

Fig. 8.14 A proof of equality of inverse of discrete logs

## 8.8 References

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## **9 Digital Checks**

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### **9.1 Introduction**

In electronic commerce, there is a need for a check-like payment system where funds are transferred from the payer's bank account to the payee's bank account at the time the transaction takes place. From the bank's point of view, it would be desirable to use existing interbank funds-transfer networks as much as possible. This chapter will introduce the foundational concept of digital check and two important electronic-check systems: NetBill and NetCheque.

### **9.2 Digital Check Concept**

#### **9.2.1 Digital Check's Basic Elements**

As with its paper counterpart, the digital check will contain an instruction to the payer's bank to make a payment of a specified amount to an identified payee. The fact that the check is in electronic form and is being conveyed across computer networks should allow more flexibility in the handling of the check. New services can be provided, such as the ability to immediately verify funds availability. Allowing digital-signature validation can enhance security, and check payments can more easily be integrated into electronic ordering and billing processes.

The concept of digital checking can be described using Fig. 9.1. There are five parties in the system: the customer, the merchant, the consumer's bank, the merchant's bank, and clearing house, in which the clearing house processes checks among different banks. The functions described for a clearing house may be handled by a separate entity or by an existing banking system. For simplicity, we have not included the online malls.



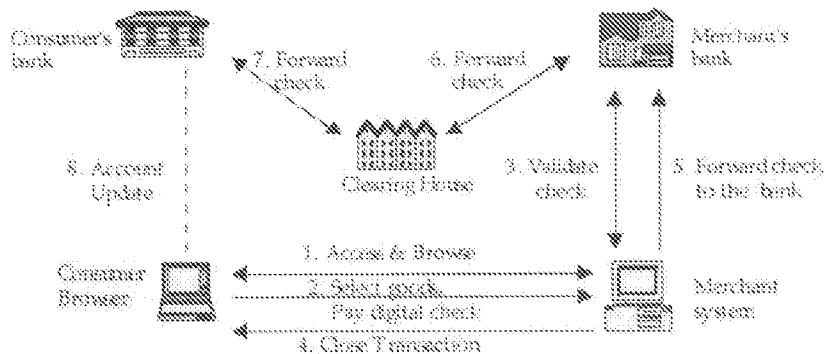


Fig. 9.1 A digital check system

The consumer uses a web browser that has access to various web servers over the Internet. The consumer views various shopping malls and storefronts at the browser. The browser has provisions for displaying the digital check formats. The banks process digital checks which are similar to paper checks.

A complete digital check transaction may consist of several basic steps outlined next. These steps are executed in three distinct and optionally separate phases. In the first phase, the consumer makes a purchase. In the second phase, the merchant sends the digital checks to its bank for redemption. In the third phase, the merchant's bank approaches the clearing house or the consumer's bank to cash the digital checks.

#### Phase 1: Purchasing goods

1. The consumer accesses the merchant server, and the merchant server presents its goods to the consumer.
2. The consumer selects the goods and purchases them by sending a digital check to the merchant. The check can be transported in some kind of secure envelope; the form of this envelope is outside the architecture and could be sent in a secure email or in an encrypted interactive dialogue between the two parties.
3. The merchant may validate the digital check with its bank for payment authorization, and endorses the check.
4. Assuming the check is validated.

**Phase 2: Depositing checks at the merchant's bank**

5. The merchant electronically forwards the checks to its bank. This action takes place at the discretion of the merchant.

**Phase 3: Clearing the checks among the banks**

6. The merchant's bank forwards the digital checks to the clearing house for cashing. The processing is identical to that undergone by any paper check today. This means that the banks involved would clear the check using the normal *automated clearing house (ACH)* or *electronic check presentation (ECP)* methods.
7. The clearing house works with the consumer's bank, clears the check, and transfers money to the merchant's bank, which updates the merchant's account.
8. At a later time, the consumer's bank updates the consumer with the withdrawal information.

**9.2.2 Security schemes for digital checks**

The security requirements for digital checks consist of authenticating the digital check, supplying the originator's public key to receiver, and securely storing the originator's private key.

**Authenticity of Digital Checks**

The digital check may consist of a document that is signed by the consumer's private key. The receiver (the merchant or the merchant's bank) uses the payer's public key to decrypt the digital signature. This assures the receiver that the sender indeed signed the check. It also provides for non-repudiation, such that the payer cannot deny issuing the check since it is signed by the payer's private key (that only the payer is expected to possess).

Additionally, the digital check also may require the digital signatures of the originator's bank. This step will assure the receiver that the check is written on a valid bank account. The receiver (or receiver's bank) can validate the authenticity of the originator's bank by using the public key of the originator's bank.

For large sums of money, additional security requirements may be levied.

### **Delivering Public Keys**

The originator as well as the originator's bank must provide their public keys to the receiver. Attaching their X.509 certificates to the digital checks can provide the public keys. These certificates may use certificate chains including the signatures of the root CA. The public key of the root CA should be well publicized to avoid fraud.

### **Storage of Private Keys**

To avoid fraud, the consumer's private key needs to be securely stored and made available to the consumer. This can be achieved by providing a smart card that the consumer can carry.

### **Cashier's Checks**

Finally, a cashier's check may be issued by a bank as follows. The check is created by a bank and is signed using the bank's private key. The originating bank includes its certificate with the digital check. The receiving bank uses the originating bank's public key to decrypt the digital signature. In this way, the receiving bank is assured that the cashier check indeed was originated by the name of the bank indicated on the check. It also provides the receiving bank with non-repudiation such that the originating bank cannot deny issuing this check since it is signed by the originating bank's private key (that only the originating bank is expected to possess).

## **9.2.3 Benefits and concerns**

Compared to paper checks and other forms of payments, digital checking provides the following advantages:

- **Time saved:**  
Digital checks can be issued without needing to fill out, mail, or deliver checks. It also saves time in processing the checks. With paper checks, the merchant collects all the checks and deposits them at the merchant's bank. With digital checks, the merchant instantly can forward checks to the bank and get them credited to their account. As such, digital checks can greatly reduce the time from the moment a consumer writes a check to the time when the merchant receives the deposit.
- **Deduced paper handling cost:**  
There is no need for long lines at the banks on the first day of the month, or for long lines of students paying their tuition at the university. Corre-

spondingly, it reduces the bank employees' effort to receive the checks, process them, and mail the cancelled checks to the consumers.

- **Reduction in bounced checks:**  
Digital checking can be designed in such a way that the merchant can get authorization from the customer's bank before accepting the digital check. Digital checks can be used to give gifts or make payments without the fear of being lost or stolen. If a check is stolen, the receiver can request the payer to stop the payment. On the other hand, digital cash is exposed to theft and other risks.

### 9.3 NetBill

NetBill is a payment system for the selling and delivery of low-priced information goods. A customer, represented by a client computer, wishes to buy information from a merchant's server. A account server (the NetBill server), maintains accounts for both customers and merchants, linked to conventional financial institutions. A NetBill transaction transfers information goods from merchant to customer, debiting the customer's NetBill account and crediting the merchant's account for the value of the goods. When necessary, funds in a customer's NetBill account can be replenished from a bank or credit card; similarly, funds in a merchant's NetBill account are made available by depositing them in the merchant's bank account. NetBill acts as an aggregator to combine many small transactions into larger conventional transactions, amortizing conventional overhead fees.

The transfer of information goods consists of delivering bits to the customer. Users may be charged on a per-item basis, by a subscription allowing unlimited access, or by a number of other pricing models.

#### 9.3.1 The NetBill Transaction Model

The NetBill transaction model involves three parties: the customer, the merchant, and the NetBill transaction server. A transaction involves three phases: price negotiation, goods delivery, and payment. For information goods, which can be delivered over the network, the NetBill protocol links goods delivery and payment into a single atomic transaction.

In a NetBill transaction, the customer and merchant interact with each other in the first two phases; the NetBill server is not involved until the payment phase, when the merchant submits a transaction request. The customer contacts the NetBill server directly only in the case of communications failure or when requesting administrative functions. Fig. 9.2 shows the relationships among parties in a NetBill transaction.

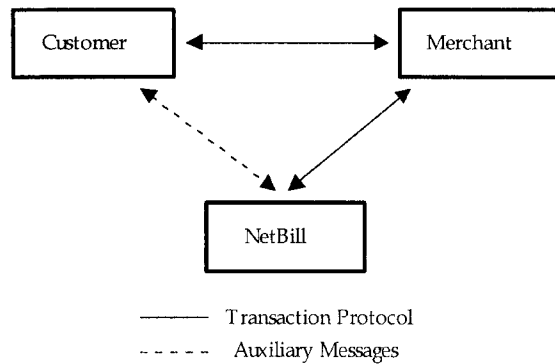


Fig. 9.2 Parties in a NetBill transaction

### Transaction Objectives

NetBill transaction can obtain the following set of objectives.

- a) Only authorized customers can charge against a NetBill account.
- b) The customer and merchant must agree on the item to be purchased and the price to be charged.
- c) A customer can optionally protect his identity from merchants.
- d) Customers and merchants are provided with proof of transaction results from NetBill.

In addition, NetBill can also obtain the following objectives to support price negotiation and goods delivery.

- e) There is an offer and acceptance negotiation phase between customer and merchant.
- f) A customer may present credentials identifying them as entitled to special pricing or treatment.
- g) A customer receives the information goods he purchases if and only if they are charged (and thus the merchant is paid ) for the goods.
- h) A customer may need approval from a fourth (access control) party before the NetBill server will allow a transaction.

Finally, as a general objective for all phases of the purchase process, the following objective can be added:

- i) The privacy and integrity of communications is protected from observation or alteration by external parties.

To achieve these goals, the NetBill protocol provides for strong authentication and privacy, atomic payment and delivery protocol, and a flexible access control system.

In the price- negotiation phase, the customer presents evidence of their identity, and (optionally) supplemental credentials, and requests a price quote on an item. The customer may also include a bid for the item. The merchant responds with a price offer.

In the second phase, the customer accepts or declines the offer. In the case of information goods, acceptance constitutes an order for network delivery. The merchant provisionally delivers the goods, under encryption, but withholds the key.

Key delivery is linked to completion of the third phase, the payment protocol. In this phase, the customer constructs and digitally signs an *electronic payment order* (EPO), and sends it to the merchant. The merchant appends the key to the EPO and endorses (digitally signs) the EPO, forwarding it to the NetBill server. The NetBill server returns a digitally signed receipt, which includes the key, to the merchant, who forwards a copy to the customer.

### 9.3.2 The Transaction Protocol

We use the notation  $X \Rightarrow Y$  to indicate that  $X$  sends the specified message to  $Y$ . The basic protocol involves three phases that can be divided into eight steps, where  $C$ ,  $M$ , and  $N$  represent respectively customer, merchant and NetBill.

1.  $C \Rightarrow M$  Price request
2.  $M \Rightarrow C$  Price quote
3.  $C \Rightarrow M$  Goods request
4.  $M \Rightarrow C$  Goods, encrypted with a key  $K$
5.  $C \Rightarrow M$  Signed Electronic Payment Order
6.  $M \Rightarrow N$  Endorsed EPO (including  $K$ )
7.  $N \Rightarrow M$  Signed result (including  $K$ )
8.  $M \Rightarrow C$  Signed result (including  $K$ )

#### The Price-Request Phase

The price-request phase consists of step 1 and step 2, which present a request/response message pair in which the customer requests a price quote of the merchant. The customer presents an identifying ticket (the identity presented may

be a pseudonym) to the merchant, along with some optional credentials establishing their membership in groups which may make their eligible for a discount.

The customer passes parameters indicating a request for the disposition of the transaction. The merchant, on receiving the request for a quotation, determines a price for the user and returns a quotation.

Step 1 and 2 may be repeated as needed until customer and merchant can agree on a price.

### **The Goods-Delivery Phase**

Once the customer and merchant have negotiated a price for the goods in question, the customer directs the merchant to deliver the goods in step 3.

In step 4, the merchant generates a unique symmetric cipher key  $K$ , encrypts the goods using this key and sends the encrypted goods to the customer, along with a cryptographic checksum computed on the encrypted goods, so that the customer will immediately detect any discrepancy before proceeding. The merchant also sends an *electronic payment order ID* (EPOID), with the goods. The EPOID is a globally unique identifier that will be used in the NetBill server's database to uniquely identify this transaction. It consists of three fields: a field identifying the merchant, a timestamp marking the time at the end of goods delivery, and a serial number to guarantee uniqueness.

The specification that the EPOID must be globally unique is used to prevent replay attacks, in which unscrupulous merchants reuse customers' old signed payment instructions. The time stamp portion of the EPOID is used to expire stale transactions; it must be generated at the end of goods delivery because the delivery (especially for very large goods) may take longer than the payment expiration time.

Because the goods are delivered encrypted in step 4, the customer cannot use them. The key  $K$  needed to decrypt the goods will be delivered in the payment phase, which follows.

### **The Payment Phase**

After the encrypted goods are delivered, the customer submits payment to the merchant in the form of a signed *electronic payment order* (EPO), in step 5. At any time before the signed EPO is submitted, a customer may abort the transaction

and be in no danger of its being completed against their will. The submission of the signed EPO marks the “point of no return” for the customer.

An EPO consists of two sections, a clear part containing transaction information that is readable by the merchant and the NetBill server, and an encrypted part containing payment instructions that is readable only by the NetBill server.

After the customer presents the signed EPO to the merchant, the merchant endorses it and forwards the endorsed EPO to the NetBill server in step 6. The endorsed EPO adds the merchant’s account number, the merchant’s memo field, and the goods decryption key, as well as the merchant’s signature.

At any time before the endorsed EPO is submitted to the NetBill server, the merchant may abort the transaction and be in no danger of its being completed against their will. The submission of the endorsed EPO marks the “point of no return” for the merchant.

Upon receipt of the signed and endorsed EPO, the NetBill server makes a decision about the transaction and returns the result to the merchant, who in turn forwards it to the customer.

The NetBill server makes its decision based on verification of the signatures, the privileges of the users involved, the customer’s account balance, and the uniqueness and freshness of the EPOID. It then issues a receipt containing the result code, the identities of the parties, the price and description of the goods, the EPOID, and the key  $K$  needed to decrypt the goods. The receipt is digitally signed by the NetBill server, using the *digital signature algorithm* (DSA).

This receipt is returned to the merchant in step 7, along with an indication of the customer’s new account balance (encrypted so that only they may read it). The EPOID is repeated in the customer-specific data to ensure that the merchant cannot replay data from an earlier transaction.

In step 8, the merchant responds to the request from the customer in step 5, forwarding the messages returned by the NetBill server in step 7.

### 9.3.3 Identities and Authentication

When a customer creates a NetBill account, they receive a unique User ID and generate the RSA public key pair associated with that User ID. This key pair is certified by NetBill, and is used for signatures and authentication within the system. In [9.1], the authors proposed that symmetric cryptography be used instead of using public-key cryptography for message authentication and encryption



throughout the NetBill system because symmetric cryptography offers significant performance advantages. At the same time, the public key cryptography is used to alleviate problems with traditional symmetric-key Kerberos.

Kerberos uses a two-level ticket scheme; to authenticate oneself to a Kerberos service, one must obtain a service ticket, which establishes a shared symmetric session key between the client and server, and establishes that the Kerberos ticket granting server believes the client's identity. To obtain a service ticket, a client must first obtain a ticket-granting ticket (TGT), which proves the client's identity to the Ticket Granting Server. A client obtains a TGT via request from a *key distribution center* (KDC).

The Kerberos KDC/TGT arrangement introduces two significant problems that we may alleviate using public-key cryptography. First, because it maintains a shared symmetric cipher key with every principal in the system, it is an attractive target for attack; recovering from compromise of the KDC requires establishing new shared keys with all users of the system. Second, a KDC and TGT will be a communications or processing bottleneck if a large number of users present a heavy traffic load.

To eliminate the ticket granting server, we replace the TGT with a public key certificate, allowing each service to act as its own ticket granting server. That is, a user presents a service ticket request encrypted with a certified public key, called a *public key-based TGT* (PKTGT), and receives in response a symmetric-cipher-based service ticket. This service ticket is identical in form to a Kerberos service ticket. The key distribution center is replaced by a key repository.

This model can preserve the efficiency of symmetric ciphers for most communication and repeated authentication, and isolates the computational expense of public key cryptography to initial authentication between parties. This model is referred as public-key Kerberos, or PK Kerberos.

In the NetBill system, a customer obtains Kerberos tickets for the NetBill transaction server at the beginning of a session and obtains Kerberos tickets for merchants as he needs them. Merchant servers will continually maintain their own tickets for the NetBill transaction server.

### **Key Repository**

Private keys are large, so users cannot be expected to remember them. Permanently storing private keys at a user's workstation poses security risks and restricts the user's electronic-commerce activities to a single workstation. NetBill uses a key repository to optionally store customers' private keys. These keys are encrypted by a symmetric key derived from a password known only to the customer.

- **Key validation and revocation certificates**

A public-key-certificate scheme is used to bind User IDs to keys, with NetBill as the certifying authority. NetBill generates a certificate when a customer first proves his identity and begins using NetBill. However, allowing merchants, as services, to grant their own ticket based on these certificates poses a problem: NetBill is no longer involved in ticket-granting, and cannot prevent a ticket from being issued to a user with a compromised key. NetBill needs to invalidate compromised keys as quickly as possible. NetBill maintains a *certificate revocation list* (CRL) at its server. When a key is compromised, the owner creates a revocation certificate and places it in the key repository along with their key. Any party can check that a given key has not been compromised by examining the revocation list. Initially, it would seem that it is necessary for the customer and merchant to contact the server to check CRLs on each transaction. However, it is possible to eliminate this check by allowing the NetBill transaction server to do it when it processes the payment transaction. By delaying the CRL check to late in the protocol, we introduce some minor risks. Customers and merchants may disclose information, such as their preference for particular items or special prices to bogus peers, but there is no financial risk.

- **Pseudonyms**

Some customers want to disguise their identities. NetBill provides two pseudonym methods to protect the privacy of the customer's identity: a per-transaction method that uses a unique pseudonym for each transaction, and a per-merchant method that uses a unique pseudonym for each customer merchant pair. The per-merchant pseudonym is useful for customers who wish to maintain a consistent pseudonymous identity to qualify for frequent-buyer discounts.

These pseudonym schemes are implemented by introducing a pseudonym-granting server to create pseudonymous for the customer.

#### 9.3.4 Credentials and Authorizations

A restricted proxy is a ticket giving the bearer authority to perform certain operations named in the ticket. NetBill uses a similar construct to implement credentials to prove group membership (to allow merchants to provide discounts to special groups) and to implement access control mechanisms.

### **Credentials for Group Membership**

An organization can provide a credential server that issues credential proxies proving membership in a group. In this case, the credential server is asserting a fact (membership in a group) about which it is authoritative. For example, an auto club may provide a credential server that issues credentials to the members of the club; merchants who offer discounts to the club's members will accept these credentials as proof of membership.

A credential issued to a customer may be unrestricted, or it may optionally be restricted for use on a specific account (for example, in order to prevent corporate employees from taking advantage of corporate discounts for personal purchases).

This is accomplished by passing the account number to the group server as part of the request. If the account number is appropriate for this group, the credential will be issued. The credential contains a cryptographic checksum of the account number and an *account verification nonce*, which is also returned to the customer along with the credential.

This nonce is a pseudorandom number ensuring that merchants can neither determine which different customers (or the same customer in repeated sessions) are using the same account nor easily verify guesses of the customer's account number. The nonce is passed along to the NetBill server in the encrypted part of the EPO so that the NetBill server can verify that checksum passed to the merchant (for his comparison to the credential) corresponds to the account number actually being used.

Credentials can also be used by cooperating merchants to restrict information access. In this way, merchants only sell to approved customers, i.e., those who can present a certain credential. This offers a solution for merchants who, for example, can restrict distribution of sensitive documents only to individuals whose credentials verify a need-to-know.

### **Access Control Mechanism**

Access control can be implemented by using proxies, an account owner (such as a parent) may have a restriction on the account such that no purchases can be completed by a given customer (such as a child) without approval from an access-control server. This allows a different organization to provide access-control services. For example, both the PTA and a church group could offer competing access control services.

The NetBill protocols are robust against failures, and retain essential information to protect customers and merchants against fraud.

### 9.4 NetCheque System

The NetCheque system, under development at the Information Sciences Institute of the University of Southern California, is a distributed accounting service supporting the credit-debit model of payment. Users of NetCheque maintain accounts on accounting servers of their choice. A NetCheque account works in much the same way as a conventional checking account: account holders write electronic documents that include the name of the payer, the name of the financial institution, the payer's account identifier, the name of the payee, and the amount of the check. Like a paper check, a NetCheque bears an electronic signature, and must be endorsed by the payee using another electronic signature before the cheque will be paid.

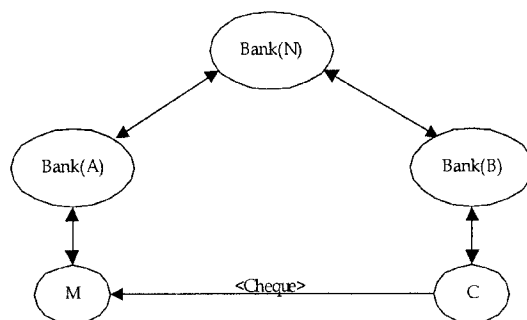


Fig. 9.3 Hierarchy of NetCheque servers

As a distributed accounting service, properly signed and endorsed cheques are exchanged between accounting servers to settle accounts through a hierarchy, as shown in Fig. 9.3. In addition to improving scalability and acceptability, clearing between servers allows organizations to set up accounts in their own in-house-accounting servers with accounts corresponding to budget lines. Authorized signers write cheques against these accounts, while the organization maintains a single account with an outside bank, integrating its own internal accounting system with the external financial system.

The NetCheque accounting system was designed originally to maintain quotas for distributed system resources, resulting in frequent transactions for small amounts. Thus, it is well suited to support small payments needed for some kinds of electronic commerce. This requirement for handling micropayments requires high performance, which is obtained through the use of conventional, instead of public-key, cryptography. This gives up some support for independent verification of payment documents at each stage in the payment pipeline.

#### 9.4.1 Implementation Overview

The system is based on the Kerberos system [9.6]. The electronic signature used when writing or endorsing a cheque is a special kind of Kerberos ticket called a proxy. The cheque itself contains information about 1) the amount of the cheque, 2) the currency unit, 3) an expiration date, 4) the account against which the cheque was drawn, and 5) the payee or payees, all readable by the bearer of the cheque, together with 6) the signatures and endorsements accumulated during processing, verifiable by the accounting server against which the cheque was drawn. For performance, the Kerberos proxy used as a signature is based on conventional cryptography, but it may be replaced by a signature using public-key cryptography with a corresponding loss of performance.

To write a cheque, the user calls the write-cheque function, specifying an account against which the cheque is to be drawn, the payee, the amount, and the currency unit. Defaults for the account and currency unit are read from the user's chequebook file. The write-cheque function generates the cleartext portion of the cheque, obtains a Kerberos ticket that will be used to authenticate the user to the accounting server, generates an authenticator with an embedded checksum over the information from the cheque, and places the ticket and authenticator in the signature field of the cheque. The cheque is then base-64 encoded and may be sent to the payee through electronic mail, or transferred in real time as payment for services provided through an online service.

The deposit-cheque function reads the cleartext part of the cheque, obtains a Kerberos ticket to be used with the payer's accounting server, generates an authenticator endorsing the cheque in the name of the payee for deposit only into the payee's account, and appends the endorsement to the cheque. An encrypted connection is opened to the payee's accounting server and the endorsed cheque is deposited. If the payee and the payer both use the same accounting server, the response will indicate whether the cheque cleared.

If different accounting servers are used, the payee's accounting server places a hold on the funds in the payee's account and indicates to the payee that the cheque was accepted for collection. The payee has the option of requesting that the cheque be cleared in real time, though we expect there may be a charge for this service. If a cheque accepted for collection is rejected, the cheque is returned to the depositor, who can take action at that time. As a cheque is cleared through multiple accounting servers, each server attaches its own endorsement, similar to the endorsement attached by the payee.

In some cases the payee's and payer's accounting servers can settle the check directly, bypassing higher levels of the hierarchy. This is possible when the cheque is drawn on an accounting server that is trusted to properly settle accounts. Such trust might be based on certificates of insurance representing endorsement of the accounting server. In such cases, the hierarchy would still be used to settle any

imbalance between credits and debits for each accounting server at the end of the day, but the cost of these transfers would be amortized over the days transactions. To determine account balances and fill out about cleared cheques, authorized users can call the statement function which opens an encrypted connection to the accounting server and retrieves the account balance for each currency unit, together with a list of cheques that have been recently deposited to, or drawn on and cleared through the account. The entire cheque is returned, allowing the user's application to extract whatever information is needed for display to the user, or for integration with other applications.

### 9.5 Summary

This chapter is divided into two parts, the first part describes the ways in which existing banking organizations can introduce a check-based payment system in a phased manner. The second one introduces two electronic check systems: NetBill and NetCheque.

In the NetBill system, some methods have been introduced for certified delivery, access control, user certificates, pseudonyms, and their integration. The design principle is to provide very high degrees of security and flexibility while still providing good efficiency.

The NetCheque system is a distributed payment system based on the credit-debit model. The strengths of the NetCheque system are its security, reliability, scalability, and efficiency. Signatures on cheques are authenticated using Kerberos. Reliability and scalability are provided by using multiple accounting servers. NetCheque is well suited for clearing micropayments; its use of conventional cryptography makes it more efficient than those systems based on public-key cryptography. Though NetCheque does not itself provide anonymity, it may be used to facilitate the flow of funds between other services that do provide anonymity.

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## 10 Secure Electronic Transactions: Overview, Capabilities, and Current Status

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### 10.1 Introduction

Until recently, there were two primary forms of credit card transactions:

- 1) Card present and,
- 2) Card not present or mail order telephone (MOT).

In a typical “in store” transaction, the customer presents their credit card to perform a transaction. The merchant “swipes” the card and the customer’s credit card information along with the amount of the transaction is forwarded to a payment gateway. Once the credit information is verified, the payment gateway returns an authorization to the merchant and a receipt is issued to the customer. In the event of fraud on the part of a customer, the merchant is indemnified against loss since the payment gateway authorized the transaction.

In the case of a purchase made via the telephone, the customer’s credit card is not physically present for verification. Generally, the merchant simply accepts the customer’s card number over the phone and completes the transaction. Since no authorization was issued by the payment gateway, liability for customer fraud rests with the merchant. For some merchants, this risk is acceptable if profit margins were large enough. On the other hand many merchants have found the risks unacceptable.

In 1996, Mastercard and Visa announced their support of a developing standard for electronic credit card transactions. This replaced the competing standards that each company was pursuing independently. In 1997 Visa and Mastercard pooled their resources and formed Secure Electronic Transaction LLC (SETCo) to implement the *SET Specification* [10.4].

SETCo manages the Specification, oversees SET product-compliance testing, and promotes the use of SET as a global payment standard.



The secure electronic transaction (SET) protocol, in many ways, mirrors a card-present transaction over the Internet.

In the following sections, we will examine the details of the operation of SET as well as compare its capabilities to other protocols used in electronic commerce. In addition, we will look issues related to SET's adoption and refinements to the protocol.

## 10.2 Protocol Stack and Capabilities

There are many functions required to implement a large interconnected network such as the Internet. To facilitate this, network functionality is usually divided into a set of layers or the *protocol stack*. Each layer "talks" to a corresponding or "peer" layer at the other end of the communications channel. Each layer works transparently with the other layers in the network. The lowest layer in the network is the *physical* layer that involves the actual means for transporting data, for example, the actual cables or fibre optics that form the network. At the highest level is the *application* layer which are the programs that are run by the user. One major advantage of such a structure is that the user does not have to be concerned with how the lower layers are implemented. The user simply runs the application and information is passed locally down through the various layers to the Physical layer. The user's data is passed to the physical layer at the destination server then back up to the corresponding application layer at the other end of the connection. In most cases, this layer transparency is realized by a process called "encapsulation;" as data is passed from a higher layer to a lower, the lower layer takes the original data and adds header and control information then passes it down to the next layer. At the destination, the process is reversed and the header/control information is stripped off as data is passed to higher layers. This process simplifies implementation of networks but introduces some interesting security issues, as we will explain below.

There are several levels at which security can be introduced to protect Internet connections. The level in which security functions are used has a strong impact on what types of security can be provided. In Fig. 10.1, three security protocols are shown as they fit into the Internet protocol stack. The three we will consider are IPSec, SSL and SET.

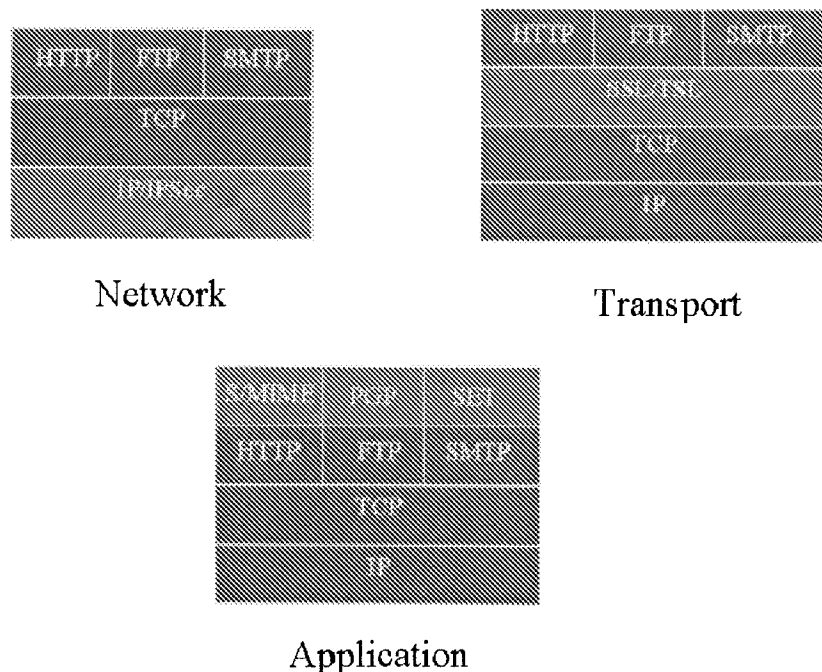


Fig. 10.1 Security layers

**10.2.1 Internet Protocol Security (IPSec)**

As we see in Fig. 10.1, Internet protocol security (IPSec) is implemented in a relatively low layer. IPSec provides the facilities to encrypt and authenticate user’s data (*payload*). If this done, an attacker can see the where the information is going (at least what IP addresses are involved) but not the information itself. In addition, IPSec has the option of taking a standard IP message encrypting it and placing it in a new IP message with a new “disguised” header. This is known as tunnel mode and allows users, for example, to set up private groups over the Internet (virtual private networks).

There are several advantages to providing security at this level:

- Security functions are transparent to the user – the user may not even be aware they are being used.
- The identity of participants can be protected as their IP addresses can be masked.

There are also disadvantages:

- The security functions only protect the IP layer and below – one data is passed to higher layers, it is not protected. If several users are on the same system, information for one user may be visible to other users.
- Identities of users can only be resolved to an IP address. It is common that many users may share an IP address thus, authentication of a particular user may not be possible.

### 10.2.2 Secure Socket Layer (SSL)

Secure Socket Layer (SSL) was developed by Netscape and is currently in version 3. It is the defacto standard for Internet security at this level and is implemented in most browsers and by most web servers. SSL is designed to provide security functions independent of the application. Since it works at a higher layer than IP-Sec, identities can be resolved to the level of an individual. By the same token, SSL by itself cannot prevent an observer from knowing who is communicating since IP addresses will be added at the lower layers.

SSL designates two types of participants: clients and servers. Clients always initiate a communications session with a server. The server is required to provide authentication information to the client (a certified public key) if requested. The client, however, is not required to provide a certified public key to the server. If this is the case, the applications using SSL may require some other means of authenticating the user (such as a user ID and password/PIN). Once the session has been negotiated, SSL provides a secure (encrypted) and authenticated (data-integrity checks) communications channel between the client and server.

### 10.2.3 SET

As shown in Fig. 10.1, SET provides security functions at the highest (application) layer of the protocol stack. As in our previous discussion, there are advantages and disadvantages to this. SET is an application and security its functions are not available to other applications. The integrity of SET relies on the ability to resolve identities to a particular individual, merchant or payment gateway (through the use of a full public key infrastructure as we will discuss in Section 10.3) as well as the ability to protect the information exchanged.

As with SSL, even though the information is protected, and observer can still glean information about the participants in a transaction.

### 10.3 SET Overview

In this section, we will examine the structure of SET and its related security functions<sup>1</sup>.

There are two major parts to the SET protocol.

- Registration
- Transaction processing

#### 10.3.1 SET Registration

The security and integrity of transactions are heavily reliant on the use of certified public keys or *public key certificates*. To create a certificate, the user presents unique identification information (ID) and their public key to a *certificate authority* (CA). Once the CA is satisfied that the user is authentic (for example, the manager of a bank may authenticate a particular customer), the CA binds the ID and public key of the user together (usually by creating a message digest<sup>2</sup>) then forms a *digital signature*<sup>3</sup> on the result. For another participant to verify the public key of a particular user, they require a trusted copy of the CA's public key in order to verify the certificate. It is assumed that a trusted version of at least one CA's public key is available to the participants.

SET recognizes three types of participants in a transaction.

- The customer (cardholder)
- The merchant
- The payment gateway.

SET then defines a hierarchical approach to creating and distributing public-key certificates for each type of participant. This is shown in Fig. 10.2. Here, the highest member of the hierarchy is the *root certificate authority* maintained by SETCo. The root authority issues public key certificates to the various payment brands. These in turn become Certificate Authorities authorized to issue certificates to their member banks.

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<sup>1</sup> A full description of SET can be found in SET Specification Books [10.4]

<sup>2</sup> A message digest is a fixed length image of a longer message formed using a transformation that is "one-way" and unpredictable. That is, it is very easy to create but virtually impossible to find a second message that would create the same image. For a more in depth look at cryptographic functions, the reader is referred to [10.2]

<sup>3</sup> A digital signature is formed using the signer's private key. It can be verified using the signer's public key.

Further down the hierarchy are the certificate authorities associated with each type of participant in a transaction. The *payment card issuing certificate authority* issues public key certificates to customers. The *merchant bank or acquirer certificate authority* issues public key certificates to the merchants while payment gateways have their own certificate authority.

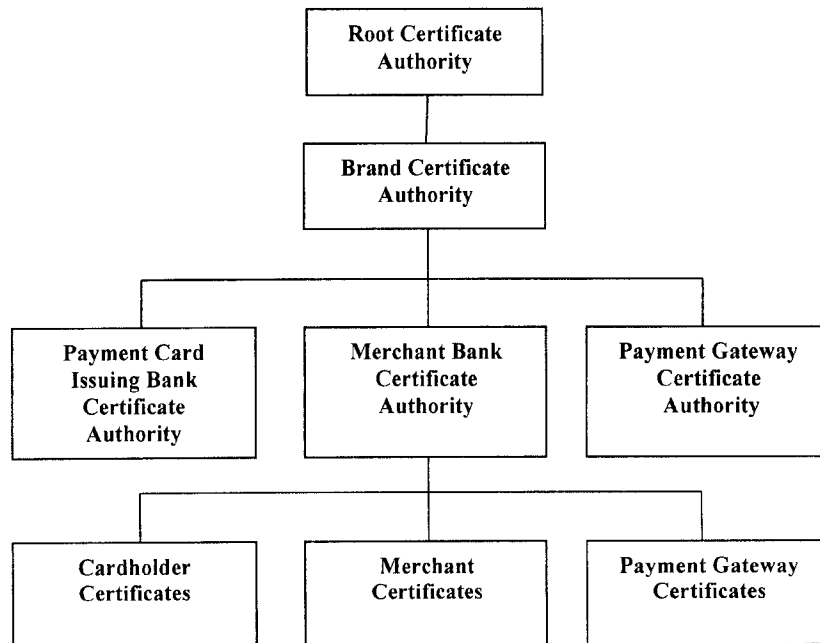


Fig. 10.2 SET certificate hierarchy

In such a hierarchy, a *certificate chain* can be used to verify any member of the hierarchy. For example, for a particular merchant, the certificate chain might include their own public key certificate issued by their acquirer CA, a certificate on the acquirer CA issued by the brand CA and finally the certificate of the brand CA as issued by the root CA. A trusted version of the root CA's public key would allow the chain to be verified. A graphic representation of a certificate chain is shown in Fig. 10.3.

<b>Merchant's Certificate (from Merchant's Bank CA)</b>	<b>Merchant's Bank CA Certificate (from Brand CA)</b>	<b>Brand's CA Certificate (from Root CA)</b>
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Fig. 10.3 Example certificate chain for a merchant

### 10.3.2 Transaction Processing

There are three main phases in a secure electronic transaction:

- Purchase request
- Payment authorization
- Payment capture

An overview of the interaction among the participants in a transaction is shown in Fig. 10.4.

#### Purchase Request Phase

The details of the purchase request are shown in Fig. 10.5. Within the purchase-request phase, there are 5 basic steps, as we will describe.

#### Initiate Request

The process starts with the customer shopping, and selecting an item or items. The customer has a completed order form and has selected a particular payment card. The customer's (cardholder's) computer running the cardholder's software package (hereafter called just the *cardholder*) sends an *initiate request* (*P INIT REQ*) message to the merchant requesting the certified public key of the payment gateway.

#### Initiate Response

Once the merchant receives the initiate request, it assigns an unique transaction ID to the message and returns a signed version of the transaction ID, its own certifi-

cate and the appropriate (for the particular brand) payment gateway's certificate to the cardholder.

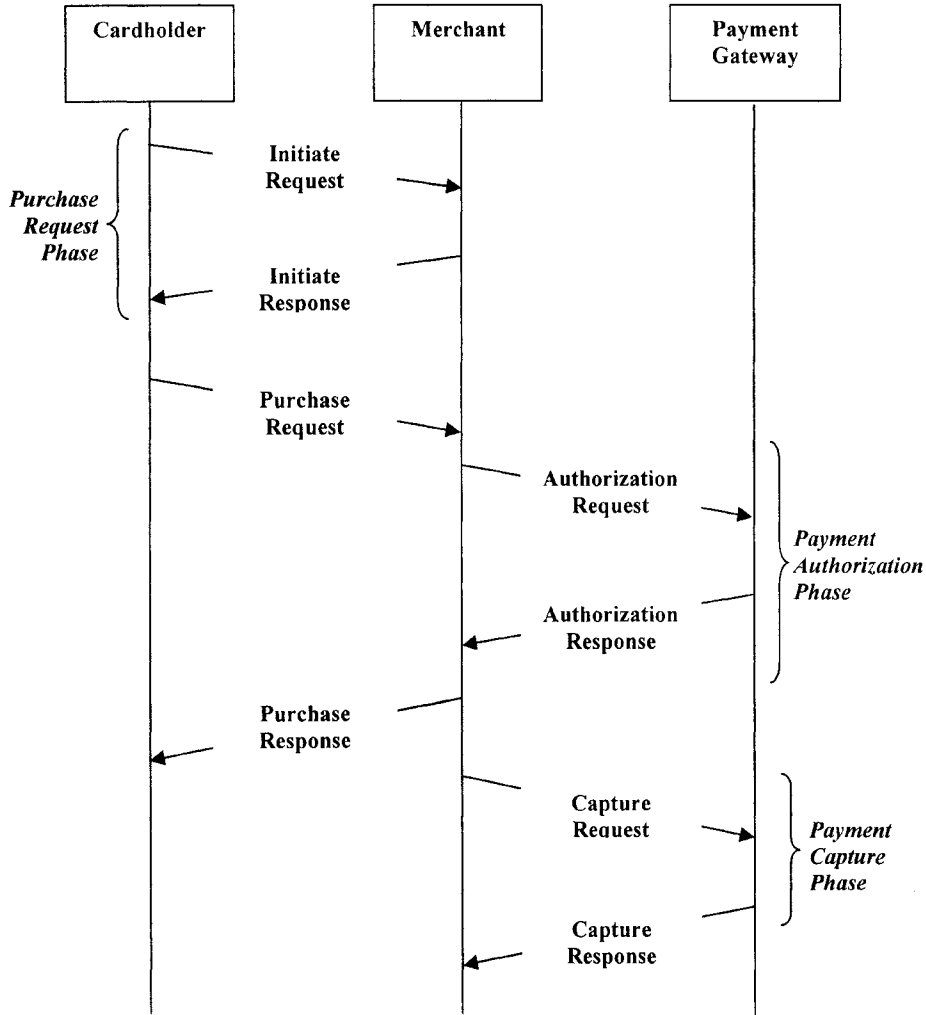


Fig. 10.4 SET overview

**Cardholder Purchase Request**

Once the response is received, the cardholder verifies the certificates of the merchant and gateway as well as the merchant's digital signature on the transaction in-

formation. Once this is complete, the cardholder creates two messages: an *order information* (OI) message intended for the merchant and a *payment information* (PI) message intended for the payment gateway. The PI message information such as the credit card number of the cardholder and will be concealed from the merchant. These messages both contain the unique transaction ID that the merchant assigned. This is done so that the two messages can be linked to one another.

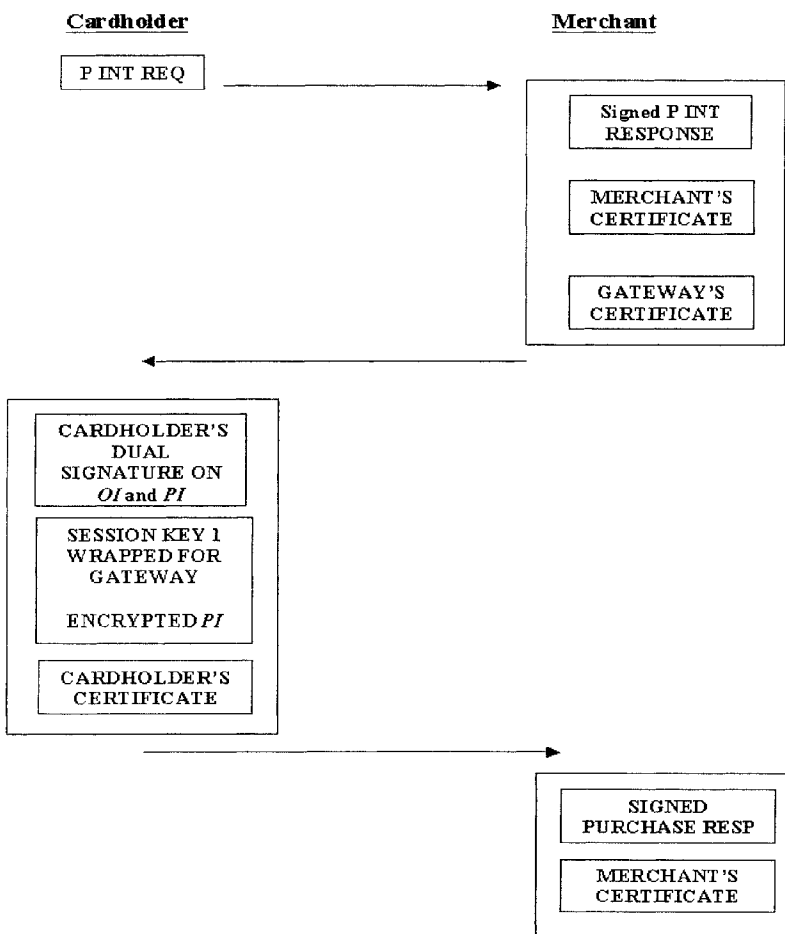


Fig. 10.5 Purchase request phase

At this point, a very elegant method is used bind the two messages together. The cardholder forms message digests of both the OI and PI. These digests are



concatenated, then a third message digest is formed. This final digest is then digitally signed by the cardholder. This forms the *dual signature* on OI and PI.

The next step is used to hide the PI information from the merchant. The cardholder generates a random session key (to be used with a conventional encryption algorithm) that is used to encrypt the PI. To transport this information to the payment gateway, the cardholder combines the random session key and their account information into a message then encrypts it using the payment gateway's public key (so that only the PG can recover the account information and the session key that can decrypt the PI).

Merchant then is forwarded a message containing the PI and OI digest, the dual signature, the "wrapped" version of the PI, session key and account information and the cardholder's certificate.

The reason for the dual signature scheme is as follows: the payment gateway will only have a digest of the order information and not the order itself. The payment gateway cannot determine the purchase from that information. If a dispute arises, between the merchant and customer, the OI can be produced and the payment gateway with knowledge of the PI can regenerate the message digests and verify whose claim is correct. This is an important element in security of SET.

#### **Merchant's Purchase Request Processing**

When the purchase request is received at the merchant, it verifies the cardholder's certificate. This is then used to verify the dual signature on the OI and digest of the PI to ensure no tampering of the OI has occurred.

Once this has been verified, the merchant generates a digitally signed *purchase response* message that is returned to the cardholder.

#### **Purchase Response**

In the final step in this phase, the cardholder uses the merchant's certified public key to verify the purchase response. This is stored for future reference.

#### **Payment Authorization Phase**

This part of the protocol involves the merchant and the payment gateway. The objective is for the merchant to acquire authorization for the transaction. There are three basic steps, as shown in Fig. 10.6.

**Merchant Authorization Request**

The merchant starts by creating a digitally signed authorization request that includes the amount to be authorized, the transaction ID, and other details about the transaction.

The merchant generates a random session key that is used to encrypt this message. The session key is then wrapped using the payment gateway's public key.

This information is sent along with the cardholder's PI information and wrapped session key, cardholder's certificate and merchant's certificate.

**Payment Gateway Processing**

When the gateway receives the authorization request, it uses its private key to recover the wrapped session key. This is then used to decrypt the request. The merchant's certificate is verified then used to verify the signature on the request.

Next, the second session key and customer account information are recovered. The session key is then used to recover the PI. The cardholder's certificate is verified and the digital signature on the OI and PI is verified. As a further check, the Transaction ID's on both parts of the message are compared to ensure that they are the same.

The next operation involves the payment gateway creating a message for the issuing bank. This is done over the private financial network.

If the purchase is authorized, then a digitally signed response message is generated by the payment gateway. This message is encrypted with a new random session key that is wrapped using the merchant's public key, then forwarded to the merchant.

**Merchant Response Processing**

When the response is received by the merchant, the payment authorization is recovered and the signature is verified. A copy of this authorization is kept by the merchant.

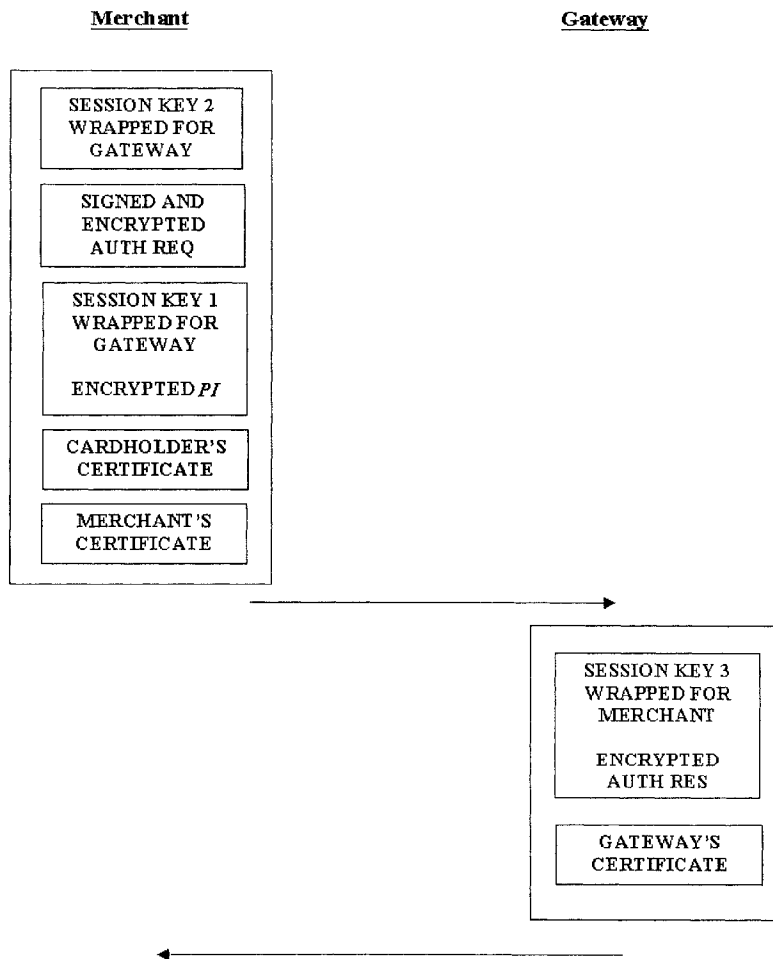


Fig. 10.6 Payment authorization phase

### Payment Capture Phase

The final phase in the SET protocol is payment capture. In this phase, the Merchant requests payment from the payment gateway. This phase may occur sometime after the transaction has occurred and involves three basic steps, as shown in Fig. 10.7.

**Merchant Payment Capture Request**

The merchant creates a digitally signed payment request that includes the final transaction amount, the transaction ID, and other transaction information. This is encrypted using a new random session key that is wrapped using the payment gateway's public key. The encrypted message is sent to the payment gateway along with the merchant's certificate.

**Payment Gateway Capture Processing**

Upon receipt, the payment gateway recovers the session key, capture request then verifies the merchant's certificate and signature on the request

The payment gateway generates a digitally signed and encrypted response message that is forwarded to the merchant along with the gateway's certificate.

**Merchant Processing of Response**

This is the final step in the protocol. The merchant recovers the session key and the capture message and verifies the gateway's certificate as well as the digital signature on the message. This is stored by the gateway for reconciliation for payment from the issuer.

**10.4 SET Performance**

From the description of the SET protocol, it is apparent that SET provides a high level of security and privacy for the participants. This is mainly due to the extensive use of public key certificates and digitally signed and verified messages. This has several important implications. Trust in the system relies on the deployment of a full public key infrastructure. If SET is to be used on a wide-scale basis, certificates have to be issued to all users. This is an enormous and expensive task. On the other hand if the PKI is not in place, then SET will not be used by a large number of users.

In version 1.0 of SET, RSA is specified to implement the public key operations. At present a minimum of 768-bit RSA is required for security, preferably 1024-bit. Public key operations (signing/verifying, wrapping/unwrapping) are computationally intensive, and certificates are large in size and require significant bandwidth to transmit.

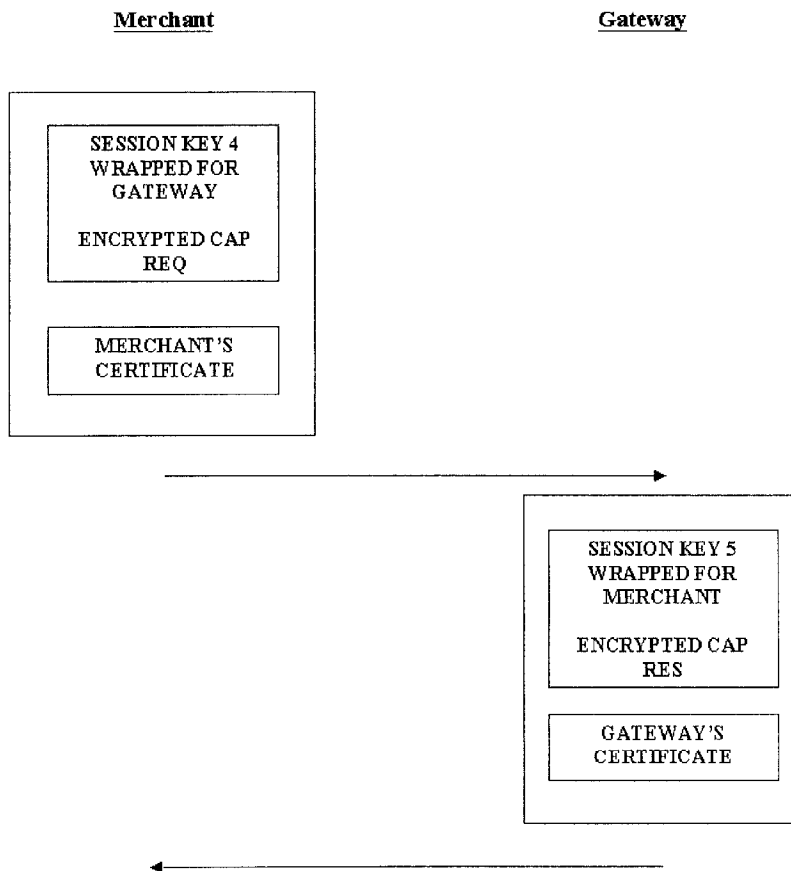


Fig. 10.7 Payment capture phase

In the case of the cardholder using a typical desktop computer, the computational load is not significant. If, on the other hand, the cardholder is not bound to a particular machine, then the cryptographic functions may be implemented in a portable token, such as a smart card. Implementing RSA on smart cards usually requires the smart card to have a cryptographic co-processor that raises the cost of the card.

There is also the issue of conducting e-commerce transactions using wireless handheld devices, such as cell phones or PDAs. In these situations bandwidth and processing power are at a premium and supporting SET may be difficult.

The GartnerConsulting Group did an extensive evaluation of the performance of SET [10.1]. In the study, it was anticipated that merchants could expect in the

order of 10,000 transactions per day while a large payment gateway may approach ½ million transactions per day. In this case, software implementations of the public-key system may not be able to perform operations quickly enough; hardware accelerators may be required (adding to the cost of the infrastructure). They also examined the advantages of using other public key cryptographic systems. In their report, *elliptic curve cryptosystems*<sup>4</sup> (ECC) were considered and shown to have significant advantages in terms of bandwidth and processing overhead.

Sans and Agnew [10.3] present the results of an extensive study of the communications and processing overhead for SET. They show some alternative methods for processing transactions that reduce the overhead incurred using SET.

### 10.5 What Lies Ahead

There are a number of companies currently offering support for SET. These include IBM, Verisign, CyberTrust, Verifone, Sterling Commerce, Terisa, Netpay and GlobeSet.

SETCo lists more than 40 countries that have adopted SET in one form or another [10.4].

A proposal for SET 2.0 incorporates alternative asymmetric key cryptographic systems (specifically, elliptic curves) and SET 2.0 will also support the use of debit cards by allowing personal identification numbers (PINs) to be encrypted and included in the payment message [10.5]. In addition, a smart-card-based version known as chip-secured SET (C-SET) is being developed to allow smart cards to perform cardholder authentication and transaction security functions (encryption and signatures).

### 10.6 Summary

In this chapter, we have presented a detailed outline of the SET protocol. The capabilities and shortcomings of SET have been compared to other Internet security protocols.

Currently, SSL is the most widely deployed and used security protocol. It is relatively fast and provides transparent security to the user. It does not, however

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<sup>4</sup> The reader is referred to [www.certicom.com](http://www.certicom.com) for a more complete review of ECC technology.

provide the mutual authentication and digital signature capabilities that are required for truly secure e-commerce.

SET, on the other hand, is a very robust protocol that provides a high level of security and trust. The major impediments to widespread deployment and use of SET are the current lack of a comprehensive public key infrastructure and the large overhead required to run the SET protocol. Improvements in processing power and the use of alternative public key cryptosystems such as elliptic-curve-based systems (ECC) may help to overcome some of these obstacles.

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## 11 Credit Card-Based Secure Online Payment\*

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### 11.1 Introduction

The credit card is a popular payment method for the purchase of goods and services. Traditionally, credit cards are used by buyers to purchase merchandise from brick-and-mortar stores. Transactions are carried out face-to-face. Typically, the merchant first obtains authorization from the credit card company regarding the transaction. If the transaction is authorized, the buyer is asked to sign for the purchase, and a paper receipt stating the terms of the sale will be issued to the buyer. The merchant also verifies that the buyer's signature matches the cardholder's signature at the back of the card, and that the card has not expired.

Shopping by phone, by mail, or by fax are convenient alternatives to shopping at a brick-and-mortar store. The buyer sends the order information to the merchant by phone, mail, or fax, together with the credit card information such as the credit card number, cardholder ID, and expiry date. The order information contains the goods or services to be provided by the merchant and the agreed price. Upon receiving the order, the merchant first obtains authorization of the transaction from the credit card company. The merchant then ships the merchandise and charges the buyer through his/her credit card. For purchase by mail or by fax, the merchant has the buyer's signature on the order form. The buyer's signature is not available to the merchant when the order is by phone. To obtain a record of the order, the

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\* This work was supported by the IBM Centre for Advanced Studies and an IBM Faculty Partnership Award.



merchant records the phone conversation with the buyer when the order was placed.

Shopping over the Internet is another alternative to shopping at a brick-and-mortar store. In this case, the order information and credit card information are transmitted over the Internet, which may not have the same level of security as phone, mail, or fax. Methods to ensure secure online payment by credit card are therefore important to the success of shopping over the Internet. This chapter is concerned with online payment methods based on the existing credit card payment infrastructure. We first provide an overview of online payment by credit card, and then discuss the trust issue related to this payment method. To overcome the trust problem, we introduce a new payment protocol using a trusted third party. This protocol can be viewed as a special case of online payment by credit card, which addresses the trust problem that the current credit-card-based online payment systems have.

## 11.2 Online Payment by Credit Card

When making a purchase over the Internet using a credit card, procedures for secure communication are needed to authenticate the parties involved, to ensure confidential transmission of order and payment information, and to protect the integrity of the transaction. The current approach to achieving secure communication is to use the secure sockets layer (SSL) [11.1].

As briefly discussed in Chap. 10, SSL is a protocol designed to provide secure communication. It performs server authentication, and, optionally, client authentication. With SSL, private information is protected through encryption, and a user is assured through server authentication that they are communicating with the desired website and not with some bogus website. In addition, SSL provides data integrity, i.e., protection against any attempt to modify the data transferred during a communication session. The main exchanges in an SSL session [11.5-11.6] are shown in Fig. 11.1, and the detailed descriptions for each exchange are provided in Sect. 11.6.1, Appendix A. The use of SSL has led to an improvement in the buyer's confidence when making payments by credit card over the Internet.

A credit card transaction involves five main parties: buyer, merchant, merchant bank, issuer, and acquirer. The merchant has a contract with the merchant bank to enable them to accept credit card payments over the Internet. The issuer is a financial institution such as a bank that issues a credit card to the buyer. It is responsible for the cardholder's debt payment. The acquirer, on the other hand, obtains credit card transactions from the merchant and processes them for payment. The acquirer provides authorization to the merchant that a given account is active and

that the proposed purchase does not exceed the cardholder's credit limit. The acquirer also makes payments to the merchant's account, and is then reimbursed by the issuer. The merchant bank may function as the acquirer.

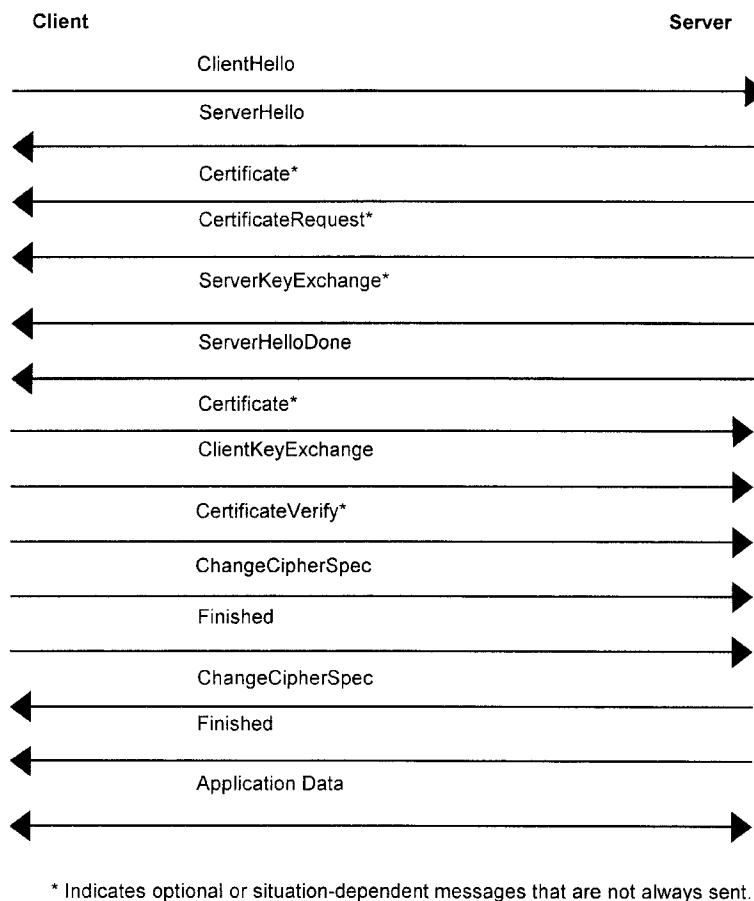


Fig. 11.1 The main SSL exchanges

We now describe the steps involved in handling payments by credit card over the Internet. The transaction starts with the buyer deciding to place an order online from a web page at the merchant's website. The merchant's commerce application prompts the buyer for payment information (i.e., credit card number, cardholder ID, and expiry date) along with other information such as shipping address. The

buyer then enters payment information into a form secured using SSL. With the secured form, the payment information is protected as it is sent to the merchant.

Upon receiving the order, the merchant server sends the payment information to the acquirer processor for authorization, using dedicated and secure lines. The authorization is a request to hold funds for the purchase. The acquirer will verify that the credit card has sufficient funds to cover the amount of the transaction. The acquirer either authorizes a certain amount of money or declines the transaction. Each authorization reduces the available credit only, it does not put a charge on the cardholder's bill or transfer funds to the merchant.

After the transaction has been authorized, the merchant charges the authorized amount to the buyer's credit card. This is known as "capture." According to bank card association rules, the merchant is not allowed to capture a transaction until the ordered goods can be shipped, so there may be a time lag between authorization and capture. If the buyer cancels the order before capture, a "void" is generated.

Captures are accumulated into a batch and settled automatically at regular time intervals, e.g., at the end of each day. This settlement can be viewed as a transaction between the acquirer and the merchant. When a batch is submitted, the merchant's payment-enabled web server connects with the acquirer to finalize the transactions and transfer the corresponding amounts to the merchant's bank account.

At the issuer, a monthly statement is sent to the cardholder for the purchases made since the last statement.

### **11.3 Trust Problems in Credit Card Payments**

The issue of trust in the payment process is one of the most critical aspects that determines the acceptability of a payment method. Clearly, if the parties participating in a payment transaction cannot be assured of the correctness of the transaction, then they are unlikely to conduct the transaction in the first place.

In a payment transaction, trust is engendered through the following assurances:

The buyers must be assured that:

- The transaction will result in them paying exactly the specified amount and being billed only for the item they bought at the agreed price.

- The payment information they provide will not be stolen or abused for extracting unauthorized payments from them.
- They will receive the goods that they have purchased.
- In the case of a dispute they have in their possession enough evidence to prove whether or not the payment took place.

The merchants must be assured that:

- The transaction will result in them being paid exactly the agreed amount.
- In the case of a dispute they have in their possession enough evidence to prove whether or not the payment took place.

A “good” payment protocol assures these trust points for both the buyer and the merchant. These trust points are easily met in credit card transactions at a brick-and-mortar store. Since the transaction is face-to-face, the merchant can verify the buyer’s signature against that on the back of the credit card. The amount of the transaction and goods purchased can readily be confirmed. There is no danger in payment information being stolen if the buyer is dealing with a trustworthy merchant. In the case of a dispute, each party has a signed copy of the receipt which can be used as evidence that the transaction took place.

The issue of trust becomes more complicated when credit-card payments are made over the Internet. The use of SSL may not address all the trust points mentioned above. A common concern is that some of the traditional assurances of integrity of the payment transactions can become compromised. Consider the assurance mentioned above in the context of online transactions.

The issues at the buyer side are:

- The buyers would like to be assured that they are paying exactly the specified amount. In general, there is a lack of trust in online systems. As a result, there is no guarantee that the amount charged is the same as the amount requested.
- The buyers would like to be assured that the payment information provided cannot be stolen or abused for extracting unauthorized payments from them. The online security of trusted data has been compromised many times, and such events have been highlighted in the media. It seems that the task of keeping trusted data, such as credit card numbers, safe from intruders in an online site is not trivial. However, merchants who collect this data are typically not technically savvy, and do not have the resources to institute the kind of secure and trusted computing base necessary to constantly guard against possible intrusion and data theft attempts.

- The buyers would like to trust that they will receive the goods that they have purchased. This depends on the track record and reputation of the merchant.
- In the case of a dispute the buyers would like to have in their possession enough evidence to prove whether or not the payment took place. In the online world, the buyers generally do not get much protection. Sometimes a merchant will give a “transaction reference number,” though this number merely indicates that a transaction has taken place, without proving the time or amount involved. Merchants have started sending e-mails confirming payment transactions, and in some cases e-mail has been accepted as evidence in court. However, there is no guarantee that the e-mail will actually be sent and, moreover, even if sent, e-mail systems have been known to lose or be unable to deliver some documents.

The best assurance that the buyer has in this area is to deal with a large and well-established company. If the transaction amount is relatively small compared to the total business done by the company, then the company will not compromise its reputation over a small dispute. However, this is not always true, and may not apply if the transaction amount is large.

The issues at the merchant side are:

- The merchants would like to be assured that they are being paid exactly the specified amount. This issue is not a concern from the perspective of the merchant.
- In the case of a dispute the merchants would like to have in their possession enough evidence to prove whether or not the payment took place. The assurance is weak because there is little evidence that the buyer has agreed to pay the specified amount. For example, the buyer may call the credit card company and claim that the transaction never took place. The merchant has little evidence to argue on. The only evidence is if the buyer has registered at the site in a way that proves their identity, and somehow signed for the purchase. In this case, one has to prove that the registration site has good password security, and even then the buyer may claim that his/her password was stolen, or given away by the merchant.

As mentioned earlier, user authentication, privacy of information, and data integrity can be assured by using SSL. However, SSL is only part of the solution to the security of online credit card transactions. It does not address all the trust issues between the buyer and the merchant. An effective approach to ensure trust is to use a *trusted third party* (TTP), who is trusted by both the buyer and the merchant.

#### **11.4 Trusted Third Party and a Payment Protocol Using a Trusted Third Party**

Long before the invention of online commerce, people resorted to the use of trusted third parties to assure transaction integrity. For example, a notary public certifies documents for correctness, which gives such documents extra weight as court evidence. Another classic example is buying a house, which is a transaction performed “in trust” by the lawyers of the buyer and the seller. In this case, the lawyers act as “trusted third parties” on behalf of their clients.

In the online world, we believe that transactions should be similarly notarized by a trusted third party, and such notarization assures both parties of the integrity of the transaction. In this section, we describe a new payment protocol that uses a trusted third party, which can be used for credit card payments and other types of payments. This protocol has several advantages over existing protocols, e.g., SET, as described in Chap. 10. These advantages are discussed below:

- There is no sharing of payment instrument between the buyer and the merchant. This results in improved protection for both parties.
- There is no need for the buyer to register with any payment service (some protocols, such as CyberCash or PayPal, require this type of registration). As a result, buyers have increased flexibility and convenience in the choice of payment service.
- The protocol is designed as a HTTP-style request-response message protocol [11.4]. This approach reduces the complexity in implementation. For example, there is no need at any point to transmit a message to two destinations and expect the receiving parties to synchronize with each other. Instead, each step in the protocol involves a single message from the sender to the receiver, and a corresponding response back from the receiver to the sender.
- The protocol is robust in the sense that recovery is possible at any point in the case of a failure; hence the protocol protects both the merchant and the buyer from insufficient or excessive charges due to communication or system failures.
- The protocol can be used with any existing payment instruments, e.g., credit cards and debit cards. This offers increased versatility in terms of supporting a variety of payment methods.
- Supporting evidence is provided to the buyer and to the merchant regarding the nature of the transaction in case dispute resolution is required. This is accomplished by sending only a digest of the details of the transaction to the TTP.
- A single TTP may be used by both the buyer and the merchant. Alternatively, the buyer and the merchant can each be represented by their own TTP.

#### 11.4.1 Description of the New Payment Protocol

In this section, the new payment protocol for the case of one TTP is described. The protocol requires the availability of a public-key certificate authority. Any certificate authority can be used, such as Pretty Good Privacy (PGP) or commercial providers, such as VeriSign.

The basic steps of our protocol are shown in Fig. 11.2. For each step, any message transfer (if required) is secured using cryptographic technology, such as SSL.

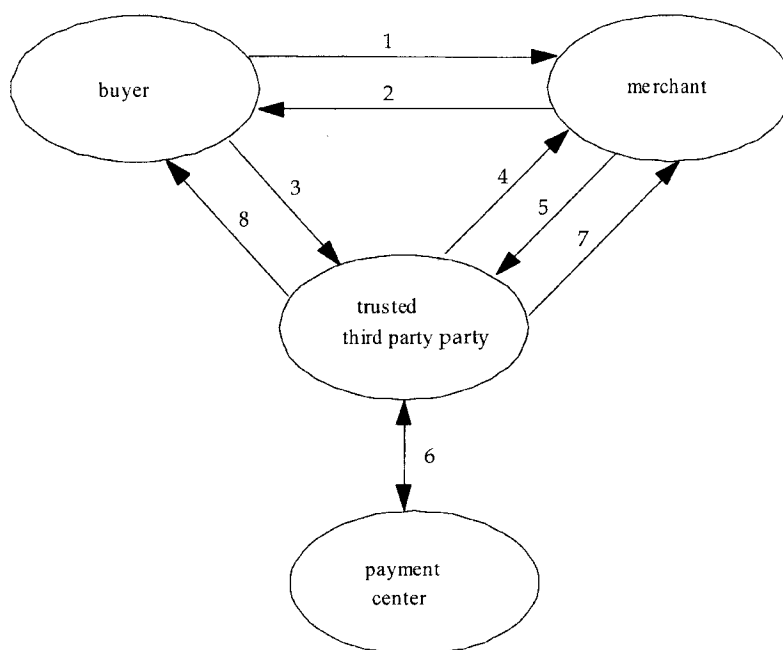


Fig. 11.2 Payment protocol with one TTP

There are eight steps in the protocol (detailed information on each step is provided in Sect. 11.6.2, Appendix B).

- (1) The buyer sends an “order” message to the merchant.
- (2) The merchant, upon receiving the order message, returns a “payment request” message to the buyer.

- (3) The buyer, after verifying the merchant's signature, proceeds by sending a "payment" message to the TTP.
- (4) The TTP, after verifying the buyer's signature, requests a confirmation from the merchant by sending a "confirmation request" message to the merchant.
- (5) The merchant, upon receiving the confirmation request message, verifies the transaction ID and amount, and sends a "transaction confirmed" message to the TTP.
- (6) The TTP obtains authorization from the payment center.
- (7) The TTP sends a signed "merchant receipt" message to the merchant.
- (8) The TTP sends a signed "buyer receipt" message to the buyer.

In these steps, all three parties, namely, the buyer, the merchant, and the trusted third party have each provided evidence of the transaction (a signed request or receipt). In the case of a dispute, the buyer has a signed payment request from the merchant and a signed receipt from the TTP. The merchant has a signed receipt from the TTP. The TTP has a signed payment from the buyer and a signed confirmation from the merchant. The signed information is sufficient for dispute-resolution purposes.

#### 11.4.2 Extension to the Case of Two TTPs

For the case of a single TTP, the TTP could have a conflict of interest in the case of a dispute because it would be representing the interests of both the buyer and the merchant. For this reason, examples of candidates for trusted third parties are typically organizations, such as major banks or major credit card companies, which have no obvious vested interest in supporting either dispute party in a transaction.

In some cases, however, buyers and merchants may want to be represented by a trusted third party that is more active in supporting their concerns, and perhaps is targeted specifically at providing a service for their needs. In such a case, a conflict of interest can be avoided if two TTPs are involved, one for the buyer (referred to as TTP-B), and the other for the merchant (referred to as TTP-M). In the case of a dispute, TTP-B and TTP-M will be involved in dispute resolution, protecting the interests of the buyer and merchant, respectively. In addition, such a protocol with two TTPs has the potential to allow more types of organizations to assume the role of the trusted third party.

The payment protocol can readily be extended to the case of two TTPs. The basic steps are illustrated in Fig. 11.3.



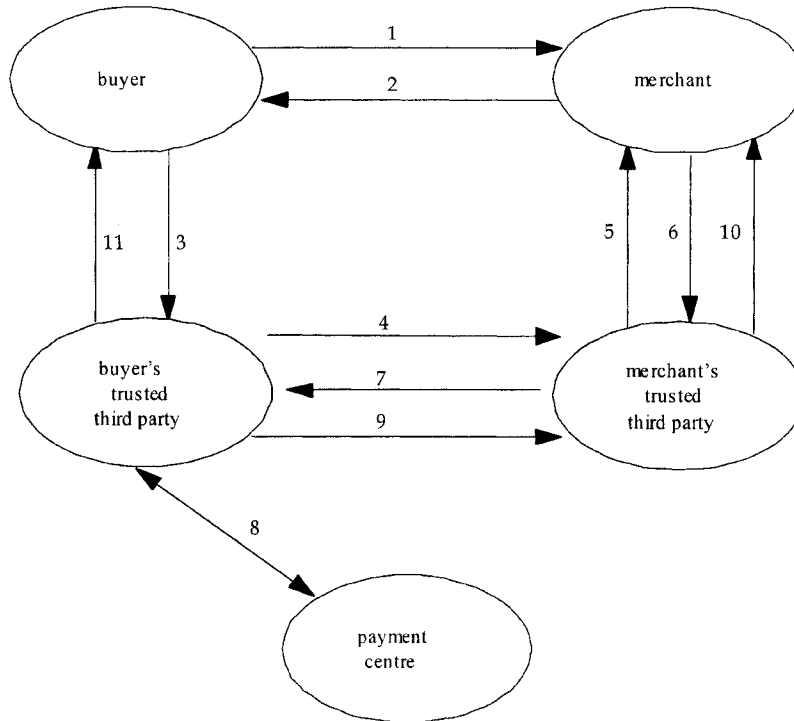


Fig. 11.3 Payment protocol with two TTPs

These steps are:

- (1) The buyer sends order information to the merchant.
- (2) The merchant requests payment from the buyer (message from the merchant to the buyer also contains the address of TTP-M).
- (3) The buyer sends the payment information and the amount of the payment to TTP-B (this message also contains the address of TTP-M).
- (4) TTP-B sends a message to TTP-M, requesting a confirmation from the merchant.
- (5) TTP-M checks with the merchant to get a confirmation of the transaction and the amount of the payment.
- (6) The merchant returns a confirmation to TTP-M.
- (7) TTP-M forwards the confirmation to TTP-B.
- (8) Message exchange between TTP-B and the payment center regarding the payment authorization.
- (9) TTP-B sends a receipt to TTP-M, confirming the payment.
- (10) TTP-M forwards the receipt to the merchant.

(11) TTP-B sends a receipt to the buyer.

The message contents, together with the actions taken by the buyer, the merchant, TTP-B, and TTP-M at the various steps are straightforward extensions of those for the case of one TTP (see Sect. 11.6.2, Appendix B), and will not be presented.

### 11.4.3 Discussion

It is important to trace the business reason for the viability of this payment protocol.

Typically, once a buyer gives the payment information to the merchant, it is the merchant's responsibility to ensure that payment is captured from the corresponding financial institution. Note that in some cases the financial institution may insure the buyer against fraudulent use of the payment information. This is the case with credit cards, where most issuers do not hold buyers responsible for payment of unauthorized transactions on their cards. The cost of this insurance is imposed on the merchants, who must pay an increased fee for online transactions.

With our protocol, some of the burden of transaction insurance is shifted to the trusted third party. The buyer's TTP provides assurance to the buyer that the correct amount of payment will be collected and passed to the merchant. At the same time, insurance against unauthorized transactions may now be split among the financial institution and the TTP, depending on the service agreement.

The merchant's TTP must provide assurance to the merchant that the buyer's payment instrument will be charged, and funds transferred to the merchant. This had been the merchant's responsibility, but is now a burden carried by the TTP.

Clearly, for the protocol to be successful there needs to be a business case to operate a buyer or merchant TTP service. The following are sample business cases:

- The TTP charges the merchant a transaction fee (similar to current credit card transaction fees), and carries the entire weight of the fraudulent transaction insurance. Typically, credit card companies charge a large premium for Internet-based transactions. By charging merchants a fixed or transaction-based service fee, the TTP would fund the insurance. In this scenario, the TTP is effectively competing with credit card companies for a portion of the payment transaction fees.

- The buyer's TTP charges the buyer a fixed service fee, or a transaction fee. The buyer would use the service because it results in more trusted transactions, with extra security provided by the TTP, as well as the TTP's enhanced insurance policy.
- The TTP charges the merchant a fixed service fee. The merchant uses the service to attract buyers who demand the use of a trusted payment protocol.
- A financial institution provides a single TTP service, to stimulate online commerce by engendering trust, and hence potentially increase its transaction revenue.

## 11.5 Summary

In this chapter, an overview of credit card-based online transactions is presented, including payment authorization, capture, and settlement. The issue of trust between buyers and merchants is analyzed. We have also described a new protocol for secure online payment. This protocol allows a buyer to avoid sharing key payment method information with merchants, by moving the burden of payment assurance to a trusted third party. The protocol supports privacy because the order information is not sent to the trusted third party. The buying operation is simplified because there is no need to register with a payment service.

## 11.6 Appendices

### 11.6.1 Appendix A: the Main SSL Exchanges

In this section, we provide detailed information on the main exchanges in an SSL session.

To establish an SSL session between an SSL client and server, they need to agree on the SSL protocol version to be used, select cryptographic algorithms, optionally authenticate each other, and use public-key encryption techniques to generate and exchange shared secrets. The main exchanges between the client and the server during the establishment of an SSL session are described as follows:

**ClientHello and ServerHello messages:** These two messages are used to establish security enhancement capabilities between the client and the server. The attributes of the two messages include:

- Protocol version
- Session ID
- List of cryptographic options
- Compression method
- Random number

**Server certificate:** The server sends its certificate, if it is to be authenticated. The certificate format generally follows the X.509.v3 standard [11.7].

**Server key exchange message:** This is optional. It is required for certain circumstances, for example, if the server has no certificate, or if its certificate is for signing only. The attributes include a key exchange algorithm and associated parameters (e.g., RSA algorithm with RSA modulus and exponent).

**ServerHelloDone message:** This message indicates that the hello-message phase of the handshake is complete. After sending this message, the server will be in a mode to wait for a client response. The client verifies that the server provided a valid certificate if required and checks that the ServerHello parameters are acceptable.

**Client key exchange message:** This message has different formats, depending on which public-key algorithm has been selected between the ClientHello and the ServerHello messages. Once again, similar to the Server key exchange message, the attributes include a key exchange algorithm and associated parameters.

**ChangeCipherSpec message:** This is not a handshake message. After this message is sent, the pending CipherSpec is transferred into the current CipherSpec.

**Finished message:** This message is always sent immediately after a ChangeCipherSpec message to verify that the key exchange and authentication processes were successful.

### 11.6.2 Appendix B: Steps of the Payment Protocol for the Case of One TTP

In this section, we provide the detailed steps of the payment protocol for the case of one TTP.

The following notation is used in our description:

CERT <sub>j</sub>	j's certificate (j = b for buyer, j = m for merchant, j = t for TTP)
H(x)	Cryptographic digest of x
S <sub>j</sub> (y)	Signature on information set y using private key of j (j = b for buyer, j = m for merchant, j = t for TTP)
*	Optional field

**Step 1.** The buyer sends an “order” message to the merchant.

The “order” message contains the following information:

order = items to be purchased, shipping information, \*previously quoted price, \*time stamp

The previously quoted price is an optional field. The time stamp is an optional field included to prevent a replay attack. An intruder performs a replay attack by intercepting a protected message, and replaying it at a later time. The timestamp contained in a received message can be used to determine whether this is a replay of a previously received message or not.

**Step 2.** The merchant, upon receiving the order message, returns a “payment request” message to the buyer.

The “payment request” message contains the following information:

payment request = transaction ID, amount, order, validity period, CERT<sub>m</sub>, \*purchase agreement, S<sub>m</sub>(transaction ID, amount, order, validity period, CERT<sub>m</sub>, \*purchase agreement)

The transaction ID is generated by the merchant and used by the merchant and the TTP to keep track of all the transactions. The order information is the same as that provided by the buyer. The validity period specifies the time during which the payment must be confirmed. The merchant’s certificate can be used by the buyer to verify the merchant’s signature. The purchase agreement is an optional field which contains information such as refund policy, product quality, warranty, etc. A digital signature is included as part of the payment request message.

**Step 3.** The buyer, after verifying the merchant’s signature, proceeds by sending a “payment” message to the TTP.

The “payment” message contains the following information:

payment = payment information, amount, merchant, transaction ID,  $CERT_b$ , \*timestamp,  $S_b$ (payment information, amount, merchant, transaction ID,  $CERT_b$ , \*timestamp)

The payment information field contains information such as the credit card number, credit card holder, and expiry date. Besides credit cards, other payment instruments such as debit cards can be used. The transaction ID is the same as that provided by the merchant. The buyer’s certificate can be used by the TTP to verify the buyer’s signature. Again, an optional time stamp may be included to prevent a replay attack. A digital signature is included as part of the payment message.

**Step 4.** The TTP, after verifying the buyer’s signature, requests a confirmation from the merchant by sending a “confirmation request” message to the merchant.

The “confirmation request” message contains the following information:

confirmation request = transaction ID, amount, status,  $S_t$ (transaction ID, amount, status)

This message contains the transaction ID, amount, and payment status. A digital signature is included as part of the confirmation request message.

**Step 5.** The merchant, upon receiving the confirmation request message, verifies the transaction ID and amount, and sends a “transaction confirmed” message to the TTP.

The “transaction confirmed” message contains the following information:

transaction confirmed = transaction ID, amount, status,  $S_m$ (transaction ID, amount, status), \* $H$ (transaction ID, amount, order, validity period, \*purchase agreement),  $S_m$ ( $H$ (transaction ID, amount, order, validity period, \*purchase agreement))

This message contains the transaction ID, amount, and payment status. As an option, a cryptographic digest of the transaction details (namely the transaction ID, amount, order, validity period, purchase agreement), as contained in the payment request message in step 2, may be included. This digest is useful for dispute-resolution purposes. A digital signature is included as part of the transaction-confirmed message.

**Step 6.** Obtain authorization from the payment center.

Upon receiving the transaction-confirmed message, the TTP requests the authorized amount from the payment center. The payment center returns an approval to the TTP.

Note that any payment method can be used in this step. Note also that the requirement for payment approval is tied to the TTP's policy. It is possible that in some cases (e.g., for preferred customers) the TTP would not wait for credit approval, but would process the payment immediately. In this case, the TTP, rather than the payment center, would be taking on the responsibility for the payment.

Furthermore, different TTPs may have different policies on handling unknown or delayed credit approval requests. For example, if the approval request times out, the TTP may either refuse to process the payment, or may take the risk of processing it. Similarly, even if the payment center rejects the request, the TTP may still process it, taking on the payment responsibility as described above.

**Step 7.** The TTP sends a signed "merchant receipt" message to the merchant.

The "merchant receipt" message contains the following information:

merchant receipt = payment ID, transaction ID, amount,  $S_t(\text{payment ID, transaction ID, amount})$

**Step 8.** The TTP sends a signed "buyer receipt" message to the buyer.

The "buyer receipt" message contains the following information:

buyer receipt = payment ID, transaction ID, amount,  $S_t(\text{payment ID, transaction ID, amount})$

After step 8, the TTP captures the payment and transfers the funds to the merchant. This step happens offline and involves the actual payment settlement.

Note that the above steps are sequential in nature. The transaction is not complete until the last step (step 8) is performed. A timer is used at each step to protect against unusual situations where one of the parties (buyer, merchant, or TTP) is not proceeding to the next step within a predetermined time interval. For steps 1 to 6, if the timer expires the transaction is assumed to be aborted. Any subsequent messages regarding this transaction will be ignored. Therefore, up to this point, any party can abort the transaction by simply not continuing with the next step.

At step 7, if the merchant does not receive a receipt within a time-out period, the merchant attempts to obtain the receipt by sending a request message to the

TTP. If a receipt is not received after a predetermined number of attempts, the transaction is assumed to be aborted. In this case, the buyer will not receive the order, but he/she can contact the TTP to request a refund.

At step 8, if the buyer does not receive a receipt within a time-out period, the buyer may request a receipt from the TTP at a later time. This would not affect the transaction because the order will be shipped by the merchant as long as the merchant has received the receipt.

### 11.7 References

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## 12 Micropayments

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### 12.1 Introduction

Open data networks, such as the Internet and the wireless data networks, allow low-cost delivery of content (information) and services to a huge population (market). The production costs of content and services are often small and largely independent of the number of customers. Therefore, producers of content and services provided to many customers often want to charge very small amounts – if the payment system allows it (with reasonable overhead). Payment by credit cards, which is the common method for online consumer purchasing, involves substantial minimal fee per transaction, e.g., 20 cents, and therefore is not applicable for charging smaller amounts. This provides one definition of the micropayments, as charging amounts smaller (or close to) the minimal credit card transaction fees (of about 20 cents). There are other difficulties in using credit cards for low-value transactions, namely, substantial delay and user involvement, and the potential for disputes resulting in refunds, chargebacks, and substantial handling costs.

This creates a difficulty for many existing and potential applications and services on the Internet<sup>1</sup>, which need a source of income to cover their costs and generate profits while the amount they can charge (for one use) is too low to justify a credit card transaction. Currently, most of the deployed services and applications are funded only by advertising or by charging substantial amount in advance for multiple purchases (e.g., subscriptions). A direct-payment mechanism could be an important alternative or complementary source of funding, especially to facilitate smaller vendors and applications where advertising cannot be used (e.g., due to lack of appropriate display, and in particular when services are consumed by automated agents without any advertising potential). This motivates the development and introduction of *micropayment* schemes and systems.

In this chapter, we focus on providing micropayment services with acceptable (low) transaction cost. This is the basic requirement from a micropayment system, namely, that it can be used to charge sufficiently low amounts, in particular, below

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<sup>1</sup> We only mention the Internet but the discussion applies to most open networks.

credit card minimal fees (of about 20 cents). The minimal amount to be supported may be considered as a parameter of the system, or there may be a specific requirement. In particular, when considering payments that involve a manual decision element (by a person), it seems that a minimal amount of about one cent may be sufficient, as the cost of the decision process itself is probably worth about a cent, and smaller-value items should probably not require specific user decision and action (otherwise, a lower-denomination coin would have been introduced). When considering payments by a software agent of the user, e.g., to pay for the actual communication services, there may be room for payments of amounts even significantly smaller than one cent.

In Section 12.3 below we analyze the different cost factors for online payments, and in Section 12.4 we elaborate on different mechanisms used to reduce each of the significant cost factors. But first, in the next section, we provide an overview of micropayment systems.

## **12.2 Overview of Micropayment Systems**

There are different motivations for developing new payment mechanisms. We focus on micropayments mechanisms that are operated by one or more payment service provider (PSP), allowing merchants to charge small amounts from customers. There have been many different definitions, goals, and proposals for micropayment mechanisms, including low-value offline payments (using a device rather than coins), anonymous payments (digital cash), and systems where the merchant charges a large amount once but allows the customer to use it incrementally over many small purchases (merchant acting also as a micropayment service provider).

Our focus is on the most common interpretation, namely, many payments of small amounts (micropayments) from customers to merchants, over open-data networks, such as the Internet, made by using one or more payment service providers. A PSP maintains a long-term relationship with customers and merchants, receiving payments of aggregated (large) amounts from customers and passing aggregated payments to the merchants, as illustrated in Fig. 12.1. This model assumes that consumer relationships with merchants are sporadic rather than long-term, and that a major role of the PSP is to provide facilities for efficient and secure transactions by using its relationships with the parties.

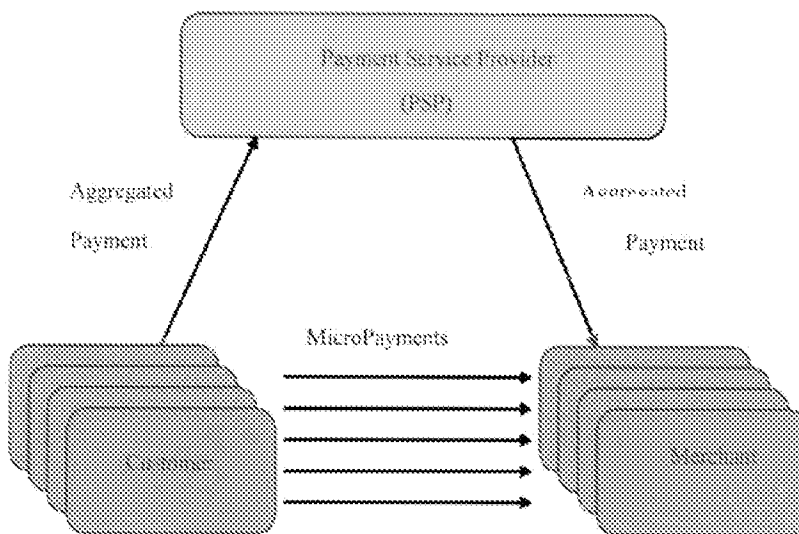


Fig. 12.1 Micropayments via a single PSP

Fig. 12.1 shows the payment relationships between the parties: sporadic micropayments from consumers to merchants, and long-term, usually periodic, payments of aggregated amounts from customers to PSP and from PSP to merchants. This does not describe the flow of messages for a micropayment transaction; we will describe different protocols, with different message flows. Payment protocols include mechanisms for *payment approval* by the customer, where the customer agrees to pay, as well as *payment authorization* by the PSP, where the PSP indicates that there are funds to cover the payment.

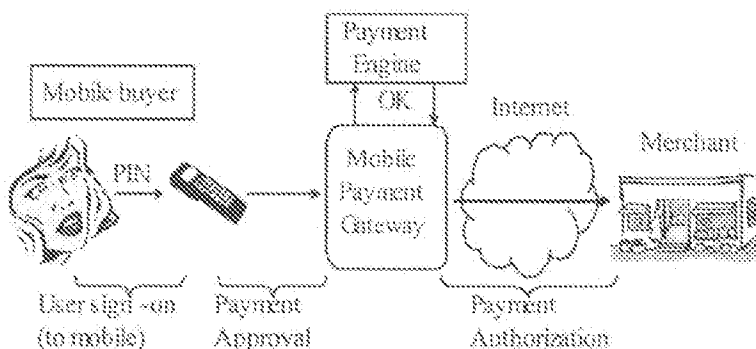


Fig. 12.2 Payments via the PSP

Payment approval and payment authorization may be integrated or separated. Separation of the payment-approval process from the payment-authorization process is appropriate, in particular, in scenarios where the PSP is (or controls) a gate-

way between the customer and merchant, as illustrated in Fig. 12.2. The customer approves the payment to the PSP, and then the PSP sends an *authorized payment order* (PO) to the merchant. This scenario is applicable whenever the PSP is also providing the communication services to the consumer or is in close alliance with the communication providers. In particular, this scenario is appropriate when the PSP is also the consumer's ISP or a mobile-communication provider, or when the ISP or mobile provider are cooperating with the PSP to improve the user interface for payments. In this case, the payment authorization is, naturally, always online and involves only the PSP and the merchant. Furthermore, payment authorization can be completely independent from the payment approval process between the consumer and the PSP, and certainly from the login process (if any) between the consumer and their computer or device. In particular, in this scenario we can take advantage of existing security mechanisms between the consumer and their ISP or mobile gateway to validate that the consumer approved the payment. For example, a mobile gateway usually can identify the handset, e.g. using a shared key, and the handset may identify its user, e.g., using PIN, voice recognition, or any other identification technology.

In other scenarios, the PSP is not "on the path" between the consumer and merchant, and therefore either consumer or merchant should contact it to request authorization for payment when required. This is typical, e.g., for web browsing, when the PSP is not the ISP (or in alliance with the ISP). In most micropayment systems, the consumer contacts the PSP to approve the payment and to request the PSP to authorize the PO. For technical reasons, namely, allowing the PSP to operate as an efficient server application, the PSP sends the authorized PO as a response to the consumer, who forwards it to the merchant. The merchant will later (offline) deposit the PO, often in a batch process with many other payment orders, to receive the aggregated payment.

Fig. 12.3 presents a high level illustration of the online payment process in this scenario (payment invoked by the consumer), as implemented by most currently-deployed micropayment systems, e.g., by Qpass, iPin, and TrivNet. We will later also discuss systems where the merchant is requesting the authorization from the PSP, or where there is no online payment authorization.

So far, we have discussed only a single PSP providing service to both customer and merchant. The single-PSP solution is simple and efficient. However, currently, there is no dominant single PSP for micropayments. Indeed, there are a substantial number of competing PSPs for micropayments, and we can expect more PSPs to emerge as the demand for micropayments grows and the market matures. In fact, the expected financial returns from a micropayment system may not be high enough to justify a sufficient effort by a single PSP, or even a small number of PSPs, to gain market dominance (in contrast to the 2 ~ 3 major credit card brands). We would therefore expect that there will be multiple PSPs offering micropayment services.

It is unrealistic to expect all customers and all merchants to have accounts with multiple PSPs. Instead, we expect that micropayment systems will need to support interoperability among multiple PSPs, each with its own customers and merchants, with aggregated payments and long-term relationships between the PSPs, allowing customers of one PSP to make purchases from merchants of the other PSP. A simple architecture with two PSPs is illustrated in Fig. 12.4.

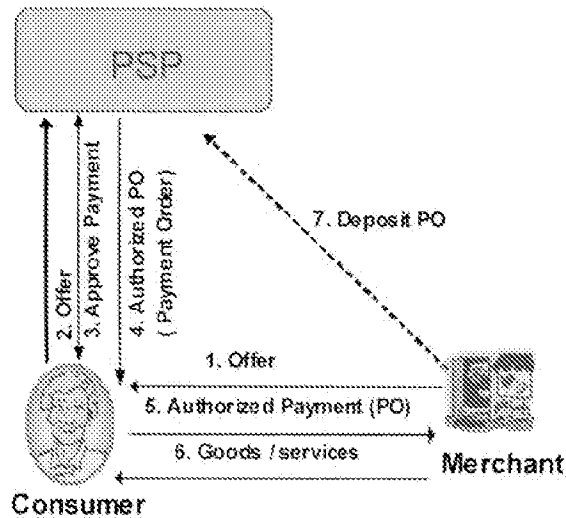


Fig. 12.3 Online payments invoked by consumer

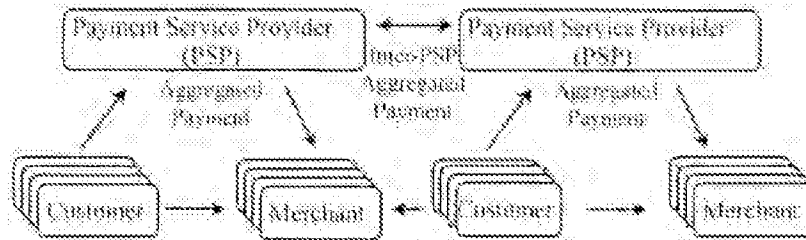


Fig. 12.4 Micropayments via two interoperating PSPs

### 12.3 Cost Factors for Online Payments

In order to allow economical charging of small amounts, we need to consider the different cost factors that, by affecting the payment service provider, affect the merchant directly and indirectly. Indeed, from the merchants' perspective, it may be enough to use a PSP without the substantial minimal-fee requirement of existing credit cards; but these costs are not pure profit, and the PSP needs to have a viable business case. In order to design a mechanism with substantially reduced costs, as compared to credit cards, we need to consider (and minimize) at least the most significant cost factors.

In the following sections, we consider three major categories of costs:

- **Disputes, chargebacks and their processing cost:** Many payment systems, and even certain laws, allow the customer to dispute charges, or otherwise not to pay, usually under certain circumstances. In some or all of these cases, the PSPs may *reverse* the transaction, requiring the merchant to return the funds (*chargeback*). In particular, payment orders received electronically, without a signed authorization, are often reversible. Indeed, disputes and subsequent chargebacks are substantially more common for Internet transactions than for face-to-face transactions that have been authorized with the signature of the customer. The costs here include the actual refund amount, as well as substantial processing cost (for the PSPs and the merchant) and possible penalty payments (by the merchant). The processing costs of credit card payment service providers are estimated at about \$50, with penalties payments for merchants with frequent disputes of about \$100 [12.34]. This is probably the most critical cost factor for micropayments, and much of the work on micropayment systems is targeted at reducing the expenses associated with it (see Section 12.4).
- **Customer acquiring and support costs:** These are the costs of encouraging customers to deploy the new service (open an account, install a wallet, etc.), and later assisting customers. These expenses may be substantial, especially compared to the small value of the transaction. The main mechanism to reduce these costs is to use simple procedures and user interface. In particular, it is highly desirable to offer an easy-to-use, "click and pay" user interface for micropayments. On the other hand, to minimize installation and support costs, the customer should be able to use standard software tools (e.g., a browser) rather than installing customer software (wallet) on the consumer's machine. Finally, PSPs should be interoperable, namely, the customer of one PSP should be able to buy from a merchant of another PSP, as shown in Fig. 12.4, so that multiple

PSPs share the customer acquiring and support costs (See more details in Section 12.5).

- **Equipment, processing, and communication costs:** These are the costs of the necessary hardware, software, and communication for processing the payments by customer, merchant, and PSP. These costs are a function of the processing and communication requirements of the payment protocol, including the dependency on online involvement of the PSP, requiring high availability. Indeed, most of the research on micropayments, and several of the deployed systems, focus on minimizing the processing and/or communication costs. In particular, many efforts have focused on reducing the processing costs by avoiding public-key operations. Another area that received a lot of attention is reduction in communication requirements, and in particular, allowing offline or semi-offline payments (in particular, “stored value” offline payments, where the merchant and browser are in direct connection but disconnected from the PSP. See more details in Section 12.6).

There are several additional cost factors, which are less significant or easier to deal with, such as:

- **Bookkeeping and auditing costs:** Many payment systems have substantial bookkeeping and auditing mechanisms and costs. It is tempting to suggest that these costs can be eliminated by simply not logging and auditing micropayments, or keeping only very partial and temporal logs. However, accurate logging and auditing is often required by law, and may also be necessary to provide non-repudiation for efficient dispute resolution and to detect fraud. Bookkeeping and auditing costs may be reduced by secure automated *record aggregation* mechanisms, e.g. [12.13], whereby the customer signs a single document, which is archived instead of multiple separate documents (similarly to the presentment of a monthly statement by utilities). Record aggregation may reduce, also help, to protect the privacy of the customer by not keeping track of individual transactions for long. Other approaches try to protect the privacy of the buyer even further, by preventing the PSP from identifying payments of a particular customer, using one of the many anonymous (digital) cash protocols, e.g. [12.3]. Some, e.g. [12.1], believe that anonymous payments would also be less expensive, by avoiding bookkeeping (almost) entirely and preventing disputes and chargebacks.
- **Point-of-sale integration costs:** These are the costs for a merchant for setting up merchandise for sale, and for publishing information and services. These costs can be reduced by simple, automated tools for the merchants (for small merchants, and for initial phases), hosting services by

the PSP may also be desirable. However, these are one-time expenses and should usually be rather insignificant in the long run.

- **Credit risk:** When the customer is charged for the aggregated payments only after the purchases are made, the customer may refuse to pay their PSP. Often, PSPs eliminate this risk by requiring funds to be deposited in advance. This problem also appears when interoperating between multiple PSPs, where one PSP ends up owing the other PSP; in this case, prepayment is rarely a solution, since usually both PSPs may end up owing the other PSP. This becomes a risk-management issue, with associated costs of estimating and containing the risk.

## 12.4 Disputes and Chargebacks

As noted above, disputes and chargebacks, and in particular, their processing costs, are of the most significant expense factors for online credit card purchasing. In credit card purchasing, and to some extent in any remote purchasing, such as through the Internet, there are laws protecting consumer's right to dispute and reverse transactions that were not approved by the consumer, and often to some extent also transactions that were not properly fulfilled. This creates a difficult challenge to the designers of micropayment systems. In general, disputes and chargebacks for electronic payments fall into four main categories.

- **Disputes on whether payment was approved by consumer:** Consumer claims that they did not *approve* the payment.
- **Unauthorized overspending chargebacks:** PSP claims that it did not *authorize* the payment, and that there are not sufficient funds in the customer's account to cover it (in systems where the merchant should receive authorization from the PSP for each payment).
- **Disputes on delivery and/or quality:** Consumer claims that the merchant did not *deliver properly* the goods or services as ordered.
- **Chargebacks due to consumer default:** PSP claims that the consumer *defaulted*, and did not provide necessary funds.

We now discuss each of these categories for disputes and chargebacks, beginning with the last two, which we believe should simply be disallowed for micropayment systems. But first let us consider an example.

### 12.4.1 Example: First Virtual Payment System

A simple example is the First Virtual payment system, illustrated in Fig. 12.5, which was of the earliest payment systems proposed [12.36]. One of First Virtual's goals was to offer lower fees for small charges (compared to credit cards)



and avoidance of chargebacks. First Virtual's system used two (non-cryptographic) security mechanisms for each purchase: a secret "first virtual account number" (FV#) provided by the consumer to the merchant and forwarded to the First Virtual Net server (on the Internet), and an email approval request, sent from the First Virtual Net server to the consumer and approved (or declined) in a message from the consumer back to the First Virtual Net server. Only after the consumer approves the payment, the merchant's account with First Virtual is credited, the merchant is informed that the payment was cleared. A credit card transaction is performed (immediately or periodically) to collect the funds from the customer's credit card account, whose details were kept in a separate First Virtual "Credit Card Server".

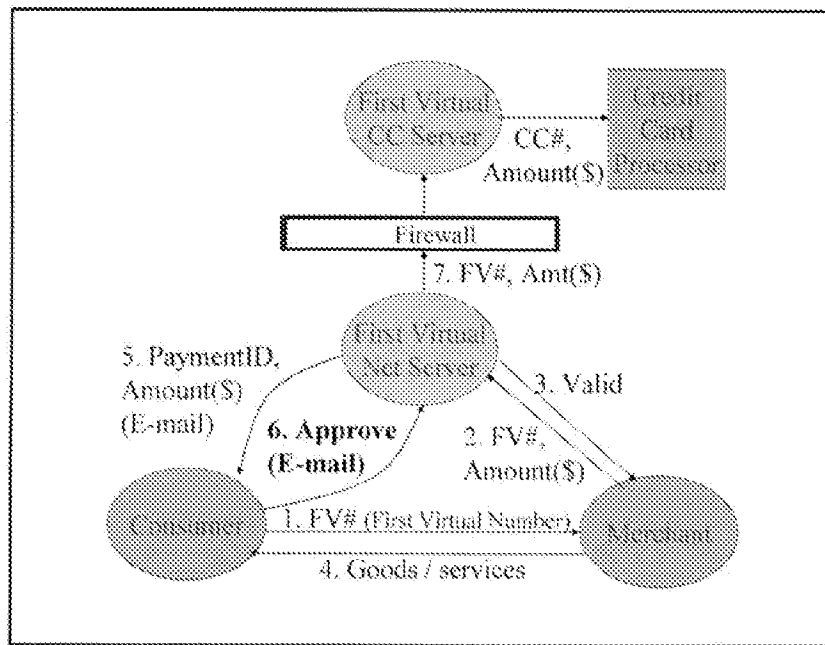


Fig. 12.5 First Virtual's centralized PSP based on email confirmation

The payment-approval process of First Virtual is subject to attacks, since standard Internet email is not secure; this makes the entire authorization process insecure. It is particularly easy to inject e-mail messages with incorrect source identification; First Virtual protects against this attack by including a random payment transaction identifier in the approval-request email message (PaymentID). However, the attacker may be able to intercept the email message in transit to the consumer, and then send the approval response with the correct PaymentID. To protect against this, First Virtual suggested that consumers may use available secure email software to digitally sign their payment approval responses.

#### 12.4.2 Consumer Default and Disputes on Delivery/Quality

We believe that micropayment systems should not allow disputes on product delivery or quality or on chargebacks due to consumer default. The basic reason is that there may not be a long-term relationship between the buyer and the merchant. Therefore, the merchant can hardly manage such risks, e.g., the risk of the consumer defaulting on its payment obligations to its PSP.

In particular, consider disputes about whether the purchased product or service was in fact delivered, or about the quality of the product or service. Some proposed and deployed systems attempt to avoid disputes on product delivery, by using a trusted third party as an “escrow agent” that ensures delivery of product (to buyer) and payment (to merchant). Most of the deployed systems, e.g., [12.6, 12.21], focus on escrow of high-value physical products (or legal title, e.g., to real estate), and in particular involve minimal fees of several to dozens of dollars. Proposals have also been made for escrow for digital content (for efficiency, the actual escrow is often of a key to decrypt the content, see [12.4]), which may seem applicable to micropayments. However, it is impossible to completely automate the resolution of disputes regarding quality of (most) products and services. Therefore, the third party will require manual intervention for every dispute, making the process rather expensive, and inappropriate for micropayments. Therefore, micropayment service providers should prohibit this kind of dispute.

By disallowing disputes related to proper delivery/quality and chargebacks due to consumer default, micropayment systems can focus on disputes related to payment approval (by the customer) and payment authorization (by the PSP).

#### 12.4.3 Unauthorized Overspending Chargeback

In some payment systems, a customer may overspend, i.e. approve more payments than the funds available in her account. In this case, the PSP may wish to refuse to pay (or chargeback) the merchant. Some micropayment systems allow this, claiming that merchants can accept this risk, since the amounts are small, and especially for selling information (with negligible cost for the merchant for each extra transaction).

However, since merchants do not have a long-term relationship with consumers, they often require secure *payment authorization* from the PSP, such that payments properly authorized by the PSP cannot be reversed. Micropayment schemes often focus on reducing the overhead required for payment authorization, especially on the PSP, by adopting different strategies. The overhead for payment authorization has two major elements: communication and computation.

First, consider the computational overhead, and in particular, whether the PSP must perform computationally-intensive operations such as public key signature

for each payment. Public key signatures are the main technique for achieving non-repudiation. For large amounts, and when the merchant does not trust the PSP, the merchant may require non-repudiation of the payment authorization from the PSP, to make sure that the PSP is committed to transfer the funds for the payment. In particular, in multi-PSP scenarios as illustrated in Fig. 12.4, the merchant may require non-repudiation from the customer's PSP. In Section 12.6, we discuss techniques for achieving non-repudiation with reduced computational requirements, compared to digitally signing each payment authorization.

When the transaction amounts are small relative to the value of the PSP-merchant relationships, then the merchant may not demand non-repudiation for every (micropayment) transaction, and agree to receive only secure payment authorization from the PSP (not signed). When the aggregated amount of authorized (but not signed) payments exceeds some merchant-specified threshold, the merchant may require the PSP signature authorizing the total, aggregated amount (providing non-repudiation). By not signing (and validating) every micropayment authorization, the PSP (and merchant) may save some computations.

Consider now the communication required for the PSP to authorize payments. Several micropayment schemes support *offline payment authorization*, i.e., transactions where the client communicates with the merchant, without involving the customer's PSP to authorize the payment. Offline transactions can be used where communication with the PSP during the purchase process is impractical, e.g. for payment using direct communication between consumer and merchant, without requiring connectivity and communication with the PSP. Usually, the PSP will require the merchant to return funds in case of double spending; but sometimes PSPs may assume limited liability, usually when the consumer is using a tamper-resistant hardware that authorizes the payments on behalf of the PSP (and keeps track of the available funds in the consumer's account). The PSP may pre-authorize payments up to a predefined amount for a particular merchant, but this is rarely useful (since it is hard to predict purchases) and indeed rarely used.

Therefore, whenever communication with the PSP during the purchase process is feasible, micropayment schemes should use it to perform *online payment authorization*. Sometimes, as in Fig. 12.2, all communication between the consumer and the merchant flows through the PSP (or a gateway associated with it), in which case the online payment authorization does not add substantial overhead. In other cases, the customer or the merchant must contact the PSP to request payment authorization. When possible, it is preferable for the customer to request the (online) payment authorization, so that, after local validation, the merchant can respond to the purchase request from the customer immediately without having to keep the connection with the customer open while requesting authorization from the PSP.

#### 12.4.4 Disputes on Whether Payment Was Approved by Consumer

We now focus on the most important (and common) type of disputes and charge-backs, where the customer claims they did not approve the payment transaction. To understand this problem better, consider the common mechanism of performing credit card transactions over the Internet (or phone), by sending the credit card details to the merchant. Usually, the credit card details are encrypted on transit using SSL/TLS [12.27-12.28], as illustrated in Fig. 12.6. Since payment approval is only by inclusion of the credit card number, at any time in the transaction, an attacker with access to the card number may invoke an unapproved transaction. As a result, there are many disputes in Internet transactions, which are much larger than proportion to all credit card transactions. The dispute rate in Internet transactions was so high that it caused losses to credit card issuers, and in the first years of Internet commerce, the rate grew rapidly (for example, see practical experience in [12.34]). The rate of disputes was considerably reduced with the introduction of substantial penalties to merchants with high dispute rates<sup>2</sup>. Many disputes were due to unauthorized purchases by a third party that somehow got hold of the customer's details, by exposure in Internet or non-Internet transaction, or otherwise. In addition, there are disputes made by customers denying payments they actually approved, knowing that there is no way to distinguish between them and unapproved transactions, namely, that there is no non-repudiation.

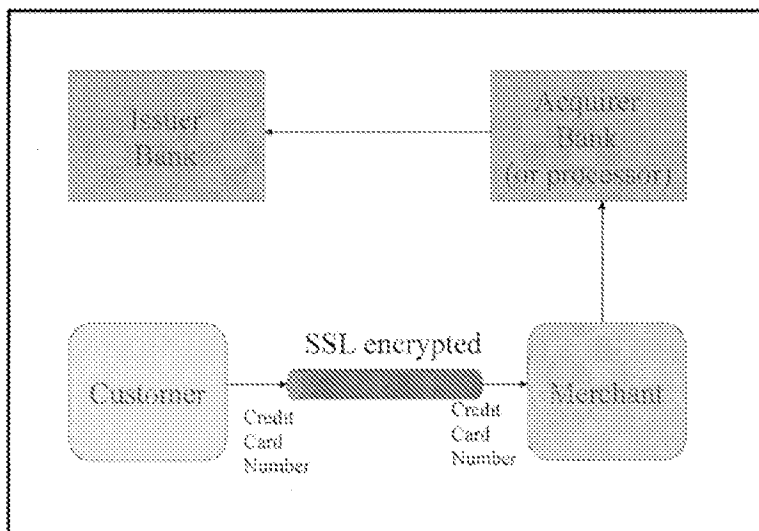


Fig. 12.6 SSL credit card payments

<sup>2</sup> Typical penalties for disputes: merchants with over 2.5% disputes among their transactions, pay 100\$ per dispute [34].

Due to the high cost of dispute resolution and chargebacks, there have been several proposals to improve the security of the consumer approval process for credit card payments over the Internet. This has resulted in the iKP protocol [2], which evolved to the SET credit card payment standard [12.33, 12.20], and later in other proposals, such as 3D Secure and secure payment application (SPA) [20]. Most of these proposals attempt to emulate “face to face” transactions, where the customer physically signs a payment order (and presents a physical card with the same signature), often by using digital signatures. The goal is to reduce the number of disputes by preventing unauthorized use and preferably ensuring non-repudiation.

Reducing the number, and associated cost, of disputes resulting from claims of payments that were not approved by the consumer is even more critical for micropayment systems, where the average transaction amount is several orders of magnitude below the reported cost of handling a dispute in the credit card business. In the rest of this section, we discuss three major approaches to reducing the number of disputes and chargebacks due to consumer denial of approving the payments, and the associated costs.

The first approach is to perform a *secure payment approval* process, confirming to the PSP that the consumer approves the transaction. This would prevent an attacker from initiating transactions without consumer approval, which the consumer would later dispute. It also allows the PSP to detect when a consumer is disputing a properly approved transaction, although the PSP may not be able to “prove” to a third party that the transaction was properly approved, as long as non-repudiation is not provided. Possibly, the agreement between the consumer and the PSP may indicate that the consumer is willing to accept the records kept by the PSP of transactions approved by the consumer, and not to dispute them.

The second approach takes another step and provides not only secure payment approval, but also *non-repudiation* of the payment approval. Namely, whenever the PSP authorizes a transaction, it will retain a proof that allows it to convince a third party that the consumer, indeed, properly authorized the transaction. The proof will usually be in the form of a payment order digitally signed by the consumer. When complemented with an appropriate agreement with the consumer, accepting the digital signature or other proof as sufficient evidence to the consumer's approval of the transaction, this may be sufficient to prevent disputes. The agreement may also require the consumer's signature only when the aggregated amount of approved payments exceeds some predefined threshold, thereby amortizing the computational overhead over several micropayments.

The third approach takes a somewhat radical view, namely, that the only legally-acceptable way to refuse to reverse a transaction is when the PSP is technically *unable to reverse transactions*, since the necessary records do not exist. We call such payment instruments *bearer certificates*, since the payment is done by

passing a message (*token, bearer certificate*) to the merchant, who deposits it at the PSP, but the message does not indicate the identity of the consumer. Designs that try to ensure irreversible transactions sometimes use *anonymous payment* (“digital cash”) mechanisms, such as blinded signatures.

We discuss each of these approaches in more detail in the following sections.

### Secure Payment Approval

Secure payment approval is relatively simple between two parties with a long-term relationship, such as the customer and their PSP. In this case, the payment approval is by an authenticated message from the customer to the PSP. Often, end-to-end authentication of the payment approval message from customer to PSP is possible (typically, when the customer communicates directly with their PSP, as in Fig. 12.2 or Fig. 12.3). Such end-to-end authentication of the payment approval requires only standard, pre-installed software components. The payment-approval process, when invoked by the consumer using only standard browser, as illustrated in Fig. 12.3, has the following steps:

1. The merchant presents the offer of goods or services to the consumer. In the usual browsing scenario, the offer is in a regular or special hypertext link, sometimes called a *per-fee link*, invoked by the consumer to pay, and encoding the payment details necessary to create the payment order. Inside the per-fee link, and possibly also outside it, the merchant provides the *offer description*, which is text and/or graphics describing the offer and presented to the consumer. We discuss some standardization efforts for the offer and per-fee link later on.
2. Typically, the browser displays the offer description. The customer invokes the payment process, typically by pressing the per-fee link. This results in passing the per-fee link parameters to the PSP, providing it with the payment offer details.
3. At this point, in most cases, the consumer has already been presented with the payment details in the description sent with the per-fee-link. However, a malicious merchant could have provided a description that differs from the payment details sent to the PSP. Therefore, the PSP has to validate that the consumer has actually approved the payment details. This is usually done by sending a payment approval request, e.g., as a web page. The user approves (or declines) this request. The approval process should be authenticated to ensure secure authorization.
4. Once the PSP has validated that the consumer properly approved the payment, then the PSP issues an authorized payment order (PO) sent to the consumer. The PO is often authorized by being signed by the PSP or

authenticated using a key shared between the PSP and the merchant. If the payment order as sent to the consumer might be “stolen” by an attacker and used to obtain goods and/or services for the attacker, this communication may be encrypted, e.g., using SSL.

5. The consumer’s browser usually automatically processes the authorized PO by sending it as a request to the merchant. When a dedicated payment wallet is used by the consumer, it may modify the PO before sending it to the merchant, e.g., adding the consumer’s signature or otherwise “validating” the payment order.
6. The payment order should be validated by the merchant, checking that it was properly authorized by the PSP. This may be done using a MAC key shared between the PSP and the merchant, or by the PSP’s public key signature. Once the payment order has been validated, the merchant should provide the ordered goods or services to the consumer.
7. In an offline, “batch” process, the merchant deposits the payment orders and receives the funds.

Alternatively, and in particular, when the customer does not communicate directly with the PSP, but only via the merchant, then the customer can authenticate the payment approval by appending a message authenticator to it. The authenticator may be message authentication code (MAC), using a secret key shared between the PSP and the customer, or a digital signature, using the customer’s private signature key and validated using the customer’s public key. This may require dedicated payment software (*wallet*) in the customer’s computer. We discuss this issue in Section 12.5.

#### **Non-repudiation for Payment Approval**

The solutions discussed so far provide different levels of security for the payment approval from the consumer. However, they do not completely prevent fraud; hackers may guess, steal, or otherwise expose passwords and keys, email may be misrouted, hackers may expose cookies in transit, and other users of the same computer may expose keys and passwords. In particular, all of the mechanisms above are vulnerable to a software virus in the consumer’s computer or device (although many existing mobile devices may not be susceptible to viruses, due to limited functionality). Furthermore, the process depends completely on the trustworthiness of the PSP; a corrupted PSP (possibly hacked by an employee or third party) could claim that transactions were authorized, and in particular, compute any authenticators and authentication keys, as all such keys (if used at all) are also known to the PSP’s computer. Definitely, therefore, non-repudiation is not achieved. Hence, consumers may still dispute their transactions, claiming unauthorized use, rightfully or possibly to avoid payment (without justification). In ad-

dition, of course, customer may dispute a transaction claiming dissatisfaction with the service or merchandise, as discussed earlier; but we focus on disputes claiming unauthorized use.

Some micropayment systems, e.g., First Virtual [12.36], solved the remaining disputes problem simply: they automatically refunded each dispute, and in this case did not pass the funds to the merchant. In fact, to completely protect First Virtual, they simply did not pay the merchants until the dispute period expired, thereby making additional profit from the float as well as avoiding the dependency on the merchant to actually pay them back. Considering the credit card experience showing the disputes are largely due to problematic merchants and merchant practices, there is some justification to this policy. Yet, it is clearly open to abuse by consumers, and raises a substantial business risk for merchants. Indeed, one might suspect that if a payment product adopting such a fully automated refund will become widely popular, then cheating may become commonplace. We therefore focus on systems that do not automatically accept all disputes. As noted above, we discuss only disputes claiming unauthorized transactions.

Many micropayment systems take the opposite approach, and simply forbid any disputes claiming unauthorized use (and therefore, usually, any form of dispute with the PSP). Often this is done simply by requiring the customer to agree to accept the record of transactions kept by the PSP. However, in many cases this mechanism may be unacceptable and possibly even illegal, especially when consumers are not fully protected against unauthorized charges. It appears that in order to completely disallow disputes, it is highly desirable that the PSP is able to prove to a third party that the consumer actually authorized each payment. This requires *non-repudiation*.

Non-repudiation may be achieved by using digital signatures, such as RSA to sign the payment approval from the consumer computer or device to the PSP. The customer must also agree in advance that payment orders digitally signed using their private key are to be considered as signed and authorized directly by the customer. The private signing key will be installed by the customer in their signing software, service and/or device.

There is, unfortunately, one serious pragmatic problem with digitally signing payment orders by the customer's computer or device: digital signing is *not* a standard, easy-to-use feature of widely-deployed<sup>1</sup> operating systems, browsers, or mobile devices. This should be compared with the solutions in the previous section, which do not offer non-repudiation, but on the other hand, do not require any new software in the consumer's computer or mobile device, or any complex operation for a consumer wishing to use them.

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<sup>1</sup> Digital signing functionality is available in some versions of the Netscape browser, e.g. 4.04, as well as in some mobile devices.



An obvious solution is to require the consumer to install digital-signing software. Indeed, digital-signing functionality is often one of the main roles of a *wallet* utility installed on the consumer's machine. Wallets can perform other useful functions, such as payment management and logging, but their deployment is difficult and expensive. We discuss this important issue, and some possible solutions, in Section 12.5.

Another concern is that digital signing technology is relatively computationally intensive. A large amount of work on micropayment systems is focused on providing non-repudiation while minimizing or avoiding completely the use of public-key operations; see Section 12.6.

### Irreversible Transactions and “Bearer Certificates”

We now discuss the third approach for preventing disputes, which takes a somewhat radical view: Design the micropayment system in such way that it will be technically infeasible to reverse payments, rather than relying on the consumer's agreement that properly authorized (or digitally signed) payments cannot be disputed. In this approach, the micropayment system operates in such a way that the PSP would not maintain track of individual payment transactions and would therefore be *unable to reverse transactions*. This kind of payment order is often referred to as *bearer certificates*, since the payment is done by the customer passing a message to the merchant, who deposits it at the PSP, but this bearer-certificate payment-order message does not indicate the identity of the consumer [12.12, 12.1]. More specifically, a bearer-certificate payment involves two separate phases:

1. Customer “buys” bearer-certificates from PSP (payment approval or withdrawal phase).
2. Customer pays merchant by providing the bearer certificate (payment authorization phase).

The PSP does not keep records of the identity of the customer who received each bearer certificate. In some proposals, the bearer certificates are provided during withdrawal, in a “blinded” manner, that does not allow the PSP to identify which bearer certificate was sent at which withdrawal. For more details on such blinded withdrawal and digital cash, see Chapter 8. In other systems, weaker anonymity is used, and the PSP simply does not maintain the records linking from the bearer certificate to a particular customer.

Bearer certificate systems should ensure that an attacker cannot “steal” the bearer certificate in transit from the PSP to the customer, from the consumer to the merchant, or from the merchant to the PSP. When the consumer is using standard, available browser software, and the bearer certificate is forwarded to the merchant exactly as sent from the PSP, the communication may be protected by using

browser-provided encryption (usually SSL/TLS). In some cases, this may be avoided by requesting a bearer certificate specific to the requirements of this particular consumer. However, this may conflict with the requirement that bearer certificates cannot be linked to a particular consumer and purchase (to make it impossible to dispute transactions).

When the consumer uses dedicated wallet software, then the wallet may “activate” the bearer certificate it receives from the PSP. A bearer certificate that the wallet did not activate is not considered valid. Therefore, the attacker will not gain anything from a copy of the bearer certificate in transit from the PSP to the consumer. This activation may be as simple as attaching a random number  $x$  to the bearer certificate, where on payment approval the consumer provided to the PSP with the result of a cryptographic, a one-way hash function  $h(x)$  is applied to  $x$ , and the bearer certificate is linked to  $h(x)$ , e.g., by including the PSP’s signature on  $h(x)$ .

In any case, using a “bearer certificate” it should be impossible to link back from the payment order to the identity of the customer or to the withdrawal transaction in which the customer bought the bearer certificate. Therefore, the PSP simply has no way to reverse a payment done using the bearer certificate. Therefore, disputes are technically impossible. Proponents of this approach [12.12, 12.1] argue that bearer certificates are the only way to avoid disputes, since consumer-protection laws may overrule any limitations on disputes included in the agreement between the consumer and the PSP. On the other hand, using a bearer certificate, the consumer does not receive a receipt of having paid from the payment system. This could be a substantial disadvantage for some applications.

Even if bearer certificates are used, it seems that for the goal of avoiding disputes, it may be acceptable for the PSP to know the linkage between the customer and the bearer certificate at the time of the withdrawal. This seems acceptable, as long as the PSP always erases this information later and does not provide a proof of it to the consumer. Clearly, such a solution is much simpler than the techniques used for digital cash.

## 12.5 Customer Acquiring and Support Costs

Businesses often spend large amounts to acquire new customers and to retain and support existing customers. Micropayments services have very small revenues per transaction and per customer. Therefore, it is especially critical to minimize the average amortized costs of customer acquiring and support efforts. In the following sections, we discuss three techniques for minimizing costs and maximizing the number of payment transactions, together ensuring low amortized costs per transaction.

1. Enable a simple-to-use, intuitive “click and pay” mechanism for payment approval. This has the dual impact of encouraging usage (more payments) and reducing support and acquiring costs (easier to use, i.e., fewer questions, easier to sell).
2. Support customers without requiring installation of a PSP-provided and supported local wallet application. This can reduce the substantial costs of providing wallet applications and supporting them (for multiple platforms), as well as the costs of convincing customers to install the local wallets.
3. Allow interoperability among the PSPs, namely, a customer of one PSP can pay a merchant of another PSP (as shown in Fig. 12.4).

### 12.5.1 Click and Pay Using Per-Fee Links

Micropayment systems are designed for low-value transactions. As such, it is important that the user interaction will be as natural, convenient, and quick as possible – ideally, click and pay. In fact, if the customer is not willing to pay much for a product or service, they may also not be willing to waste a lot of time and energy in the payment process. An easy, convenient and fast click-and-pay process also reduces costs for customer acquiring and support. The click-and-pay payment process becomes a natural extension of the familiar web surfing interface: To buy information or service, the user just clicks on *per-fee link*, much like clicking on a normal hyperlink.

We must ensure that the user pays only intentionally, i.e., the seller cannot trick the user into pressing a per-fee link without the user being willing to pay the price charged. For example, the IBM Micro Payments system [12.17, 12.11] provides per-fee-links which appear very similar to regular hyperlinks, by adding cues for payment. Specifically, when the cursor is over the per-fee link, the shape of the cursor changes to either a dollar sign (if the amount is over a user set threshold) or a cent sign (if the amount is under the threshold). Furthermore, the exact price is indicated in message/status area of the browser (where it normally writes the URL of the hyperlink); and the customer can specify a maximal amount for “click and pay”, such that over this a pop-up box will require confirmation.

There are multiple ways for implementing per-fee links. The Web consortium developed a proposal [12.24] for per-fee-link syntax (this proposal was suspended since there were only few implementations). The proposal supported several ways for specifying and displaying per-fee-links, as <Embed>, <Applet> or <Object> elements; all of these require extensions to the standard browsers to display the per-fee-link, such as a plug-in, ActiveX control, or an applet. This requires installation of “wallet” software on the customer’s machine.

It is sometimes also possible to provide per-fee link using only a standard browser to display the price simply as added text to the link. Consider Fig. 12.2, where the communication between the customer and the merchant flows through the PSP or a gateway associated with the PSP. In such scenarios, the PSP may modify the per-fee-link on its way from the merchant to the customer, and indicate the purchase details information (in particular the price) by adding the description of the payment details as textual and/or graphical hypertext link as part of the hypertext content sent to the consumer. For example, when using HTML:

```
<A HREF="url">click here to receive the song [5cents charge]</A>
```

The price information ([5cents charge]) was inserted or validated by the payment gateway (so that the displayed amount will be identical to the charged amount). The consumer indicates agreement by simply selecting (clicking on) this link. The transformation of the page sent from the merchant is especially natural in mobile scenarios, where the mobile gateway often creates the encoding (HTML or otherwise) appropriate to the consumer's device display capabilities.

Some caution is necessary, however, when using a regular hypertext link with the price added to the textual message as shown above, to prevent a merchant from invoking payment from a seemingly free (or less expensive) link. Namely, the PSP must accept as approval only requests that result from the consumer following the link it modified; the risk is that the merchant will insert in a page sent to the consumer a link invoking the payment procedure in the PSP but different (seemingly free) text.

To avoid this threat, the PSP may filter the hypertext to remove any fraudulent per-fee links inserted by the merchant. Another technique to prevent such fraud is to customize the per-fee links, e.g., by encoding in the hypertext link (the HREF attribute) an authenticator such as  $MAC_k(\text{price}, \text{description}, \text{clientID}, \text{time}, \text{requestID})$ . The key  $k$  used in calculating the authenticator is known only to the PSP. The *price* and *description* fields ensure that the purchase conforms to what the customer approved. The *clientID*, *time* and *requestID* fields prevent the merchant from copying the authenticator field from a previous request (where *time* is used for a stateless server and *requestID* for a server who can remember states).

In addition, the gateway should validate that the page, as sent to the consumer's computer or device, does not contain script that may modify the page presented to the consumer (e.g., changing the description presented to the consumer). See [12.14] for techniques to validate that a web page is not modified by a script contained in it.

### 12.5.2 Local Wallets and Server Wallets

Acquiring customers, and helping them when they encounter difficulties, is difficult and expensive. It is difficult to convince customers to sign up with the system, open an account, and do any additional operations such as installation of a wallet (if necessary). Acquiring customers may therefore require substantial investment in the form of advertising and incentives, and even then, it usually takes substantial time to convince a small fraction of the potential customers to try the system.

When customers use the system, the costs of answering customer inquiries, which could be technical, financial, or administrative, can be significant. Customers are usually expecting financial service providers, including micropayment PSPs, to provide highly available and free customer support. The average cost per customer call is substantial and far exceeds the typical cost of micropayment transactions, not to mention the fees. These costs may exceed the thin profit margin per transaction, especially of a micropayment service provider.

Customer acquiring and support costs depend significantly on whether the customer has to install and use dedicated *local wallet* software to authorize micropayments, or whether the customer can use pre-installed, general-purpose mechanisms, such as the browser and/or e-mail utilities, with the payment functionality provided by a *wallet server* in the network. Dedicated, local-wallet software, running on the customer's computer or device, can provide better user interface and functionality, e.g., provide transaction log. Most importantly, dedicated wallet software can perform public-key digital signatures for payment orders, providing non-repudiation of the fact that that customer authorized the payment, and possibly avoiding dispute resolution and chargebacks.

However, it is important to realize that a malicious local user, or program, can often bypass local wallet software. In particular, when running insecure operating systems such as Windows, any malicious program (e.g., a virus) or any other user of the computer will be able to perform unauthorized signatures. Therefore, even a local, dedicated wallet cannot completely prevent unapproved payments.

Furthermore, it is substantially harder to motivate customers to download and install dedicated wallet software, compared to opening an account using purely pre-installed, general purpose mechanisms (e.g., a browser). Furthermore, dedicated, locally installed wallet software requires substantially more support costs, e.g., to resolve installation issues, and to support different operating systems. As a result, wallet software results in high customer acquiring and support costs, and a lower adoption rate. Another problem for local wallets is that consumers may use multiple devices and computers, e.g., at home, office, and while mobile, resulting in coordination problems between multiple wallet installations of the same consumer. Indeed, as shown in [12.19], there have been only failures so far in efforts to introduce wallet software, for micropayment as well as for credit card and other payments, and essentially all existing deployments support a wallet server.

However, a server wallet operated by the PSP has some significant drawbacks as well, in particular, in forcing the consumer to completely trust the PSP, which may necessitate dispute resolution with its associated high costs. In order to support micropayments without allowing disputes, the PSP may find it necessary to offer the customer control over the payment authorization, possibly as an option.

### **The Future: Multiple and Third-Party Wallets**

We expect that in the future, PSPs will offer their customers to either use the PSP's server wallet, in which case they agree to trust it completely, or to use local-wallet or third-party operated server wallet that provides digitally-signed payment orders to the PSP, in which case non-repudiation is achieved by the public key signature. The PSP would offer local wallet software that signs the payment orders. Alternatively, the PSP may allow the customer to use third-party provided wallets to sign the payment orders, where the third-party wallets may be local or server-based. The third parties will offer the wallets as a productivity aid and often as part of a larger money-management or personal information management software or service, e.g., as part of the services offered by a portal. If some of the operations are especially sensitive, then the PSP may even require approval by more than one of the wallets of the same customer, providing additional protection against unauthorized use (but this additional complexity is probably not necessary for micropayments). By offering customers the option of using local wallets and third-party operated wallets, the PSP should be able to avoid dispute resolution process entirely, and therefore maintain low operational costs.

In Fig. 12.7, we show such an architecture, where the PSP allows the customer to use the PSP's wallet server, a local wallet provided by the PSP, or a third-party-provided wallet server or local wallet. The customer may authorize payments from their own computer or another computer, or from any of a variety of devices (different wallet servers may support different devices). This architecture requires protocols for managing an account and authorizing transactions from multiple wallets (software agents of the consumer), ensuring that the entire log of transactions is available to one or more wallets as needed. For such protocols also supporting record aggregation, see [12.13].

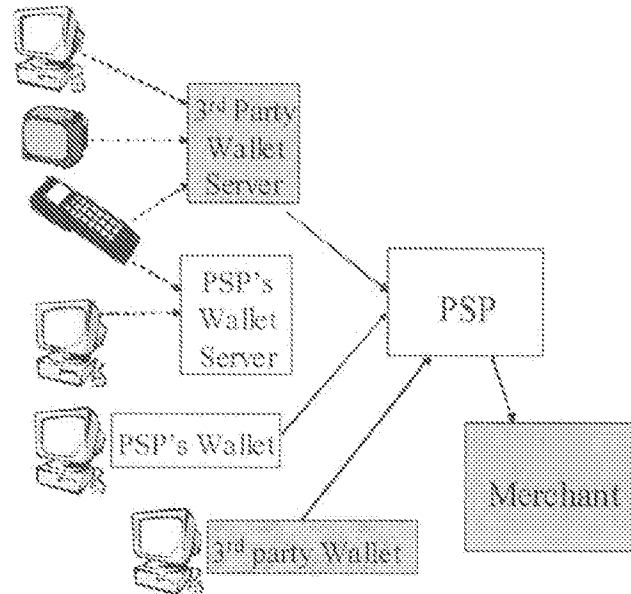


Fig. 12.7 Multiple wallets, devices, and computers for the same account

To invoke a wallet server, the merchant usually includes a link to it in the web page, with text describing the offer. It is possible for a single per-fee link to invoke one of multiple wallet servers as needed; this is achieved by the merchant including a link to a special “PSP directory” site. The PSP directory can try to detect automatically the identity of the customer’s PSP, e.g., using a cookie stored in the browser and sent automatically to the PSP directory (see Fig. 12.8).

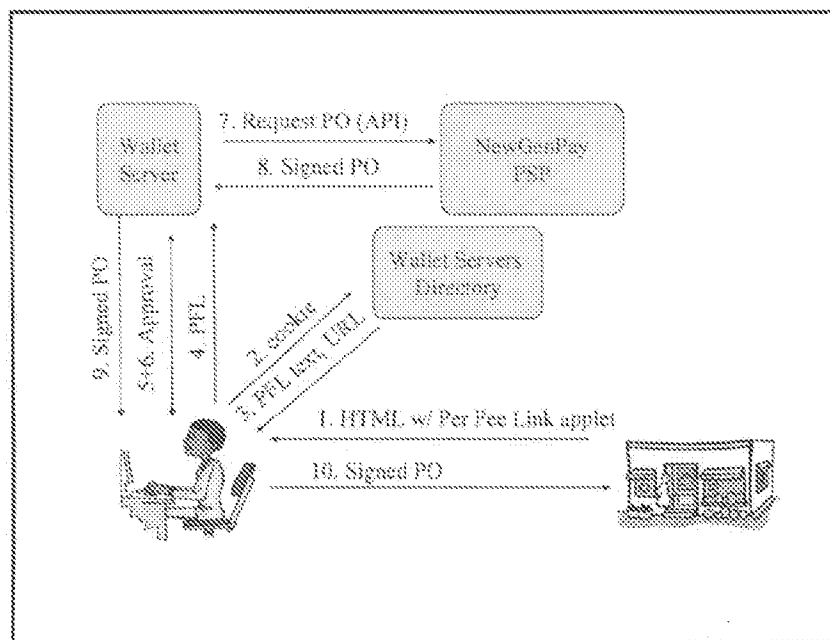


Fig. 12.8 Automated wallet server selection from directory

### 12.5.3 Building Critical Mass and Acceptability by Interoperability Among PSPs

For a micropayment system to be profitable, it is critical to have a large number of transactions, customers, and merchants. This is required both to reduce the amortized cost of fixed expenses (such as software development), and to make it easier to acquire customers and merchants (since customers and merchants prefer systems where they can transact with most merchants and customers, respectively).

Many micropayment service providers approach this problem by simply planning (or hoping) to become the dominant micropayment PSP, providing services to most customers and merchants. However, in an open, competitive market, it will probably require a very large investment in order to become the dominant PSP, and there is a substantial risk of failure to meet this goal.

An alternative approach is for multiple PSPs to cooperate, allowing customers of each PSP to pay merchants of each of the PSPs. This approach of cooperation between competitors is well established in many other areas of the modern, global economy. Indeed, there are several large networks connecting competitors and allowing them to interoperate, particularly, in payments, e.g., the credit card net-



works, clearing networks between banks, ATM networks, and others. It is therefore reasonable to expect a similar global network will handle micropayments.

It is difficult and expensive to establish trust among competitors, and even more so among many competitors. However, trust is required for allowing an interoperable payment network, where a merchant can receive a payment authorized by different PSPs. Existing, deployed payment networks handle this problem in one of two ways:

- **Centralized solution:** The payment network is “owned” by a single entity, usually called a *brand*. The brand sets up rules of operation for all the participating PSPs, possibly including technical means, such as communication protocols, and audits their operation. The recipient of payment trusts only the brand (and possibly their PSP). The major credit card systems, e.g., Visa and MasterCard, operate in this way. This solution could be appropriate for micropayments as well, if a very small number (say under five) of dominant micropayment brands would become dominant. However, substantial investment is necessary to establish a dominant brand. Such investment may not be economical for establishing a brand for micropayments where the expected fees are low.
- **Offline clearing solution:** The other approach minimizes any assumptions about global trust or organization. This is the approach normally used to deposit checks from remote, unknown banks. Namely, funds are available to the depositor (e.g., the merchant) only after the depositor’s bank has received the funds from the payer’s bank. This solution has two problems that seem to make it unsuitable for electronic payments (and in particular micropayments):
  - The merchant must wait very long to know if the payment is valid.
  - A corrupted intermediary bank (PSP) may deposit the check, receive the funds, but keep the funds to itself while claiming to the depositor that the payment was rejected. With physical checks, the merchant usually receives back the check in case of failure to prevent this attack (and for other remedies).

We conclude that, to provide interoperability among PSPs, it is desirable to ensure security without requiring global trust in all PSPs, as such, global trust will require central management and ownership (which may not exist).

### **Open, Decentralized Payment Network**

We now describe the design of open, decentralized payment network, as presented in [12.17, 12.11, 12.16]. This design is based on two principles:

- **Minimal trust requirements – only between PSP and its account owners:** All account-based payment systems require trust between the party maintaining the account (e.g., bank or PSP) and the account owner (customer, merchant, or another PSP). This trust allows the account owner to deposit money and received payment orders in the account, trusting that the PSP will properly credit the account and that the funds will be available to the account owner and used only according to the account owner's instructions. Similarly, the PSP may trust the account holder to provide funds to cover any debt due to credit payments from the account. Such direct trust between the PSP and the owners of the accounts kept by the PSP is unavoidable, on the other hand, it is relatively easy to manage, as it involves only two parties with long-term relationship. However, no other trust relationships should be required. By avoiding any 'global' trust requirements we make it easier and cheaper to manage risks and avoid fraud, thereby reducing costs.
- **Automated dispute resolution between PSP and account owners:** By specifying the exact terms for any transaction related to the account, we can completely automate the resolution of any disagreement between them.

The main mechanisms for achieving these goals are two digitally signed messages: the *payment order* and the *payment routing table* (PRT). Consider the simple scenario with two PSPs, A and B, illustrated in Fig. 12.9. In this scenario, the customer C accepts an offer (flow number 3) from the merchant M, and pays for it by sending to the merchant a payment order signed by PSP\_A (flow number 6). The merchant can immediately validate the payment order. The merchant can then deposit the payment order, as in flows 7 and 8. Deposit can be immediate or delayed; the merchant (and intermediate PSP\_B) may wait some time for possible batching with other deposits for efficiency. The immediate, local validation, without online communication by the merchant, is possible using information that the merchant received from PSP\_B in the payment routing table signed by PSP\_B, in an offline process before the purchase, in flow 2.

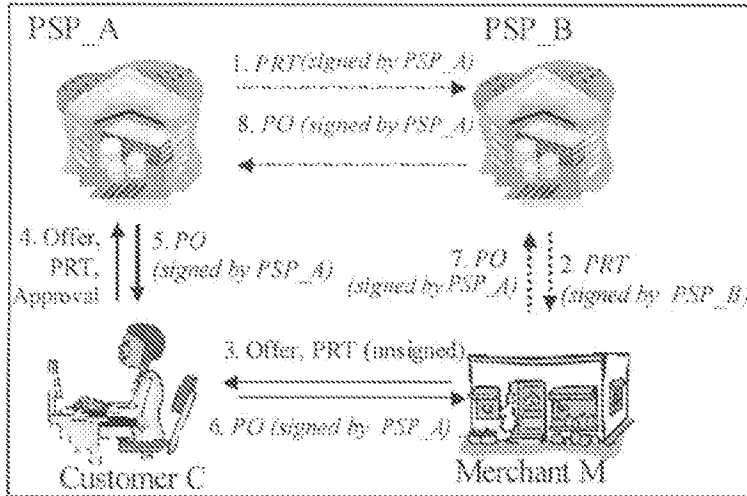


Fig. 12.9 Interoperability between two PSPs

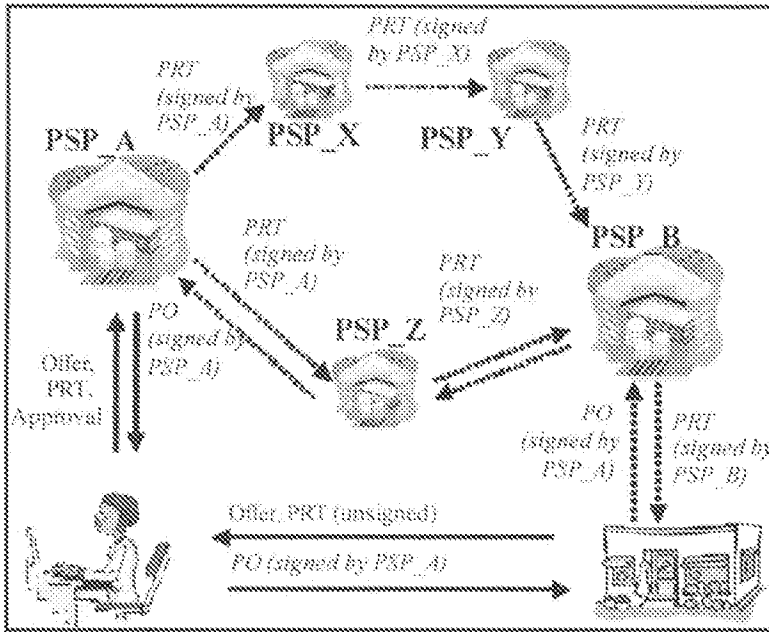


Fig. 12.10 Interoperable PSP network (example)

The payment routing table is sent in advance, e.g., daily, from each PSP to all of the entities keeping an account with this PSP and which may receive payment

orders for deposit. In Fig. 12.9, PSP\_A sends (e.g., daily) PRT to PSP\_B, and PSP\_B sends PRT to the merchant. For a more complex scenario, consider Fig. 12.10, where we show five PSPs. Normally, each PSP will send a PRT message periodically to all of its merchants and to all of the PSPs keeping an account with it (namely, to every entity that may deposit a payment in this PSP). For efficiency, a single PRT message may contain payment routing entries for multiple issuing PSPs (i.e., for payment orders issued by different PSPs).

The PRT contains all the information necessary to allow the merchant to process a payment order signed by PSP\_A. The PSP sending the PRT will always sign it with its private key (e.g., PSP\_B). Payment service providers construct their outgoing PRT messages, based on the incoming messages, and on local policies (e.g., for limiting the damage if a particular PSP does not keep its commitments, or for maximizing revenues via adjustment of fees). The PRT, signed by PSP\_B, will include the following details for every PSP from which PSP\_B agrees to receive payment orders:

1. The identity of the account holder (merchant M).
2. The public key of the PSP issuing the payment order (e.g., PSP\_A).
3. The maximal total amount of payments from this PSP allowed (until the next PRT).
4. The fees applied to deposits of payment orders from this PSP (e.g. maximum between 5 cents and 2%). The merchant receives the amount in the payment order minus these fees (no additional, “hidden” fees).
5. Minimal deposit time, in which deposits will be honored only if made before this time.
6. Acceptable proof of transmission identifies what is a sufficient proof of transmission of a message and of the time of transmission. This proof allows automated resolution of disputes on whether payments were deposited in time or expired. Typically, the proof will be either the transmission log of the PSP, or a signed receipt from one or more trusted third parties store-and-forward servers. The store-and-forward servers allow the depositor (merchant or PSP) and the PSP to resolve disputes due to failure of communication between them; as long as the total pending payments amounts are not very large, the PSP log files may be acceptable.
7. The path of PSPs through which the payment orders will be deposited. In the scenario in Fig. 12.9, this will only include the identity of PSP\_B. In the scenario in Fig. 12.10, this may include the path {PSP\_B, PSP\_Y, PSP\_X} or the path {PSP\_B, PSP\_Z}.

8. The validity period during which the PSP issuing this PRT (e.g., PSP\_B) is committed to the terms specified in it. Later deposits may not be honored, unless covered by a new PRT.
9. A unique identifier for this PRT (e.g., counter).
10. Few other technical details may be added to ensure that there are no disagreements, see [12.16].

The Payment Order (PO) contains the precise details of the payment, including:

1. The amount to be paid (and currency).
2. The path of PSP's through which this PO is to be deposited.
3. The expiration time (the issuer will not pay for the PO after this time – it will become void).
4. The identifier of the PRT that this payment is applied to.
5. The issuing time of this PSP and a serial number of PO issued at this time (for detecting replays).
6. Possibly, additional conditions on the validity of this PO, such as a hash  $h(x)$  sent by the customer, such that the payment order is valid only if the customer attaches to it the pre-image  $x$ .

The merchant also sends a (simplified) version of the PRT to the customer, and the customer may send it to her PSP (PSP\_A). This allows the customer to choose the best route (and possibly currency) to use in the payment order.

## 12.6 Equipment, Processing, and Communication Costs

In this section, we discuss schemes to reduce the cost of the equipment necessary for the micropayment system, and in particular the cost due to the processing and communication requirements. Computational and communication requirements are reasonably well defined, and minimizing them is an obvious goal, easily measured, and similar to problems of minimizing communication and processing complexities in many other algorithms. Therefore, it is not surprising that much (or most) of the academic research on micropayments has focused on minimization of processing and communication costs. However, while these techniques are of algorithmic interest, we caution that the actual impact on cost and performance

may be insignificant in many cases, as processing and communication costs are often a negligible compared to the other expenses (and delays) in the system.

Most of the efforts in reducing complexities and requirements focused on one of the following areas:

1. *Avoiding or reducing the use of public key cryptography* (digital signatures), since it is relatively computationally intensive.
2. *Allowing offline (or semi-offline) payments*, where the PSP is not involved during the process of payment (or most payments, respectively). An important form of offline payments are *stored-value payments*.

We now discuss offline (and semi-offline) payments and then techniques to avoid or reduce the use of public key cryptographic operations.

#### **12.6.1 Reducing Communication Costs – Offline (and Semi-Offline) Payments**

As discussed in Section 12.4, most micropayment systems require secure authorization of every transaction by the PSP, to assure the merchant that the payment is final and that the PSP will not refuse to pay, claiming that the customer spent more than the maximal amount allowed (overspent). Usually, this requires the PSP to authorize each payment online. In many cases, the online authorization is easy and inexpensive, as the PSP controls a gateway on the communication path between the consumer and the merchant, as in Fig. 12.2. However, in other cases, the PSP is not on the communication path; in order to involve it, the merchant must contact it (as in Fig. 12.5) or the customer must contact it (as in Fig. 12.3). This requires additional appropriate communication capabilities and capacities by the PSP and merchant or customer, in particular:

- The PSP must have sufficient capacity to handle the maximal number of concurrent payment authorization requests expected at peak time.
- Either merchant or buyer (or both) must have communication capabilities to the PSP online (during payment process). This is usually the case when paying using communication devices, such as mobile phones or computers connected to the Internet. In fact, in many applications, it is feasible and cheap to add communication capabilities to either the payer or payee (e.g., add a GSM module to a vending machine). However, there are scenarios where both payer and payee are disconnected and where it is not reasonable to require one of them to add communication capabilities, e.g., payments between two handheld devices.

In this section, we look at mechanisms for avoiding or reducing the online authorization requirements from the PSP, thereby eliminating or reducing the costs

of the communication (messages) and of the necessary communication capabilities.

Micropayment schemes are called *offline* if the PSP is *never* involved during the payment process and *semi-offline* if the PSP is involved only in few payment transactions. Both offline and semi-offline payment schemes may reduce the load on the PSP, and in particular avoid bottlenecks at peak hours. Offline payments may further allow applications where payments are between a (low-cost, mobile) device carried by the customer and a (low-cost, fixed or mobile) point-of-sale device, without any network connectivity to the PSP.

The main approaches to providing offline and semi-offline payments are:

- **No authorization:** A trivial way to avoid online authorization is not to require any authorization by the PSP at all. The risk of overspending is borne by the PSP or the merchant, depending on the agreement between them. However, this requires the PSP or merchant to cover the cost of overspending by customers, which may be an unacceptable risk and expense.
- **Random or threshold authorization:** To reduce the number of authorization requests from the PSP, while limiting the risk to the merchant of a payment being cancelled due to overspending, the merchant can decide on whether online authorization by the PSP is required for each transaction. When using randomized or threshold authorization, either the merchant or the consumer wallet can request the authorization; requesting by the merchant is more direct as the merchant decides on the need for online authorization, but requesting indirectly by the consumer's wallet allows a simple, efficient client/server design for the merchant. In early versions of IBM Micro Payments [12.11, 12.17] we used threshold authorization, where the merchant requests payment authorization from the PSP when reaching a threshold amount (of that particular transaction or of all transactions pending authorization by that buyer). However, we later changed to online authorization, since we found that its overhead is negligible, that merchant servers may spend considerable resources to keep track of total purchasing per customer, and that merchants are alarmed and confused by the possibility of unapproved payments being cancelled later. We also considered using random authorization, as proposed (independently) in Agora [12.9], where the merchant requests authorization randomly and the PSP identifies and blacklists any overspending customers. However, maintaining and distributing the blacklists may become a bottleneck and open the system to denial-of-service attacks, while on the other hand the overspending is still possible (until detected and until blacklist is updated). This, combined with the simplicity of

opening multiple micropayments accounts, makes this solution impractical.

- **Pre-authorization:** The PSP may authorize the customer payments up to a pre-defined limit to a *specific* merchant. Overspending is then limited to multiple payments to that specific merchant, which the merchant can easily detect (e.g., using sequence number). When the PSP pre-authorizes payments (up to some limit, for a given merchant), it actually delegates its authority to the customer, who provides the final payment authorization directly to the merchant or point-of-sale (e.g., vending machine). The customer may digitally sign each payment authorization, or use one of the techniques described below to authorize the payments with reduced computational requirements. Pre-authorization is a semi-offline technique, as the customer needs to request pre-authorization for each specific merchant.
- **Stored Value Payments:** Taking one-step further than pre-authorization, the PSP can avoid online authorization completely by delegating its authority to authorize payments to a *tamper-resistant module trusted by the PSP*, e.g., a smartcard provided by the PSP. The module keeps track of the spending by the consumer, and authorizes payments only as long as the customer does not overspend. In a sense, the funds (value) which the customer can legitimately spend are stored in the device; hence, the name *stored value*. Stored value solutions depend on the temper-resistance of the module, to prevent duplication of money. Tamper resistant modules seem to require hardware (there are some efforts to create tamper-proof software, by *obfuscation*, but recent negative results seem to indicate that this is difficult or impossible). This introduces significant installation costs. Even tamper-resistant hardware is often subject to attacks. Therefore, stored-value protocols should limit the damage due to exposure of the keys of a limited number of modules. To limit the damage, most stored-value systems use a different key for each module and blacklist over-spending modules (but this requires identification of over-spending modules and informing all merchants, a non-trivial undertaking). Some authors claim that stored-value payment devices have the advantage of a total limit to the value lost if the card/device is stolen and abused. However, such a limit is easy to achieve with an account-based solution, simply by setting a limit to the amounts that the customer can spend using a given key.

### 12.6.2 Reducing Computational Complexity due to Public Key Operations

As discussed in Section 12.4, non-repudiation of payment approval is highly desirable, as it can help to reduce disputes and detect consumer fraud. The main



cryptographic tool for achieving non-repudiation is public key digital signature, typically using the RSA or DSA algorithms [12.30, 12.5]. However, most public-key cryptographic mechanisms, and in particular digital signatures, are computationally intensive operations, compared to hash functions and shared-key cryptographic mechanisms. The ratios in the processing times depend, of course, on specific functions and implementations, but ratios of 100 and even substantially more are quite common. Much of the research on micropayment systems focused on reducing this computational burden by designing micropayment protocols and systems that avoid the use of public key cryptography, use only a very small number of public-key operations, or use more special, efficient public-key cryptographic mechanisms. In this section, we review some of these techniques.

We comment, however, that while the goal of avoiding or minimizing the use of (computationally intensive) public-key operations is natural and interesting, the actual cost of their processing time may be negligible compared to other costs and overheads in a practical micropayment system. The computation of an RSA digital signature [12.30], on typical desktop machines, takes only very few milliseconds; validation usually takes even less (when a small public exponent is used). The DSA algorithm [12.5] is about as efficient (but with computation faster than validation). Hardware accelerators can further substantially reduce the overhead. Therefore, it seems that for most realistic micropayment applications, computation, and validation of a digital signature on the payment order is not a significant cost factor. We therefore believe that techniques to avoid or reduce the use of public key operations and, in particular, of digital signatures and their validation, should only be used in special circumstances, and only when they do not result in a more substantial increase in other expenses. For example, a situation where it may be important to avoid digital signatures by the buyer is when the buyer is using inexpensive mobile devices for payments, such as a key-chain gadget or smart card.

The main techniques for avoiding or minimizing the computational burden due to public-key cryptographic operations are:

- Use authentication mechanisms that do not provide non-repudiation, such as (shared-key) message authentication code (MAC). This is appropriate between two parties with a long-term relationship, such as customer and their PSP or merchant and their PSP, and as long as the total amounts are not too high. However, this is not recommended between two parties with a sporadic, ad-hoc relationship, such as customer and merchant, or when the total amounts become larger than the value of the relationship. The possible savings in computation time may become smaller than the added risks and operational costs due to dispute resolution and customer support. Proposals for micropayment systems using MAC instead of digital signatures include NetBill [12.4] and MilliCent [12.23, 12.8].

- Use public-key signature algorithm that is substantially more efficient than [12.30] or [12.5]. There were several proposals of significantly more efficient public-key signature schemes, e.g., [12.31]. However, none of these schemes has yet gained sufficient adoption, and the amount of cryptanalysis effort to break them are, so far, limited, therefore their use is not recommended for sensitive and high-value signatures or where it may lead to disputes.
- Use an online/offline signature scheme as proposed in [12.7]. With these schemes, the payment is signed (online) using a one-time (or limited-use) public key digital signature scheme, which is substantially more efficient than regular, unlimited use public key signature schemes such as [12.30] and [12.5]. The public-key of the one-time scheme is signed in advanced (offline), using a regular digital signature scheme. This reduces the number of computations required online (during the payment process). By using an appropriate limited-use scheme, it may also be possible to reduce the average computational load. These schemes are easily adopted for semi-offline payments where the PSP pre-authorizes the one-time signature scheme for a particular merchant and a specific maximal amount, and the consumer applies the one-time signature to authorize a specific amount (up to the maximal).
- Use one-way hash functions, which are much more efficient than public-key signatures. These techniques fall into the following two categories:
  - *Hash chains and Hash trees*: this technique uses digital signatures for non-repudiation, but only once for multiple purchases between the same customer and merchant. Often, all purchases must be of the same amount. The customer or PSP digitally signs one (pre-) authorized payment order for the merchant, which the customer uses to authorize multiple purchases. We can therefore use this technique for semi-offline pre-authorized payments, where the PSP pre-authorizes the payment and the customer provides the final authorization. The (pre-)authorized, signed payment order includes a value  $y$ , which is the result of repeatedly applying  $l$  times a one-way hash function  $h$  to randomly chosen seed  $x$ . Namely,  $y=h^{(l)}(x)$ . The signature also includes a monetary value per pre-image, say  $c$ . To pay  $ic$  (e.g.,  $i$  cents, when  $c$  is declared to equal one cent), the customer sends the authorized payment order together with a value  $x_i$  such that  $y=h^{(i)}(x_i)$ , namely,  $y$  is the result of applying  $i$  times the one-way hash function  $h$  to the value  $x_i$ . As long as  $i \leq l$  it is very easy for the customer to compute this since he knows  $x$ . Therefore, repeated payments of the same amounts to the same merchant require only few computations from consumer and seller. This scheme is useful when the consumer buys repeatedly from the same merchant (and usually for the same amounts). Proposals based on hash chains include PayWord [12.29],

micro-iKP [12.15] and others. Some variants use the natural extension of the hash-chain idea into a *hash-tree*, e.g., [12.18], for improved performance and flexibility.

- *MicroMint* [12.29]: This scheme is unique in requiring the PSP to perform a “hard” cryptographic operation, i.e., an operation that is assumed to require huge computational resources, but is easy to verify. This is justified by performing many such operations together, which is substantially more efficient *per operation* than performing only a single “hard” operation or relatively few operations, as can be expected of an attacker. Rivest and Shamir [12.29] suggest as “hard” operation to find a *k-way collision* for a collision-resistant hash functions, namely, values  $(x_1, x_2, \dots, x_k)$  such that  $h(x_1)=h(x_2)=\dots=h(x_k)=y$ . It is easy to see that, indeed, if searching for collisions by exhaustive search, the overhead *per each k-way collision* is much smaller if a large number of collisions are collected together. The scheme has several variants, including identifying the buyer and possibly even the seller (e.g., by producing only strings where specific bits are the buyer/seller identity), non-repudiation (e.g., by signing a common prefix to all produced coins), and others.
- Probabilistic payments: This is another hybrid technique, where the merchant receives one signed payment order for a substantial maximal amount, but with additional messages defining the actual amount paid, thereby allowing the same pre-authorized payment to be used for many micropayments. However, in this case, the micropayments are not done by gradually increasing the value (as with hash trees), but by gradually raising the *probability* of payment of the maximal (total) amount. Therefore, each micropayment is done by increasing the expected value that the merchant will receive – but the amount that the merchant actually receives is always either zero or the maximal amount. See such techniques in [12.26, 12.22].

## 12.7 Summary

When the buyer and seller are in physical proximity, it is easy to pay small amounts (micropayments) using cash. There is a substantial number of such transactions, however their total value and importance is quite limited. However, remote micropayments, over a network, are an important challenge. On the one hand, we cannot physically transfer cash (or other object); and alternative existing payment mechanisms involve substantial fees, impractical for small amounts. On the other hand, there are critical needs in e-commerce for micropayments, in particular to pay for information, evaluations and services.

There have been many efforts to enable micropayments, however none has succeeded yet. To understand what makes micropayments so difficult, we reviewed the cost factors involved in payment transactions. Most of the research on micropayments focused on reducing processing costs, and in particular, avoiding the use of (computationally intensive) public key operations; we discussed some of the techniques, but also noted that in reality, the processing costs of (reasonably-efficient) implementations are not one of the most significant cost factors, even when using public key signatures.

The two most important cost factors, in practice, are (1) disputes, charge-backs and their processing, and (2) customer acquiring and support. The best way to deal with disputed micropayments is by providing secure payment authorization, and refusing to reverse the (properly-authorized) micropayments. We discussed some of the challenges of this approach, including legal and marketing issues which are beyond the scope of this work.

Finally, we discussed ways to minimize customer acquiring and support costs. We argue that these costs could be minimized in one of two opposing approaches: (1) having one or two dominant providers of micropayment services, reducing competition and associated expenses while allowing relatively high profit margins, or (2) cooperation in a network of many interoperable micropayment service providers, using appropriate secure protocols. We presented the principles of an appropriate protocol for interoperability between competing micropayment providers.

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## 13 Industrial E-Payment Systems and Solutions\*

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### 13.1 Introduction

As e-commerce over the Internet is taking off, online payment (or e-payment) has become an essential piece of the e-commerce puzzle. To support e-commerce, a variety of industrial e-payment systems and solutions have been developed and deployed in many countries. These e-payment systems and solutions enable transactions for people to trade goods or services for money. It is not our desire to cover the entire e-payment industry in a single chapter. Rather, we prefer to select a few e-payment solutions and introduce them to the readers as real-life e-payment examples, or, to some extent, as e-payment case studies. In this chapter, we select three e-payment solutions for discussion, including Visa Cash, iPIN, and PayPal. For each of them, we describe design goals, features, functions, and security mechanisms. In addition, in the appendices of the chapter, based on the available information, we selectively present the architecture of these payment systems.

### 13.2 Visa Cash

Visa Cash is the first e-payment system and solution that we have chosen for discussion [13.1]. The reason for selecting Visa Cash is that it is a global brand.

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Visa Cash is an electronic purse. It is a card that works like cash. A microchip is embedded in each card to store a specific amount of money and do some cryptography calculation. The Visa Cash system is a secure application module (SAM)-based system. With Visa Cash, one can pay for everyday necessities without having to carry around a pocket full of change. It is a fast, easy, convenient method of payment, which can be used for small purchases such as pay phones, cinema tickets, parking machines, or public transportation. Visa Cash can be used either in the real world or in cyberspace over the Internet.

Since its launch in 1995, Visa Cash has been widely used worldwide, including Argentina, Australia, Brazil, Canada, Columbia, Hong Kong, Ireland, Israel, Japan, Mexico, Norway, Puerto Rico, Russia, Spain, Taiwan, the UK, and the US.

### 13.2.1 Design Goals of Visa Cash

The design goals of Visa Cash are:

- Provide a payment product that is more convenient than cash, particularly in small-value transactions.
- Support a multi-currency capability and currency exchange.
- Supporting multi-applications on a single Visa Cash card.
- Offer similar convenience to cardholders wherever they are, traveling around the world or staying at home.
- Offer merchants a means to serve both domestic and traveling cardholders for the payments.
- Enable card issuers and acquirers to offer internationally acceptable electronic-purse services to cardholders and merchants.
- Work consistently within the existing financial environment.

### 13.2.2 Features of Visa Cash

Visa Cash has the following features:

- Easy to use:  
To use a Visa Cash card, one can simply insert it into the merchant's Visa Cash card reader. Visa Cash card's current balance will be displayed to let the cardholder know in advance how much Visa Cash they have to spend. The cashier will enter the amount of the transaction which is displayed to the cardholder. When the cardholder presses the "accept" button on the card reader, the amount of the purchase is automatically deducted from the Visa Cash card balance. The Visa Cash card's new card balance is then displayed.



- **Anonymous:**  
Compared with a Visa credit card, Visa Cash provides anonymity by not requiring the user's ID at the time of payment.
- **Flexible card types:**  
Visa Cash provides two types of cards, namely, disposable cards and reloadable cards. Disposable cards are loaded with a predefined value. They come in denominations of local currency, and make use of low-cost memory cards to store Visa Cash money. When the value stored in a card is used up, one can discard the card and purchase a new card. A reloadable card comes without a predefined value. This type of card can be loaded with value through specially configured devices, such as ATMs and other load devices. When the value is used up, the cardholder can reload the card. In terms of implementation, these two types of cards can be implemented based on either a proprietary or an open platform.
- **Wireless supports:**  
Visa Cash cards can be loaded through GSM networks.

### 13.2.3 Functions of Visa Cash

Visa Cash cards provide convenient and fast means for the cardholders and enable them to always have exact change. The cardholders can perform the following functions:

- Load: transfer money from a bank account to the Visa Cash card,
- Unload: the inversion of load,
- Currency exchange,
- Purchase,
- Purchase reversal,
- Incremental purchase,
- Cancel last purchase,
- Personalization: storing some personal information,
- On-line updates to the card application data.

Visa Cash can be used in many places, such as quick-serve restaurants, convenience stores, vending machines, gas stations, transportation, sundries stores, cinemas, newsstands, parking garages, grocery stores, department stores, taxis, parking meters, cafeterias, and video stores.

The most successful application of Visa Cash may be electronic tickets for the public transportation systems of Madrid and Barcelona, Spain. In these cities, Visa Cash is not only used in the public transportation system, but also used for car

parking, public telephones, etc. Up to now, there have been at least 50 million Visa Cash cards issued in Spain.

#### 13.2.4 Security of Visa Cash

The security of Visa Cash is based on the tamper-resistant property of smart cards. The security requirement is mainly authentication between each party in a Visa Cash system. In offline transactions, the smart card and merchant's terminal must perform mutual authentication using asymmetric cryptography. The authentication is a type of dynamic authentication (challenge/response).

In order to authenticate a smart card, it must be loaded with the following keys:

- Symmetric MAC (message authentication code) key,
- Card secret key,
- Card public key certified by the issuer with their private key,
- Issuer public key certified by a certification authority with their private key,
- Certification authority public key.

In order to authenticate the merchant's terminal, the terminal must be loaded with the following keys:

- PSAM (purchase secure application module) secret key,
- PSAM message authentication codes (MAC keys),
- PSAM public key certified by the acquirer with its private key,
- Acquirer public key certified by a certification authority (the same certification authority as that of the card) with its private key,
- Certification authority public key.

These keys stored in smart cards and merchant's terminals are protected by a hardware-security module. There are multiple certification authorities (CA) in the Visa Cash system and they are organized into different levels (international level, country, or region level).

#### 13.2.5 Architecture and Workflow of Visa Cash

Participants in a Visa Cash system include: (1) the cardholder who holds a Visa Cash card; (2) the merchant whose terminal contains a card reader to read the user's card and a SAM smart card, to execute a transaction and to receive the transferred cash value; (3) the acquirer who collects and possibly aggregates transactions from several purchase devices for delivery to one or more system operators; (4) the card issuer who is responsible for the provision and distribution

of integrated circuit cards, and who also authenticates load requests and transaction records, and provides cardholders with customer services. In addition, there may be a load acquirer through whom a load transaction and currency exchange transaction is initiated.

The typical workflows of a Visa Cash system include generic load transaction, processing a transaction between a cardholder and a merchant, and clearance. The descriptions for each of these three workflows follow.

#### Workflow for Generic Load Transaction

In this transaction, the cardholder loads money to the Visa Cash card from a linked account. The linked account is the cardholder's account at the card insurer.

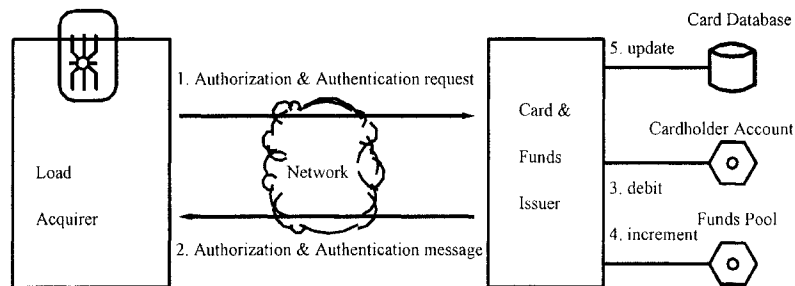


Fig. 13.1 Load workflow

- (1) The load acquirer sends a combined authorization and authentication request to the card-and-funds issuer via the network.
- (2) The card-and-funds issuer sends the positive combined authorization and authentication message to the load acquirer via the network. The electronic purse card is loaded.
- (3) The card-and-funds issuer debits the cardholder account.
- (4) Increments the funds pool of the currency loaded.
- (5) The card-and-funds issuer updates the card database.

#### Transaction Workflow between a Cardholder and a Merchant

The cardholder places their Visa Cash card into the merchant's card reader. Then the Visa Card and the merchant's purchase secure application modules (PSAM) interact as follows (see Fig. 13.2):

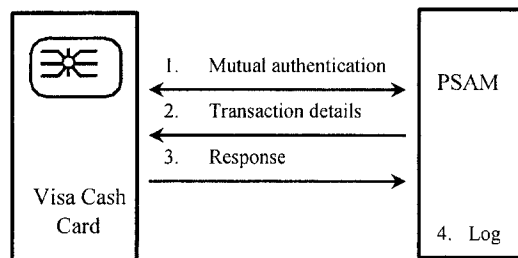


Fig. 13.2 Offline transaction workflow

- (1) Mutual authentication to ensure that the Visa Card is valid and the PSAM is not a fraud.
- (2) PSAM constructs the correct cryptographic details about the transaction and sends the details to the customer's card to activate the Visa Cash card to do the transaction.
- (3) Visa Cash card sends a response to the PSAM and the PSAM verifies the response from the Visa Cash card to ensure that funds were deducted.
- (4) PSAM produces the transaction log entry.

**Workflow for Clearance and Settlement**

The offline transaction between the cardholder and merchant has been done. The merchant wants to get back the money that the cardholder paid (see Fig. 13.3).

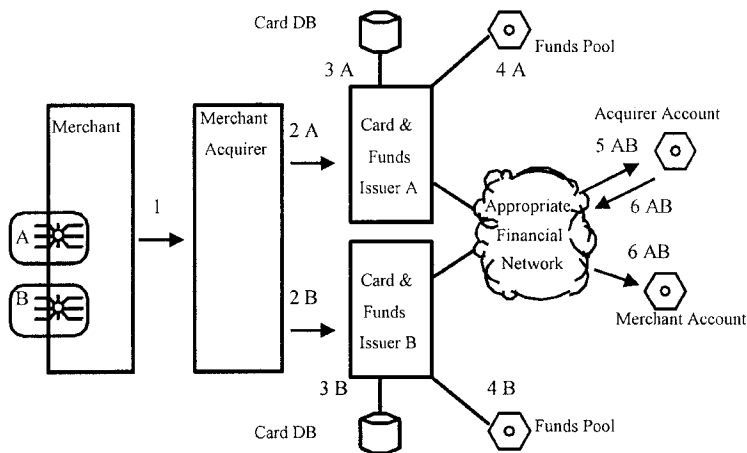


Fig. 13.3 Clearance and settlement workflow

- (1) The merchant sends the transactions to the merchant acquirer.

- (2) The merchant acquirer sends the transactions to the card issuer via the respective networks.
- (3) The card issuer updates their card databases.
- (4) The card issuer's funds pool of the transaction currency is decremented and the merchant acquirer's account is credited via the respective networks.
- (5) The merchant acquirer's account is debited through the appropriate financial network.
- (6) The merchant's account is credited through the appropriate financial network.

### **13.3 iPIN E-Payment**

iPIN is an e-payments company headquartered in Northern California's "Silicon Valley" [13.2]. It also has offices in North America, Europe, and Asia. iPIN provides e-payment solutions for Web and wireless purchase transactions. It also offers e-payment solutions to telecommunications operators, financial institutions, automotive OEMs, and ISPs who want to provide their consumers with choices in paying for digital and hard goods across access devices, alternative payment options, and multiple networks and standards. We chose iPIN as the second example for e-payment systems and solutions because it is a premier provider of e-payment software worldwide, and because it has experience in the banking, credit card, telecommunications, software, and Internet industries.

#### **13.3.1 Design Goals of iPIN**

The iPIN e-payment solution is a platform to support payment across vertical markets in both the virtual and physical world. With iPIN, banks, telecommunications companies, and other partners can offer their customers the next generation of online and wireless payment products. Consumers can make payments for their purchases from any Internet-enabled device by selecting the payment method. For example, the consumers can make their payment by direct debit, credit cards, or prepaid cards.

By authorizing companies to take advantage of iPIN e-payment solutions, customers can now build their own payment networks, interconnect with industry leaders and merchants across the globe, or simply make their existing e-commerce and m-commerce initiatives more productive.

### 13.3.2 iPIN E-Payment Features

The features of the iPIN e-payment solution include:

- The ability to support multiple access devices: handsets (wireless devices), personal digital assistants, and Internet appliances.
- Multiple payment options enabled by iPIN's multiple payment instrument (MPI) module. An electronic MPI is similar to a physical wallet in that the consumers can select from several options in their billfold, i.e., debit cards, credit cards, stored value cards, etc., to make purchases.
- The iPIN e-payment solution is able to operate interchangeably across global networks and standards.
- The iPIN e-payments solution can be adapted to fit customers' needs by plugging into one of the add-on iPIN e-payment modules. In addition, business rules and security measures can be customized to meet specific requirements. The modular applications allow iPIN to more closely match customers' needs.

### 13.3.3 iPIN E-Payment Functions

iPIN e-payment provides the following functions:

- Account management: users are able to view their transaction history and change their security settings.
- Person-to-person payment (P2P).
- Payment with direct debit account.
- Payment with pre-paid/stored value.
- Bill aggregation.
- Exceptions processing.
- Sales and remittance reporting.
- Payment with any Internet-enabled PC, PDA, or mobile phone.
- Roaming freedom: layered authentication allows users to cross devices anytime, anywhere.

### 13.3.4 Security of iPIN

The security of iPIN e-Payment includes the following components:

- Data segregation:  
When a consumer initiates a purchase, they are redirected to the iPIN e-payment solution platform residing behind the partner's firewall for

authentication, account selection, and authorization. Once authorized, the partner sends an authorization message to the merchant.

- Message integrity:  
All messaging between consumers, merchants, and partners is digitally signed using private keys, and encrypted using SSL.
- Authorization timeouts.
- Anti-robot and anti-spoof mechanisms.
- Transaction and spending limits.
- Non-payment account suspension.

The iPIN security mechanism is scalable. The customers using the iPIN e-payment solution are able to select the level of the security that is required as well as the method that will be used in the purchase. For example, in the purchase authentication, the iPIN payment platform may simply read the terminal ID for a US\$ 0.50 purchase of information to be placed against a monthly bill, and require no other form of authentication. At the other end of the spectrum, a \$150 purchase could be authorized against a private credit line or a checking account that may require the customer to authenticate via a digital certificate, a biometric parameter, password, and/or secret questions and answers.

Using the standard implementation of the iPIN security system, the sensitive account information is never electronically transmitted to the merchant when making a purchase, so iPIN customers are assured of the end-consumers' security.

### 13.3.5 Architecture and Workflow of iPIN

The iPIN e-payment architecture shown in Fig. 13.4 is comprised of the following components:

- Transaction acquisition,
- Transaction processing and real-time accounting,
- Clearing and settlement,
- Customer and merchant care.

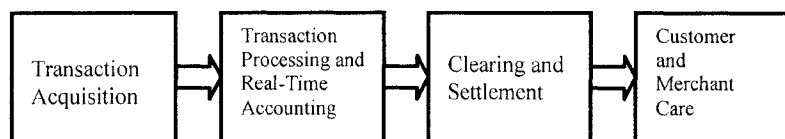


Fig. 13.4 iPIN e-payment function and architecture

### Transaction Acquisition

The transaction acquisition allows the secure capture and authorization of a user transaction across multiple electronic channels. The functions include (see Fig. 13.5):

- Transaction authorization and confirmation,
- Multi-level user authentication,
- Transaction connectivity and routing.

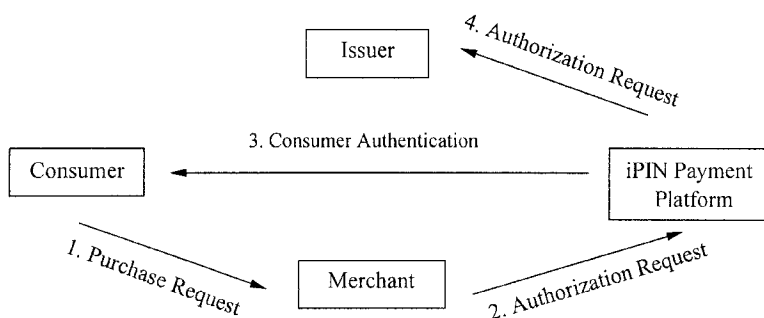


Fig. 13.5 Transaction acquisition

### Transaction Processing and Real-Time Accounting

The functions of this component include transaction accounting, consolidation, revenue sharing, and transaction fee calculation and reporting (see Fig. 13.6).

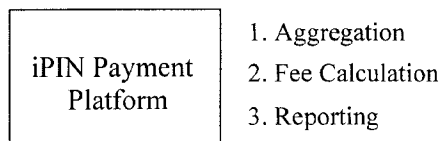


Fig. 13.6 Transaction processing and real-time accounting

### Clearing and Settlement

This component facilitates the management of accounts receivable, accounts payable, and general ledger interfaces to financial systems. It includes the following four interfaces (see Fig. 13.7):



- Interface for accounts receivable and accounts payable,
- Interface to treasury management,
- Interface to financial management,
- Interface to settlement network.

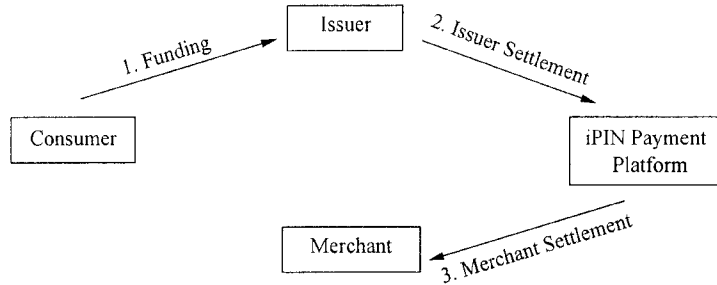


Fig. 13.7 Clearance and settlement

**Customer and Merchant Care**

This component provides the following tools about which the customer and merchant care (see Fig. 13.8):

- iPIN customer tools:  
Administrative tools, activity reporting, customer support.
- End-consumer tools:  
Payment panel, account management, and self-care.
- Merchant tools:  
Activity reporting, exception, and dispute handling.

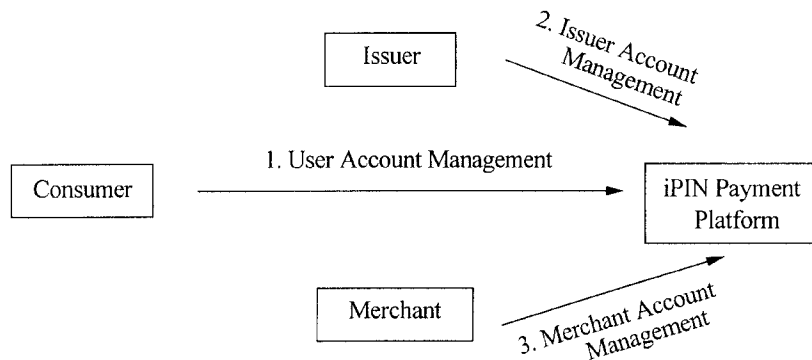


Fig. 13.8 Customer and merchant care

### **13.4 PayPal**

PayPal is designed for handling payments and money transfers for small businesses, online merchants, individuals, and others currently poorly served by traditional payment mechanisms. The PayPal network extends the existing financial infrastructure of bank accounts and credit cards and creates a global payment solution. PayPal enables any business or consumer with an email address to securely, conveniently, and cost-effectively send and receive these payments. Any business or consumer with an email address can send and receive payments online instantly.

Paypal is now offering services to users in 38 countries including the US. It has over 16 million registered users, including more than 3 million business accounts.

#### **13.4.1 Design Goals of PayPal**

##### **E-Commerce Services for Businesses and Individuals**

PayPal [13.3] enables quick and easy payment processing for websites, classified ads, auction sites, and email (i.e., anywhere a person wants to collect payments online). PayPal supports the following functionality:

- Accept credit card and/or bank account payments for single or multiple item purchases.
- Sell products to PayPal users in 38 countries outside the US.
- Collect subscription or recurring payments.
- Gather donations or “tips.”
- Get instant notification when you receive payments.

##### **Online Auction Services**

PayPal also supports online auction services. One can

- Insert PayPal logos into any number of listings automatically.
- Notify winning bidders instantly.

##### **Person-to-Person Payment Services**

PayPal makes person-to-person payment easy without the headache of the traditional person-to-person payment process involving checks, stamps, and envelopes. With PayPal one can:

- send money online from a credit card or bank account,
- request money from an individual or group,
- use a virtual debit card for safe and easy online shopping.

#### **13.4.2 Features of PayPal**

Paypal has the following features:

- Three types of accounts:  
PayPal offers three types of accounts according to the different needs. These are personal, premier, and business accounts.
- No service fee or low service fee:  
For a personal account, sending money and receiving money is free. For premier and business accounts, sending money is free of charge, while for receiving money the fee is very low.
- The PayPal VISA credit card account will be governed by the Providian, which protects customer privacy and handles customer information in a secure and confidential manner.
- It allows customers to pay anyone who has an email address.
- Over 33,000 websites accepted PayPal at the time of writing.

#### **13.4.3 Functions of PayPal**

There are two main functions in the PayPal system, namely, “send money” and “request money.”

##### **Send Money**

“Send Money” allows the customer to pay anyone who has an email address. One can make the payment by just entering the recipient’s email address and the amount that one wishes to send. The payment can be made either using a credit card or through a checking account.

##### **Request Money**

“Request Money” offers the customer an organized method to request and track funds. To send an auction invoice or a personal bill, one just needs to enter the recipient’s email address and the amount that one wishes to request.

#### **13.4.4 Security of PayPal**

PayPal stores credit card and bank account information only in encrypted form on computers that are not connected to the Internet. PayPal restricts access to the customer's personally identifiable information to employees who need to know that information in order to provide products or services to the customer.

##### **Secure Web Sites**

When customers log into their PayPal accounts, customers will always be on a secure web site. Whenever entering sensitive personal information (such as checking account or credit card numbers) onto the secure web site, the web site encrypts the information that the customer sends to and receives from the site.

##### **Data Security and Encryption**

PayPal automatically encrypts the confidential information in transit from the customer computer to PayPal using the secure sockets layer protocol (SSL) with an encryption key length of 128 bits. Before a customer even registers or logs on the PayPal site, the server checks that the customer is using an approved browser, that is, one that uses SSL 3.0 or higher. Once the customer information reaches PayPal, it resides on a server that is secured both physically and electronically. The servers sit behind a secure firewall and are not directly connected to the Internet, so that the customer's private information is accessible only to the authorized computers.

##### **PayPal's Identity Verification System**

Verification provides the customer with some more information about the people with whom the customer transacts through PayPal, so that the customer may make more informed decisions.

There are several ways to take advantage of PayPal's verification process and decrease customer-fraud risks:

- When the customer receives a payment:  
After logging into the customer's account, the customer can go to the "History" sub tab of the "My Account" tab, find the payment in question and choose the status link (e.g., "Pending") in the Status column. This will take the customer to a payment details page. Next to the sender's name, the customer will find their verification status (verified, unverified, or international).
- When the customer sends a payment:

As the customer is sending a payment, on the "Send Money: check the details of your payment" page, a reputation link is provided where the customer may view the recipient's status (verified, unverified, or international).

**Additional Verification**

If PayPal cannot verify the information that the customer provides, or if the customer requests a withdrawal by check to an address other than the customer-verified credit card billing address, PayPal asks the customer to send additional information to PayPal by fax (such as the customer's driver's license, credit card statement, and/or a recent utility bill or other information linking the customer to the applicable address), or to answer additional questions online to help verify the customer's information.

**13.4.5 Architecture and Workflow of PayPal**

**Workflow of PayPal Email Payments**

The PayPal email payments system allows the user to send money instantly and securely to anyone with an email address. The workflow of PayPal email payments is shown in Fig. 13.9. The description of the workflow is as follows:

- (1) The payer signs up and enters bank account information, the payee's address, and the dollar amount to PayPal.
- (2) The payment is transferred from the payer account to the payee account.
- (3) The payee gets an email notification with a link.
- (4) The payee follows the link to sign up.
- (5) The payee withdraws money or mails it to others.

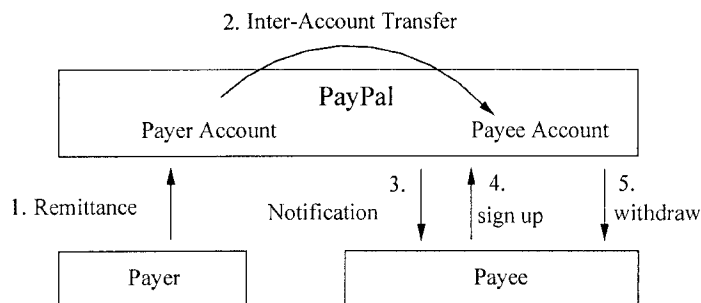


Fig. 13.9 Workflow of PayPal email payments

### Workflow of PayPal Mobile Home Banking

Paypal mobile home banking allows peer-to-peer payments via wireless PDAs or web phones and allows money to be transferred from a credit card account to the recipient's PayPal account. The workflow of PayPal mobile home banking is shown in Fig. 13.10.

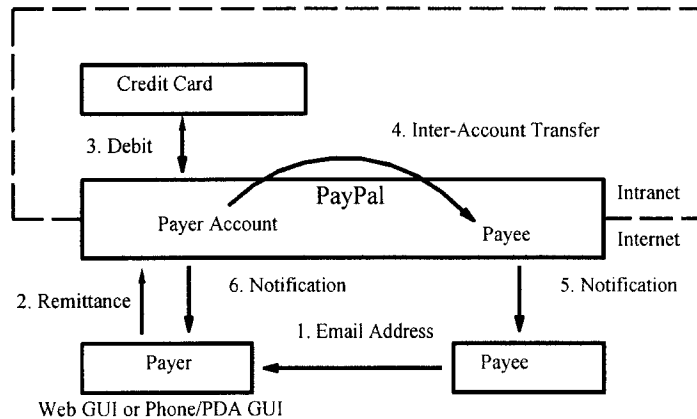


Fig. 13.10 Workflow of PayPal mobile home banking

The description of the workflow in Fig. 13.10 is as follows:

- (1) The payee sends the payee's email address to the payer.
- (2) The payer signs up and enters the credit card (or bank account) information, the payee's address, and the dollar amount to PayPal.
- (3) Using the credit card, the payment is deducted from the payer's credit card.
- (4) The payment is deducted from the payer's PayPal account and the payment is credited to the payee's PayPal account.
- (5) The payee receives an email notification.
- (6) The payer receives an email notification.

### 13.5 Summary

In this chapter, we have discussed three e-payment solutions: Visa Cash, iPIN, and PayPal. Visa Cash is an electronic purse, and it belongs in the digital cash payment category. iPIN provides e-payment solutions for Web and wireless purchase transactions. It supports various payment methods. For example, with

iPIN e-Payment solutions, the consumers can make their payments by direct debit, credit card, or prepaid card. PayPal conducts payments through email. With PayPal, any business or consumer with an email address can send and receive payments online instantly.

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## **14 Challenges and Opportunities in E-Payment**

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### **14.1 E-Commerce Challenges: E-Payment Security and Privacy**

The rapid growth of online business transactions indicates that e-commerce over the Internet is an irreversible trend. Based on various reports from leading international consulting firms such as Forrester Research and International Data Corporation, it is predicted that B2B e-commerce will be worth as much as 7 trillion of US dollars in a few years, and B2C will also be worth over hundreds of billions of US dollars in the United States alone.

Although e-commerce has huge potential, there are challenges for people in adopting e-commerce in their daily life. For example, in Hong Kong it was found that only 4% of Hong Kong Internet users bought goods or services or traded securities online, according to a recent survey conducted by the Census and Statistics Department of Hong Kong. In the United States, according to E-Stats released by the Department of Commerce, retail e-sales were \$10 billion US dollars in the fourth quarter of 2001, about 1.2% of total retail sales in that quarter. In Europe, according to Datamonitor, the size of the European online market in 2001 is about \$3.23 billion US dollars.

What are the barriers that prevent e-commerce from reaching the mass market? A recent survey report shows that payment security is a major concern for online shopping. Consumers are not willing to expose their credit card numbers online if they are not certain whether the numbers are securely transferred and saved.

Another important issue is privacy. Currently, online merchants usually require consumers to fill in detailed private information, including address and credit card information. Consumers do not like to have their shopping activities easily traceable. Consumers want easy access to premium content without the hassle of disclosing personal credit card information to unknown sites, or going through a tedious registration and authorization process.



A recent survey on merchants shows that they are concerned that B2C e-commerce may not be cost-effective if there are not enough Internet buyers and that the cost of setting up and operating a payment-enabled Web storefront is high. These concerns contribute to the slow growth of online merchants.

In fact, both consumers and merchants face one common problem from different perspectives, that is, the lack of a secure, reliable, cost-effective, and easy-to-use online payment solution. There are some electronic payment systems for B2C e-commerce commercially available. These systems are not flexible enough to handle different payment methods. Some systems have captured the US market share, and some have captured small segments of the European and Asian markets. However, until now none of these payment systems has been able to achieve the critical mass required for B2C e-commerce to take off across the entire globe.

#### **14.2 E-Payment Systems Supporting Multiple Payment Methods**

By analyzing the current business problems in B2C e-commerce, it is found that these problems can be looked at from the three participants' perspectives:

- Consumers' concern about privacy, payment security, and convenience.
- Merchants' concern about the number of online buyers, payment options, and high cost of setting up payment-enabled Web storefronts.
- E-payment service providers face the problem of not having enough consumers and merchants.

To address these problems and meet the challenges of e-commerce, there is a need to develop an e-payment system that supports multiple payment methods including credit/debit cards, prepaid cards, and a variety of smart cards. It also supports payment through an account with a telephone company or an ISP.

Through this e-payment system, the above problems are addressed from three perspectives:

- From the consumers' perspective, to enhance payment security and provide multiple payment options, such an e-payment system should include a strong privacy protection mechanism. This will increase consumers' confidence in online shopping and payment.
- On the merchants' side, through the multiple payment options, merchants will be exposed to more Internet users thus enlarging their customer base. Consumers will also benefit from a large merchant network.

- With multiple payment options, strong security, and proper privacy protection, payment service providers will benefit from increased numbers of online consumers and merchants.

One of the key requirements of the e-payment system is to provide a privacy protection mechanism. To ensure the protection of consumers' privacy, a secure scheme should be included in the system to protect consumers' privacy and anonymity in e-commerce. The system can be designed in such a way that no single party knows the details of the entire shopping transaction. The transaction can be traced only if three parties (the merchant, the payment gateway, and the payment service provider) are working together under a court order. The idea is that the merchant does not have to know the customer identity; the merchant does not need to access any account information that is private to the customer; the bank does not need to know the order information to authorize the payment from the customer's account as long as the customer has enough money to cover the transaction.

The privacy protection scheme is based on blind signature techniques. A blind signature is a regular digital signature with the following features:

- The signatory does not know the content of the message that they are signing, as the message has been blinded before reaching them.
- From the signed blinded message, the signature on the message can be recovered by the party who blinded the message in the first place.
- After the message and the signature are revealed to the public, the signature can be verified, but the signatory cannot trace who blinded the message in the first place.

Blind digital signature has been studied for sometimes [14.1]. The objective is to design and implement the e-payment system with privacy protection and secure payment, based on a blind digital signature.

To protect consumers' privacy, the following design requirements have to be met: First, it is not acceptable for any single party in the system to know every detail of an online transaction, for example, the consumer's identification, the product that the consumer is buying, the quantity, and the price. Second, the merchant needs to have the payment authority's confirmation so that the merchant is guaranteed to be paid. Third, the payment authority must be comfortable with providing such a confirmation without knowing the transaction details. Here, the payment authority can be either a payment service provider or a billing company such as an ISP. The existing blind-signature protocols do not support the above design requirements.

To protect the consumer, the merchant will provide the consumer with a receipt of payment for the products purchased. The receipt contains a digital signature of the merchant and the purchase date and time. The exchange or refund can be

arranged with this receipt according to the purchase agreement between the merchant and the consumer. Such an agreement can be included in the receipt. For example, the “final sale” products cannot be refunded or exchanged; or some products can be exchanged within 7 days after the purchase; or some products can be refunded provided that they are not opened or have a defect.

### 14.3 Smart Cards and Digital Cash

Smart cards provide a means of storing and processing value for digital cash. In particular, reloadable smart cards have become very popular nowadays. For example, a number of cities around the world are using or plan to use smart cards in their public transportation systems. Such cities include Washington DC, San Francisco, San Diego, Montreal, London, Singapore, Hong Kong, and many others. The Washington metropolitan transit pilot using smart cards was launched in 1999. It has 210,000 smart cards in circulation. As much as \$200 US can be loaded onto the cards. Among these examples, the best one is the Octopus card in Hong Kong, as it has become a necessity for people’s daily travel needs. With an estimated 10 million passenger journeys each day on Hong Kong’s wide variety of public transportation services, the Octopus card provides evidence for the potential success of digital cash payment.

It was reported recently that the Octopus card is expanding its business into a variety of applications apart from public transportation, including 7-Eleven convenience stores, ticketing for the Broadway cinema chain, fast-food shops, such as Café de Coral, Maxim’s, Starbucks, and even the giant hamburger chain McDonald’s.

To examine the success of the Octopus card, in addition to what was discussed in Chapter 5, the following factors are crucial:

- Anonymity: no customer information is carried on the Octopus card and when using the Octopus card to make a payment, no privacy information is involved in the transaction.
- Risk is small as most people typically only load less than \$200 Hong Kong dollars (or US\$ 25.64) onto the card. If the card is stolen or lost, it is not a big concern to people.
- It is easy to reload the card with cash. There are many places in Hong Kong where people can reload their Octopus cards with cash, for example, at MTR (subway) stations or 7-Eleven convenience stores.

The Octopus card is an excellent candidate payment method for e-commerce applications over the Internet. However, there is a major issue that has to be resolved before the Octopus card can become popular as the preferred e-payment method over the Internet, that is, how to read from and write to an Octopus card using PCs, PDAs, pocket PCs, cellular phones, or other pervasive devices, as currently most PCs or pervasive devices are not equipped with an Octopus card reader. It is not realistic to ask every owner of a PC or pervasive device to purchase such a reader. In addition, there are issues of security and reliability related to the Octopus card readers.

#### **14.4 Micropayment Issues and Solutions**

Micropayment is particularly applicable to e-commerce over the Internet. Micropayment deals with a very small payment, typically in the range from one cent to a few dollars. Sometimes, the payment can be even a fraction of one cent. The applications for micropayment include “pay per click” for an image, a piece of music (or video), online gaming, an online report, or a piece of online information. The business justification for micropayment is the huge online customer base even if each transaction value may be tiny. The popular credit card-based online payment method may not be appropriate for small-value transactions because there is a minimum credit card charge, usually about a quarter (US\$ 0.25) or so. The amount in a micropayment transaction may be too low to justify the payment using a credit card.

The major issues for micropayment are that the payment-processing cost is relatively high compared to the amount in a micropayment transaction, and the cost of implementation of existing micropayment schemes is also high. When implementing a micropayment system, one needs to consider the cost of the infrastructure support such as the communication, computation, hardware equipment, and associated software. In addition, there are other costs involved, such as the cost of customer acquisition, the cost of handling disputes and chargebacks, and the cost of customer support.

To reduce the payment-processing cost, one obvious solution is to aggregate many small micropayments into a few regular payments. The question is how can the aggregation be done. There are several ways to do the aggregation. For example, it can be performed per user session, or it can be done in different user sessions but limited to a specific online merchant. Of course, it can also be done across different merchants through a payment-service provider. Different aggregation schemes require different accounting and user transaction management approaches. Again, we encounter the cost issue for implementing the aggregation schemes for micropayment, which could be substantially high.

To handle the dispute, the customer needs to directly interact with the online merchant. In addition, the proper security measures, such as digital signatures, must be in place. In case there is a dispute, at least digital signatures can provide non-repudiation of a transaction.

To save on communication costs, it is desirable to handle the payment offline and to make the payment protocol non-interactive, for example, through an email, to reduce the number of round-trip communications between the merchant's server and the customer's browser. The offline payment can be achieved through the aggregation of authorizations and deposits. The micropayment service provider only needs to examine the value flow when necessary.

## 14.5 Summary

In this chapter, we have discussed the challenges and opportunities of e-payment. The major challenges for e-payment are as follows:

- **Freedom to choose an e-payment method:** giving online customers freedom to choose which e-payment method they prefer (that means, the e-payment systems/solutions need to support multiple e-payment methods).
- **Security:** how to make e-payment more secure to ensure the safety of the customers' online transactions.
- **Privacy:** how to protect the online customers' private information
- **Anonymity:** how to make the e-payment anonymous.
- **Risk:** how to reduce the online customers' risk involved in e-payment.
- **Convenience:** how to provide the online customers with convenience.
- **Cost:** how to reduce the implementation and processing costs of e-payment systems/solutions.

The opportunities are to respond to the online customers' needs and meet the challenges identified above by developing new e-payment systems/solutions.

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## **Glossary**

### **Application programming interface (API)**

A set of the specific methods, services, or instructions prescribed by a computer program by which a programmer writing an application program can make requests of the computer program.

### **Authentication**

Providing assurance that the entity (user, host, and so forth) requesting access is the entity that it claims to be.

### **Behavioral biometric**

A biometric that is characterized by a behavioral trait that is learned and acquired over time, rather than a physical or physiological characteristic (contrast with physical biometric).

### **Biometric system**

An automated system capable of: capturing a biometric sample from an end-user; extracting biometric data from that sample; comparing the biometric data with that contained in one or more reference templates; deciding how well they match; and indicating whether or not an identification or verification of identity has been achieved.

### **Certificate**

A digital credential in a public-key cryptography system, which contains the certificate holder's name and public key, a serial number, the expiration date of the certificate, and the digital signature of the certificate authority that issued the certificate.

**Certificate authority (CA)**

A trusted entity that is part of a public key infrastructure (PKI) and that creates, issues, and manages certificates for PKI users.

**Certificate revocation list (CRL)**

A list of certificates issued by a certification authority (CA) that are no longer valid. The CRL is maintained and published by the CA.

**Chargeback**

A process where the PSP requires the merchant to return funds for a disputed or cancelled payment.

**Cookie**

A file sent by a web server to a browser and stored by the browser. The cookie includes a destination address as a URL, possibly with wildcards. When the browser sends any request to a web server corresponding to the destination address, the browser attaches the cookie to the request. Cookies are used to identify the consumer, especially for repeat access to the same site.

**Credit risk**

The risk that the consumer will fail to pay the payment service provider (PSP) for aggregated payments (when the PSP charges the consumer after payments were made).

**Digital cash**

An electronic form of cash in a cash-like e-payment system with which a person can make online payment for goods or services purchased over the Internet.

**Digital check**

An electronic form of a check in a check-like e-payment system where the check can be conveyed across computer networks.



**Digital signature**

A digital string produced by applying a cryptographic algorithm with the private-key information on a message/document to authenticate the message/document.

**Dispute resolution**

A process invoked by the consumer to cancel a transaction (payment) that the consumer believes was not authorized or should be cancelled for other valid reasons.

**Enrollment**

The process of collecting biometric samples from a person and the subsequent preparation and storage of biometric reference templates representing that person's identity.

**Enrollment time**

The time a person must spend to have their biometric reference template successfully created.

**Enrollment station**

A workstation at which an individual's biometrics (fingerprint, voiceprint, etc.) and personal information (name, address, etc.) can be entered into a bioidentification system.

**Escrow agent**

A party that receives payments from the consumer and goods from the merchant, and, only when both were received properly, delivers the goods to the consumer and the payment to the merchant.

**Extensible Markup Language (XML)**

Universal format for structured documents and data on the Web, supporting the customized tags, enabling the definition, transmission, validation, and interpretation of data between applications and between organizations.

**Extraction**

The process of converting a captured biometric sample into biometric data so that it can be compared to a reference template.

**False acceptance rate (FAR)**

The probability that a biometric system will incorrectly identify an individual or will fail to reject an impostor. Also known as the Type II error rate.

**False rejection rate (FRR)**

The probability that a biometric system will fail to identify an enrollee, or verify the legitimately claimed identity of an enrollee. Also known as the Type I error rate.

**HyperText Transfer Protocol (HTTP)**

Standard transfer protocol used in the Internet, which defines how messages are formatted and transmitted, and what actions web servers and browsers should take in response to various commands. For example, when entering a URL in a browser, one actually sends a HTTP command to the Web server and instructs it to fetch and transmit the requested Web document.

**Internet protocol security (IPSec)**

A set of security functions and options available at the IP level.

**Internet service provider (ISP)**

A company that provides users with access to the Internet. For a monthly fee, the ISP provides users with a software package, user ID, password, and access phone number. Some ISPs also provide users with a modem to enable users to access the Internet.

**Irreversible transactions**

Payments that are done in such a way that the PSP cannot technically reverse them with a chargeback to the merchant, since there is no identification of the merchant.

**Kerberos**

In Greek mythology, the three-headed dog that guards the entrance to the underworld. In network security, Kerberos is a cryptographic authentication system that makes use of a third-party server to authenticate clients and servers. The system was developed in the Athena Project at the Massachusetts Institute of Technology (MIT).

**Key**

(a) A small piece of data used in conjunction with an algorithm to encrypt or decrypt messages/data of arbitrary size (see also PKI), or (b) an attribute whose value serves to identify a unique record in a database/table (e.g., employee ID number may be the primary key used to locate and identify a specific employee's personnel data, such as name, address, telephone number, salary).

**Mail-order telephone (MOT)**

Classification of credit card transaction performed when the credit card is not physically present for verification

**Message authentication code (MAC)**

A fixed-size binary code obtained by applying a shared-key cryptographic algorithm to an arbitrary amount of data to serve as an authenticator of the data.

**Micropayment**

A payment of small amounts, close to or below the credit card minimal fees (of about 20 US cents).

**Micropayment system**

A system allowing merchants to charge many payments of small amounts (micropayments) from customers over open data networks such as the Internet by using one or more payment service providers (PSPs).

**Mobile agents**

A computer program that represents a user and can migrate autonomously from node to node in a computer network, to perform some computation on behalf of the user.

**Mobile agent host**

A computer program running in a networked computer that provides an execution environment where mobile agents can execute their code and can communicate with one another.

**NetBill**

A payment system where the digital check is used to sell and deliver low-priced information goods.

**NetCheque system**

A distributed accounting service supporting the credit-debit model of payment.

**Nonrepudiation**

A proof that the consumer approved a particular action, typically a payment.

**Octopus card**

A smart card system used in Hong Kong for local transportation fare collection.

**Offline payments**

Payments between the consumer and the merchant which do not require communication with other parties such as the PSP.

**Order information (OI)**

Information included in a SET transaction to describe the transaction.

**Original equipment manufacturer (OEM)**

A biometric organization (manufacturer) that assembles a complete biometric system from parts, or a biometric module for integration into a complete biometric system.

**Payment approval**

A process where the customer agrees to a particular payment.

**Payment authorization**

A process where the PSP takes responsibility for a payment, in particular by indicating that there are funds to cover the payment.

**Payment gateway (PG)**

Entity in a SET transaction that handles credit card verification and authorization of transactions.

**Payment information (PI)**

Information included in a SET transaction to describe a payment (such as the credit card holder and number).

**Payment order (PO)**

A message indicating payment to the merchant.

**Payment routing table (PRT)**

A message sent by a PSP to a merchant or another PSP, indicating the terms under which the PSP sending the PRT is willing to receive payment orders issued by other PSPs.

**Payment service provider (PSP)**

An entity that maintains a long-term relationship with customers and merchants, receiving payments of aggregated (large) amounts from customers, and passing aggregated payments to the merchants.

**Penalty payment**

A payment by a merchant who has had too many disputes and/or chargebacks.

**Personal identification number (PIN)**

A security method whereby a (usually) four-digit number is entered by an individual to gain access to a particular system or area.

**Physical/physiological biometric**

A biometric that is characterized by a physical characteristic rather than a behavioral trait (contrast with behavioral biometric).

**Prepayment**

Requiring funds to be deposited in advance.

**Private key**

In public-key cryptography, this key is the secret key. It is primarily used for decryption but is also used for encryption with digital signatures.

**Public key**

In public-key cryptography, this key is made public to all. It is primarily used for encryption but can be used for verifying signatures.

**Public-key cryptography**

Cryptography based on methods involving a public key and a private key.

**Public-key infrastructure (PKI)**

Structure used to issue, manage, and allow verification of public-key certificates. PKI is a security framework for messages and data, based on the notion of a pair of cryptographic keys (i.e., one public and one private) and used to facilitate security, integrity, and privacy.

**Radio frequency identification (RFID)**

The use of radio waves to facilitate wireless (contactless) communication with a chip or device.

**Record aggregation**

Replacing multiple separate documents, e.g., payment orders, with a single aggregated document, e.g., a payment order.

**Rejection/false rejection**

When a biometric system fails to identify an enrollee or fails to verify the legitimately claimed identity of an enrollee. Also known as a Type I error.

**Response time/processing time**

The time period required by a biometric system to return a decision on the identification or verification of a biometric sample.

**Secure electronic commerce**

A form of commerce conducted via electronic means, but designed with security in mind to enable identification, authentication, authorization, or payment processing.

**Secure electronic transaction (SET)**

A protocol for secure payment processing over the Internet in which credit card information (e.g., Visa, MasterCard) is not read or stored by a merchant. The protocol links many parties, including the customer, merchant, acquirer, and certification authorities. The protocol is designed to emulate card-present transactions.

**Secure sockets layer (SSL)**

A protocol originally introduced by Netscape to secure communication between web servers and web clients, supported by most web browsers and servers; superseded by TLS.

**Semi-offline payments**

Payment protocol where most transactions are offline (involve only communication between the consumer and merchant, not with the PSP), but sometimes communication with the PSP is necessary.

**Smart card**

A plastic card with an embedded chip to enable payment processing or digital identification. A typical smart card chip includes a microprocessor or CPU, ROM (for storing operating instructions), RAM (for storing data during processing), and EPROM (or EEPROM) memory for nonvolatile storage of information.

**Software agent**

A computer program that acts autonomously on behalf of a person or organization to accomplish a predefined task or a series of tasks.

**Stored-value card**

A smart card that comes preloaded with a certain amount of value (e.g., money, phone calls, transit trips), but which cannot be reloaded.



**Stored-value payments**

Offline payments where the consumers have complete control over the payments, in particular they can pay any merchant without contacting the PSP.

**Subscriber identification module (SIM)**

SIM is for GSM digital telephony. SIM smart cards are used to provide user authentication, voice/data integrity, and confidentiality.

**Symmetric cryptography**

A way of keeping data secret in which the sender and receiver use the same key.

**T=0/T=1 Protocols**

ISO 7816 asynchronous byte (T=0) and block (T=1) transmission protocols at the data-link layer, used for communication between a smart card and a reader.

**Threshold**

The acceptance or rejection of biometric data is dependent on the match score falling above or below the threshold. The threshold is adjustable so that the biometric system can be more or less strict, depending on the requirements of any given biometric application.

**Transmission control protocol (TCP)**

Internet protocol which manages message exchanges at the transport level.

**Transport-layer security (TLS)**

An IETF (Internet Engineering Task Force) standard protocol to secure communication between web servers and web clients, supported by most web browsers and servers; the previous version was called SSL.

**Trusted third party**

An organization or entity that is impartial to both the customer and the merchant (or buyer and seller), is trusted by both, and whose testimony is accepted as valid evidence in a court of law.

**URL**

Uniform Resource Locator specifying the unique address of a Web document.

**Validation**

The process of demonstrating that the system under consideration meets in all respects the specification of that system.

**Wireless application environment (WAE)**

The application framework for WAP applications. WAE consists of a set of standards that collectively define a group of formats for wireless applications and downloadable content.

**Wireless application protocol (WAP)**

A specification that allows users to access information instantly via handheld wireless devices such as cellular phones, pagers, and personal digital assistants (PDAs) through wireless communication networks and the Internet.

**Wireless datagram protocol (WDP)**

A datagram protocol for non-IP wireless packet data networks. WDP specifies how different existing bearer services should be used to provide a consistent service to the upper layers of the WAP architecture framework.

**Wireless markup language (WML)**

An XML-based markup language for wireless handheld devices, including cellular phones, pagers, and PDAs.

**Wireless session protocol (WSP)**

A protocol family derived from the HTTP version 1.1 standard with extensions for wireless data applications. WSP provides WAP applications with a consistent interface for session services.

**Wireless telephony applications (WTA)**

A framework for integrating wireless data applications with voice networks. WTA is a collection of telephony-specific extensions for call and feature control mechanisms that make advanced mobile network services available to the mobile users.

**Wireless transaction protocol (WTP)**

A protocol operating on top of a secure or insecure datagram service. WTP is an extremely lightweight request-response-acknowledge transaction protocol.

**Wireless transport-layer security (WTLS)**

A security protocol based on SSL and adapted to wireless networks and datagram transports.

## About the Editor

**Weidong Kou** is Associate Director of the E-Business Technology Institute (ETI) and Adjunct Professor of the Department of Computer Science and Information Systems at the University of Hong Kong.

Prof. Kou also serves as Adjunct Professor of the Department of Computer Science and Electrical Engineering at the University of Maryland in US, Shanghai Jiao Tong University, South China University of Technology, and Lan Zhou University in China, and Guest Professor of Sun Yat-Sen University, South East University, and Beijing University of Posts and Telecommunications in China. In addition, he is a member of the Advisory Committee on Computer Science and Electrical Engineering at the University of Maryland in Baltimore, Co-chair of the Technical Advisory Board of the e-Generation Technology Center at Shanghai Jiao Tong University, Deputy Director of the Academic Committee of the National Key Laboratory of the Ministry of Education of China on Computer Networking and Information Security at Xidian University, and Technology Advisor for the IBM Great China Group's University Relationship Program.

Prof. Kou was a Research Professor at Rutgers University. He served as the Industrial Co-leader of a major project of the CITR (Canadian Institute of Telecommunications Research, a Canadian National Center of Excellence), *Enabling Technology for Electronic Commerce*, for more than three years. He served as a member of American national standard committees, ANSI X9B9 (Financial Image Interchange) and ANSI X3L3 (JPEG and MPEG), for more than four years. He has also served as a Guest Editor of special issues on e-commerce for the *International Journal on Digital Libraries* and the *ACM Computing Survey*. Prof. Kou was the Founding Chair of the International Symposium on Electronic Commerce (ISEC), and from 1998 to 2001 he was the General Chair and Program Chair for the ISECs and International Workshops on Technological Challenges of Electronic Commerce.

Since joining ETI at the University of Hong Kong in August 2000, Prof. Kou has been leading the e-commerce and wireless research and development efforts. Notably, Prof. Kou and his team were awarded the Innovation and Technology Fund (ITF). The ITF exercises, being highly competitive and placing great emphasis on local relevance, select only projects with great potential for Hong Kong. Out of a total of 19 proposals submitted in January 2001 by all sectors in Hong Kong, only three projects were awarded, and two of these came from the teams led by Prof. Kou. The total funding for the two winning projects was over 17 million Hong Kong dollars for a period of two years. One of these projects focuses on payment technologies for electronic commerce.

Prof. Kou has over 12 years of industrial experience in the software development and management in North America. Prior to joining ETI, Prof. Kou was Principal Investigator at the IBM Center of Advanced Studies in Toronto, Canada, where he led R&D projects on e-commerce. From 1995 to 1997, he was an Architect of a major IBM B2B e-commerce project for a national government at the IBM Industrial Solution Development Center in Canada. Prior to joining IBM in 1995, he was the Chairman of the Imaging Committee at the AT&T Imaging Systems Division, where he led a number of financial imaging projects. Prior to joining AT&T in 1991, he was Senior Software Engineer at Siemens in Toronto, Canada, where he invented compression algorithms and implemented them in Siemens' imaging products. He received various invention achievement and technical excellence awards from IBM, AT&T, and Siemens.

Prof. Kou has authored/edited five books in the areas of e-commerce, security, and multimedia technologies, and published over 50 papers on journals and conferences, including papers in prestigious journals such as *IEEE Transactions on Communications*, *IEEE Transactions on Signal Processing*, *IEEE Transactions on Acoustics, Speech and Signal Processing*, and *International Journal of Computer and Information Science*. He has also authored nine US and Canadian issued and pending patents.

One of Prof. Kou's books, *Digital Image Compression: Algorithms and Standards*, published by Kluwer Academic Publishers in 1995, has been widely used in a variety of universities around the globe as a recommended reference book, for example in Southern Queensland University in Australia, Catalunya University in Spain, Saarland University in Germany, Glasgow University and the University of London in the UK, Chalmers University in Sweden, Bandung Technology Institute in Indonesia, Stanford University, George Mason University, Ohio State University, and Albany New York State University in the US, and Calgary University in Canada.

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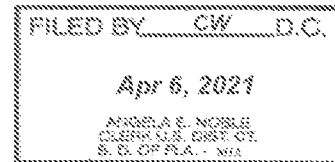
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UNITED STATES DISTRICT COURT  
SOUTHERN DISTRICT OF FLORIDA

ADMINISTRATIVE ORDER 2021-33

IN RE: CORONAVIRUS PUBLIC EMERGENCY

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**NINTH ORDER CONCERNING JURY TRIALS AND OTHER PROCEEDINGS**

This Order is issued in conjunction with Administrative Orders 2021-12, 2020-76, 2020-53, 2020-41, 2020-33, 2020-24, 2020-21 and 2020-18 which limited in-court appearances and continued all jury matters.

**THEREFORE**, the United States District Court for the Southern District of Florida hereby issues the following order:

1. All persons entering any federal courthouse facility within the Southern District of Florida **must** wear a face mask at all times unless otherwise directed by the Court. Face masks may not contain exhalation valves or vents. The only exceptions to the face mask requirement are for a medical condition that precludes an individual from wearing a face mask and children under two (2) years of age.
2. All persons entering any federal courthouse facility within the Southern District of Florida **must** maintain a social distance of at least 6' apart unless they are members of the same household.
3. All persons entering any federal courthouse facility within the Southern District of Florida may be subject to screening.
4. All persons using the elevators in any federal courthouse facility within the Southern District of Florida shall abide by social distancing signage posted at the elevator entrance unless the individuals in the elevator are members of the same household.



5. The United States Courthouses in Miami, Fort Lauderdale, West Palm Beach, Fort Pierce, and Key West, including Bankruptcy Court and Probation, will remain open for business, with reduced staffing, to a level to maintain essential operations, consistent with Administrative Order 2020-20 and subject to the following limitations.

6. Jury trials in the Southern District of Florida scheduled to begin on or after March 30, 2020, are continued until July 6, 2021, excluding preselected Pilot jury trials which will proceed as scheduled by the presiding Judge. The Court may issue other Orders concerning future continuances as necessary and appropriate.

7. All trial-specific deadlines in criminal cases scheduled to begin before July 6, 2021, are continued pending further Order of the Court. Individual judges may continue trial-specific deadlines in civil cases in the exercise of their discretion.

8. Individual judges presiding over criminal proceedings may take such actions consistent with this Order as may be lawful and appropriate to ensure the fairness of the proceedings and preserve the rights of the parties.

9. The Court is cognizant of the right of criminal defendants to a speedy and public trial under the Sixth Amendment, and the particular application of that right in cases involving defendants who are detained pending trial. Any motion by a criminal defendant seeking an exception to this Order in order to exercise that right should be directed to the District Judge assigned to the matter in the first instance; provided, however, that no such exception may be ordered without the approval of the Chief Judge after consultation with the Court.

10. The time period of any continuance entered as a result of this Order shall be excluded under the Speedy Trial Act, 18 U.S.C. § 3161(h)(7)(A), as the Court finds that the ends of justice served by taking that action outweigh the interests of the parties and the public in a speedy trial. Absent further Order of the Court or any individual judge, the period of

exclusion shall be from March 30, 2020, to July 6, 2021. The Court may extend the period of exclusion as circumstances may warrant. This Order and period of exclusion are incorporated by reference as a specific finding pursuant to 18 U.S.C. § 3161(h)(7)(A) in the record of each pending case where the Speedy Trial Act applies. *See Zedner v. United States*, 547 U.S. 489, 506–07 (2006). The period of exclusion in this Court’s prior Administrative Orders on this subject (2021-12, 2020-76, 2020-53, 2020-41, 2020-33, 2020-24, 2020-21 and 2020-18) are likewise incorporated by reference as a specific finding pursuant to 18 U.S.C. § 3161(h)(7)(A) in the record of each pending case where the Speedy Trial Act applies.

11. Individual judges may continue to hold hearings, conferences, and bench trials in the exercise of their discretion, consistent with this Order.

12. Judges are strongly encouraged to conduct court proceedings by telephone or video conferencing where practicable.

13. Criminal matters before Magistrate Judges, such as initial appearances, arraignments, detention hearings, and the issuance of search warrants, shall continue to take place in the ordinary course.

14. All grand jury sessions in the Southern District of Florida resumed on November 16, 2020, with no more than two grand jury sessions per week. The U.S. Attorney’s Office and Clerk of Court will continue to safely convene no more than two grand jury sessions per week until further Order. The Court may issue other Orders concerning future continuances, or additional grand jury sessions, as necessary and appropriate.

15. This Court’s most recent Administrative Order on the Coronavirus pandemic (2021-12) states that, although the Speedy Trial Act requires an information or indictment charging an individual with the commission of an offense to be filed within thirty (30) days from the

date on which such individual was arrested or served with a summons in connection with such charges, the period from March 26, 2020, until July 6, 2021, is excluded pursuant to 18 U.S.C. § 3161(h)(7)(A) and (B)(iii). The Court is cognizant of the right of criminal defendants to a speedy and public trial under the Sixth Amendment, and the particular application of that right in cases involving defendants who are detained pending trial. Nonetheless, this Court found that the ends of justice served by excluding this time outweighed the interests of the parties and the public in a speedy trial because the absence of grand jury sessions made it unreasonable to expect the return and filing of an indictment within the period set forth in 18 U.S.C. § 3161(b). Likewise, the Court finds that the ends of justice are served by extending again this period of exclusion, and outweigh the interests of the parties and the public in a speedy trial. As stated above, this Court has authorized the resumption of only two grand jury sessions per week; ordinarily, according to the U.S. Attorney's Office, there are eleven. Additionally, according to the U.S. Attorney's Office, it must present approximately 150 matters to a grand jury for indictment, plus new arrests. Given the limited availability of grand jury resources and continued exigent circumstances created by the pandemic, the Court finds that it remains generally unreasonable to expect the return and filing of an indictment within the period set forth in 18 U.S.C. § 3161(b), and an additional period of exclusion will promote the safe and orderly administration of justice. The additional period of exclusion shall be for the period from March 15, 2021, until July 6, 2021. The Court may shorten or extend the period of exclusion as circumstances warrant. Any individual judge may enter an Order modifying this additional period of exclusion for any particular case, including upon motion by any party. This Order and period of exclusion are incorporated by reference as a specific finding pursuant to 18 U.S.C. § 3161(h)(7)(A) in the record of each pending case where the Speedy Trial Act applies. *See Zedner v. United*

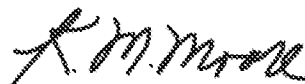
*States*, 547 U.S. 489, 506–07 (2006).

16. All judicial naturalization ceremonies in the Southern District of Florida will be held remotely or by video conference.

17. The Clerk’s Office, Probation, the Bankruptcy Court, and all other Court services shall remain open with reduced staffing, at a level to maintain essential operations, consistent with Administrative Order 2020-20.

This Order shall remain in effect until further Order of the Court.

**DONE AND ORDERED** in Chambers at Miami, Miami-Dade County, Florida, this 6th day of April, 2021.



\_\_\_\_\_  
K. MICHAEL MOORE  
CHIEF UNITED STATES DISTRICT JUDGE

- c: Honorable William H. Pryor, Jr., Chief Judge, Eleventh Circuit  
All Southern District Judges, Bankruptcy and Magistrate Judges  
James Gerstenlauer, Circuit Executive, Eleventh Circuit  
Juan Antonio Gonzalez, Acting United States Attorney  
Gadyaces Serralta, United States Marshal  
Michael Caruso, Federal Public Defender  
Angela E. Noble, Court Administrator • Clerk of Court  
Joe Falzone, Clerk, Bankruptcy Court  
Consuelo Irimia, Chief Probation Officer  
Library

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application of:	Paresh K. Patel	Confirmation No.:	5568
Serial No.:	18/197,070	Art Unit:	3698
Filed:	May 14, 2023	Examiner:	Frantzy POINVIL
For:	METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS	Attorney Docket No.:	104402-5074-US

**INFORMATION DISCLOSURE STATEMENT**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In accordance with the duty of disclosure provisions of 37 C.F.R. §1.56, there is hereby provided certain information which the Examiner may consider material to the examination of the subject U.S. patent application. It is requested that the Examiner make this information of record if it is deemed material to the examination of the application.

1. Enclosures accompanying this Information Disclosure Statement are:
  - 1a.  A list of all patents, publications, applications, or other information submitted for consideration by the office.
  - 1b. A legible copy of:
    - Each foreign patent;
    - Each publication or that portion which caused it to be listed on the PTO-1449;
    - For each cited pending U.S. application, the application specification including the claims, and any drawing of the application, or portion of the application which caused it to be listed on the PTO-1449 including any claims directed to that portion;
    - all other information or portion which caused it to be listed on the PTO-1449.
  - 1c.  An English language copy of search report(s) from a counterpart foreign application or PCT International Search Report.
  - 1d.  Explanations of relevancy (ATTACHMENT 1(d), hereto) or English language abstracts of the non-English language publications.

2.  This Information Disclosure Statement is filed under 37 C.F.R. §1.97(b):
- Within three months of the filing date of a national application other than a continued prosecution application under §1.53(d);
  - Within three months of the date of entry of the national stage as set forth in §1.491 in an international application;
  - Before the mailing of the first Office action on the merits;
  - Before the mailing of a first Office action after the filing of a request for continued examination under §1.114.

3.  This Information Disclosure Statement is filed under 37 C.F.R. §1.97(c) after the period specified in 37 C.F.R. §1.97(b), but before the mailing date of any of a final action under 37 C.F.R. §1.113, a notice of allowance under 37 C.F.R. §1.311 or an action that otherwise closes prosecution in the application.

*(Check either Item 3a, 3b, 3c or 3d)*

- 3a.  The Certification Statement in Item 5 below is applicable. Accordingly, no fee is required.
- 3b.  The \$260 (large entity) fee set forth in 37 C.F.R. §1.17(p) in accordance with 37 C.F.R. §1.97(c) is to be charged to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no. \_\_\_\_\_).
- 3c.  The \$104 (small entity) fee set forth in 37 C.F.R. §1.17(p) in accordance with 37 C.F.R. §1.97(c) is to be charged to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no. 104402-5073-US).
- 3d.  The \$52 (micro entity) fee set forth in 37 C.F.R. §1.17(p) in accordance with 37 C.F.R. §1.97(c) is to be charged to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no. \_\_\_\_\_).

*(Items 3b or 3c to be checked if any reference known for more than 3 months)*

4.  This Information Disclosure Statement is filed under 37 C.F.R. §1.97(d) after the period specified in 37 C.F.R. §1.97(c), but on or before the date of payment of the issue fee.

*(Check Item 4a, and 4b, 4c or 4d)*

- 4a.  The Certification Statement in Item 5 below is applicable.
- 4b.  The \$260 (large entity) fee set forth in 37 C.F.R. §1.17(p) in accordance with 37 C.F.R. §1.97(c) is to be charged to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no. \_\_\_\_\_).
- 4c.  The \$104 (small entity) fee set forth in 37 C.F.R. §1.17(p) in accordance with 37 C.F.R. §1.97(c) is to be charged to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no. \_\_\_\_\_).
- 4d.  The \$52 (micro entity) fee set forth in 37 C.F.R. §1.17(p) in accordance with 37 C.F.R. §1.97(c) is to be charged to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no. \_\_\_\_\_).

5.  Certification Statement (applicable if Item 3a or Item 4a is checked)  
*(Check either Item 5a, 5b, 5c or 5d)*
- 5a.  In accordance with 37 C.F.R. §1.97(e)(1), it is certified that each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Information Disclosure Statement.
- 5b.  In accordance with 37 C.F.R. §1.97(e)(2), it is certified that no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 C.F.R. §1.56(c) more than three months prior to the filing of this information disclosure statement.
- 5c.  Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and the communication was not **received** by any individual designated in 37 C.F.R. §1.56(c) more than thirty days prior to the filing of this information disclosure statement.
- 5d.  Pursuant to 37 C.F.R. §1.704(d), each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and the communication was not **received** by any individual designated in 37 C.F.R. §1.56(c) more than thirty days prior to the filing of this information disclosure statement.
6.  Copies of each cited U.S. patent and each U.S. patent application publication are not enclosed pursuant to the USPTO OG Notice dated 05 August 2003 waiving the requirement under 37 C.F.R. 1.98(a)(2)(i) for U.S. patent applications filed after June 30, 2003.
7.  This application is a continuation application under 37 C.F.R. §1.53(b) or (d).  
*(Check appropriate Items 7a, 7b and/or 7c)*
- 7a.  A Petition to Withdraw from issue under 37 C.F.R. §1.313(b)(5) is concurrently filed herewith.
- 7b.  Copies of publications listed on Form PTO-1449 from prior application Serial No. 17/973,507, filed on October 25, 2022, from prior application Serial No. 17/654,732, filed on March 14, 2022, from prior application Serial No. 17/147,305, filed on January 12, 2021, from prior application Serial No. 15/603,400, filed on May 23, 2017, from prior application Serial No. 14/458,199, filed on August 12, 2014, from prior application Serial No. 14/456,683, filed on August 11, 2014, from prior application Serial No. 14/335,762, filed on July 18, 2014, from prior application Serial No. 14/214,644, filed on March 14, 2014, of which this application claims priority under 35 U.S.C. §120, are not being submitted pursuant to 37 C.F.R. §1.98(d).

- 7c.  Copies of the publications listed on the attached Form PTO-1449 that were not previously cited in prior application Serial No. 17/973,507, filed on October 25, 2022, from prior application Serial No. 17/654,732, filed on March 14, 2022, from prior application Serial No. 17/147,305, filed on January 12, 2021, from prior application Serial No. 15/603,400, filed on May 23, 2017, from prior application Serial No. 14/458,199, filed on August 12, 2014, from prior application Serial No. 14/456,683, filed on August 11, 2014, from prior application Serial No. 14/335,762, filed on July 18, 2014, from prior application Serial No. 14/214,644, filed on March 14, 2014, are provided herewith.
8.  This is a Supplemental Information Disclosure Statement. (Check Item 8a)
- 8a.  This Supplemental Information Disclosure Statement under 37 C.F.R. §1.97(f) supplements the Information Disclosure Statement filed on . A bona fide attempt was made to comply with 37 C.F.R. §1.98, but inadvertent omissions were made. These omissions have been corrected herein. Accordingly, additional time is requested so that this Supplemental Information Disclosure Statement can be considered as if properly filed on .
9.  In accordance with 37 C.F.R. §1.98, a concise explanation of what is presently understood to be the relevance of each non-English language publication is:
- ( Check Item 9a, 9b, or 9c)*
- 9a.  satisfied because all non-English language publications were cited on the enclosed English language copy of the PCT International Search Report or the search report from a counterpart foreign application indicating the degree of relevance found by the foreign office.
- 9b.  set forth in the application.
- 9c.  enclosed as an attachment hereto.
10.  The Commissioner is authorized to charge any additional fee required or credit any overpayment for this Information Disclosure Statement and/or Petition to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no. 104402-5074-US).
11.  No admission is made that the information cited in this Statement is, or is considered to be, material to patentability nor a representation that a search has been made (other than a search report of a foreign counterpart application or PCT International Search Report if submitted herewith). 37 C.F.R. §§1.97(g) and (h).

Respectfully submitted,

Date: December 19, 2023

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 (650) 843-4000





Espacenet

**Bibliographic data: JP4586607 (B2) — 2010-11-24**

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**AUTOMATIC TRANSACTION SYSTEM**

**Inventor(s):** KIHARA HIDEO

**Applicant(s):** OKI ELECTRIC IND CO LTD

**Classification:** - **international:** G06Q20/18; G06Q40/00; G06Q40/02; G07D9/00  
- **cooperative:**

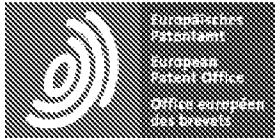
**Application number:** JP20050095083 20050329 Global Dossier

**Priority number(s):** JP20050095083 20050329

**Also published as:** JP2006277296 (A)

**Abstract of JP2006277296 (A)**

**PROBLEM TO BE SOLVED:** To provide an automatic transaction system improving efficiency of a campaign screen by performing display control of a stop instruction key in the campaign screen, regarding the automatic transaction system which is connected with a customer information management system (CRM system) and displays the campaign screen corresponding to a user. ;**SOLUTION:** The CRM system 4 receiving account information of a customer from the automatic transaction system 1 returns campaign screen information for the customer and display control information of the stop instruction key ("return to transaction" button) in the campaign screen to the automatic transaction system 1. The automatic transaction system 1 displays the campaign screen for the customer in intervals of transaction on the basis of the information from the CRM system 4, and controls display and non-display of the "return to transaction" button, and also controls transitional timing from the campaign screen to the transaction screen. ;**COPYRIGHT:** (C)2007,JPO&INPIT



# Patent Translate

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## Notice

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## DESCRIPTION JP4586607B2

*10* Automatic transaction device

[0001]

*14* TECHNICAL FIELD The present invention relates to transition control of display screens for customers in an automated teller machine.

[0002]

*19* Conventionally, when customers of financial institutions such as banks, post offices, and credit unions perform financial transactions such as deposits, withdrawals, transfers, and balance inquiries, ATMs (Automatic Teller Machines) installed at branches of the financial institutions: Automatic teller machine), CD (Cash Dispenser), etc. When using an automatic transaction device, in addition to the display (guidance) of the operation instruction of the automatic transaction device on the display screen of the automatic transaction device, the financial Institution-to-customer messages (including campaign messages, advertisements, notifications, etc.) is provided.

[0003]

*30* For example, when the customer operates an automated teller machine at a bank to inquire about the balance, after entering the PIN, during the inquiry to the host, the display screen displays the following message: It was started.

*33* Go ahead and use it, please! ” is displayed as a campaign message.

[0004]

*37* Furthermore, in recent years, by adopting a customer information management system (CRM

Petitioner Exhibit 1002-4540

system: Customer Relationship Management System), it has become possible to create a message with contents corresponding to each customer.

40 In this case, based on information on the basic attributes of each customer such as address, name, age, occupation, income, family structure, etc., and information on the history of past account transactions of each customer. , a so-called tailor-made message with content corresponding to each customer can be created and presented to the customer.

[0005]

47 As a result, financial institutions can timely deliver messages on financial products that are suitable for each customer, and can deliver messages that are expressed appropriately for each customer. .

50 (For example, see Patent Document 1. ) When the customer has finished viewing the campaign message, the customer touches the "Close" button displayed on the screen to stop displaying the campaign message screen and return to the account system screen. . (For example, see Patent Document 2. )

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[0006]

59 However, in the conventional automated teller machine, the display of the campaign screen can be terminated before the account system transaction is completed by the customer touching the "close" button displayed on the campaign message screen. It was possible.

62 SUMMARY OF THE INVENTION An object of the present invention is to improve the efficiency of campaign display and effectively utilize the communication time of the accounting system.

[0007]

67 Therefore, the automatic transaction apparatus of the present invention comprises a display section for displaying guidance necessary for customer transactions, an operation input section for inputting customer instructions, and a control section for controlling these sections. wherein the automatic transaction device is communicably connected to an information management device that manages message screen information, the control unit acquires message screen information from the information management device, and displays the acquired message screen to the It is displayed on the display unit, and the display/non-display of the return-to-transaction instruction key is controlled based on the result of comparison between the display time of the message screen information stored in advance in the information management device and the display time threshold information. characterized by

[0008]

81 In the present invention, guidance necessary for customer transactions and message information to the customer are displayed on the display unit, and the display of a return-to-transaction instruction key that instructs to stop displaying the displayed message information is controlled to be valid/invalid. Thus, there is an effect that the display efficiency of message information performed between customer transactions can be improved.

[0009]

89 An embodiment of the present invention will be described with reference to the drawings.

90 In addition, the same code|symbol is attached|subjected to the element which is common to each drawing.

[0010]

95 First embodiment

96 (1) Structure of Automatic Transaction Apparatus FIG. 1 is a block diagram of an automatic transaction system showing the first embodiment of the present invention, and FIG.

98 In FIG. 1, an automated teller machine 1 operated by a customer for trading is connected to a host computer 3 and a CRM system 4 via a network 2 .

[0011]

103 The automated teller machine 1 is an ATM, CD, etc., installed in the branch, and is operated by the customer of the financial institution to deposit, withdraw, passbook entry, balance inquiry, transfer, transfer, remittance, fixed payment, etc. It is a device for conducting financial transactions such as setting up sex deposits.

107 In addition, the host computer 3 receives processing requests from the automated teller machine 1 and performs various data processing related to financial institution operations such as deposit account management.

110 The CRM system 4 is a system that holds customer information and provides various information to the automatic teller machine 1 based on the customer information, and functions as a customer information management device.

[0012]

116 FIG. 2 is a block diagram of the automatic transaction apparatus 1, and the configuration of the automatic transaction apparatus will be explained using this diagram.

118 The automated teller machine 1 includes an operation/display unit 11, a card processing unit 17, a passbook processing unit 18, a money processing unit 19, and a control unit 12 that controls these units.

121 Here, the operation/display unit 11 is composed of a liquid crystal display with a touch panel

that functions both as an input device and as a display device.

123 In addition to the guidance necessary for transactions (instructions for inputting PIN numbers, instructions for withdrawing amounts, instructions for picking up cards and cash, etc.), the display section also displays intermittent transaction guidance (such as counting deposited cash, It is possible to display a screen containing messages and advertisements regarding financial products on the display device during a period of time such as when the user is accessing an accounting system.

### [0013]

132 The card processing unit 17 also handles cards such as cash cards and acquires customer IDs.

133 Here, the card is a card issued to a customer by a financial institution for performing financial transactions such as deposits, withdrawals, transfers, and balance inquiries. a magnetic stripe that stores the

136 The member for storing the information may be an IC card in which an IC chip is embedded instead of the magnetic stripe.

138 The card processing unit 17 has a card insertion slot into which a card is inserted. Behind the insertion slot, there is a conveying device for conveying cards, and recording information is read and written from the magnetic stripe and IC chip of the card. A magnetic head, terminals, and the like are provided for this purpose.

142 The card processing unit 17 in the present embodiment further includes a statement issuing unit that prints and issues a statement of transaction.

### [0014]

147 The passbook processing unit 18 receives the passbook of the customer and performs processing such as printing and magnetic writing to the magnetic stripe provided on the passbook.

150 The money processing unit 19 has a banknote deposit/withdrawal unit that handles banknotes and a coin deposit/withdrawal unit that handles coins, and performs processes such as money deposit/withdrawal and counting according to customer transactions.

153 The control unit 12 includes a CPU 13, a memory 14, a timer 15, and the like, and controls each unit of the automated teller machine 1. FIG.

155 The control unit 12 also includes a communication control unit 16 that connects to the network 2 and communicates with the host computer and the CRM system 4 .

### [0015]

160 Next, the configuration of the CRM system 4 in FIG. 1 will be described.

161 The CRM system 4 has a memory 42 that stores information necessary for various controls, a control unit 41 that performs various controls of the CRM system 4, a CRM database 43 that stores data related to campaign messages, and a customer data that stores customer data. A

master database 44 is provided.

165 Here, the CRM database 43 stores display data for each customer, campaign screen information, etc., and the customer master database 44 stores customer ID, address, name, age, occupation, income, family composition, etc. for each customer. basic attribute information, that is, customer basic attribute information, and account transaction information such as a history of past account transactions.

[0016]

173 The CRM database 43 also includes a history database that stores campaign information provided to customers, campaign histories related to messages, etc., and operation histories of customers operating the automatic teller machine 1 and the like.

176 The CRM system 4 uses these data to create guidance information with contents suitable for the customer.

[0017]

181 FIG. 3 is a diagram showing an example of data in the CRM database in the CRM system.

182 The CRM database 43 stores the campaign ID, campaign name, display timeout time, target person information (account number, etc.) and the like for each campaign.

184 Campaign screen information (screen data) is stored in the CRM database in association with this campaign ID.

186 Also, FIG. 4 is an example of customer data stored in the customer master database.

187 For each account number, the customer name, account balance, whether or not the account is a salary transfer destination, whether or not the account is a payment account for public utility charges, etc. are stored.

190 Next, the operation of the automatic transaction system according to this embodiment will be described using the flowchart of FIG.

192 In addition, as a transaction, the case of a withdrawal transaction will be described as an example.

[0018]

197 (1) From the start of the transaction to before the display of the campaign screen, the customer selects the transaction by touching the "withdrawal" transaction button on the transaction selection screen displayed on the operation/display unit 11 of the automated teller machine 1. , the card is inserted into the card processing unit 17 and the transaction is started (Sa1).

202 Note that the card may be inserted before transaction selection.

203 When a customer selects a transaction and inserts a card, the control unit 12 of the automated teller machine 1 reads the customer's account information (account number, etc.) from the magnetic stripe of the card and sends it to the CRM system via the communication

control unit 16. 4 (Sa2).

207 After that, the automated teller machine 1 guides the customer to input the personal identification number and the withdrawal amount via the operation/display unit 11, and prompts the customer to input (Sa3).

210 In addition, the automated teller machine 1 transmits the personal identification number entered by the customer and the withdrawal amount according to the guidance to the host computer 3 together with the account information described above (Sa4).

#### [0019]

216 The control unit 41 of the CRM system 4 receives the account information transmitted by the automatic teller machine 1 at Sa2, compares the received account information of the customer with the CRM database 43, and determines the campaign ID set for the customer. exists (Sa5).

220 If the campaign ID exists, the control unit 41 refers to the CRM database 43 and further acquires the timeout period set for that campaign ID (Sa6).

#### [0020]

225 The control unit 41 reads out the "threshold value of the timeout period" from the memory 42, and performs a comparison operation process with the timeout period acquired in Sa6 (Sa7).

228 If the timeout period of the current campaign is equal to or greater than the threshold, the control unit 41 sets the "return to transaction" button display flag (F) to "1" and stores it in the memory 42 (Sa8a).

231 On the other hand, if the timeout period of the current campaign is smaller than the threshold, the flag (F) is set to "0" and stored in the memory 42 (Sa8b).

233 The control unit 41 transmits campaign information to the automated teller machine 1 in a data format as shown in FIG. 6 (Sa9).

#### [0021]

238 In FIG. 6, the account number is the account information received from the automated teller machine 1 .

240 The campaign information consists of campaign ID, campaign name, campaign message screen data, campaign timeout time (To), etc., and is data obtained from the CRM database.

242 The button display flag is the value of the flag F set in Sa7-Sa8 and stored in the memory 42. FIG.

244 The header and footer are composed of addresses and check data for communication control.

#### [0022]

- 248 As described above, the reason why the "timeout time" is set for each campaign is to prevent the campaign screen from remaining displayed due to no customer operation during display of the campaign screen.
- 251 The CRM database 43 stores a timeout period set according to the notification content for each campaign.
- 253 In addition, the "threshold of timeout time" is set with the intention that the customer does not have to press the "return to transaction" button as much as possible, and is set to a value such as 7 seconds. be.
- 256 Therefore, in this example, if the timeout time (time to automatically return to the transaction screen) in the campaign screen is less than 7 seconds, the flag F is set to hide the "return to transaction" button. If it is set to "0" and the timeout period is 7 seconds or more, the flag F will be set to "1" to display the "return to trade" button.
- 260 Therefore, for example, in a campaign screen such as a questionnaire, in which the user reads the message content and thinks about the answer, the timeout period is set long, and the user can stop displaying the campaign screen and return to the transaction in the middle of the display. button is displayed.

#### [0023]

- 267 (2) Displaying the "return to transaction" button on the campaign screen When the control unit 12 of the flow automated teller machine 1 receives the campaign information from the CRM system 4, it stores the contents of the campaign data in the memory 14.
- 270 Also, the value of the flag (F) is checked (Sa10).
- 271 When the flag (F)= "1" , the control unit 12 synthesizes the campaign screen data stored in the memory 14 and the "return to transaction" button data stored in advance in the memory 14, and displays the campaign display screen. data is generated, the generated display screen data is transferred to the operation/display unit 11, and the campaign screen is displayed on the display unit (Sa11).
- 276 In this flow chart, an example of transmitting transaction information to the host computer 3 and then transferring display screen data to the operation/display unit 11 is described. This may be done in parallel, and the campaign screen may be displayed immediately after the input of the withdrawal amount is completed.
- 280 (This also applies to the following embodiments.
- 281 ) In any case, this campaign screen is displayed between transaction guidances for customers.

#### [0024]

- 285 FIG. 7(a) is an example of a campaign screen, in which a message for a questionnaire campaign is displayed.
- 287 A "return to transaction" button is displayed at the lower right of the screen, and by touching this button, the customer's instruction to return to the transaction is valid.
- 289 Further, at the upper left of the screen, "withdrawal" is displayed as information on the



current transaction, and the customer's name is displayed in the campaign message.

291 These screens are synthesized and displayed by the control unit 12 based on transaction information selected by the customer and relevant information transmitted from the host computer 3 or the CRM system 4 .

[0025]

297 Subsequently, while FIG. 7A is being displayed, the control unit 12 checks whether or not the customer has touched the "return to transaction" button (Sa12).

299 When the control unit 12 determines that the customer has touched the "return to transaction" button by touch detection on the touch panel of the operation/display unit 11, whether or not the notification that the withdrawal transaction is possible has been received from the host computer 3. (Sa13), and if the notification has been received, a withdrawal transaction guidance screen as shown in FIG. 7(c) is displayed (Sa14).

304 The control unit 12 ejects the card and the receipt to the customer via the card processing unit 17, and when detecting that the customer has received them, pays out the money (Sa15).

307 When it is detected that the money dispensed to the money processing unit 19 has been taken out by the customer, the control unit 12 determines that the transaction is completed, notifies the host computer 3 and the CRM system 4 of the transaction completion, and The information of the transaction selection screen is transferred to the operation display unit 11, and the state of waiting for transaction selection is returned.

[0026]

315 The control unit 12 transmits to the CRM system 4 campaign screen display history information (corresponding account information, campaign ID, response information to the campaign (questionnaire response content), etc.).

318 The control unit 41 of the CRM system 4 updates the contents of the CRM database 43 based on these history information transmitted from the automated teller machine 1 .

320 If it is determined at Sa13 that the notification that the withdrawal transaction is possible has not yet been received from the host computer 3, the control section 12 displays the operation/display section 11 with the message "Inquiring to the host computer.

323 Please wait.

324 or the like, and waits for a notification from the host computer 3 (Sa16).

[0027]

328 Further, when receiving a notification that the personal identification number does not match from the host computer 3, the control section 12 displays a personal identification number re-input screen on the operation/display section 11, and repeats the process from Sa4 again.

331 Furthermore, when a notice of impossibility of transaction is received from the host computer

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3, such as that there is no corresponding account, the control unit 12 displays "transaction impossibility" on the operation/display unit 11, and returns to the transaction selection screen. .

335 Further, the control unit 12 measures the campaign screen display time by the timer 15 while the campaign screen is being displayed, and determines whether or not the campaign screen display time is equal to or longer than the campaign timeout time (To) transmitted from the CRM system 4. , To or more, a withdrawal transaction guidance screen is displayed, and if it is less than To, the process returns to determine whether or not the "return to transaction" button has been selected (Sa12, Sa17).

341 This prevents the customer from returning to the transaction screen while the campaign screen is being displayed.

[0028]

346 (3) In the flow Sa10 when the "return to trade" button is not displayed on the campaign screen, the control unit 12 synthesizes the data of the "return to trade" button when the flag (F) = "0". The campaign screen data stored in the memory 14 is transferred to the operation/display unit 11, and the campaign screen is displayed on the display unit (Sa18).

350 FIG. 7(b) is an example of the campaign screen, in which the message of the questionnaire implementation campaign is displayed, but in this case the "return to transaction" button is not displayed.

353 That is, the instruction to stop displaying the campaign screen and return to the trading screen is disabled.

[0029]

358 The control unit 12 measures the campaign screen display time by the timer 15 while the campaign screen is being displayed, determines whether the campaign screen display time is equal to or longer than the campaign timeout time (To) transmitted from the CRM system 4, If the above is reached, the withdrawal transaction guidance screen is displayed, and if the To is not reached, the campaign screen is continued to be displayed.

363 ( S a 1 8、 S a 1 9 ) 。

364 A supplementary description will be given of the processing of the control unit 12 when determining whether or not the display time of the campaign screen has passed the timeout time (To).

367 When the campaign screen spans a plurality of screens, when the screen is switched, the display time up to that point is cleared (set to "0"), the display time is measured again, and it is determined whether the timeout time has elapsed.

370 Also, when the "Return to Transaction" button is displayed while the campaign screen is being displayed, it is determined whether or not the timeout period (To) has elapsed without clearing the display time for the campaign screen being displayed. do.

[0030]

376 As described above, according to the first embodiment, for a campaign with a short time-out period, for example, a simple campaign whose content can be grasped in a short time, the instruction to stop displaying the campaign screen and return to the transaction is invalid. Yes, it will be displayed until timeout.

380 As a result, there is an effect that the customer can read the contents of the campaign more thoroughly.

382 On the other hand, for campaigns with a long time-out period (those that take time, such as questionnaires), the instruction to cancel the display of the campaign screen and return to the transaction is valid. can be used according to

[0031]

388 Second embodiment

389 A block diagram of the second embodiment is the same as that of the first embodiment, so description thereof is omitted.

391 The operation of the second embodiment will be described below with reference to the flow chart of FIG.

393 (Sb1) to (Sb4) are processed in the same manner as in the first embodiment.

394 The control unit 41 of the CRM system 4 receives the account information transmitted by the automatic teller machine 1 in Sb2, compares the received account information of the customer with the CRM database 43, and determines the campaign ID set for the customer. exists (Sb5).

[0032]

401 The control unit 41 acquires the campaign name, campaign message screen data, campaign timeout time (To), etc., from the extracted campaign ID, and transmits these campaign information to the automated teller machine 1 (Sb6).

404 The control unit 12 of the automated teller machine 1 stores campaign information such as campaign data and campaign timeout time (To) received from the CRM system 4 in the memory 14 .

407 Then, the campaign message screen data stored in the memory 14 is transferred to the operation/display section 11, and the campaign screen is displayed on the display section (Sb7).

410 At this time, the "return to transaction" button is not displayed.

[0033]

414 The control unit 12 reads the non-display time (Th1) of the "return to transaction" button stored in the memory 14 in advance, and compares it with the campaign screen display time

counted by the timer 15 .

417 As a result, if the display time is shorter than (Th1), this checking process is repeated (Sb8).

418 On the other hand, if the display time is longer than (Th1), the image of the "return to transaction" button stored in advance in the memory 14 is combined with the displayed campaign screen and displayed on the display unit. (Sb9).

421 When a plurality of campaign screens are displayed and the campaign screen is switched by the customer's operation, the display time is cleared and the display time of the new campaign screen is compared with (Th1).

424 As a result, even when the campaign screen is displayed over a plurality of screens, each screen can be reliably displayed to the customer.

426 The non-display time (Th1) is set in advance from the viewpoint of the minimum time that the customer should see the campaign screen, and is stored in the memory 14 .

#### [0034]

431 FIG. 9(a) is an example of a campaign screen, in which a message requesting cooperation in the questionnaire implementation campaign is displayed.

433 At the time of display in Sb7, the "return to transaction" button has not yet been displayed.

434 FIG. 9(b) is an example of the screen when the customer touches the "Next" button in FIG. It has become so.

436 In Sb8, when the display time in FIG. 9B is equal to or longer than the non-display time (Th1), as described in Sb9, the "return to transaction" button is displayed, and as shown in FIG. 9C screen display.

#### [0035]

442 Returning to the flowchart of FIG. 8, after displaying the screen of FIG. 9C in Sb9, the control unit 12 determines whether the display time is longer than the campaign timeout time (To) transmitted from the CRM system 4. (Sb10).

445 If the display time is shorter than (To), the control unit 12 checks whether or not the "return to transaction" button has been selected (Sb11), and if the "return to transaction" button has not been selected, , Sb10.

448 On the other hand, if the display time is equal to or longer than (To), the control unit 12 checks whether or not the notification that the withdrawal transaction is possible has been received from the host computer 3 (Sb12), and has received the notification. In this case, the guidance screen for the withdrawal transaction shown in FIG. 7(c) is displayed (Sb13).

452 After that, withdrawal processing is performed in the same manner as in the first embodiment, and the transaction is completed.

454 In Sb12, if the notification that the withdrawal transaction is possible has not been received from the host computer 3, a standby instruction screen is displayed and the notification from the host computer 3 is waited for.

[0036]

460 In the present embodiment, since the campaign screen can be displayed at least until the button non-display time elapses, the campaign can be carried out more reliably.

462 In this way, the "return to transaction" button is not displayed during the preset non-display time (Th1). occurrence can be suppressed.

464 Therefore, it is possible to effectively display the campaign.

[0037]

468 Third embodiment

469 A block diagram of the third embodiment is also the same as that of the first embodiment, so description thereof will be omitted.

471 In this embodiment, the memory 42 of the CRM system 4 stores the button non-display time (Th2) corresponding to the type of transaction received from the automatic teller machine 1. For example, the contents shown in FIG. is stored.

474 The operation of the third embodiment will be described below with reference to the flow chart of FIG.

[0038]

479 (Sc1) to (Sc4) are processed in the same manner as in the first embodiment.

480 The control unit 41 of the CRM system 4 receives the account information transmitted by the automated teller machine 1 in Sc2, compares the received account information of the customer with the CRM database 43, and determines the campaign ID set for the customer. exists (Sc5).

484 Further, the control unit 41 reads the button non-display time stored corresponding to the transaction from the memory 42 (Sc6).

486 Then, the campaign information including this button non-display time (Th2) is transmitted to the automated teller machine 1 (Sc7).

[0039]

491 The control unit 12 of the automated teller machine 1 stores the campaign information received from the CRM system 4 in the memory 14 .

493 Then, the campaign message screen data stored in the memory 14 is transferred to the operation/display section 11, and the campaign screen is displayed on the display section (Sc8).

496 At this time, the "return to transaction" button is not displayed.

497 The control unit 12 reads the non-display time (Th2) of the "return to transaction" button transmitted from the CRM system 4 from the memory 14 and compares it with the campaign screen display time counted by the timer 15 .

500 As a result, if the display time is shorter than (Th2), this checking process is repeated (Sc9).  
501 On the other hand, when the display time is longer than (Th2), the image of the "return to transaction" button stored in advance in the memory 14 is combined with the displayed campaign screen and displayed on the display unit. (Sc10).

#### [0040]

507 When a plurality of campaign screens are displayed and the campaign screen is switched by the customer's operation, the display time is cleared and the display time of the new campaign screen is compared with (Th2).  
510 As a result, even when the campaign screen is displayed over a plurality of screens, each screen can be reliably displayed to the customer.  
512 In addition, the non-display time (Th2) is set in advance from the viewpoint of the minimum time that the customer wants to see according to the time between each transaction (processing time at the host, etc.).

#### [0041]

518 After the "return to transaction" button is displayed on the campaign screen in Sc10, the control unit 12 determines whether the display time is longer than the campaign timeout time (To) sent from the CRM system 4 (Sc11).  
521 If the display time is shorter than (To), the control unit 12 checks whether or not the "return to transaction" button has been selected (Sc12), and if the "return to transaction" button has not been selected, , and return to Sc11.  
524 On the other hand, if the display time is equal to or longer than (To), the control unit 12 checks whether or not a notification that the withdrawal transaction is possible has been received from the host computer 3 (Sc13), and has received the notification. In this case, the guidance screen for the withdrawal transaction shown in FIG. 7(c) is displayed (Sc14).  
528 After that, withdrawal processing is performed in the same manner as in the first embodiment, and the transaction is completed.  
530 In addition, in Sc13, if the notification that the withdrawal transaction is possible has not been received from the host computer 3, a standby instruction screen is displayed and the notification from the host computer 3 is waited for.

#### [0042]

536 In this embodiment, the time until the "return to transaction" button is displayed on the campaign screen can be changed for each transaction type.  
538 Therefore, the campaign can be displayed in accordance with the communication time between the host computer and the automated teller machine, and the efficiency of implementing the campaign can be improved.

[0043]

544 Fourth embodiment

545 The block diagram of the fourth embodiment is also the same as that of the first embodiment, so the explanation is omitted.

547 The operation of the fourth embodiment will be described below with reference to the flowchart of FIG.

[0044]

552 (Sd1) and (Sd2) are processed in the same manner as in the first embodiment.

553 The control unit 41 of the CRM system 4 receives the account information transmitted by the automatic teller machine 1 in Sd2, compares the received account information of the customer with the CRM database 43, and determines the campaign ID set for the customer exists (Sd3).

557 If the campaign ID exists, the control unit 41 refers to the CRM database 43, further acquires the timeout period set for the campaign ID, and transmits the campaign information to the automated teller machine 1 (Sd4).

[0045]

563 In parallel with these, the automated teller machine 1 guides the customer to input the personal identification number and the withdrawal amount via the operation/display unit 11, prompting the customer to input (Sd5).

566 The automated teller machine 1 transmits the personal identification number entered by the customer and the withdrawal amount according to these guidances to the host computer 3 together with the account information described above (Sd6).

569 Also, upon receiving the campaign information from the CRM system 4, the control unit 12 of the automated teller machine 1 stores the campaign information in the memory 14.

571 Among the data stored in the memory 14, the campaign message screen data is transferred to the operation/display section 11, and the campaign screen is displayed on the display section (Sd7).

574 At this time, the "return to transaction" button is not displayed.

[0046]

578 After displaying the campaign screen, the control unit 41 checks whether or not a notification that a withdrawal transaction is possible has been received from the host computer 3 (Sd8).

If not, it is determined whether the display time of the campaign screen is equal to or longer than the campaign timeout time (To) sent from the CRM system 4 (Sd9).

582 If the campaign timeout time has not elapsed, the process returns to checking whether the accounting system communication has ended, and repeats this process (Sd8, Sd9).

584 As a result of checking whether or not the control unit 41 has received the notification that the withdrawal transaction is possible from the host computer 3 (Sd8), if the notification has been received, that is, the completion of the accounting communication has been notified. If so, the campaign image and the "return to trade" button are combined on the screen, and the "return to trade" button is displayed in the campaign screen via the operation/display unit 11 (Sd10).

[0047]

593 When the "return to transaction" button is displayed on the campaign screen in Sd10, the control unit 12 determines whether the campaign screen display time is equal to or longer than the campaign timeout time (To) sent from the CRM system 4 (Sd11).

596 If the display time is shorter than (To), the control unit 12 checks whether or not the "return to trade" button has been selected (Sd12), and if the "return to trade" button has not been selected, , Sd11.

599 On the other hand, if the display time is equal to or longer than (To), the control unit 12 displays the withdrawal transaction guidance screen shown in FIG. 7(c) (Sd13).

601 After that, withdrawal processing is performed in the same manner as in the first embodiment, and the transaction is completed.

[0048]

606 In the present embodiment, the timing for validating the display stop instruction key (end of the predetermined processing related to the transaction) is that the campaign screen is displayed until the notification that the withdrawal transaction is possible is received from the host computer, that is, until the accounting communication is completed. I don't see the "back to trade" button in

611 Therefore, the campaign can be displayed while the host computer and the automated teller machine are communicating with each other, and the efficiency of the campaign can be further improved.

[0049]

617 In this way, if the display control of the "Return to transaction" button is not performed according to the communication time of the accounting system communication with the host, for example, the communication time of the accounting system is 10 seconds for the balance inquiry. If the transfer time is 20 seconds, and the button non-display time is uniformly set to 15 seconds, there will be a difference between the communication time and the button display time.

623 For example, in balance inquiry processing, the campaign screen will always be displayed for 5 seconds after the completion of host processing and the notification of completion has been received. Sometimes, even if you can instruct to cancel the campaign display by



pressing the "Return to Transaction" button, the screen waiting for processing will be displayed for 5 seconds.

[0050]

631 Here, the time during which the campaign is being displayed even though the communication has ended is unnecessary time for the user who has no intention of viewing the campaign, and the usage efficiency of the automated teller machine tends to decrease accordingly. , the campaign ends, but the communication is not finished, there is a tendency that the campaign will not be seen by that much, and the effect of the campaign will decrease.

636 In the present embodiment, by adjusting the button non-display time according to the type of transaction, it is possible to increase the utilization efficiency of the automated teller machine and the implementation efficiency of the campaign.

[0051]

642 Fifth embodiment

643 In each of the above-described embodiments, the automated teller machine synthesizes and displays the "return to trade" button on the campaign message screen, but it can also be configured as follows.

646 In recent years, it has become possible to create a screen displayed on a display unit using a page description language such as HTML (Hyper Text Markup Language) or Java (registered trademark) Script, and to embed various control programs as objects. there is

[0052]

652 An example of using such a page description language will be described.

653 That is, on the CRM system 4 side, the campaign screen is created in HTML format, and the campaign timeout time (To), non-display time (Th1), non-display time (Th2), and operation instructions after these times have passed are stored as objects. , the automatic transaction device 1 may control display/non-display of the "return to transaction" button based on the script of this object.

658 Scripts for such objects serve as control information.

659 In the case of such a configuration, there is an effect that various controls for display screen transition can be incorporated on the CRM side without changing the program on the automatic transaction apparatus 1 side.

[0053]

665 The examples in the respective embodiments described above are examples, and the present invention is not limited thereto.

667 For example, although a campaign message has been described as an example of a message

addressed to a customer, it may be a campaign message or a financial product advertisement message.

670 Further, in each of the above-described embodiments, an example of controlling the display and non-display of the "return to trading" button has been described. When the key is displayed in color and pressed, the key functions as a valid key, and when the key is invalid, the key may be displayed in achromatic color and the key may not be validated even if the key is pressed.

675 That is, if the key operation for instructing to stop the display of the message display screen and shift to the transaction screen is enabled or disabled, even if it is the control of the display, the control of the key input is performed. or a combination thereof.

#### [0054]

681 In addition, the campaign message may be displayed on a screen that is completely different from the transaction screen, or may be displayed on a part of the transaction screen.

683 In addition, in the campaign message display stop instruction, if there is only one campaign screen, the stop will end the display of that screen, and if multiple campaign screens are flipped in sequence, the display of the second and subsequent screens will be displayed. including the case of canceling and returning to the transaction screen.

687 Also, although there is a "return to transaction button", this is also an example of how to call it, and it is not limited to the case of a physical button.

689 In addition, in the second embodiment, an example in which the non-display time (Th1) is stored in advance in the memory 14 of the automated teller machine 1 has been described. You may make it transmit to an automatic transaction apparatus as one of the campaign information.

#### [0055]

696 The host computer 3 and the CRM system 4 may be the same machine.

697 Also, the CRM system 4 may be composed of a plurality of machines.

698 Furthermore, the automatic transaction apparatus 1 may be provided with all or part of the functions of the CRM system.

700 For example, information such as the timeout period may be searched by the CRM system, or may be searched from data held in advance by the automated teller machine.

702 In addition, although an example of card transactions has been explained, other transactions such as passbook transactions may also be used.

704 Moreover, although the example of the account number was demonstrated as an example of the customer's identification information which is transmitted from the automated teller machine to the CRM system, it is not limited to this.

#### [0056]

710 In addition, the automatic transaction device 1 described above is a multifunctional terminal such as a kiosk terminal having other functions such as a ticket reservation function, a product purchase application function, a credit card credit confirmation function, a facility information guidance function, and the like. good too.

714 A customer is a person who opens an account in a financial institution and uses the financial institution, and is generally an individual, but may be a company, an organization, or the like.

716 The network 2 described above may be any network such as a wireless or wired dedicated communication line network or public communication line network, the Internet, a LAN (Local Area Network), a WAN (Wide Area Network), or the like.

719 The network 15 is preferably a dedicated network, but may be a VPN (Virtual Private Network) using a public network.

### [0057]

724 It is a block diagram of an automatic transaction system in each embodiment.

725 It is a block diagram of automatic transaction device 1 in each embodiment.

726 It is a configuration example of a CRM database.

727 It is a configuration example of a customer master database.

728 4 is a flow chart in the first embodiment;

729 It is an example of transmission data transmitted from the CRM system to the automated teller machine.

731 It is an example of a screen display of the automatic transaction apparatus in 1st Embodiment.

733 It is a flow chart in a 2nd embodiment.

734 It is an example of a screen display of the automatic transaction apparatus in 2nd Embodiment.

736 It is a flow chart in a 3rd embodiment.

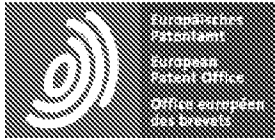
737 It is an example of a timeout period for each transaction type in the third embodiment.

738 It is a flow chart in a 4th embodiment.

739 Code explanation

### [0058]

743 1 automatic transaction device 2 network 3 host computer 4 CRM system 11 operation/display unit 12 control unit 13 CPU 14 memory 15 timer 16 communication control unit 17 card processing unit 18 passbook processing unit 19 money processing unit 41 control unit 42 memory 43 CRM database 44 Customer master database



# Patent Translate

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## CLAIMS JP4586607B2

1.

*13* An automatic transaction device comprising a display unit for displaying guidance necessary for customer transactions, an operation input unit for inputting customer instructions, and a control unit for controlling these units, The automatic transaction device is communicably connected to an information management device that manages message screen information, The control unit acquires message screen information from the information management device, displays the acquired message screen on the display unit, and displays a display time and display of the message screen information stored in advance in the information management device. An automatic transaction device that controls display/non-display of a return-to-transaction instruction key based on a result of comparison with time threshold information.

2.

*26* An automatic transaction device comprising a display unit for displaying guidance necessary for customer transactions, an operation input unit for inputting customer instructions, and a control unit for controlling these units,

*29* The automatic transaction device is communicably connected to an information management device that manages message screen information,

*31* The control unit acquires message screen information from the information management device, displays the acquired message screen on the display unit, and displays information associated with the message screen information pre-stored in the information management device. An automated teller machine that acquires a non-display time and displays a return-to-transaction key based on the non-display time.

3.

39 An automatic transaction device comprising a display unit for displaying guidance necessary for customer transactions, an operation input unit for inputting customer instructions, and a control unit for controlling these units,

42 The automatic transaction device is communicably connected to an information management device that manages message screen information,

44 The control unit acquires message screen information from the information management device, displays the acquired message screen on the display unit, and based on the type of transaction currently being performed by the customer, the information management device An automated teller machine, wherein a non-display time associated with a stored transaction type is acquired, and a return instruction key to the transaction is displayed based on the non-display time.

4.

53 An automated teller machine equipped with a display section for displaying guidance necessary for customer transactions, an operation input section for inputting customer instructions, and a control section for controlling these sections, and information management for managing message screen information an automated trading system comprising:

57 The information management device

58 a search means for searching the display time set for the message screen information to be sent to the automated teller machine;

60 comparison means for comparing the retrieved display time with pre-stored display time threshold information;

62 transmitting means for transmitting the message screen information and the information based on the result of the comparison to the automated teller machine;

64 The automated teller machine comprises receiving means for receiving the message screen information transmitted from the information management device and the information based on the result of the comparison,

67 The automatic transaction system, wherein the control unit, when displaying the message screen on the display unit, controls display/non-display of a return-to-transaction instruction key based on information based on the result of the comparison.

5.

73 An automated teller machine equipped with a display section for displaying guidance necessary for customer transactions, an operation input section for inputting customer instructions, and a control section for controlling these sections, and information management for managing message screen information an automated trading system comprising:

77 The information management device

78 A retrieval means for retrieving non-display time information of a return-to-transaction key set for message screen information to be transmitted to an automated teller machine, and a non-

display time of said message screen information and the searched return-to-transaction key and transmission means for transmitting information to the automatic transaction machine, and the automatic transaction machine receives the message screen information and the non-display time information of the return-to-transaction instruction key transmitted from the information management device. and the control unit displays the message screen on the display unit, and controls to display the return-to-transaction instruction key after the non-display time of the return-to-transaction instruction key has elapsed. automated trading system.

6.

91 An automated teller machine equipped with a display section for displaying guidance necessary for customer transactions, an operation input section for inputting customer instructions, and a control section for controlling these sections, and information management for managing message screen information an automated trading system comprising:

95 The information management device

96 a retrieval means for retrieving non-display time information of a return-to-transaction instruction key set in advance for a transaction type currently being performed in an automated teller machine;

99 a transmission means for transmitting the message screen information and the non-display time information of the searched return instruction key to the transaction machine,

101 The automated teller machine comprises receiving means for receiving the message screen information and non-display time information of the return-to-trade instruction key transmitted from the information management device,

104 The automatic transaction system, wherein the control unit displays the message screen on the display unit and displays the return-to-transaction instruction key after a non-display time of the return-to-transaction instruction key has elapsed.

7.

110 An automatic transaction system according to claim 5, wherein said message screen information incorporates non-display time information and control information of said return-to-transaction instruction key.

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(54) 【発明の名称】 自動取引装置

(57) 【特許請求の範囲】

【請求項1】

顧客取引に必要なガイダンスを表示する表示部と、顧客の指示を入力するための操作入力部と、これら各部を制御する制御部とを備えた自動取引装置であって、

前記自動取引装置は、メッセージ画面情報を管理する情報管理装置と通信可能に接続され、

前記制御部は、前記情報管理装置からメッセージ画面情報を取得し、前記取得したメッセージ画面を前記表示部に表示させるとともに、前記情報管理装置で予め記憶されている前記メッセージ画面情報の表示時間と表示時間閾値情報とを比較した結果に基づいて取引への戻り指示キーの表示・非表示を制御することを特徴とする自動取引装置。

【請求項2】

顧客取引に必要なガイダンスを表示する表示部と、顧客の指示を入力するための操作入力部と、これら各部を制御する制御部とを備えた自動取引装置であって、

前記自動取引装置は、メッセージ画面情報を管理する情報管理装置と通信可能に接続され、

前記制御部は、前記情報管理装置からメッセージ画面情報を取得し、前記取得したメッセージ画面を前記表示部に表示させるとともに、前記情報管理装置で予め記憶されている前記メッセージ画面情報に対応付けられた非表示時間を取得し、前記非表示時間に基づいて取引への戻り指示キーを表示することを特徴とする自動取引装置。

【請求項3】

顧客取引に必要なガイダンスを表示する表示部と、顧客の指示を入力するための操作入力部と、これら各部を制御する制御部とを備えた自動取引装置であって、

前記自動取引装置は、メッセージ画面情報を管理する情報管理装置と通信可能に接続され、

前記制御部は、前記情報管理装置からメッセージ画面情報を取得し、前記取得したメッセージ画面を前記表示部に表示させるとともに、当該顧客が現在行っている取引種別を基に、前記情報管理装置で予め記憶されている取引種別に対応付けられた非表示時間を取得し、前記非表示時間に基づいて取引への戻り指示キーを表示することを特徴とする自動取引装置。

【請求項4】

顧客取引に必要なガイダンスを表示する表示部と、顧客の指示を入力するための操作入力部と、これら各部を制御する制御部とを備えた自動取引装置、及びメッセージ画面情報を管理する情報管理装置とを備えた自動取引システムであって、

情報管理装置は、

自動取引装置に送信するメッセージ画面情報に対して設定された表示時間を検索する検索手段と、

前記検索した表示時間と予め記憶した表示時間閾値情報とを比較する比較手段と、

前記メッセージ画面情報及び前記比較の結果に基づく情報とを自動取引装置に送信する送信手段とを備え、

自動取引装置は、前記情報管理装置から送信された前記メッセージ画面情報及び前記比較の結果に基づく情報とを受信する受信手段を備えるとともに、

前記制御部は、前記メッセージ画面を前記表示部に表示させる際に、前記比較の結果に基づく情報により取引への戻り指示キーの表示・非表示を制御することを特徴とする自動取引システム。

【請求項5】

顧客取引に必要なガイダンスを表示する表示部と、顧客の指示を入力するための操作入力部と、これら各部を制御する制御部とを備えた自動取引装置、及びメッセージ画面情報を管理する情報管理装置とを備えた自動取引システムであって、

情報管理装置は、

自動取引装置に送信するメッセージ画面情報に対して設定された取引への戻り指示キーの非表示時間情報を検索する検索手段と、

前記メッセージ画面情報及び検索した取引への戻り指示キーの非表示時間情報とを自動取引装置に送信する送信手段とを備え、

自動取引装置は、前記情報管理装置から送信された前記メッセージ画面情報及び取引への戻り指示キーの非表示時間情報とを受信する受信手段を備えるとともに、

前記制御部は、前記メッセージ画面を前記表示部に表示しつつ、取引への戻り指示キーの非表示時間経過後に取引への戻り指示キーを表示するよう制御することを特徴とする自動取引システム。

【請求項6】

顧客取引に必要なガイダンスを表示する表示部と、顧客の指示を入力するための操作入力部と、これら各部を制御する制御部とを備えた自動取引装置、及びメッセージ画面情報を管理する情報管理装置とを備えた自動取引システムであって、

情報管理装置は、

自動取引装置で現在行なわれている取引種別に対して予め設定された取引への戻り指示キーの非表示時間情報を検索する検索手段と、

前記メッセージ画面情報及び検索した取引への戻り指示キーの非表示時間情報とを自動取引装置に送信する送信手段とを備え、

自動取引装置は、前記情報管理装置から送信された前記メッセージ画面情報及び取引への戻り指示キーの非表示時間情報とを受信する受信手段を備えるとともに、

前記制御部は、前記メッセージ画面を前記表示部に表示しつつ、取引への戻り指示



キーの非表示時間経過後に取引への戻り指示キーを表示するよう制御することを特徴とする自動取引システム。

【請求項7】

請求項5または6項において、前記メッセージ画面情報には、前記取引への戻り指示キーの非表示時間情報及び制御情報が組み込まれていることを特徴とする自動取引システム。

【発明の詳細な説明】

【技術分野】

【0001】

本発明は、自動取引装置における顧客への表示画面の遷移制御に関するものである。

【背景技術】

【0002】

従来、銀行、郵便局、信用金庫等の金融機関の顧客が、預金、引出し、振込、残高照会等の金融取引を行う場合、前記金融機関の営業店などに設置されたATM (Automatic Teller Machine: 現金自動預払機)、CD (Cash Dispenser: 現金自動支払機)等の自動取引装置を利用すると、該自動取引装置の表示画面に自動取引装置の操作指示の表示(ガイダンス)に加えて、前記金融機関から顧客へのメッセージ(キャンペーンメッセージ、広告、通知等を含む。)の付加情報が表示されるシステムが提供されている。

【0003】

例えば、前記顧客が銀行における自動取引装置を操作して残高照会を行う際、暗証番号入力の後、ホストへの照会中に、表示画面に「当行におきましては、○月○日より新しい××サービスを開始しました。どうぞご利用下さい。」というようなキャンペーンメッセージを表示するようになっている。

【0004】

さらに、近年においては、顧客情報管理装置(CRMシステム: Customer Relationship Management システム)を採用することによって、それぞれの顧客に対応した内容のメッセージを作成することができるようになっている。この場合、それぞれの顧客の住所、氏名、年齢、職種、収入、家族構成等の顧客の基本的な属性に関する情報や、それぞれの顧客の過去に行われた勘定取引に関する履歴等の情報に基づいて、それぞれの顧客に対応した内容を備える、いわゆる、オーダーメイドのメッセージを作成して、顧客に提示することができる。

【0005】

これにより、金融機関は、それぞれの顧客に適した内容の金融商品に関するメッセージをタイムリーに顧客に伝えることができ、また、それぞれの顧客に即した適切な表現のメッセージを顧客に伝えることができる。(例えば、特許文献1参照。)

また、キャンペーンメッセージを見終わったときには、画面の中に表示される「閉じる」ボタンを顧客がタッチすることにより、キャンペーンメッセージ画面の表示を中止し、勘定系の画面に戻るようになっている。(例えば、特許文献2参照。)

【特許文献1】特開2003-346040号公報

【特許文献2】特開2003-323659号公報

【発明の開示】

【発明が解決しようとする課題】

【0006】

しかしながら、従来の自動取引装置にあつては、キャンペーンメッセージ画面に表示される「閉じる」のボタンを顧客がタッチすることにより、勘定系の取引が終了する前にキャンペーン画面の表示を終了させることが可能であった。

本発明は、キャンペーン表示の効率を高め、勘定系の通信時間を有効利用することを目的としている。

【課題を解決するための手段】

## 【0007】

そのため、本発明の自動取引装置は、顧客取引に必要なガイダンスを表示する表示部と、顧客の指示を入力するための操作入力部と、これら各部を制御する制御部とを備えた自動取引装置であって、前記自動取引装置は、メッセージ画面情報を管理する情報管理装置と通信可能に接続され、前記制御部は、前記情報管理装置からメッセージ画面情報を取得し、前記取得したメッセージ画面を前記表示部に表示させるとともに、前記情報管理装置で予め記憶されている前記メッセージ画面情報の表示時間と表示時間閾値情報とを比較した結果に基づいて取引への戻り指示キーの表示・非表示を制御することを特徴とする。

## 【発明の効果】

## 【0008】

本発明では、顧客取引に必要なガイダンス及び顧客へのメッセージ情報を表示部に表示するとともに、表示したメッセージ情報の表示中止を指示する取引への戻り指示キーの表示の有効・無効を制御することにより、顧客取引の合間に行なうメッセージ情報の表示効率を高めることができるという効果を奏する。

## 【発明を実施するための最良の形態】

## 【0009】

本発明の実施の形態について図面を参照しながら説明する。尚、各図面に共通な要素には同一符号を付す。

## 【0010】

## 第1の実施の形態

## (1) 自動取引装置の構成

図1は、本発明の第1の実施の形態を示す自動取引システムのブロック図であり、図2は、自動取引装置1のブロック図である。

図1において、顧客が取引のための操作を行う自動取引装置1は、ネットワーク2を介してホストコンピュータ3及びCRMシステム4に接続されている。

## 【0011】

自動取引装置1は、前記営業店に配設されたATM、CD等であり、前記金融機関の顧客が自分で操作して入金、出金、通帳記帳、残高照会、振込、振替、送金、定期性預金設定等の金融取引を行うための装置である。

また、ホストコンピュータ3は、自動取引装置1からの処理依頼を受けて、預金口座管理等の金融機関業務に関する各種データ処理を行う。

また、CRMシステム4は、顧客情報を保有し顧客情報に基づき種々の情報を自動取引装置1に提供するシステムであり、顧客情報管理装置として機能する。

## 【0012】

図2は自動取引装置1のブロック図であり、本図を用いて自動取引装置の構成を説明する。

自動取引装置1は、操作・表示部11、カード処理部17、通帳処理部18、貨幣処理部19及びこれら各部を制御する制御部12を備えている。

ここで、操作・表示部11は、入力装置と表示装置との機能を兼ね備えるタッチパネル付き液晶ディスプレイで構成されている。

なお、表示部では、取引に必要なガイダンス（暗証番号入力指示や引出金額入力指示、カードや現金の引き取り指示など）のほか、このような取引ガイダンスの合間（入金された現金をカウントしたり、勘定系のシステムにアクセスしているような時間）に金融商品に関するメッセージや広告を含む画面を前記表示装置に表示することができるようになっている。

## 【0013】

また、カード処理部17は、キャッシュカード等のカードを取り扱い、顧客IDの取得などを行う。ここで、前記カードは、金融機関が顧客に対して発行した入金、出金、振込、残高照会等の金融取引を行うためのカードであり、顧客識別情報として、店番号、科目、口座番号などを格納する磁気ストライプを備える。なお、前記情報を格納する部材とし

ては、前記磁気ストライプに代えて、ICチップを埋め込んだICカードであってもよい。

そして、カード処理部17は、カードが挿入されるカード挿入口を備え、該挿入口の奥には、カードを搬送する搬送装置、及び、カードの磁気ストライプやICチップから記録情報を読み取り・書き込むための磁気ヘッドや端子などが配設されている。なお、本実施の形態におけるカード処理部17は、さらに取引明細票を印刷して発行する明細票発行部も備えている。

【0014】

通帳処理部18は、顧客の通帳を受け入れ、印字や通帳に設けられた磁気ストライプへの磁気書き込みなどの処理を行う。

貨幣処理部19は、紙幣を取り扱う紙幣入出金部や硬貨を取り扱う硬貨入出金部を有し、それぞれ顧客の取引に応じて貨幣の入金・出金や計数などの処理を行う。

制御部12は、CPU13、メモリ14、タイマ15などを備え、自動取引装置1の各部を制御する。また制御部12は、ネットワーク2に接続し、ホストコンピュータやCRMシステム4との間で通信を行うための通信制御部16を備えている。

【0015】

次に図1におけるCRMシステム4の構成を説明する。

CRMシステム4は、各種制御に必要な情報を記憶するメモリ42を有しCRMシステム4の各種制御を行う制御部41と、キャンペーンメッセージに関するデータを格納したCRMデータベース43と、顧客データを格納した顧客マスタデータベース44を備えている。

ここで、CRMデータベース43は、顧客別表示データ、キャンペーン画面情報等を格納し、顧客マスタデータベース44は、それぞれの顧客について、顧客ID、住所、氏名、年齢、職種、収入、家族構成等の顧客の基本的な属性に関する情報、すなわち、顧客基本属性情報、及び、過去に行われた勘定取引に関する履歴等の勘定取引情報を格納している。

【0016】

また、CRMデータベース43は、顧客に対して提供されたキャンペーン情報、メッセージ等に関するキャンペーン履歴、顧客が自動取引装置1等を操作した操作履歴等を格納する履歴データベースも備えている。

なお、CRMシステム4は、これらデータを利用して顧客に適した内容の案内情報を作成するようになっている。

【0017】

図3は、CRMシステムにおけるCRMデータベース内のデータ例を示した図である。CRMデータベース43には、それぞれのキャンペーンに関してキャンペーンID、キャンペーン名称、表示タイムアウト時間、対象者の情報(口座番号など)などが格納されている。なお、キャンペーン画面情報(画面データ)は、このキャンペーンIDに対応付けて、CRMデータベースに格納されている。

また、図4は、顧客マスタデータベースに格納された顧客データの例である。それぞれの口座番号に対し、顧客氏名、口座残高、当該口座が給与振込先で有るか無いか、公共料金の支払口座で有るか無いかなどが格納されている。

次に、図5のフローチャートを用いて、本実施の形態に係る自動取引システムの動作を説明する。なお、取引としては、引出し取引の場合を例に説明する。

【0018】

(1) 取引開始～キャンペーン画面表示の前まで

顧客が、自動取引装置1の操作・表示部11に表示された取引選択画面で、「引出」取引のボタンをタッチすることにより取引選択を行うとともに、カード処理部17にカード挿入し、取引を開始する(Sa1)。なお、取引選択の前にカードを挿入してもよい。

顧客によって取引が選択され、カードが挿入されると、自動取引装置1の制御部12は、カードの磁気ストライプから顧客の口座情報(口座番号など)を読み取り、通信制御部1

6を介してCRMシステム4へ送信する(Sa2)。

自動取引装置1は、その後、操作・表示部11を介して、顧客に暗証番号及び引出し金額の入力をガイダンスして、顧客入力を促す(Sa3)。また、自動取引装置1は、これらガイダンスに従い顧客が入力した暗証番号及び引出し金額を上述した口座情報とともに、ホストコンピュータ3へ送信する(Sa4)。

【0019】

CRMシステム4の制御部41は、Sa2において自動取引装置1が送信した口座情報を受信するとともに、受信した顧客の口座情報と、CRMデータベース43とを対比して、当該顧客に設定されたキャンペーンIDが存在するかを検索する(Sa5)。

制御部41は、キャンペーンIDが存在する場合、CRMデータベース43を参照して、さらにそのキャンペーンIDに設定されたタイムアウト時間を取得する(Sa6)。

【0020】

制御部41は、メモリ42から「タイムアウト時間の閾値」を読み出すとともに、Sa6で取得したタイムアウト時間と比較演算処理を行う(Sa7)。

制御部41は、今回のキャンペーンのタイムアウト時間が閾値以上の場合、「取引に戻る」ボタン表示フラグ(F)を「1」に設定して、メモリ42に記憶する(Sa8a)。一方、今回のキャンペーンのタイムアウト時間が閾値より小さい場合は、フラグ(F)を「0」に設定して、メモリ42に記憶する(Sa8b)。

制御部41は、図6に示すようなデータフォーマットで、自動取引装置1にキャンペーン情報を送信する(Sa9)。

【0021】

図6において、口座番号は自動取引装置1から受信した口座情報である。また、キャンペーン情報は、キャンペーンID、キャンペーン名称、キャンペーンメッセージの画面データ、キャンペーンタイムアウト時間(To)などからなり、CRMデータベースから取得したデータである。また、ボタン表示フラグは、Sa7～Sa8で設定されメモリ42に記憶されたフラグFの値である。また、ヘッダとフッタは通信制御のためのアドレスやチェックデータなどで構成される。

【0022】

なお、上述の通り、キャンペーン毎に「タイムアウト時間」を設定しているのは、キャンペーン画面表示中に顧客操作がないために、キャンペーン画面を表示したままになるのを防止するためである。キャンペーン毎の通知内容に応じて設定されたタイムアウト時間がCRMデータベース43に記憶されている。

また、「タイムアウト時間の閾値」は、顧客が「取引に戻る」ボタンを押すといった操作をなるべくしなくてもいいように、という意図で設定されるもので、例えば7秒などの値に設定される。従って、この例では、キャンペーン画面のうち、タイムアウト時間(自動的に取引画面に戻るまでの時間)が、7秒より小さい場合には、「取引に戻る」ボタンを非表示とするべくフラグFが「0」に設定され、タイムアウト時間が7秒以上であれば、「取引に戻る」ボタンを表示するべくフラグFが「1」に設定されることになる。従って、例えばアンケートのようにメッセージ内容読んで、回答を考えるようなキャンペーン画面では、タイムアウト時間が長く設定され、表示の途中でキャンペーン画面表示を中止して取引に戻れるように、「取引に戻る」ボタンを表示するようになっている。

【0023】

(2) キャンペーン画面に「取引に戻る」ボタンを表示する場合のフロー

自動取引装置1の制御部12は、CRMシステム4からキャンペーン情報を受信すると、キャンペーンデータの内容をメモリ14に格納する。また、フラグ(F)の値をチェックする(Sa10)。

制御部12は、フラグ(F) = 「1」の場合には、メモリ14に記憶したキャンペーン画面データ及び予めメモリ14に記憶した「取引に戻る」ボタンのデータとを合成して、キャンペーン表示画面のデータを生成するとともに、この生成された表示画面データを操作・表示部11に転送し、表示部にキャンペーン画面を表示する(Sa11)。なお、本

フローチャートでは、ホストコンピュータ3に取引情報を送信した後に操作・表示部11への表示画面データの転送を行う例を記載しているが、暗証番号、引出し金額入力(Sa3)の処理と並行して行い、引出し金額入力が終わると直ちにキャンペーン画面が表示されるようにしてもよい。(以下の実施の形態においても同様である。)

いずれにしても、顧客に対する取引ガイダンスの合間にこのキャンペーン画面を表示するようにしている。

【0024】

図7(a)は、キャンペーン画面の一例であり、アンケート実施キャンペーンのメッセージが表示されている。また、画面右下には、「取引に戻る」のボタンが表示され、このボタンをタッチすることにより、顧客による取引に戻る指示が有効となっている。さらに、画面の左上には、現在行っている取引の情報として「お引出し」と表示し、また、キャンペーンメッセージ中には、顧客氏名が表示されている。これらは、制御部12が、顧客が選択した取引の情報やホストコンピュータ3あるいはCRMシステム4から送信される該当する情報に基づき、画面合成を行い表示しているものである。

【0025】

続いて、図7(a)が表示されている状態で、制御部12は、顧客が「取引に戻る」ボタンをタッチしたか否かをチェックする(Sa12)。

制御部12は、操作・表示部11のタッチパネルにおけるタッチ検出で、顧客が「取引に戻る」ボタンをタッチしたと判断した場合には、ホストコンピュータ3からの引出し取引可能な通知が届いているか否かをチェックし(Sa13)、当該通知を受信している場合には、図7(c)に示すような、引出し取引の誘導画面を表示する(Sa14)。

制御部12は、カード処理部17を介して顧客にカード及びレシートを排出し、顧客が受領したことを検出すると、貨幣の払い出しを行う(Sa15)。制御部12は、貨幣処理部19に払いだされた貨幣が顧客により取り出したことが検出されると、取引終了と判断し、ホストコンピュータ3及びCRMシステム4に取引完了を通知するとともに、操作・表示部11に取引選択画面の情報を転送して、取引選択待ちの状態に戻る。

【0026】

なお、制御部12は、キャンペーン画面表示の履歴情報(該当口座情報、キャンペーンID、キャンペーンに対するレスポンス情報(アンケート回答内容)など)をCRMシステム4に送信する。CRMシステム4の制御部41は、自動取引装置1から送信されたこれら履歴情報に基づきCRMデータベース43の内容を更新する。

なお、Sa13において、ホストコンピュータ3からまだ引出し取引可能な通知が届いていないと判断された場合には、制御部12は、操作・表示部11に「ホストコンピュータに照会中です。しばらくお待ちください。」等の待機指示画面を表示して、ホストコンピュータ3からの通知を待つ(Sa16)。

【0027】

また、ホストコンピュータ3から、暗証番号不一致の通知を受信した場合には、制御部12は、操作・表示部11に暗証番号再入力画面を表示し、再度Sa4から処理を繰り返す。さらに、ホストコンピュータ3から、該当口座が無いなど取引不可の通知が届いた場合には、制御部12は、操作・表示部11に「取引不可」の旨を表示して、取引選択画面に戻る。

また、制御部12は、キャンペーン画面表示中に、タイマ15によりキャンペーン画面表示時間を計測し、キャンペーン画面表示時間がCRMシステム4から送信されたキャンペーンタイムアウト時間(To)以上となったかどうかを判断し、To以上となった場合には、引出し取引誘導画面を表示し、Toに満たない場合には、「取引に戻る」ボタンが選択されたか否かの判断に戻る(Sa12、Sa17)。これにより、顧客がキャンペーン画面を表示したまま、取引画面に戻らないこととなるのを防止する。

【0028】

(3) キャンペーン画面に「取引に戻る」ボタンを表示しない場合のフロー

Sa10において、制御部12は、フラグ(F) = 「0」の場合には、「取引に戻る」

ボタンのデータを合成することなく、メモリ14に記憶したキャンペーン画面データ操作・表示部11に転送し、表示部にキャンペーン画面を表示する(Sa18)。

図7(b)は、キャンペーン画面の一例であり、アンケート実施キャンペーンのメッセージが表示されているが、この場合には「取引に戻る」のボタンが表示されない。即ち、キャンペーン画面表示を中止して取引画面に戻る指示が無効となっている。

【0029】

制御部12は、キャンペーン画面表示中に、タイマ15によりキャンペーン画面表示時間を計測し、キャンペーン画面表示時間がCRMシステム4から送信されたキャンペーンタイムアウト時間(To)以上となったかどうかを判断し、To以上となった場合には、引出取引誘導画面を表示し、Toに満たない場合には、キャンペーン画面の表示を継続する。(Sa18、Sa19)。

なお、キャンペーン画面の表示時間がタイムアウト時間(To)を経過したか否かを判断する場合の制御部12の処理について補足する。

キャンペーン画面が複数画面にわたる場合、画面を切替えた際にはそれまでの表示時間をクリア(「0」にして)再度表示時間を計測し、タイムアウト時間を経過したか判断する。また、キャンペーン画面表示中に「取引に戻る」ボタンを表示した際には、表示中のキャンペーン画面については、表示時間をクリアせずに、引き続きタイムアウト時間(To)が経過したか否かを判断する。

【0030】

以上のように、第1の実施の形態によれば、タイムアウト時間が短いキャンペーン、例えば、短時間で内容が把握できる簡単なキャンペーンについては、キャンペーン画面表示を中止して取引に戻る指示が無効であり、タイムアウトまで表示されることになる。これにより、顧客にキャンペーン内容をよりしっかり読んでもらえるという効果がある。

一方、タイムアウト時間が長いキャンペーン(アンケートなど時間を要するもの)については、キャンペーン画面表示を中止して取引に戻る指示が有効となっているので、キャンペーン画面途中で中止することができ、顧客の都合に合わせた利用が可能となる。

【0031】

## 第2の実施の形態

第2の実施の形態におけるブロック図は、第1の実施の形態と同じであるので説明を省略する。

以下、図8のフローチャートに沿って、第2の実施の形態における動作を説明する。

(Sb1)から(Sb4)までは第1の実施の形態と同じく処理する。

CRMシステム4の制御部41は、Sb2において自動取引装置1が送信した口座情報を受信するとともに、受信した顧客の口座情報と、CRMデータベース43とを対比して、当該顧客に設定されたキャンペーンIDが存在するかを検索する(Sb5)。

【0032】

制御部41は、抽出されたキャンペーンIDから、キャンペーン名称、キャンペーンメッセージの画面データ、キャンペーンタイムアウト時間(To)などを取得し、これらキャンペーン情報を自動取引装置1へ送信する(Sb6)。

自動取引装置1の制御部12は、CRMシステム4から受信した、キャンペーンデータ及びキャンペーンタイムアウト時間(To)などのキャンペーン情報をメモリ14に格納する。そして、メモリ14に記憶したキャンペーンメッセージ画面データを操作・表示部11に転送し、表示部にキャンペーン画面を表示する(Sb7)。なお、この時点では、「取引に戻る」のボタン表示は行わない。

【0033】

制御部12は、予めメモリ14に記憶された「取引に戻る」ボタンの非表示時間(Th1)を読み出し、タイマ15で計数しているキャンペーン画面の表示時間と比較する。この結果、表示時間が(Th1)より小さい場合には、このチェックの処理を繰り返す(Sb8)。一方、表示時間が(Th1)以上となっている場合には、表示しているキャンペーン画面に、予めメモリ14に格納された「取引に戻る」のボタンの画像を合成して表示

部に表示する (Sb9)。

なお、キャンペーン画面が複数にわたる場合であって、顧客の操作によってキャンペーン画面が切替えられたときには、表示時間をクリアにし、新たなキャンペーン画面の表示時間が (Th1) と比較される。これにより、複数の画面にわたりキャンペーン画面を表示する場合であっても、確実に各画面を顧客に対して表示することができる。

また、非表示時間 (Th1) は、そのキャンペーン画面について顧客に最低限見てもらいたい時間という観点で予め設定され、メモリ14に格納されている。

【0034】

図9 (a) は、キャンペーン画面の一例であり、アンケート実施キャンペーンへの協力要請のメッセージが表示されている。Sb7で表示した時点では、まだ「取引に戻る」のボタンが表示されていない。

図9 (b) は、図9 (a) において、顧客が「次へ」のボタンをタッチした場合の画面例であり、ここでは、具体的なアンケート内容が表示され、顧客により回答が選択されるようになっている。

Sb8において、図9 (b) の表示時間が、非表示時間 (Th1) 以上となった場合には、Sb9で説明した通り、「取引に戻る」ボタンが表示され、図9 (c) のような画面表示となる。

【0035】

図8のフローチャートに戻って、Sb9で図9 (c) の画面を表示したら、制御部12は、表示時間がCRMシステム4から送信されたキャンペーンタイムアウト時間 (To) 以上となったかどうかを判断する (Sb10)。

制御部12は、表示時間が (To) より短い場合には、「取引に戻る」ボタンが選択されたか否かをチェックし (Sb11)、「取引に戻る」ボタンが選択されていない場合には、Sb10へ戻る。

一方、表示時間が、(To) 以上の場合には、制御部12は、ホストコンピュータ3からの引出し取引可能の通知が届いているか否かをチェックし (Sb12)、当該通知を受信している場合には、図7 (c) に示す引出し取引の誘導画面を表示する (Sb13)。その後、第1の実施の形態と同様に引出し処理を行い取引終了する。なお、Sb12において、ホストコンピュータ3から引出し取引可能の通知が届いていない場合には、待機指示画面を表示してホストコンピュータ3からの通知を待つ。

【0036】

本実施の形態では、少なくともボタン非表示時間が経過するまではキャンペーン画面を表示することができるため、キャンペーンの実施をより確実に行うことができる。

このように、予め設定した非表示時間 (Th1) の間は、「取引に戻る」ボタンを表示しないので、例えば、すぐに取引画面に戻っても通信が終わるまで顧客が待たされるようなケースの発生を抑えることができる。従って、キャンペーン表示を効果的に行うことが可能となる。

【0037】

### 第3の実施の形態

第3の実施の形態におけるブロック図も、第1の実施の形態と同じであるため説明を省略する。

なお、本実施の形態では、CRMシステム4のメモリ42に、自動取引装置1から受信した取引種別に対応した、ボタン非表示時間 (Th2) が記憶されており、例えば、図11のような内容が記憶されている。

以下、図10のフローチャートに沿って、第3の実施の形態における動作を説明する。

【0038】

(Sc1) から (Sc4) までは第1の実施の形態と同じく処理する。

CRMシステム4の制御部41は、Sc2において自動取引装置1が送信した口座情報を受信するとともに、受信した顧客の口座情報と、CRMデータベース43とを対比して、当該顧客に設定されたキャンペーンIDが存在するかを検索する (Sc5)。

さらに、制御部41は、メモリ42から、当該取引に対応して記憶されたボタン非表示時間を読み出す(S c 6)。そして、このボタン非表示時間(Th 2)を含めたキャンペーン情報を自動取引装置1へ送信する(S c 7)。

【0039】

自動取引装置1の制御部12は、CRMシステム4から受信した、キャンペーン情報をメモリ14に格納する。そして、メモリ14に記憶したキャンペーンメッセージ画面データを操作・表示部11に転送し、表示部にキャンペーン画面を表示する(S c 8)。なお、この時点では、「取引に戻る」のボタン表示は行わない。

制御部12は、CRMシステム4から送信された「取引に戻る」ボタンの非表示時間(Th 2)を、メモリ14から読み出し、タイム15で計数しているキャンペーン画面の表示時間と比較する。この結果、表示時間が(Th 2)より小さい場合には、このチェックの処理を繰り返す(S c 9)。一方、表示時間が(Th 2)以上となっている場合には、表示しているキャンペーン画面に、予めメモリ14に格納された「取引に戻る」のボタンの画像を合成して表示部に表示する(S c 10)。

【0040】

なお、キャンペーン画面が複数にわたる場合であって、顧客の操作によってキャンペーン画面が切替えられたときには、表示時間をクリアにし、新たなキャンペーン画面の表示時間が(Th 2)と比較される。これにより、複数の画面にわたりキャンペーン画面を表示する場合であっても、確実に各画面を顧客に対して表示することができる。

また、非表示時間(Th 2)は、各取引における合間の時間(ホストでの処理時間など)に応じて顧客に最低限見てもらいたい時間という観点で予め設定される。

【0041】

S c 10でキャンペーン画面に「取引に戻る」ボタンを表示したら、制御部12は、表示時間がCRMシステム4から送信されたキャンペーンタイムアウト時間(T o)以上となったかどうかを判断する(S c 11)。

制御部12は、表示時間が(T o)より短い場合には、「取引に戻る」ボタンが選択されたか否かをチェックし(S c 12)、「取引に戻る」ボタンが選択されていない場合には、S c 11へ戻る。

一方、表示時間が、(T o)以上の場合には、制御部12は、ホストコンピュータ3からの引出し取引可能の通知が届いているか否かをチェックし(S c 13)、当該通知を受信している場合には、図7(c)に示す引出し取引の誘導画面を表示する(S c 14)。その後、第1の実施の形態と同様に引出し処理を行い取引終了する。なお、S c 13において、ホストコンピュータ3から引出し取引可能の通知が届いていない場合には、待機指示画面を表示してホストコンピュータ3からの通知を待つ。

【0042】

本実施の形態では、キャンペーン画面に「取引に戻る」ボタンを表示するまでの時間を取引種別ごとに変更することができる。したがって、ホストコンピュータと自動取引装置の通信時間に合わせてキャンペーンを表示することができ、キャンペーンの実施効率を上げることができる。

【0043】

#### 第4の実施の形態

第4の実施の形態におけるブロック図も、第1の実施の形態と同じであるので説明は省略する。

以下、図12のフローチャートに沿って、第4の実施の形態における動作を説明する。

【0044】

(S d 1)、(S d 2)は、第1の実施の形態と同じく処理する。

CRMシステム4の制御部41は、S d 2において自動取引装置1が送信した口座情報を受信するとともに、受信した顧客の口座情報と、CRMデータベース43とを対比して、当該顧客に設定されたキャンペーンIDが存在するかを検索する(S d 3)。

制御部41は、キャンペーンIDが存在する場合、CRMデータベース43を参照して



、さらにそのキャンペーンIDに設定されたタイムアウト時間を取得し、これらキャンペーン情報を自動取引装置1へ送信する(Sd4)。

【0045】

これらと並行して、自動取引装置1は、操作・表示部11を介して、顧客に暗証番号及び引出し金額の入力をガイダンスして、顧客入力を促す(Sd5)。自動取引装置1は、これらガイダンスに従い顧客が入力した暗証番号及び引出し金額を上述した口座情報とともに、ホストコンピュータ3へ送信する(Sd6)。

また、自動取引装置1の制御部12は、キャンペーン情報をCRMシステム4から受信すると、メモリ14に格納する。そして、メモリ14に記憶したデータのうち、キャンペーンメッセージ画面データを操作・表示部11に転送し、表示部にキャンペーン画面を表示する(Sd7)。なお、この時点では、「取引に戻る」のボタン表示は行わない。

【0046】

制御部41は、キャンペーン画面を表示した後、ホストコンピュータ3からの引出し取引可能な通知が届いているか否かをチェックし(Sd8)、当該通知を受信していない場合、即ち、勘定系通信が終了していない場合には、キャンペーン画面の表示時間がCRMシステム4から送信されたキャンペーンタイムアウト時間(To)以上となったかどうかを判断する(Sd9)。また、キャンペーンタイムアウト時間を経過していない場合には、勘定系通信が終了しているかどうかのチェックに戻り、この処理を繰り返す(Sd8、Sd9)。

なお、制御部41は、ホストコンピュータ3からの引出し取引可能な通知が届いているか否かをチェック(Sd8)の結果、当該通知を受信している場合、即ち、勘定系通信の終了が通知されている場合には、キャンペーン画像と「取引に戻る」ボタンとの画面合成を行い操作・表示部11を介してキャンペーン画面中に「取引に戻る」ボタンを表示する(Sd10)。

【0047】

Sd10でキャンペーン画面に「取引に戻る」ボタンを表示したら、制御部12は、キャンペーン画面表示時間がCRMシステム4から送信されたキャンペーンタイムアウト時間(To)以上となったかどうかを判断する(Sd11)。

制御部12は、表示時間が(To)より短い場合には、「取引に戻る」ボタンが選択されたか否かをチェックし(Sd12)、「取引に戻る」ボタンが選択されていない場合には、Sd11へ戻る。

一方、表示時間が、(To)以上の場合には、制御部12は、図7(c)に示す引出取引の誘導画面を表示する(Sd13)。その後、第1の実施の形態と同様に引出し処理を行い取引終了する。

【0048】

本実施の形態では、表示中止指示キーを有効とするタイミング(取引に係る所定の処理の終了)として、ホストコンピュータからの引出し取引可能な通知が届くまで、即ち勘定系通信が終了するまでキャンペーン画面に「取引に戻る」ボタンが表示されない。したがって、ホストコンピュータと自動取引装置が通信を行っている間は常にキャンペーンを表示することができ、キャンペーンの実施効率をさらに上げることができる。

【0049】

なお、このように、ホストとの間の勘定系通信の通信時間に合わせて、「取引に戻る」ボタンの表示制御を行わない場合には、例えば、勘定系の通信時間が残高照会は10秒、振り込みは20秒の場合には、ボタン非表示時間を一律に15秒とすると、通信時間とボタンが表示されるまでの時間に差ができてしまう。このことは、例えば、残高照会処理においては、ホスト処理が完了し終了の通知が届いた後も必ず5秒間キャンペーン画面が表示されることになり、また、振り込みの場合には、15秒経過したときに、「取引に戻る」ボタンによるキャンペーン表示の中止指示を行うことができたとしても、5秒間は処理待ちの画面が表示されることとなる。

【0050】

ここで、通信は終わっているがキャンペーンを表示している時間は、キャンペーンを見る意思のない利用者にとって不要な時間であり、自動取引装置の利用効率もその分下がってしまう傾向があり、また、キャンペーンを終了したが、通信は終わっていない時間は、その分キャンペーンを見てもらえなくなり、キャンペーンの効果が下がってしまう傾向がある。

本実施の形態では、ボタン非表示時間を取引種別に応じて調節することで、自動取引装置の利用効率とキャンペーンの実施効率を上げることができる。

【0051】

#### 第5の実施の形態

上記各実施の形態では、自動取引装置側でキャンペーンメッセージ画面に「取引に戻る」ボタンを合成して表示するようにしていたが、例えば次のように構成することもできる。

近年、表示部に表示される画面をHTML (Hyper Text Markup Language) やJava (登録商標) Scriptなどのページ記述言語を用いて作成し、各種の制御プログラムをオブジェクトとして埋め込むことができるようになっている。

【0052】

このようなページ記述言語を利用した場合の例を説明する。

即ち、CRMシステム4側で、キャンペーン画面をHTML形式で作成するとともに、キャンペーンタイムアウト時間 (To)、非表示時間 (Th1)、非表示時間 (Th2) 及びこれら時間を経過した後の動作指示をオブジェクトとして埋め込んで作成することにより、自動取引装置1側では、このオブジェクトのスクリプト (script) に基づいて、「取引に戻る」ボタンの表示・非表示の制御を行うようにしてもよい。このようなオブジェクトのスクリプトは制御情報として機能する。

このように構成の場合、自動取引装置1側のプログラムを変更しなくとも、CRM側で表示画面遷移の制御を各種作り込むことができるという効果がある。

【0053】

上述した各実施の形態における例は、一例であり本発明はこれに限られない。

例えば、顧客宛のメッセージとしてキャンペーンメッセージの例を説明したが、キャンペーンメッセージの他、金融商品広告のメッセージなどでもよい。

また、上述した各実施の形態では、「取引に戻る」ボタンの表示、非表示の制御例を説明したが、例えば、「取引に戻る」ボタンを常時表示させておくとともに、有効なときは有彩色で表示するとともにキーを押下すると有効なキーとして機能し、無効なときは無彩色で表示するとともにキーを押下してもキーが有効とならないようにしてもよい。即ち、メッセージ表示画面の表示を中止して取引用の画面に移行するよう指示するためのキー操作を有効にしたり、無効にしたりするものであれば、表示の制御であってもキー入力の制御であってもまたはこれらの組み合わせであっても構わない。

【0054】

また、キャンペーンメッセージは、取引画面とは全く別の画面に切替えて表示する場合の他、取引画面の一部に表示するものであっても適用可能である。

また、キャンペーンメッセージ表示の中止指示における、中止とは、キャンペーン画面が1画面の場合にその画面の表示を終了させる他、複数のキャンペーン画面を順次捲っていく場合における2画面目以降の画面の表示を中止して、取引画面に戻る場合も含む。

また、「取引に戻るボタン」とあるが、これも一例としての呼び方であり、物理的なボタンの場合に限るものではない。

また、第2の実施の形態においては、非表示時間 (Th1) を予め自動取引装置1のメモリ14に格納しておく例を説明したが、CRMシステム4のCRMデータベース43に格納しておき、キャンペーン情報の1つとして自動取引装置に送信するようにしてもよい。

【0055】

なお、ホストコンピュータ3とCRMシステム4は同一のマシンでもよい。また、CR

Mシステム4は複数のマシンから構成されていてもよい。さらに、CRMシステムの機能の全部若しくは一部を自動取引装置1に備えるようにしてもよい。例えば、タイムアウト時間などの情報は、CRMシステムで検索するもの他、自動取引装置が予め保有しているデータから検索するようにしてもよい。

また、カード取引の場合の例を説明したが、通帳取引などその他の取引でも構わない。

また、自動取引装置からCRMシステムへ送信する顧客の識別情報の例として、口座番号の例を説明したが、これに限られない。

【0056】

また、上述した自動取引装置1は、他の機能、例えば、チケット予約機能、商品購入申込機能、クレジットカードの与信確認機能、施設情報案内機能等を有するキオスク端末のような多機能端末であってもよい。また、顧客は、金融機関に自己の口座を開設し、前記金融機関を利用する者であり、一般的には個人であるが、企業、団体等であってもよい。

上述したネットワーク2は、無線又は有線の専用通信回線網又は公衆通信回線網、インターネット、LAN (Local Area Network)、WAN (Wide Area Network) 等いかなるものであってもよい。なお、前記ネットワーク15は、専用ネットワークであることが望ましいが、公衆ネットワークを利用したVPN (Virtual Private Network) であってもよい。

【図面の簡単な説明】

【0057】

【図1】各実施の形態における自動取引システムのブロック図である。

【図2】各実施の形態における自動取引装置1のブロック図である。

【図3】CRMデータベースの構成例である。

【図4】顧客マスタデータベースの構成例である。

【図5】第1の実施の形態におけるフローチャートである。

【図6】CRMシステムから自動取引装置に送信される送信データの例である。

【図7】第1の実施の形態における自動取引装置の画面表示例である。

【図8】第2の実施の形態におけるフローチャートである。

【図9】第2の実施の形態における自動取引装置の画面表示例である。

【図10】第3の実施の形態におけるフローチャートである。

【図11】第3の実施の形態における取引種別毎のタイムアウト時間の例である。

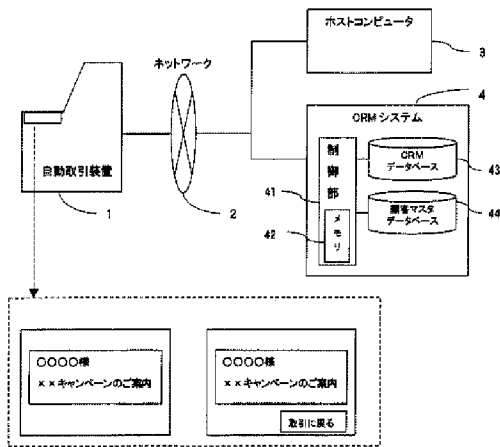
【図12】第4の実施の形態におけるフローチャートである。

【符号の説明】

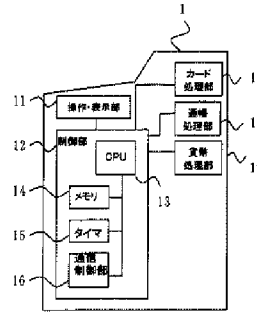
【0058】

- 1 自動取引装置
- 2 ネットワーク
- 3 ホストコンピュータ
- 4 CRMシステム
- 11 操作・表示部
- 12 制御部
- 13 CPU
- 14 メモリ
- 15 タイマ
- 16 通信制御部
- 17 カード処理部
- 18 通帳処理部
- 19 貨幣処理部
- 41 制御部
- 42 メモリ
- 43 CRMデータベース
- 44 顧客マスタデータベース

【図1】



【図2】



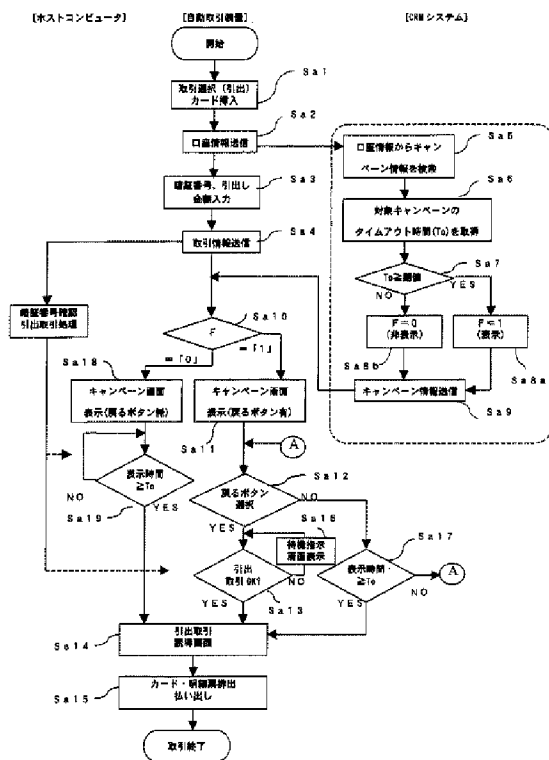
【図3】

キャンペーンID	名称	タイムアウト時間	対象者の情報
1	投資信託案内	15	0000001, 0000002, ...
2	〇〇アンケート	20	0000001, 0000003, ...

【図4】

口座番号	氏名	口座残高	給与振込	公共料金支払
0000001	山田 太郎	1,000,000	有	無
0000002	山田 花子	200,000	無	有

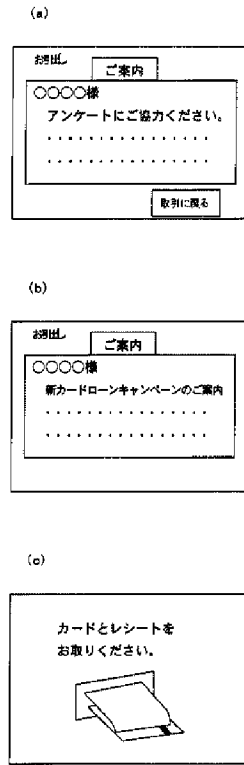
【図5】



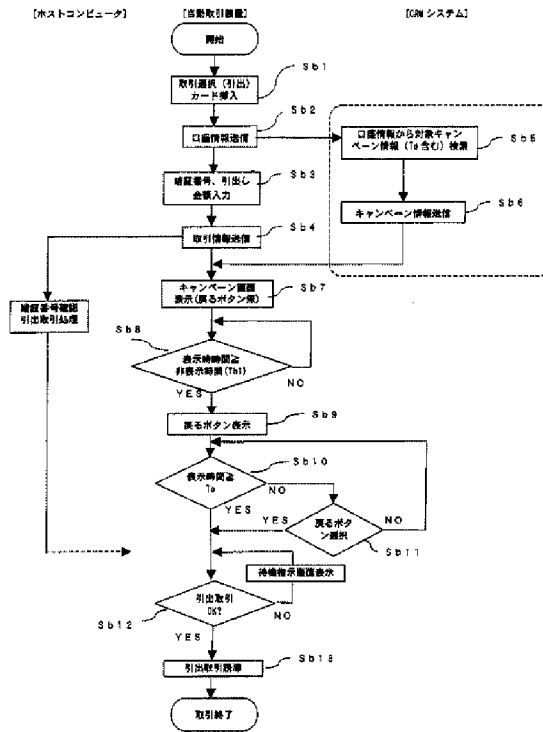
【図6】

ヘッダ	口座番号	キャンペーン情報		フッタ
		画面情報、ボタン表示フラグ、表示タイムアウト時間など		

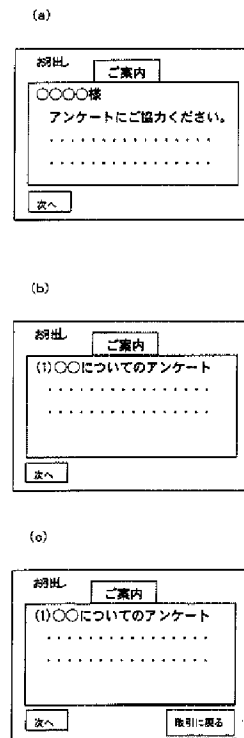
【図7】



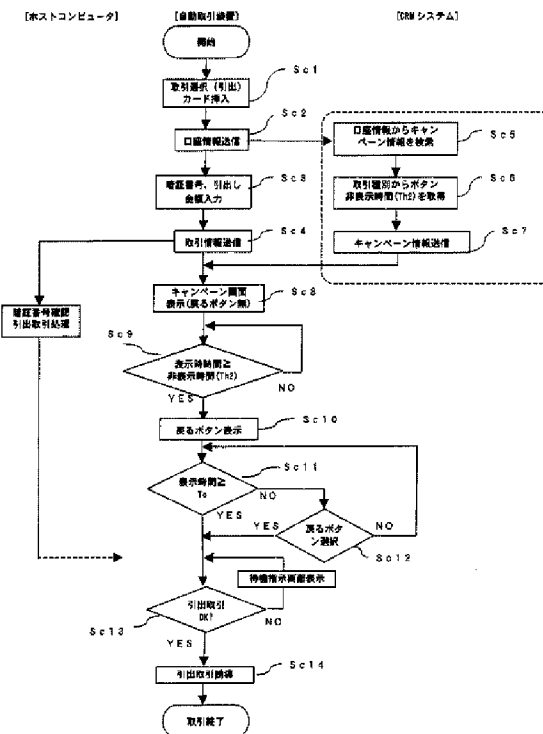
【図8】



【図9】



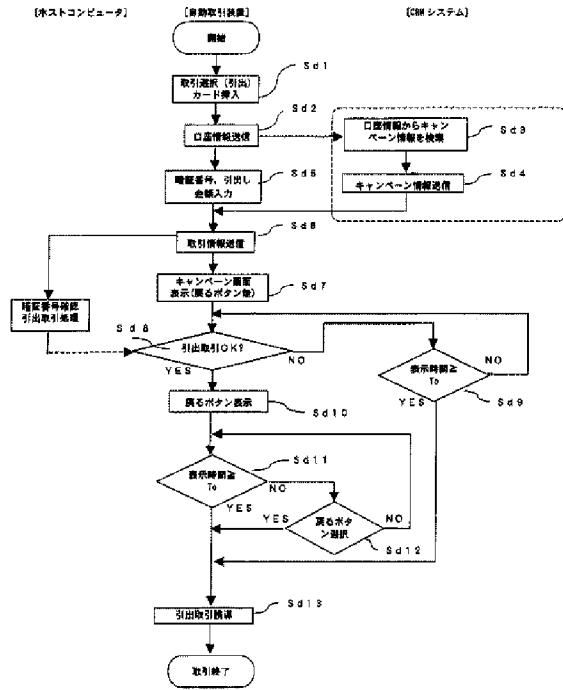
【図10】



【図11】

取引種別	タイムアウト時間(秒)
預金	5
引出	5
振込	10
振替	10
積立預金	5
通帳記載	5

【図12】



(56)参考文献 特開平10-105785 (JP, A)  
特開2003-323659 (JP, A)  
特開平10-222725 (JP, A)  
特開平09-198545 (JP, A)  
特開平01-237897 (JP, A)

(58)調査した分野(Int.Cl., DB名)  
G07D 9/00  
G06Q 40/00



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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO. Includes details for application 17/443,802 and examiner HASSAN, AURANGZEB.

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

donald.mixon@morganlewis.com
padocketingdepartment@morganlewis.com



## Office Action Summary

**Application No.**

17/443,802

**Applicant(s)**

Patel, Paresh K.

**Examiner**

AURANGZEB HASSAN

**Art Unit**

2184

**AIA (FITF) Status**

Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)  Responsive to communication(s) filed on 7/27/21.

A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.

2a)  This action is **FINAL**.

2b)  This action is non-final.

3)  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.

4)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims\***

5)  Claim(s) 1-20 is/are pending in the application.

5a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

6)  Claim(s) \_\_\_\_\_ is/are allowed.

7)  Claim(s) 1,6-9,14-17 and 20 is/are rejected.

8)  Claim(s) 2-5,10-13 and 18-19 is/are objected to.

9)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement

\* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

**Application Papers**

10)  The specification is objected to by the Examiner.

11)  The drawing(s) filed on 7/27/21 is/are: a)  accepted or b)  objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

a)  All      b)  Some\*\*      c)  None of the:

1.  Certified copies of the priority documents have been received.

2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.

3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\*\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1)  Notice of References Cited (PTO-892)

3)  Interview Summary (PTO-413)

Paper No(s)/Mail Date 12/12/22.

2)  Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)

4)  Other: \_\_\_\_\_.

Paper No(s)/Mail Date 8/17/2022.

## DETAILED ACTION

### *Notice of Pre-AIA or AIA Status*

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

### *Double Patenting*

2. A rejection based on double patenting of the “same invention” type finds its support in the language of 35 U.S.C. 101 which states that “whoever invents or discovers any new and useful process... may obtain a patent therefor...” (Emphasis added). Thus, the term “same invention,” in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957).

*A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the claims that are directed to the same invention so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.*

**Claim 4** is rejected under 35 U.S.C. 101 as claiming the same invention as that of claim 1 of prior U.S. Patent No. 11,074,580. This is a statutory double patenting rejection.

**Claim 12** is rejected under 35 U.S.C. 101 as claiming the same invention as that of claim 7 of prior U.S. Patent No. 11,074,580. This is a statutory double patenting rejection.

3. *The nonstatutory double patenting rejection* is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP § 2146 *et seq.* for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit [www.uspto.gov/patent/patents-forms](http://www.uspto.gov/patent/patents-forms). The filing date of the application

in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to [www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp](http://www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp).

**Claim 1** is rejected on the ground of nonstatutory double patenting as being unpatentable over claim 1 of U.S. Patent No. 11,074,580. Although the claims at issue are not identical, they are not patentably distinct from each other because the patented claim contain all of the elements seen in the instant application and has additional details of receiving a first command at the slave interface, sending an acknowledgement and relaying the command. Broadening of claims in a child application dictates obviousness.

**Claim 9** is rejected on the ground of nonstatutory double patenting as being unpatentable over claim 7 of U.S. Patent No. 11,074,580. Although the claims at issue are not identical, they are not patentably distinct from each other because the patented claim contain all of the elements seen in the instant application and has additional details of receiving a first command at the slave interface, sending an acknowledgement and relaying the command. Broadening of claims in a child application dictates obviousness.

**Claim 17** is rejected on the ground of nonstatutory double patenting as being unpatentable over claim 13 of U.S. Patent No. 11,074,580. Although the claims at issue are not identical, they are not patentably distinct from each other because the patented

claim contain all of the elements seen in the instant application and has additional details of receiving a first command at the slave interface, sending an acknowledgement and relaying the command. Broadening of claims in a child application dictates obviousness.

Instant Application	11074580
Claim 1	Claim 1 teachings of slave interface coupled via MDB Host interface Wireless transceiver Processor handling electronic device interaction with machine controller, peripheral device, mobile device; Validating a peripheral device request and send associated commands therein
Claim 9	Claim 7 teachings of slave interface coupled via MDB Host interface Wireless transceiver Processor handling electronic device interaction with machine controller, peripheral device, mobile device;

	Validating a peripheral device request and send associated commands therein
Claim 17	Claim 13 teachings of slave interface coupled via MDB Host interface Wireless transceiver Processor handling electronic device interaction with machine controller, peripheral device, mobile device; Validating a peripheral device request and send associated commands therein

***Claim Objections***

4. Claim 9 is objected to because of the following informalities: line 7 should be corrected to disclose what MDB represents. Appropriate correction is required which should be written as “a multi-drop bus (MDB)”.

Claim 17 is objected to because of the following informalities: line 7 should be corrected to disclose what MDB represents. Appropriate correction is required which should be written as “a multi-drop bus (MDB)”.

***Claim Rejections - 35 USC § 103***

5. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 6 – 9, 14 – 17, and 20 are rejected under 35 U.S.C. 103 as being unpatentable over Ran (US Publication Number 20130332293) in view of Kolls (US Publication Number 2014/0143074).

7. As per claims 1, 9, and 17, Ran teaches an electronic device, method and medium for retrofitting a machine to provide external access to one or more electronic peripheral devices of the machine, the electronic device (212, figure 3) comprising: a slave interface (414, figure 4) configured to couple the electronic device to a machine controller (314, figure 4) of the machine via a multi-drop bus (MDB); a host interface (412, figure 4, handles the communication mechanism between the connected elements) configured to couple the electronic device to a first peripheral device (peripheral device, 318, paragraph 44) of the one or more electronic peripheral devices

of the machine, wherein the first peripheral device is configured to communicate and is decoupled from the MDB of the machine (peripheral can handle virtual tokens where not necessarily connected to the machine, paragraph 44 – 45); a wireless transceiver; one or more processors (410, figure 4); and non-transitory memory (424, figure 4) storing one or more programs to be executed by the one or more processors (310, figure 4), the one or more programs comprising instructions for: registering the electronic device as a slave to the machine controller (paragraph 44, registering the possible objects the electronic device can handle); registering the first peripheral device as a slave to the electronic device (paragraph 44, peripheral device connectivity is handled by the driver, wherein registering is seen and initiating connectivity); receiving, from a mobile device via the wireless transceiver (wireless communication with a wireless receiver requires a transceiver on the sending side, paragraphs 26 and 27), a request to access signals generated by the first peripheral device (token management received by UPOS service, paragraph 44); validating the request (paragraph 40), wherein validation of the request indicates that the mobile device is authorized, by a remote server, to access the signals generated by the first peripheral device (validating the authorization of a connected device with respect to the server); and sending a first reset command to the first peripheral device via the host interface (resetting the token upon completion event, 120, figure 1), wherein the first reset command includes a directive to update a signal destination address (step 110, figure 1) of the first peripheral device from a controller address (114, figure 1) of the machine controller to a device address of the electronic device (initialization and handling of addressing of interfaced devices to gain access to the pos system, paragraphs 22 – 25).



Ran does not explicitly disclose the MDB functionality with explicitly characterizing and registering a device as a slave.

However, Kolls teaches coupling the electronic device to the machine controller via a multi-drop bus (MDB); wherein the first peripheral device is configured to communicate via MDB protocol and is decoupled from the MDB of the machine; registering the electronic device as a slave to the machine controller; registering the first peripheral device as a slave to the electronic device (slaves characterized with MDB functionality, paragraph 166).

Ran and Kolls are analogous art because they are from the same field of endeavor of sale-based systems.

It would have been obvious to one of ordinary skill in the art before the effective filing date of the claimed invention, having the teachings of Ran and Kolls before him, to modify the characterization of Ran with that of Kolls as it would further allow for enhance connectivity and identification. The motivation for doing so would have been to enhance efficiency in the system (paragraphs 14 – 16). Therefore, it would have been obvious to combine Kolls with Ran to obtain the invention as specified in the instant claims.

8. Ran modified by the teachings of Kolls as seen in claim 1 above, as per claim 6, 14, and 20, Ran teaches a device, method, medium, wherein the instructions for registering the electronic device as a slave to the machine controller comprise instructions for: identifying the electronic device to the machine controller as the first

peripheral device; and accepting registration of the electronic device as the first peripheral device (token handling, paragraph 18, 22 – 24).

9. Ran modified by the teachings of Kolls as seen in claim 1 above, as per claim 7 and 15, Kolls teaches a device and method, wherein the first peripheral device is a coin acceptor (506, figure 5), a bill acceptor (506, figure 5), or a payment card reader (526, figure 5), and the first signal is a payment received signal (to 502, figure 5, payment management).

10. Ran modified by the teachings of Kolls as seen in claim 1 above, as per claim 8 and 16, Kolls teaches a device and method, wherein the machine is a vending machine, a parking meter, a toll booth, a laundromat washer or dryer, an arcade game, a kiosk, a photo booth, a toll booth, or a transit ticket dispensing machine (different machine functionality seen in paragraph 87).

***Allowable Subject Matter***

11. Claims 2 – 5, 10 – 13, 18 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### **Conclusion**

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Wang/Bell/Fu/Bishop/Villa have teachings of mobile device payment handling and authentication with respect to a pos system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AURANGZEB HASSAN whose telephone number is (571)272-8625. The examiner can normally be reached 7 AM to 3 PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Henry Tsai can be reached on 571-272-4176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: <https://patentcenter.uspto.gov>. Visit <https://www.uspto.gov/patents/apply/patent-center> for more information about Patent Center and <https://www.uspto.gov/patents/docx> for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AH

/HENRY TSAI/  
Supervisory Patent Examiner, Art Unit 2184

<b><i>Examiner-Initiated Interview Summary</i></b>	<b>Application No.</b> 17/443,802	<b>Applicant(s)</b> Patel, Paresh K.		
	<b>Examiner</b> AURANGZEB HASSAN	<b>Art Unit</b> 2184	<b>AIA (First Inventor to File) Status</b> Yes	<b>Page</b>  1 of 1

All Participants (applicant, applicants representative, PTO personnel)	Title	Type
AURANGZEB HASSAN	Examiner	Telephonic
Benjamin Pezzner	Attorney	

**Date of Interview:** 12 December 2022

**Issues Discussed:**

**Other**

Examiner and Applicant briefly discussed the PTAB proceedings with respect to the parent of the instant application US Patent No. 11,074580 (attached) , different art cited along with relevance, and the most recent decision by the Board to deny the petition request on 12/6/2022. Examiner noted that the decision with respect to the parent case would be considered in any claims of the instant application having the same elements therein.

Attachment

/AURANGZEB HASSAN/ Examiner, Art Unit 2184	
<p><b>Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04</b></p> <p>Please further see: MPEP 713.04 Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b) 37 CFR § 1.2 Business to be transacted in writing</p>	

**Applicant recordation instructions:** It is not necessary for applicant to provide a separate record of the substance of interview.

**Examiner recordation instructions:** Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

**Notice of References Cited**

Application/Control No.  
17/443,802

Applicant(s)/Patent Under  
Reexamination  
Patel, Paresh K.

Examiner  
AURANGZEB HASSAN

Art Unit  
2184

Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-6594759-B1	07-2003	Wang; Ynjiun P.	G06Q20/327	713/172
*	B	US-20050021459-A1	01-2005	Bell, John David	G07F7/08	705/40
*	C	US-20060043175-A1	03-2006	Fu; Rong Yao	G06Q20/3276	235/383
*	D	US-7493288-B2	02-2009	Bishop; Fred	G07F7/0833	705/50
*	E	US-8831677-B2	09-2014	Villa-Real; Antony-Euclid C.	G07F7/0886	455/552.1
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

**FOREIGN PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

**NON-PATENT DOCUMENTS**

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



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NOTICE OF ALLOWANCE AND FEE(S) DUE

24341 7590 06/28/2023
Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

Table with 2 columns: EXAMINER (HASSAN, AURANGZEB), ART UNIT (2184), PAPER NUMBER (7874)

DATE MAILED: 06/28/2023

Table with 5 columns: APPLICATION NO. (17/443,802), FILING DATE (07/27/2021), FIRST NAMED INVENTOR (Paresh K. Patel), ATTORNEY DOCKET NO. (104402-5053-US), CONFIRMATION NO. (7874)

TITLE OF INVENTION: DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES

Table with 7 columns: APPLN. TYPE (nonprovisional), ENTITY STATUS (SMALL), ISSUE FEE DUE (\$480), PUBLICATION FEE DUE (\$0.00), PREV. PAID ISSUE FEE (\$0.00), TOTAL FEE(S) DUE (\$480), DATE DUE (09/28/2023)

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

**PART B - FEE(S) TRANSMITTAL**

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

24341                      7590                      06/28/2023  
 Morgan, Lewis & Bockius LLP (PA)  
 1400 Page Mill Road  
 Palo Alto, CA 94304-1124

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/443,802	07/27/2021	Paresh K. Patel	104402-5053-US	7874

TITLE OF INVENTION: DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0.00	\$0.00	\$480	09/28/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
HASSAN, AURANGZEB	2184	705-071000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

"Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively, \_\_\_\_\_ 1

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. \_\_\_\_\_ 2

\_\_\_\_\_ 3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE \_\_\_\_\_ (B) RESIDENCE: (CITY and STATE OR COUNTRY) \_\_\_\_\_

Please check the appropriate assignee category or categories (will not be printed on the patent) :  Individual  Corporation or other private group entity  Government

4a. Fees submitted:  Issue Fee  Publication Fee (if required)

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

Electronic Payment via Patent Center or EFS-Web  Enclosed check  Non-electronic payment by credit card (Attach form PTO-2038)

The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. \_\_\_\_\_

5. Change in Entity Status (from status indicated above)

- Applicant certifying micro entity status. See 37 CFR 1.29
- Applicant asserting small entity status. See 37 CFR 1.27
- Applicant changing to regular undiscounted fee status.

**NOTE:** Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

**NOTE:** If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

**NOTE:** Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

**NOTE:** This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature \_\_\_\_\_ Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_ Registration No. \_\_\_\_\_

**Petitioner Exhibit 1002-4593**



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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Row 1: 17/443,802, 07/27/2021, Paresh K. Patel, 104402-5053-US, 7874
Row 2: 24341, 7590, 06/28/2023, Morgan, Lewis & Bockius LLP (PA), 1400 Page Mill Road, Palo Alto, CA 94304-1124
Row 3: EXAMINER HASSAN, AURANGZEB
Row 4: ART UNIT 2184, PAPER NUMBER
Row 5: DATE MAILED: 06/28/2023

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.



## OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

### Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

<b>Notice of Allowability</b>	<b>Application No.</b> 17/443,802	<b>Applicant(s)</b> Patel, Paresh K.	
	<b>Examiner</b> AURANGZEB HASSAN	<b>Art Unit</b> 2184	<b>AIA (FITF) Status</b> Yes

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1.  This communication is responsive to Remarks 5/31/23.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
2.  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
3.  The allowed claim(s) is/are 1-3,5-11 and 13-20 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information , please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).
4.  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All      b)  Some\*      c)  None of the:
1.  Certified copies of the priority documents have been received.
  2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_ .
  3.  Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5.  CORRECTED DRAWINGS (as "replacement sheets") must be submitted.  
 including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_ .  
**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6.  DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |   |  |
|---|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)  | 5. <input type="checkbox"/> Examiner's Amendment/Comment                             |
| 2. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date <u>12/28/22; 5/31/23</u> . | 6. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material _____.                       | 7. <input type="checkbox"/> Other _____.   |
| 4. <input checked="" type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date. <u>5/31/23</u> .                            |  |

/HENRY TSAI/  
Supervisory Patent Examiner, Art Unit 2184

## **DETAILED ACTION**

### ***Notice of Pre-AIA or AIA Status***

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

### ***Allowable Subject Matter***

Claims 1 – 3, 5 – 11, and 13 – 20 are allowed.

The following is an examiner's statement of reasons for allowance: Applicant's submission on 5/31/23 of arguments and terminal disclaimer have been fully considered to be persuasive therein the claim limitations are in allowable format.

The prior art fails to teach or suggest alone or in combination the limitations of the claims as a whole including a slave interface coupled to a machine controller of a machine's MDB further coupled to a host. Further including registering the device as a slave to the machine controller, registering a first peripheral as a slave to the device and receiving/validating a request from a mobile device to access the first peripheral where the configuration of slaves and master are handled to interface request handling therein. Prior art is further silent on modification to combine such features and functionality and is therefore deemed allowable.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Information Disclosure Statement***

The information disclosure statement filed 12/28/2022 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

The NPL listed on the 12/28/2022 IDS “Kumar, Amazon gets Indian patent for auto authentication of mobile transactions” was not submitted along with the documents filed on 12/28/2022 so it has not been considered in that particular submission. However, in an interview on 5/31/2023, the Examiner and Applicant discussed the missing document which was then appropriately filed on 5/31/2023 and has been considered/accepted accordingly.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AURANGZEB HASSAN whose telephone number is (571)272-8625. The examiner can normally be reached on 7 AM to 3 PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Henry Tsai can be reached on 571-272-4176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AH

/HENRY TSAI/  
Supervisory Patent Examiner, Art Unit 2184

# Communitysourcing: Engaging Local Crowds to Perform Expert Work Via Physical Kiosks

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## ABSTRACT

Online labor markets, such as Amazon’s Mechanical Turk, have been used to crowdsource simple, short tasks like image labeling and transcription. However, expert knowledge is often lacking in such markets, making it impossible to complete certain classes of tasks. In this work we introduce an alternative mechanism for crowdsourcing tasks that require specialized knowledge or skill: *communitysourcing* — the use of physical kiosks to elicit work from specific populations. We investigate the potential of communitysourcing by designing, implementing and evaluating *Umati: the communitysourcing vending machine*. Umati allows users to earn credits by performing tasks using a touchscreen attached to the machine. Physical rewards (in this case, snacks) are dispensed through traditional vending mechanics. We evaluated whether communitysourcing can accomplish expert work by using Umati to grade Computer Science exams. We placed Umati in a university Computer Science building, targeting students with grading tasks for snacks. Over one week, 328 unique users (302 of whom were students) completed 7771 tasks (7240 by students). 80% of users had never participated in a crowdsourcing market before. We found that Umati was able to grade exams with 2% higher accuracy (at the same price) or at 33% lower cost (at equivalent accuracy) than traditional single-expert grading. Mechanical Turk workers had no success grading the same exams. These results indicate that communitysourcing can successfully elicit high-quality expert work from specific communities.

## Author Keywords

Crowdsourcing, Kiosks, Ubiquitous Computing, CSCW

## ACM Classification Keywords

H.5.2 Information Interfaces and Presentation: User Interfaces - Graphical User Interfaces

## General Terms

Design, Human Factors, Experimentation

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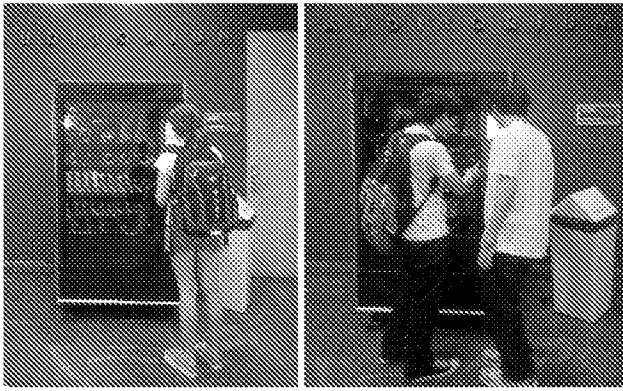
Figure 1. With Umati, the communitysourcing vending machine, users complete tasks on a touchscreen and receive non-monetary rewards.

## INTRODUCTION

Crowdsourcing, the division and assignment of tasks to large, distributed groups of online users, has the potential to create new jobs, improve the efficiency of labor markets, and enable a wide variety of new applications. Researchers have demonstrated compelling new systems enabled by crowdsourcing, including applications that assist the blind with visual tasks [8] and that help writers to copy-edit prose [7]. Many crowdsourcing efforts leverage *microtask* markets, which provide platforms for posting and finding short tasks – frequently seconds to minutes long. One of the best-known markets, Amazon Mechanical Turk (MTurk), attracts thousands of employers [15] and has had hundreds of thousands of worker accounts [30].

One limitation of microtask markets is the difficulty of accessing groups with domain-specific skills or knowledge. The short work durations and small rewards attract specific user demographics [30], limiting the variety of knowledge and expertise available. In contrast, vertical online communities (such as graphic design site 99Designs [1] and Q&A site Stack Overflow [25]) successfully gather experts, but they must either focus on building and maintaining a community of volunteers [25], or on enticing experts with high rewards for complex tasks. These hurdles limit the potential for crowdsourcing of expert work.

To enable crowdsourcing of expert work for short duration tasks, we introduce the concept of *communitysourcing*. Communitysourcing deploys tasks on physical kiosks in specific locations that attract the right “crowds” (while repelling the wrong ones), and in contexts where people have



**Figure 2.** In our study, Umati was deployed in a public hallway. Students and other building occupants graded CS exam questions on Umati.

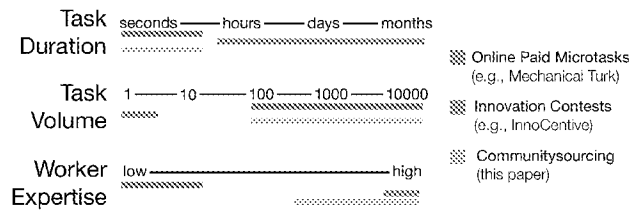
idle time (“cognitive surplus” [31]). Communitysourcing leverages the specific knowledge and skills of the targeted community; in return, it provides context- and community-specific rewards that users value more than money.

To explore the potential of communitysourcing, we asked the following research questions:

- Can communitysourcing successfully enlist new user groups in crowd work?
- Can communitysourcing outperform existing crowdsourcing methods for expert, domain-specific tasks?
- How does communitysourcing compare to traditional forms of labor, in terms of quality and cost?

We explored these questions by designing, implementing and evaluating a specific communitysourcing instance: *Umati: the communitysourcing vending machine* (see Figure 1). We built Umati by modifying a commercial vending machine. On Umati, instead of inserting money, users select and perform tasks on a high-resolution touch screen. Earned credits can be used to choose and buy items — an internal computer controls the motors that operate each of the vending arms.

We tested Umati with a Computer Science exam grading task. Grading exams is a time consuming, high-volume job that requires significant domain expertise for consistent, correct scoring of open-ended questions. Grading can also be partitioned into many small tasks. We placed Umati in the primary hallway in our Science building and filled it with snacks (see Figure 2). Exams covered introductory Computer Science topics in programming languages, algorithms, and data structures. Umati successfully targeted a specific population (81% of users were trained in Computer Science or Electrical Engineering) and achieved significant throughput: 328 participants graded 7771 exam answers in one week, for approximately \$200 of snacks. Umati attracted new workers: 80% of participants had never participated in crowdsourcing before. We compared communitysourced grades against grades from a set of ten experts. Umati was able to exceed the accuracy of traditional single-expert grading (80.3% to 78.3% at the same price) or, alternatively, lower cost by 33% (at the same accuracy). For comparison, we also recruited graders on Mechanical Turk; these workers could not grade



**Figure 3.** Communitysourcing occupies a unique position in the design space of crowdsourced work: it enables short, high-volume tasks that require high levels of expertise.

accurately (< 25% agreement with our experts). Our results suggest that communitysourcing can exceed traditional expert performance in domains where online crowdsourcing fails.

In this paper, we begin with a discussion of related work and describe the design space of communitysourcing. We motivate the choice of an exam grading task, then describe the implementation of Umati. We follow with a detailed evaluation of the system and conclude with a summary of our results and pointers to future work.

## RELATED WORK

Communitysourcing touches on prior work in crowdsourcing, location-based computing, and kiosk systems. Our experimental task also relates to prior efforts in peer grading. We discuss each area in turn.

### Crowdsourcing

Crowdsourcing and human computation are active areas of research inquiry; recent surveys describe a range of approaches [21, 28]. Projects have investigated incentives and game mechanics to motivate workers [35], new applications enabled by crowdsourcing [7, 8, 36], tools to develop crowdsourcing applications [22], and algorithms to coordinate crowd work [5, 6, 20]. Researchers have also contributed methodologies for conducting experiments using online labor [13, 19]. Much recent work focuses on increasing the complexity of work products created by a pool of unskilled workers through redundant microtasks. While communitysourcing also targets tasks of short duration, it recruits domain experts through appropriate choice of location and incentive (see Figure 3).

The dominant strategy to elicit expert responses or expert work online has been to build narrow, domain-specific communities. Topical communities of unpaid volunteers can provide high-quality answers to technical questions. However, creating successful online communities is an uncertain, labor-intensive proposition that requires leadership and constant monitoring [25]. Some online platforms succeed in eliciting paid expert work through competitions, e.g., InnoCentive for pharmaceutical research [2]; 99Designs for graphic design [1]; or TopCoder for programming [4]. Competitions are not appropriate for high-volume work because they strive to find the single best solution among the submissions. Communitysourcing can provide higher throughput by engaging many experts in short tasks.

### **Location-based Computing and Kiosks**

Researchers have investigated the role of physical location in crowdsourcing. In participatory sensing [12], people collect and report data about their environment. For example, Creek Watch [18] uses GPS coordinates to crowdsource local watershed measurements. Multiple mobile start-up companies are delivering questions and tasks to members in a given location [11, 23]. In these systems, users first have to sign up for the service and agree to have their location tracked. Communitysourcing attracts people who already frequent a particular locale through a kiosk interface.

Computer-based kiosks have long been used for self-service ticketing, banking, and location-specific information, e.g., in museums [17]. Kiosks have also been deployed in rural areas and developing countries for Internet access, for unsupervised education [27, 32], and to aid communities in reconciliation after civil unrest [33]. Research has focused on security of such public systems [9] and on facilitating information transfer between kiosks and other computing devices [14, 16]. To our knowledge, Umami is the first kiosk that elicits work and rewards workers with physical items.

### **Education and Grading**

Grading open-ended exams is an intrinsically subjective process. One common mechanism for consistently and efficiently grading open-ended questions is peer assessment. Students grading other students can lead to positive impacts on learning and attitude [24, 34]. Peer assessment is usually restricted to students within a particular course, and is prescribed by course staff. In Computer Science, prior work has investigated web-based peer review of assignments [10]. Averages of redundant peer scores are strongly correlated with teachers' scores [29]. Umami generalizes peer assessment beyond course boundaries: it enlists volunteers and provides physical rewards to incentivize participation.

### **DESIGN CONSIDERATIONS FOR COMMUNITYSOURCING**

Successful communitysourcing depends on careful selection of tasks, locations, and incentives. This section discusses important design considerations for each category.

#### **Task Selection**

Communitysourcing is best suited for short-duration, high-volume tasks that require specialized knowledge or skills which are specific to a community, but widely available within that community. Simple tasks without expertise requirements (e.g., address verification or text transcription) are a better fit for generic crowdsourcing platforms like Mechanical Turk. Low-volume, long-duration expert jobs (like graphic design or programming) are better served by vertical online markets.

Some representative tasks well-suited for a community-sourcing approach include grading exams in academia, bug and tech support triage in technology companies, fact checking for journalism, and community-specific market research in bars or specialty shops. Short task durations enable users to work on a kiosk without ergonomic issues, and enable many user to participate. Public kiosks can

potentially attract a large number of users, supporting, as well as requiring, a high task volume.

#### **Location Selection**

A communitysourcing system must target those locations where the required skills are prevalent. The locations must also repel those *without* the required knowledge. For instance, placing a kiosk in a bar could potentially target young men with market research tasks – but the kiosk would also be accessible by young women. A better location to exclusively target men would be their restroom at the bar.

The targeted community must also have some “cognitive surplus” [31] available for doing work. Practically, this means placing the kiosk in an area where people have spare time, e.g., in lounges, government office waiting rooms, or airports.

#### **Reward Selection**

Rewards must be interesting and valuable to the targeted community in the given location. For instance, airport travelers may value Wifi Internet access. In contrast, Wifi access has lower utility on a college campus, where free Internet is readily available. While cash is an obvious reward (consider an ATM-like kiosk), it has been shown that individuals can value items more than money in specific contexts and locations [26].

### **COMMUNITYSOURCING IN ACTION**

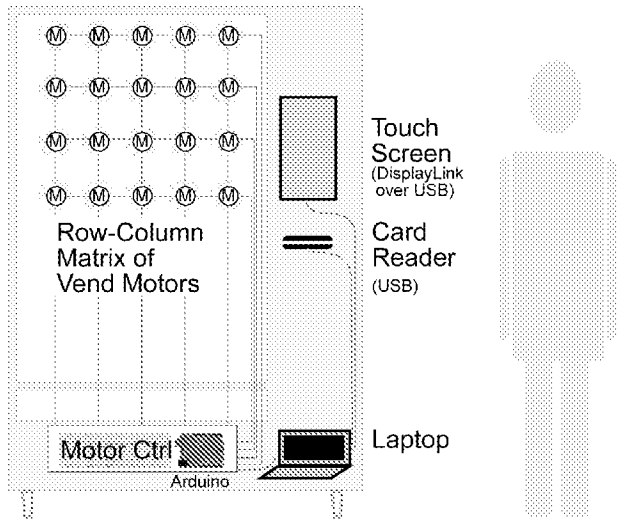
For our deployment, we chose exam grading as an experimental task, a university department as the location, and snacks as rewards. This section briefly justifies these design choices in light of the earlier design guidelines for communitysourcing.

**Task:** Grading exams is a painful, high-volume task for teaching staff. An individual student answer can be graded quickly, but large courses with hundreds of students generate thousands of answers. While people outside an academic discipline are unlikely to possess the requisite knowledge to grade open-ended problems, redundant peer grades are strongly correlated with expert scores [29], suggesting that students can grade each others' assignments and exams.

**Location:** College campuses commonly assign buildings to disciplines (departments). These buildings rarely attract visitors outside the discipline. Our Computer Science (CS) building supports mainly CS classes, along with a few unrelated events. We placed our kiosk in front of the major lecture hall in the CS building, an area where students often wait for class to begin, maximizing the cognitive surplus.

**Reward:** Food is the most common reward given to entice students to participate in campus events. Companies commonly provide pizza to bring students to recruitment events; teachers bring candy to class sections to entice participation. We decided to use snacks as our reward. This choice also impacted the physical design of our kiosk. The most common system for distributing snacks is the ubiquitous vending machine; it is familiar and clearly communicates the nature of the rewards being distributed.





**Figure 4.** Umati uses an internal laptop to control a touchscreen, USB card reader, and the vending motors. Users complete tasks on the touchscreen for rewards from the machine.

These design decisions guided our implementation of *Umati: the communitysourcing vending machine*, as described in the next section.

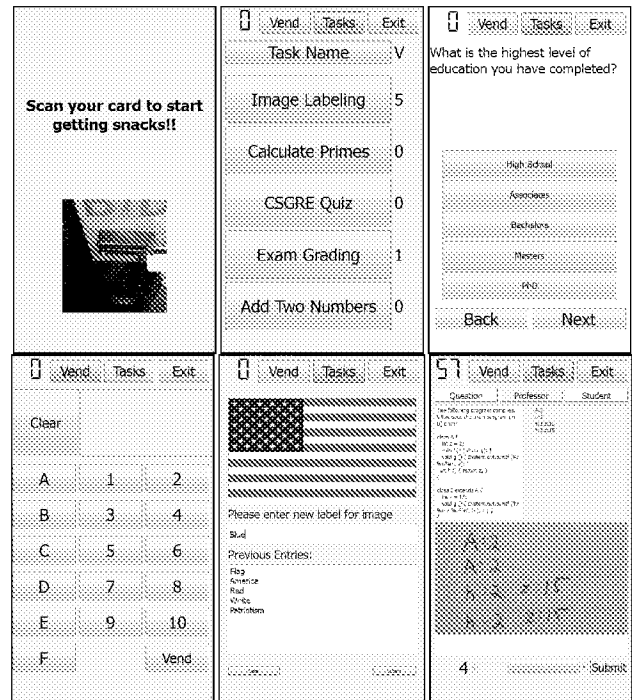
**UMATI: SYSTEM IMPLEMENTATION**

The Umati system comprises custom vending hardware; a generic software platform for work tasks; and specific task user interfaces. We describe each in turn.

**Hardware: Hacking a Vending Machine**

Umati is a modified commercial vending machine (specifically, a 1986 Snackshop 4600, Figure 1). We removed all legacy vending equipment (the bill exchanger, coin reader, keypad interface, analog motor-control circuit boards), leaving just the vending shelves and dispensing mechanism. We installed a touchscreen and keycard reader on the front of the machine, which provide the primary user interface (see Figure 4). Users must first swipe their magnetic strip ID card (given to all students, faculty, and staff on campus); card IDs enable Umati to distinguish users, though our prototype does not link card IDs to users’ names. Users complete tasks on the touch screen interface which is connected to an internally mounted laptop.

Rewards are dispensed through programmatic control of the vending mechanisms. The shelves use metal spirals driven by DC motors. The motor leads form a row-column matrix: when a particular row lead is powered and a column lead grounded, the motor at the intersection of row and column spins, dispensing an item. We attached the row-column end points to relays controlled by an Arduino microcontroller, and programmed the microcontroller to respond to vend requests from the laptop over a serial link. Motors spin uniformly enough to vend items with open-loop control, powering motors for a fixed amount of time.



**Figure 5.** Umati’s UI, clockwise from top left: introductory attract screen, task selection, survey task, grading task, image labeling task, and vending interface.

**Software: Maximizing a Small Touch Screen**

We developed the Umati software using Python and the PyQt4 UI toolkit. Umati’s architecture was designed as a generic task platform: each task and its user interface are written as plug-ins to a work management system. As a result, Umati supports many task types besides exam grading.

When the machine is idle, it displays an *attract screen*: a looping video demonstrating how to log in by swiping an ID card (see Figure 5). After swiping, users are presented with the *Task Selection* screen, allowing them to choose their task. If there is just one available task, the selection screen is bypassed and users are immediately presented with that task. The user’s earned credits are shown in the top left, and stored across work sessions. When a user wishes to cash in their credits, they switch to the *Vending* interface which provides a software keypad to select the tray of the desired item.

**Tasks**

We have implemented a variety of tasks for Umati: math tests, CS GRE questions, surveys, exam grading, and image labeling. Some of these task interfaces are shown in Figure 5. For our evaluation, we tested just two: surveys and grading.

**Surveys:** The survey task constructs an interface from an external XML file that defines questions and multiple choice answer sets. For our deployment, Umati had a basic demographic survey which collected age, department, educational status, and prior exposure to crowdsourcing. Every user was required to complete this survey before starting another task on Umati.

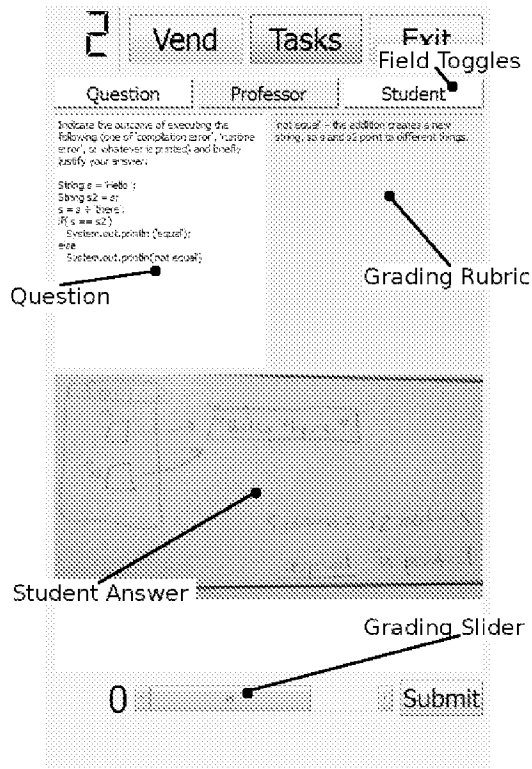


Figure 6. The Umati grading interface shows a question, an answer key, and an image of a student response. Workers assign points with a slider.

**Grading:** The grading interface presents three panels of information simultaneously to the participant: the question, the instructor’s answer key, and a student answer (see Figure 6). Each panel can be opened and closed using toggle buttons on the top row, to maximize the limited screen space. Each panel also allows panning by dragging and zooming by double-tapping. Grades are gathered on a numeric scale: the user enters the grade using a slider widget. Upon submission, Umati presents another student answer to the same question, if one is available. This allows a user to memorize the question and answer key, accelerating their grading of student answers. It also supports grading privacy, as graders cannot easily grade all of a specific student’s answers. Users cannot grade the same exam answer twice.

**Spam Detection:** Incorrect or low-quality responses (“spam”) are common for crowdsourcing; workers often complete tasks quickly and with little thought in order to maximize their earnings. To account for this tendency, Umati implements a simple spam detection system. Each task definition includes “gold standard” tasks, comprised of a task with a known correct response. If a user fails two of these tasks, that user is logged out and their ID is blacklisted from future use. Inserting such checks is a well-established technique for improving the quality of crowdsourced work [19].

## EVALUATION

Our evaluation sought to answer three primary research questions about communitysourcing: Can it enlist new

user groups in crowd work? Can it outperform existing crowdsourcing methods? And can it match more traditional approaches, in terms of cost and accuracy?

## Study Design

We created a set of Computer Science exams with answers. Three groups of participants graded the exams: users of our vending machine (Umatiers), Mechanical Turk workers (Turkers), and a group of former or potential Computer Science teaching assistants (Experts).

## Exam Corpus

We created a custom exam from prior mid-term questions of our Computer Science department’s second-semester undergraduate course, CS2. The exam was comprised of 13 questions covering basic complexity theory, object-oriented programming, search algorithms, and bit operations. Eight undergraduate students were recruited as test-takers. These students had recently completed CS2 or were enrolled at the time of the study. Students completed the exam on paper. For our *gold standard* tasks, we added an exam completed using the instructor’s grading rubric, giving us question/answer pairs that are always correct. These answers were used for our spam detection algorithm. 105 sample exam answers were generated in total. Test-takers received either a 5 USD gift card, or could make an equivalent charitable donation.

## Common Grading Instructions

Graders in all conditions were asked to assign 0 to 4 points for each question. The Instructor’s answer key was used as the grading rubric. The rubric provided no instructions for assigning partial credit. While all questions required computer science knowledge to produce a correct answer, they varied in the amount of knowledge required to assess that answer. Some were *simple*, requiring only basic pattern matching for identifying correct answers. Others were *open-ended*, requiring a deeper understanding of the underlying material. Assigning partial credit for incomplete answers always required domain-specific knowledge.

For the exam we tested, five questions were simple, while eight were open-ended. An example open-ended question and grading rubric follows:

*Q: Briefly explain the difference between a (Java) instance variable and a (Java) class variable.*

*A: Each object has its own distinct copy of an instance variable. But all the objects in a class share just one ‘copy’ of a class variable.*

Paper exams had a defined answer box for each question. We used Shreddr [3] to extract scanned answers from the exams. These images of answers were shown in the grading interface (Figure 6). Three sets of participants then graded the exams: 1) Umati users, 2) Mechanical Turk users, and 3) experts recruited from a pool of qualified students. These conditions are described in more detail below.

## Grading on Umati

We deployed Umati outside the main Computer Science lecture hall for one week. This lecture hall is primarily

used for undergraduate courses, although graduate students, staff, faculty and visitors also frequent this centrally located ground-floor area. Users received no other introduction to the system or tasks besides the looping video instructing them to swipe their card.

The machine was loaded with \$200 worth of candy. Users earned one credit per graded answer, and five for completing the survey. Most items were priced at 20 credits (with some priced at 10 and 30). In a small pilot study, we found that users completed roughly 20 tasks in five minutes. We estimated that five minutes was the maximum amount of time users would be willing to spend in front of a vending machine at any one time. Candy was purchased from a local bulk wholesale store at an average of 45 cents per item. At this price, Umatiers were paid 2.25 cents per answer, in candy.

#### *Grading on Mechanical Turk*

Workers on Amazon's Mechanical Turk (Turkers) graded the same exam questions and answers, on a web interface that was similar to the Umati touch screen interface; workers saw the question, the answer key, and the student's answer. Each Human Intelligence Task (HIT) consisted of grading all 9 answers to the same question (8 students and the experimenter's gold standard), paying 23 cents (2.6 cents / answer). We posted 130 HITs on Turk, obtaining 10 sets of grades for each student answer.

Turkers answered the same gold standard questions as Umati users, and we applied a similar spam detection algorithm. We present two sets of results: 1) all Turkers (regardless of gold standard performance); and 2) the subset of Turkers that passed the spam filter (failing at most one gold standard question). As with Umati, any answers provided before a second failed question are used in our analysis.

After a first set of workers completed our grading HITs, we also attempted to recruit more knowledgeable Turkers through a qualification test. Workers had to pass the test before they could grade exam answers. The test comprised five multiple choice questions on computational complexity and Java. For example:

*What is the Big-O run-time of the following algorithm?*

```
function(arg1, arg2):  
    return arg1+arg2
```

A:  $O(1)$  B:  $O(\log n)$  C:  $O(n)$  D:  $O(n \log n)$  E:  $O(n^2)$

For these qualified Turkers we offered 25 cents per set of 9 grades (2.8 cents /answer).

#### *Grading By Experts*

Ten former or potential CS teaching assistants graded the exam corpus on paper. These graders included: one graduate instructor for CS 2, one high-scoring undergraduate (received an A in CS 2), and eight CS PhD students. All had prior teaching experience. Each participant was paid 25 USD in Amazon credit to grade all 105 answers.

At our university, only graduate students are allowed to grade exams. Graduate students earn over 38 dollars per hour, when

including basic tuition and fee remission. On average, experts graded 115 answers per hour, for an effective rate of 34 cents per answer. All of the expert graders passed the gold-standard spam detection algorithm, as should be expected.

#### **Measures**

Grading is inherently subjective — even experts can disagree. To enable meaningful comparisons between our different conditions, we define dependent measures that compare *grade distributions* and *agreement with median expert scores*.

#### *Comparing Grade Distributions*

For both crowdsourced grading methods, Umati and Mechanical Turk, we compute a Chi Squared test statistic across the 105 exam answers to determine if the distribution of crowdsourced grades in either condition differs significantly from the expert distribution.

#### *Grade Agreement*

To measure the grading accuracy of our approach, we use the median of all expert graders (*median expert grade*) as the “correct” grade for a student's answer. We then compute *grade agreement* as the percentage of exam answers for which the median Umati and Turk grades match the median expert grade.

The status quo is to use a single expert grader, not the median of multiple graders. To investigate the relationship between grading accuracy and the cost of recruiting additional graders, we randomly sample (with replacement) subsets from each distribution of graders (expert, Umati, and Turk). For instance, we sample a single expert grader from the expert distribution, and compare that to the median expert grade for all exam answers. Similarly, we also sample subpopulations (for instance, seven Turkers), take the median of their grade distribution, and compare that to the (“correct”) median expert grade for all exam answers. This is repeated 1000 times to compute the *subgroup grade agreement* (e.g., between seven Turkers and all ten experts).

#### **Results**

We report descriptive usage results, comparisons of the experimental conditions, and qualitative observations.

#### *Umati Users*

328 participants graded 7771 exam answers on Umati in one week. Figure 7 shows self-reported demographic data from the survey. The users were primarily undergraduate computer scientists. 80% of Umati users had never previously participated in any online crowdsourcing activity (showing that Umati engaged new users in crowdsourcing). Users who successfully completed at least one task had a median usage time of 4 minutes, completing an average of 16 tasks. The most active user (or group, see below) worked continuously for more than an hour, completing 85 tasks in a row. Several users completed all 105 of the grading tasks. 61 users (19%) were blacklisted by the system for failing gold standard tasks. The high failure rate may be a consequence of the machine's

Filters	Participants	%	Tasks Completed	Task %
Total	328	100%	7777	100%
Undergraduates	263	80%	6297	81%
Graduates	39	12%	943	12%
Other (Professors, Visitors, Staff)	26	8%	531	7%
Computer Science	234	71%	5977	77%
Electrical Engineering	34	10%	485	6%
Other/Not Affiliated	60	18%	1309	17%
Had Not Crowdsourced	262	80%	5933	76%
Had Crowdsourced	66	20%	1836	24%
Knows about Crowdsourcing	216	66%	4469	58%
Does Not Know About Crowdsourcing	112	34%	3302	42%

Figure 7. Descriptive statistics for one week of Umati use.

novelty: users may have explored the interface without understanding the consequences of incorrect answers.

81% (268) of Umati users majored in Computer Science or Electrical Engineering; both groups are required to take CS 2. Our system was able to effectively engage our target population and complete a large number of tasks. This demonstration of Umati's ability to target crowdsourcing work to hundreds of unique, expert users over the span of just one week is a primary result of our work. We also note that these numbers were achieved despite limited resources: twice, our vending machine was emptied of snacks in less than two days; we refilled once. Effectively, the machine ran for four of the seven days.

#### Mechanical Turk Users

We gathered 1050 grades in three days using Mechanical Turk. 46 unique Turkers graded exams, with 16 (35%) failing the spam detection (incorrectly grading two or more gold standard questions). While we offered higher wages to workers who passed the CS qualification, no workers successfully qualified during our experiment. We conclude that a qualification exam is not an efficient mechanism for attracting workers with computer science knowledge on Mechanical Turk.

#### Comparing Grade Distributions

We computed the distribution of grades for each exam answer from experts, Turkers and Umatiers. These distributions were summed across all responses, and across all answer items, to produce the statistic used to test the potential differences between response distributions.

Chi Squared tests find a significant difference between the expert and either Turker score distribution ( $P_{TURK} < .001$  and  $P_{TURK_{NoSpam}} < .001$ ). We see no such significant difference between the experts and Umati users ( $0.263 < P_{UMATI} < .997$ )<sup>1</sup>. This suggests that the Umatiers, on aggregate, grade similarly to experts; Turkers do not.

<sup>1</sup>The 105 survey items allowed for 5 score options, zero to four. Each individual answer's distribution then has 4 degrees of freedom (knowing the probability mass in bins 0 through 3 fixes the amount of mass in bin 4). From this, we know the number of degrees of freedom for the overall Chi Squared test is at least  $4 \times 105 = 420$  and at most  $5 \times 105 - 1 = 524$ , depending on the amount of dependence between the student answers. This provides us with bounds on the p-values of each experiment.

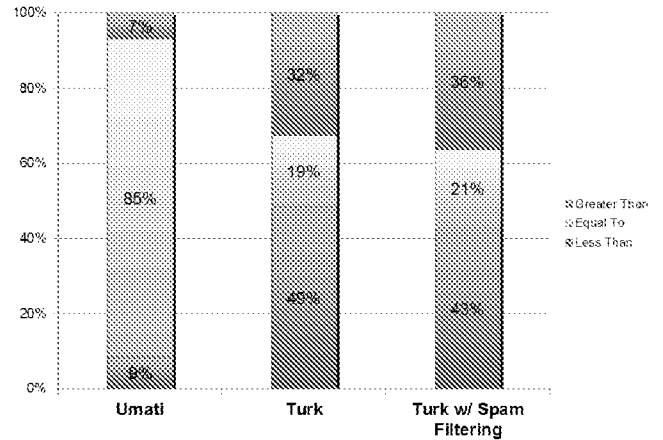


Figure 8. Agreement between conditions and the median of the 10 expert graders. Umati users' response distributions were much closer to the experts than distributions of Mechanical Turk users.

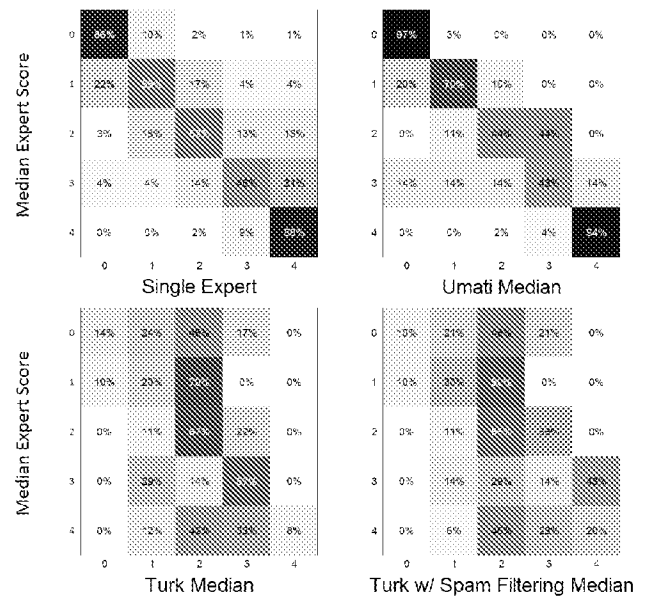


Figure 9. Comparing grade agreement between the the experts and our test conditions. Umatiers and single experts often agreed with the pool of experts. Turkers were consistently random.

#### Comparing Grades

Umati users agreed with the experts' median grade 85% of the time (Figure 8). In comparison, Turkers only agreed with experts 19% of the time; this figure increases only slightly to 21% with spam filtering.<sup>2</sup>

Figure 9 shows how different graders diverged from the grades of all expert graders. Boxes along the diagonal show agreement with experts. Individual experts and Umatiers agree strongly with all experts on assigning full credit or no credit. Single experts appear to have less variance than

<sup>2</sup>Random guesses have an expected agreement of 20% on a five-point scale.

Umatiers when assigning partial credit. We reserve a careful study of systematic biases to future work. MTurk workers' responses have no discernible pattern, leading to a generally centered (2/4) median score.

#### Price-Accuracy Trade-off

We explore the effects of assigning varying numbers of graders on accuracy by sampling subgroups from the distribution of experts, Turkers, and Umatiers and calculating median agreements for these groups to all experts.

Figure 10 plots agreement as greater numbers of respondents are considered. Individual expert graders agreed with the median of all experts 78.3% of the time. Ten Umatiers agreed 79% of the time, but cost 33% less ( $10 \times 2.3 = 23$  cents/grade vs 34 cents/grade). Mechanical Turk users never approximate the experts, regardless of their number. In fact, Turkers are *less* likely to agree with the median expert grade as the number of respondents increases.

If we keep cost constant, Umati is more accurate than a single expert grader (see Figure 11). Thirty-four cents can buy one expert answer, with an accuracy of 78.3%; or fifteen Umatiers, who have an accuracy of 80.3%. Because result quality is achieved through multiple graders at lower individual pay, it is easy to increase or decrease the accuracy by adjusting the number of redundant assignments. Additional workers can also be dynamically assigned to more difficult or controversial cases where initial ratings diverge, while the number of assignments can be held low for answers that are clearly correct or incorrect.

#### Qualitative Observations

Throughout the week-long deployment, we observed users to obtain feedback on usability and user experience. At times, student interest was higher than our single machine could handle: queues formed in front of the machine. We noticed that groups of students often used the system together (see Figure 2). Some groups were formed ad-hoc, by students waiting in line. Other groups approached the machine together. Using Umati seemed to be a social event; groups would argue about the specific merits of different answers. Such additional discussion is an unexpected secondary benefit: academic departments will likely welcome increased discussion of class material by their students. Groups would also share the rewards, for instance splitting a bag of candy amongst the participants.

However, groups could also negatively impact grading: student groups seemed more inclined to attempt to defraud the system. One group attempted to pry open the door. Queues of waiting students potentially limit the throughput of the machine, but are hard to avoid — physical interfaces do not scale easily. A number of users complained that they were unjustly blacklisted. Often this was because they had forgotten to log out. A few users reported being removed because they were exploring and were not aware of the repercussions. Better instructions about safeguarding mechanisms could address these problems.

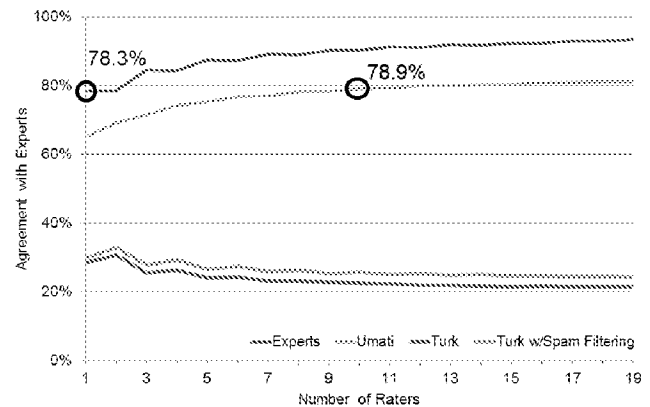


Figure 10. The accuracy of Umati users becomes comparable to a small number of experts as more participants are involved. Here, we show the point where Umati accuracy surpasses that of a single expert.

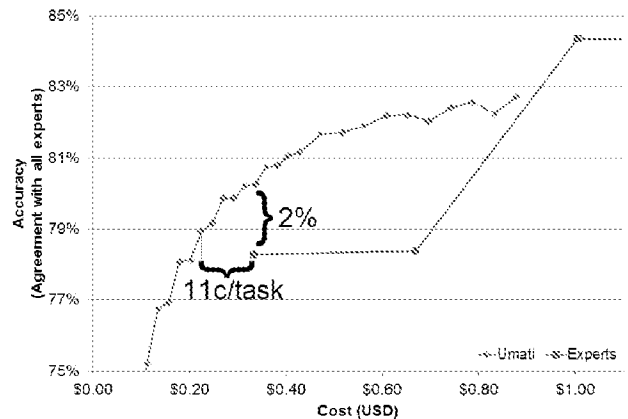


Figure 11. Accuracy (compared with all experts), for experts and Umati. One expert grader costs the university approximately 34 cents/task.

## DISCUSSION

In this section we discuss some important limitations of Umati and of our particular study design. We also discuss possible alternative strategies for communitysourcing.

### Privacy and Confidentiality for Grading

Publicly displaying student answers raises obvious privacy and confidentiality concerns. For example, handwriting might reveal the identity of a test taker. Students may not want peers grading their exams (though peer grading already exists in different forms at many schools). For the experiment described in this paper, paid participants generated exam answers; students' course grades were not determined by Umati workers. In the future, Umati can be used in situations where students have consented to this form of grading at the outset of a course. Alternatively, Umati can be used for many forms of assessment with lower stakes, e.g., homework grading or practice exams.

With the current design, students may also attempt to game the system by providing high grades to their own (or their

friend's) answers. We limited this concern by forcing graders to view all submissions to one question before moving on to the next questions. Attackers thus must grade *every* answer to *every* question in order to comprehensively cheat for just one student. Umati also gathers the student's ID, allowing us to programmatically block them from grading exams for classes they are enrolled in, or have not yet taken. To reduce the risk of cheating and of inadvertent identification by peers, test-takers and test-graders could also be geographically and socially separated – for example, students on the East Coast could grade assignments from students on the West Coast, and vice versa.

### Study Limitations

Our current study has several important limitations that should be addressed in future work.

#### *No Comparison to Expert Work Platforms*

We compared the effectiveness of grading tasks on Umati to Mechanical Turk. However, other crowdsourcing technologies could potentially be useful for grading. For instance, the computing experts on Stack Overflow [25] should have the expertise required to assess introductory exams. Similarly, we could hire a contractor on oDesk.

We are skeptical that these other engines are well suited for short-duration, expert tasks like grading. An individual expert (as on oDesk) is unlikely to be better or cheaper than the student graders we compared against. Stack Overflow workers provide the *best* answer to a question, disallowing the high-volume of tasks needed for grading. However, we have not yet tested whether these intuitions hold.

#### *Short Deployment*

A major limitation of our study is the short one-week duration of the deployment. High initial usage led to task starvation: we did not have enough sample tasks for graders. After one week, each exam response had already gathered an average of 68 grades.

While we know that the initial interest was high, we cannot yet comment on sustained, steady-state usage of Umati. We observed that more tasks were completed in the latter half of our deployment, suggesting that user momentum was still building. We are actively seeking new high-volume tasks for future deployments.

Similarly, we cannot say how much of this initial interest in Umati was due to the specific properties of our targeted crowd. It may be that Computer Science students are more excited about crowdsourcing than other groups. We hope to resolve this by targeting different communities (with different tasks) in the future.

### Interface Affordances Limit Work Duration

We chose grading as an example crowdsourcing task for Umati in part because it could be achieved with minimal user input. Umati's design might preclude many other types of work. This is primarily due to its limited input and output affordances: a 7-inch vertical touch-screen is inefficient and

error-prone for many data-entry heavy tasks. Kiosks must appear *approachable* to attract users and be *robust* to public abuse. Overly complex interfaces can create challenges for achieving these goals.

An alternative would be to divide work and reward interfaces: experts could perform work on their own computers or smart phones, e.g., through a web interface, and then come to a nearby kiosk or vending machine to redeem their rewards. In such a design, the kiosk would primarily enforce locality and community membership. However, this design would reduce the social visibility of the machine: in our deployment, students were frequently attracted by watching other students use Umati. In addition, communitysourcing requires available cognitive surplus. There are few other distractions in a public hallway; spare time may be more difficult to find when competing with a myriad of ways to spend time on the Internet. We reserve further study of these questions for future work.

### Applications of Communitysourcing to Other Problems

Our study demonstrated the value of communitysourcing for one particular task domain and reward type. Grading is just one example of a high-volume task that requires an expert population; we could instead provide specialized surveys. Snacks are just one of many possible rewards; students may prefer video game currency to snacks. In the future, we plan to develop alternative embodiments of communitysourcing, and to develop a theory of how the combination of task, location and reward affect work quality and quantity. For example, future deployments could include: a bug triage espresso machine in the lounge of a big technology company; a jukebox with market research tasks at a bar; or a slot machine in the airport with travel review tasks.

### CONCLUSION

In this work we introduced the idea of communitysourcing — the use of physical kiosks to crowdsource work from targeted populations. Communitysourcing is achieved by: 1) situating tasks in specific physical spaces that attract the right “crowd” and where people have idle time and 2) providing physical, context- and community-specific rewards that users value more than money. These two key points invite new expert workers to participate in short duration crowd work.

To explore the potential of communitysourcing, we designed, implementing and evaluated a specific communitysourcing interface for a particular expert task. *Umati, the communitysourced vending machine* enabled users to earn credit for purchasing snack items by performing grading tasks on a touchscreen. We investigated whether Umati can recruit new users: over one week, Umati successfully targeted a student community, with 302 students (of 328 total) grading 7240 (of 7771 total) exam answers. 80% of all the users had never participated in crowdsourcing before. We also investigated how task quality compared to both online crowdsourcing and traditional, offline work.

We found that Umati was able to grade exams more accurately (80.3% vs 78.3% at the same cost), or at lower

cost (23c/answer vs 34c/answer at equivalent accuracy), than traditional single-expert grading. Workers on Mechanical Turk were unable to successfully grade the exams.

In the future, we would like to test Umati over a longer period of time, to observe patterns of use and investigate the long-term prospects of expert work on kiosks. We would also like to consider alternate communitysourcing scenarios with varying configuration of task, location and reward; for example, one where users could complete tasks online using their own computers, obtaining one-time keys that can be redeemed for credit.

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# iPhone

# User Guide

For iOS 6.1 Software



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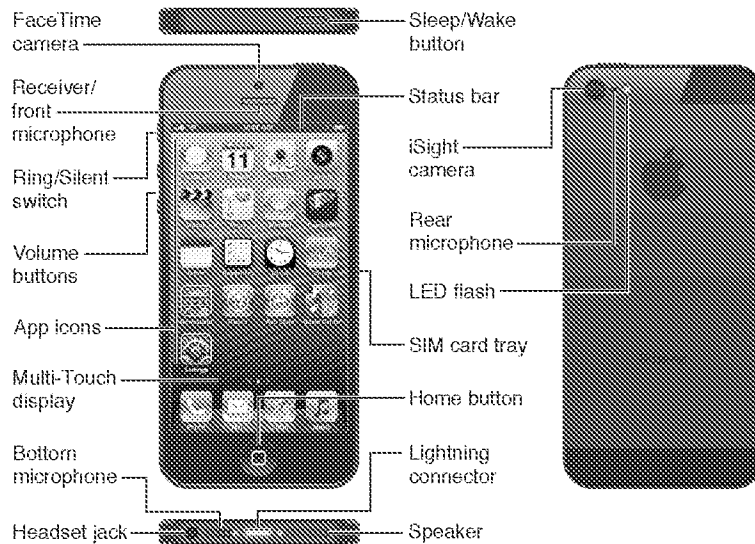
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# iPhone at a Glance

# 1

## iPhone 5 overview

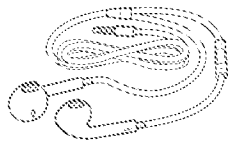


iPhone apps and features may vary based on your location, language, carrier, and model of iPhone. To find out which features are supported in your area, see [www.apple.com/ios/feature-availability](http://www.apple.com/ios/feature-availability).

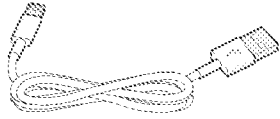
**Note:** Apps that send or receive data over a cellular network may incur additional fees. Contact your carrier for information about your iPhone service plan and fees.

## Accessories

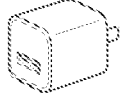
The following accessories are included with iPhone:



**Apple headset:** Use the Apple EarPods with Remote and Mic (iPhone 5) or the Apple Earphones with Remote and Mic (iPhone 4S or earlier) to listen to music and videos, and make phone calls. See Apple headset on page 31.



**Connecting cable:** Use the Lightning to USB Cable (iPhone 5) or the 30-pin to USB Cable (iPhone 4S or earlier) to connect iPhone to your computer to sync and charge.



**Apple USB power adapter:** Use with the Lightning to USB Cable or 30-pin to USB Cable to charge the iPhone battery.



**SIM eject tool:** Use to eject the SIM card tray. (Not included in all areas.)

## Buttons

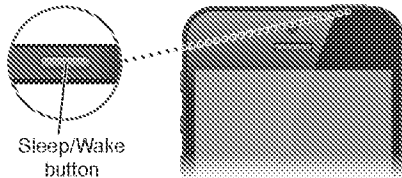
### Sleep/Wake button


When you're not using iPhone, you can lock it to turn off the display and save the battery.

**Lock iPhone:** Press the Sleep/Wake button.

When iPhone is locked, nothing happens if you touch the screen. iPhone can still receive calls, text messages, and other updates. You can also:



- Listen to music
- Adjust the volume
- Use the headset to answer a call or listen to music



**Unlock iPhone:** Press the Sleep/Wake button or the Home button , then drag the slider.

**Turn iPhone off:** Press and hold the Sleep/Wake button for a few seconds until the red slider appears, then drag the slider.

**Turn iPhone on:** Press and hold the Sleep/Wake button until the Apple logo appears.


**Open Camera when iPhone is locked:** Press the Sleep/Wake button or the Home button , then drag  up.


iPhone automatically locks if you don't touch the screen for a minute or so.

**Adjust the auto-lock timing or turn it off:** See Auto-Lock on page 136.


**Require a passcode to unlock iPhone:** See Passcode Lock on page 136.

## Home button



The Home button  takes you to the Home screen, no matter what you're doing. It also provides other convenient shortcuts.


**Go to the Home screen:** Press the Home button .

On the Home screen, tap an app to open it. See *Opening and switching between apps* on page 17.

**Display recently used apps:** With iPhone unlocked, double-click the Home button . The multitasking bar appears at the bottom of the screen, showing the most recently used apps. Swipe the bar to the left to see more apps.

**Display audio playback controls:**

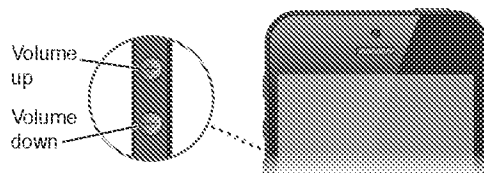
- *When iPhone is locked:* Double-click the Home button . See *Playing music*, on page 58.
- *When you're using another app:* Double-click the Home button , then swipe the multitasking bar from left to right.

**Use Siri (iPhone 4S or later) or Voice Control:** Press and hold the Home button . See Chapter 4, *Siri*, on page 36 and *Voice Control* on page 26.

## Volume controls

While you're on the phone or listening to songs, movies, or other media, the buttons on the side of iPhone adjust the audio volume. Otherwise, the buttons control the volume for the ringer, alerts, and other sound effects.

**WARNING:** For important information about avoiding hearing loss, see *Important safety information* on page 146.



**Lock the ringer and alerts volume:** Go to Settings > Sounds and turn off "Change with Buttons."



**Limit the volume for music and videos:** Go to Settings > Music > Volume Limit.

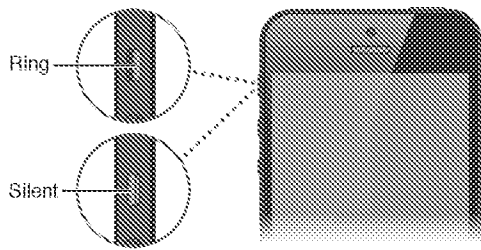
**Note:** In some countries, iPhone may indicate when you're setting the volume above the European Union hearing safety guidelines. To increase the volume beyond this level, you may need to briefly release the volume control.

You can also use either volume button to take a picture or record a video. See Chapter 12, *Camera*, on page 74.



## Ring/Silent switch

Flip the Ring/Silent switch to put iPhone in ring mode  or silent mode .



In ring mode, iPhone plays all sounds. In silent mode, iPhone doesn't ring or play alerts and other sound effects.

*Important:* Clock alarms, audio apps such as Music, and many games still play sounds through the built-in speaker when iPhone is in silent mode. In some areas, the sound effects for Camera and Voice Memos are played even if the Ring/Silent switch is set to silent.

For information about changing sound and vibrate settings, see [Sounds](#) on page 139.






You can also use the Do Not Disturb setting to silence calls, alerts, and notifications.

**Set iPhone to Do Not Disturb (🌙):** Go to Settings and turn on Do Not Disturb. Do Not Disturb keeps calls, alerts, and notifications from making any sounds or lighting up the screen when the screen is locked. Alarms still sound, however, and if the screen is unlocked, Do Not Disturb has no effect.

To schedule quiet hours, allow certain people to call, or enable repeated calls to ring through, go to Settings > Notifications > Do Not Disturb. See [Do Not Disturb and Notifications](#) on page 132.

## Status icons

The icons in the status bar at the top of the screen give information about iPhone:

Status icons		What it means
	Cellular signal*	Shows whether you're in range of the cellular network and can make and receive calls. The more bars, the stronger the signal. If there's no signal, the bars are replaced with "No service."
	Airplane mode	Shows that airplane mode is on—you cannot use the phone, access the Internet, or use Bluetooth® devices. Non-wireless features are available. See <a href="#">Airplane mode</a> on page 130.
<b>LTE</b>	LTE	Shows that your carrier's LTE network is available, and iPhone can connect to the Internet over that network. (iPhone 5. Not available in all areas.) See <a href="#">Cellular</a> on page 135.
	UMTS	Shows that your carrier's 4G UMTS (GSM) network is available, and iPhone can connect to the Internet over that network. (iPhone 4S or later. Not available in all areas.) See <a href="#">Cellular</a> on page 135.
	UMTS/EV-DO	Shows that your carrier's 3G UMTS (GSM) or EV-DO (CDMA) network is available, and iPhone can connect to the Internet over that network. See <a href="#">Cellular</a> on page 135.
	EDGE	Shows that your carrier's EDGE (GSM) network is available, and iPhone can connect to the Internet over that network. See <a href="#">Cellular</a> on page 135.

Icon	Feature	Description
	GPRS/1xRTT	Shows that your carrier's GPRS (GSM) or 1xRTT (CDMA) network is available, and iPhone can connect to the Internet over that network. See Cellular on page 135.
	Wi-Fi*	Shows that iPhone is connected to the Internet over a Wi-Fi network. The more bars, the stronger the connection. See Wi-Fi on page 130.
	Do Not Disturb	Shows that "Do Not Disturb" is turned on. See Sounds on page 139.
	Personal Hotspot	Shows that iPhone is connected to another iPhone providing a Personal Hotspot. See Personal Hotspot on page 132.
	Syncing	Shows that iPhone is syncing with iTunes.
	Network activity	Shows network activity. Some third-party apps may also use the icon to show an active process.
	Call Forwarding	Shows that Call Forwarding is set up on iPhone. See Call forwarding, call waiting, and caller ID on page 49.
	VPN	Shows that you're connected to a network using VPN. See Cellular on page 135.
	Lock	Shows that iPhone is locked. See Sleep/Wake button on page 8.
	TTY	Shows that iPhone is set to work with a TTY machine. See TTY support on page 128.
	Play	Shows that a song, audiobook, or podcast is playing. See Playing music on page 58.
	Portrait orientation lock	Shows that the iPhone screen is locked in portrait orientation. See Portrait and landscape orientation on page 19.
	Alarm	Shows that an alarm is set. See Chapter 19, Clock, on page 90.
	Location Services	Shows that an item is using Location Services. See Privacy on page 140.
	Bluetooth*	<i>Blue or white icon:</i> Bluetooth is on and paired with a device. <i>Gray icon:</i> Bluetooth is on and paired with a device, but the device is out of range or turned off. <i>No icon:</i> Bluetooth is not paired with a device. See Bluetooth devices on page 32.
	Bluetooth battery	Shows the battery level of a supported paired Bluetooth device.
	Battery	Shows battery level or charging status. See Battery on page 34.

\* **Accessories and wireless performance:** The use of certain accessories with iPhone may affect wireless performance. Not all iPod accessories are fully compatible with iPhone. Turning on airplane mode on iPhone may eliminate audio interference between iPhone and an accessory. While airplane mode is on, you cannot make or receive calls or use features that require wireless communication. Reorienting or relocating iPhone and the connected accessory may improve wireless performance.

# Getting Started

# 2



**WARNING:** To avoid injury, read Important safety information on page 146 before using iPhone.

## What you need

To use iPhone, you need:

- A wireless service plan with a carrier that provides iPhone service in your area
- An Internet connection for your computer (broadband is recommended)
- An Apple ID for some features, including iCloud, the App Store and iTunes Store, and online purchases. An Apple ID can be created during setup.

To use iPhone with your computer, you need:

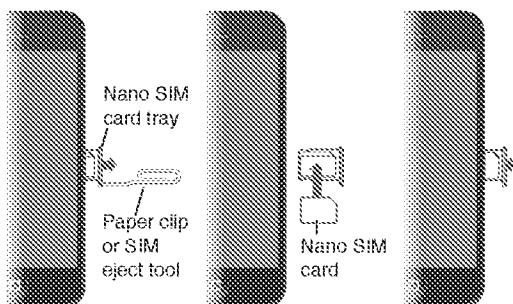
- A Mac with a USB 2.0 or 3.0 port, or a PC with a USB 2.0 port, and one of the following operating systems:
  - Mac OS X version 10.6.8 or later
  - Windows 7, Windows Vista, or Windows XP Home or Professional with Service Pack 3 or later
- iTunes 10.7 or later (for some features), available at [www.itunes.com/download](http://www.itunes.com/download)

## Installing the SIM card

If you were given a SIM card to install, install it before setting up iPhone.

*Important:* A SIM card is required in order to use cellular services when connecting to GSM networks and some CDMA networks. An iPhone 4S or later that's been activated on a CDMA wireless network may also use a SIM card for connecting to a GSM network, primarily for international roaming. Your iPhone is subject to your wireless service provider's policies, which may include restrictions on switching service providers and roaming, even after conclusion of any required minimum service contract. Contact your wireless service provider for more details. Availability of cellular capabilities depends on the wireless network.

### Installing the SIM Card in iPhone 5



**Install the SIM card:** Insert the end of a small paper clip or SIM eject tool into the hole on the SIM card tray. Pull out the SIM card tray and place the SIM card in the tray as shown. With the tray aligned and the SIM card on top, carefully replace the tray.

## Setting up and activating iPhone

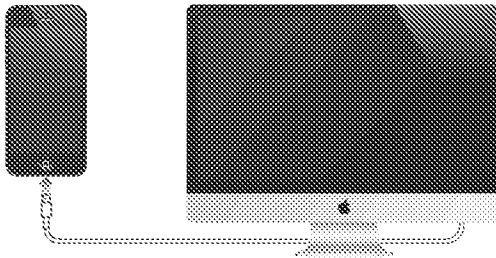
To set up and activate iPhone, turn on iPhone and follow the Setup Assistant. The Setup Assistant steps you through the setup process, including connecting to a Wi-Fi network, signing in with or creating a free Apple ID, setting up iCloud, turning on recommended features such as Location Services and Find My iPhone, and activating iPhone with your carrier. You can also restore from an iCloud or iTunes backup during setup.

Activation can be done over a Wi-Fi network or, with iPhone 4S or later, over your carrier's cellular network (not available in all areas). If neither option is available, you need to connect iPhone to your computer running iTunes for activation.

## Connecting iPhone to your computer

You may need to connect iPhone to your computer in order to complete activation. Connecting iPhone to your computer also lets you sync information, music, and other content with iTunes. See *Syncing with iTunes* on page 16.

**Connect iPhone to your computer:** Use the Lightning to USB Cable (iPhone 5) or 30-pin to USB Cable (iPhone 4S or earlier) provided with iPhone.



## Connecting to the Internet

iPhone connects to the Internet whenever necessary, using a Wi-Fi connection (if available) or your carrier's cellular network. For information about connecting to a Wi-Fi network, see *Wi-Fi* on page 130.

**Note:** If a Wi-Fi connection to the Internet isn't available, some iPhone apps and services may transfer data over your carrier's cellular network, which may result in additional fees. Contact your carrier for information about your cellular data plan rates. To manage cellular data usage, see *Cellular* on page 135.

## Setting up mail and other accounts

iPhone works with iCloud, Microsoft Exchange, and many of the most popular Internet-based mail, contacts, and calendar service providers.

If you don't already have a mail account, you can set up a free iCloud account when you first set up iPhone, or later in Settings > iCloud. See iCloud on page 15.

**Set up an iCloud account:** Go to Settings > iCloud.

**Set up some other account:** Go to Settings > Mail, Contacts, Calendars.

You can add contacts using an LDAP or CardDAV account, if your company or organization supports it. See Adding contacts on page 101.

You can add calendars using a CalDAV calendar account, and you can subscribe to iCalendar (.ics) calendars or import them from Mail. See Working with multiple calendars on page 68.

## Apple ID

An Apple ID is the user name for a free account that lets you access Apple services, such as the iTunes Store, the App Store, and iCloud. You need only one Apple ID for everything you do with Apple. There may be charges for services and products that you use, purchase, or rent.

If you have an Apple ID, use it when you first set up iPhone, and whenever you need to sign in to use an Apple service. If you don't already have an Apple ID, you can create one whenever you're asked to sign in.

For more information, see [support.apple.com/kb/ht37](http://support.apple.com/kb/ht37).

## Managing content on your iOS devices

You can transfer information and files between your iOS devices and computers using either iCloud or iTunes.

- *iCloud* stores content such as music, photos, calendars, contacts, documents, and more, and wirelessly pushes it to your other iOS devices and computers, keeping everything up to date. See iCloud below.
- *iTunes* syncs music, video, photos, and more, between your computer and iPhone. Changes you make on one device are copied to the other when you sync. You can also use iTunes to copy a file to iPhone for use with an app, or to copy a document you've created on iPhone to your computer. See Syncing with iTunes on page 16.

You can use iCloud or iTunes, or both, depending on your needs. For example, you can use iCloud Photo Stream to automatically get photos you take on iPhone to your other devices, and use iTunes to sync photo albums from your computer to iPhone.

*important:* Don't sync items in the Info pane of iTunes (such as contacts, calendars, and notes) and also use iCloud to keep that information up to date on your devices. Otherwise, duplicated data may result.

## iCloud

iCloud stores your content, including music, photos, contacts, calendars, and supported documents. Content stored in iCloud is pushed wirelessly to your other iOS devices and computers set up with the same iCloud account.

iCloud is available on devices with iOS 5 or later, on Mac computers with OS X Lion v10.7.2 or later, and on PCs with the iCloud Control Panel for Windows (Windows Vista Service Pack 2 or Windows 7 required).

iCloud features include:

- *iTunes in the Cloud*—Download previous iTunes music and TV show purchases to iPhone for free, anytime.
- *Apps and Books*—Download previous App Store and iBookstore purchases to iPhone for free, anytime.
- *Photo Stream*—Photos you take appear on all your devices. You can also create photo streams to share with others. See *Photo Stream* on page 71.
- *Documents in the Cloud*—For iCloud-enabled apps, keep documents and app data up to date across all your devices.
- *Mail, Contacts, Calendars*—Keep your mail contacts, calendars, notes, and reminders up to date across all your devices.
- *Backup*—Back up iPhone to iCloud automatically when connected to power and Wi-Fi. See *Backing up iPhone* on page 150.
- *Find My iPhone*—Locate your iPhone on a map, display a message, play a sound, lock the screen, or remotely wipe the data. See *Find My iPhone* on page 34.
- *Find My Friends*—Share your location with people who are important to you. Download the free app from the App Store.
- *iTunes Match*—With an iTunes Match subscription, all your music—including music you've imported from CDs or purchased somewhere other than iTunes—appears on all of your devices and can be downloaded and played on demand. See *iTunes Match* on page 62.
- *iCloud Tabs*—See the webpages you have open on your other iOS devices and OS X computers. See *Chapter 7, Safari*, on page 55.

With iCloud, you get a free email account and 5 GB of storage for your mail, documents, and backups. Your purchased music, apps, TV shows, and books, as well as your photo streams, don't count against your free space.

**Sign in or create an iCloud account, and set iCloud options:** Go to Settings > iCloud.

**Purchase additional iCloud storage:** Go to Settings > iCloud > Storage & Backup, then tap Manage Storage. For information about purchasing iCloud storage, go to [help.apple.com/icloud](http://help.apple.com/icloud).

**View and download previous purchases:**

- *iTunes Store purchases:* Go to iTunes, tap More, then tap Purchased.
- *App Store purchases:* Go to App Store, tap Updates, then tap Purchased.
- *iBookstore purchases:* Go to iBooks, tap Store, then tap Purchased.

**Turn on Automatic Downloads for music, apps, or books:** Go to Settings > iTunes & App Stores.

For more information about iCloud, go to [www.apple.com/icloud](http://www.apple.com/icloud). For support information, go to [www.apple.com/support/icloud](http://www.apple.com/support/icloud).


## Syncing with iTunes

Syncing with iTunes copies information from your computer to iPhone, and vice versa. You can sync by connecting iPhone to your computer, or you can set up iTunes to sync wirelessly with Wi-Fi. You can set iTunes to sync music, photos, videos, podcasts, apps, and more. For information about syncing iPhone with your computer, open iTunes, then choose iTunes Help from the Help menu.

**Set up wireless iTunes syncing:** Connect iPhone to your computer. In iTunes on the computer, select your iPhone, click Summary, then turn on “Sync with this iPhone over Wi-Fi.”


When Wi-Fi syncing is turned on, iPhone syncs every day. iPhone must be connected to a power source, iPhone and your computer must both be on the same wireless network, and iTunes must be open on your computer. For more information, see iTunes Wi-Fi Sync on page 136.


### Tips for syncing with iTunes

- If you use iCloud to store your contacts, calendars, bookmarks, and notes, don't also sync them to your device using iTunes.
- Purchases you make from the iTunes Store or the App Store on iPhone are synced back to your iTunes library. You can also purchase or download content and apps from the iTunes Store on your computer, and then sync them to iPhone.
- In the device's Summary pane, you can set iTunes to automatically sync when your device is attached to your computer. To temporarily override this setting, hold down Command and Option (Mac) or Shift and Control (PC) until you see iPhone appear in the iTunes window.
- In the device's Summary pane, select “Encrypt iPhone backup” if you want to encrypt the information stored on your computer when iTunes makes a backup. Encrypted backups are indicated by a lock icon , and a separate password is required to restore the backup. If you don't select this option, other passwords (such as those for mail accounts) aren't included in the backup and will have to be reentered if you use the backup to restore the device.
- In the device's Info pane, when you sync mail accounts, only the settings are transferred from your computer to iPhone. Changes you make to an email account on iPhone don't affect the account on your computer.
- In the device's Info pane, click Advanced to select options to let you *replace* the information on iPhone with the information from your computer during the next sync.
- If you listen to part of a podcast or audiobook, the place you left off is included if you sync the content with iTunes. If you started listening on iPhone, you can pick up where you left off using iTunes on your computer—or vice versa.
- In the device's Photo pane, you can sync photos and videos from a folder on your computer.

## Viewing this user guide on iPhone

You can view the *iPhone User Guide* on iPhone in Safari, and in the free iBooks app.

**View the user guide in Safari:** Tap , then tap the iPhone User Guide bookmark.

- *Add an icon for the guide to the Home screen:* Tap , then tap “Add to Home Screen.”
- *View the guide in a different language:* Tap “Change Language” on the main contents page.


**View the user guide in iBooks:** If you haven't installed iBooks, open App Store, then search for and install “iBooks.” Open iBooks and tap Store. Search for “iPhone User,” then select and download the guide.

For more information about iBooks, see Chapter 30, iBooks, on page 109.

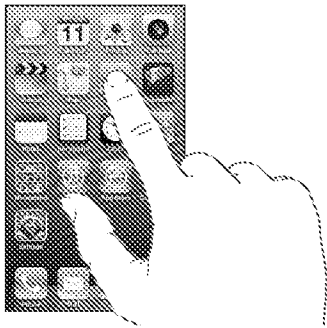
## Using apps


You interact with iPhone using your fingers to tap, double-tap, swipe, and pinch objects on the touchscreen.

### Opening and switching between apps

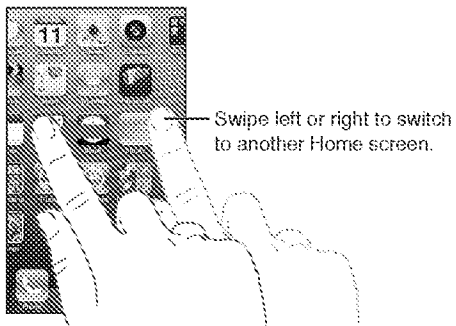
To go to the Home screen, press the Home button .


**Open an app:** Tap it.




To return to the Home screen, press the Home button  again.

**See another Home screen:** Swipe left or right.

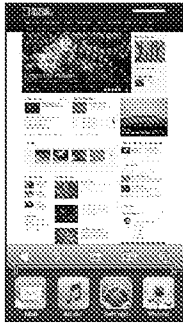


**Go to the first Home screen:** Press the Home button .

**View recently used apps:** Double-click the Home button .



Tap an app to use it again. Swipe left to see more apps.

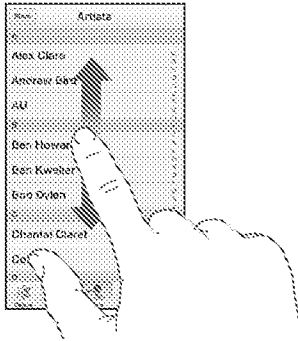


Recently used apps

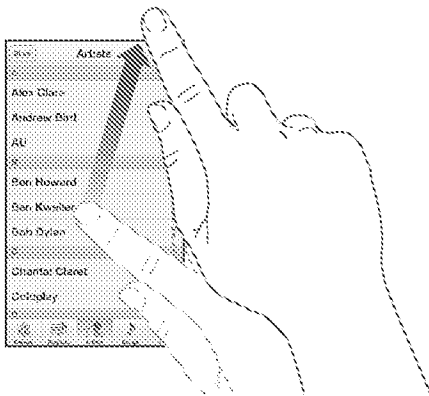
If you have a lot of apps, you might want to use Spotlight to locate and open them. See Searching on page 27.

### Scrolling

Drag up or down to scroll. On some screens, such as webpages, you can also scroll side to side. Dragging your finger to scroll won't choose or activate anything on the screen.



Flick to scroll quickly.



You can wait for the scrolling to come to a stop, or touch the screen to stop it immediately.

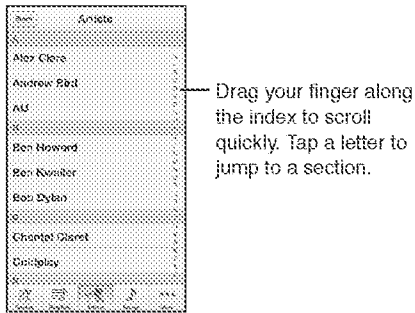
To quickly scroll to the top of a page, tap the status bar at the top of the screen.

### Lists

Depending on the list, choosing an item can do different things—for example, it may open another list, play a song, open an email, or show someone's contact information.

**Choose an item in a list:** Tap it.

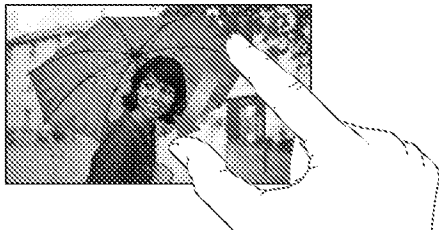
Some lists have an index along the side to help you navigate quickly.



**Return to a previous list:** Tap the back button in the upper-left corner.

### Zooming in or out

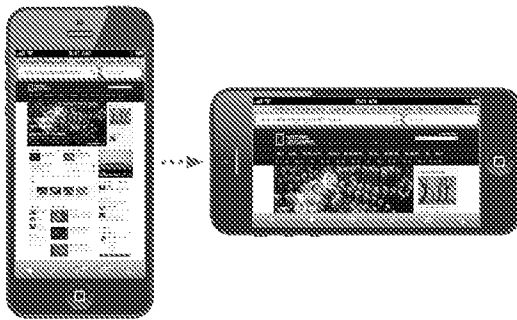
Depending on the app, you may be able to zoom in to enlarge, or zoom out to reduce the image on the screen. When viewing photos, webpages, mail, or maps, for example, pinch two fingers together to zoom out or spread them apart to zoom in. For photos and webpages, you can also double-tap (tap twice quickly) to zoom in, then double-tap again to zoom out. For maps, double-tap to zoom in and tap once with two fingers to zoom out.





Zoom is also an accessibility feature that lets you magnify the screen with any app you're using, to help you see what's on the display. See [Zoom](#) on page 125.


### Portrait and landscape orientation

You can view many iPhone apps in either portrait or landscape orientation. Rotate iPhone and the display rotates too, adjusting to fit the new orientation.



**Lock the screen in portrait orientation:** Double-click the Home button , swipe the multitasking bar from left to right, then tap .



The orientation lock icon  appears in the status bar when the screen orientation is locked.

### Adjusting brightness

You can manually adjust the brightness of the screen, or turn on Auto-Brightness to have iPhone use the built-in ambient light sensor to automatically adjust the brightness.

**Adjust the screen brightness:** Go to Settings > Brightness & Wallpaper, then drag the slider.

**Turn Auto-Brightness on or off:** Go to Settings > Brightness & Wallpaper.


See Brightness & Wallpaper on page 139.

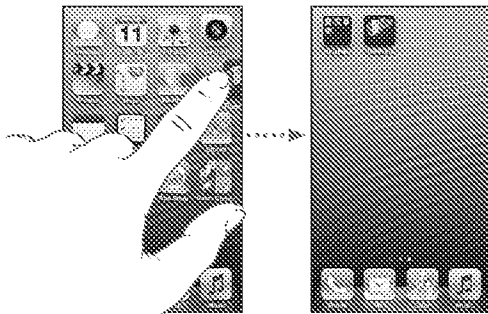
### Customizing iPhone

You can customize the layout of your apps on the Home screen, organize them in folders, and change the wallpaper.

#### Rearranging apps


Customize your Home screen by rearranging apps, moving apps to the Dock along the bottom of the screen, and creating additional Home screens.

**Rearrange apps:** Touch and hold any app on the Home screen until it jiggles, then move apps around by dragging them. Press the Home button  to save your arrangement.



**Create a new Home screen:** While arranging apps, drag an app to the right edge of the rightmost screen, until a new screen appears.

You can create up to 11 Home screens. The dots above the Dock show the number of screens you have, and which screen you're viewing.

Swipe left or right to switch between screens. To go to the first Home screen, press the Home button .

**Move an app to another screen:** While it's jiggling, drag an app to the side of the screen.

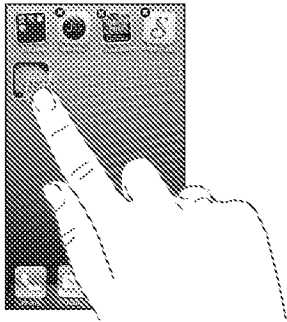
**Customize the Home screen using iTunes:** Connect iPhone to your computer. In iTunes on your computer, select iPhone, then click the Apps button to see the image of the iPhone Home screen.

**Reset the Home screen to its original layout:** In Settings, go to General > Reset, then tap Reset Home Screen Layout. Resetting the Home screen removes any folders you've created and applies the default wallpaper to your Home screen.

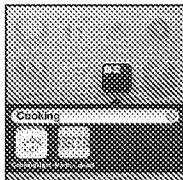
### Organizing with folders


You can use folders to organize the apps on your Home screens. Rearrange folders—just as you do apps—by dragging them around your Home screens or to the Dock.

**Create a folder:** Touch an app until the Home screen icons begin to jiggle, then drag the app onto another.




iPhone creates a new folder that includes the two apps, and names the folder based on the type of apps. To enter a different name, tap the name field.



**Open a folder:** Tap the folder. To close a folder, tap outside the folder or press the Home button .

**Organize with folders:** While arranging apps (the icons are jiggling):

- *Add an app to a folder:* Drag the app onto the folder.
- *Remove an app from a folder:* Open the folder if necessary, then drag the app out.
- *Delete a folder:* Move all apps out of the folder. The folder is automatically deleted.
- *Rename a folder:* Tap to open the folder, then tap the name and enter a new one.

When you finish, press the Home button .

### Changing the wallpaper

You can customize both the Lock screen and the Home screen by choosing an image or photo to use as wallpaper. Choose one of the supplied images, or a photo from your Camera Roll or another album on iPhone.

**Change the wallpaper:** Go to Settings > Brightness & Wallpaper.

## Typing

The onscreen keyboard lets you type when you need to enter text.

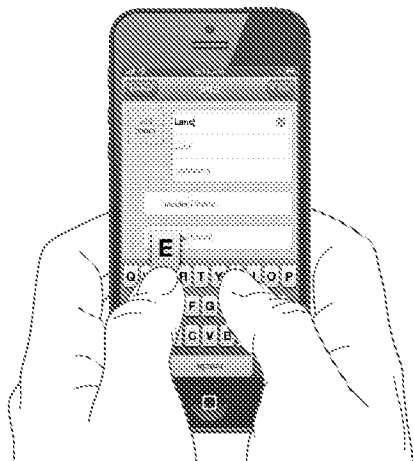
### Entering text





Use the onscreen keyboard to enter text, such as contact information, mail, and web addresses. Depending on the app and the language you're using, the keyboard may correct misspellings, predict what you're typing, and even learn as you use it.

You can also use an Apple Wireless Keyboard to type. See *Apple Wireless Keyboard* on page 24. To use dictation instead of typing, see *Dictation* on page 25.

**Enter text:** Tap a text field to bring up the keyboard, then tap keys on the keyboard.

As you type, each letter appears above your thumb or finger. If you touch the wrong key, you can slide your finger to the correct key. The letter isn't entered until you release your finger from the key.



- *Type uppercase:* Tap the Shift key  before tapping a letter. Or touch and hold the Shift key, then slide to a letter.
- *Quickly type a period and space:* Double-tap the space bar.
- *Turn on caps lock:* Double-tap the Shift key . To turn caps lock off, tap the Shift key.
- *Enter numbers, punctuation, or symbols:* Tap the Number key . To see additional punctuation and symbols, tap the Symbol key .
- *Enter accented letters or other alternate characters:* Touch and hold a key, then slide to choose one of the options.



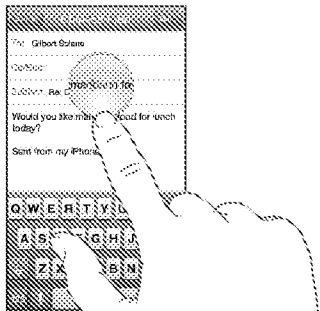
To type an alternate character, touch and hold a key, then slide to choose one of the options.

**Set options for typing:** Go to Settings > General > Keyboard.

## Editing text

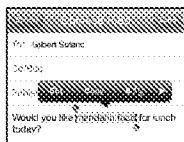
If you need to edit text, an onscreen magnifying glass lets you position the insertion point where you need it. You can select text, and cut, copy, and paste text. In some apps, you can also cut, copy, and paste photos and videos.

**Position the insertion point:** Touch and hold to bring up the magnifying glass, then drag to position the insertion point.



**Select text:** Tap the insertion point to display the selection buttons. Tap Select to select the adjacent word, or tap Select All to select all text.


You can also double-tap a word to select it. Drag the grab points to select more or less text. In read-only documents, such as webpages, touch and hold to select a word.



**Cut or copy text:** Select text, then tap Cut or Copy.

**Paste text:** Tap the insertion point, then tap Paste to insert the last text that you cut or copied. To replace text, select it before tapping Paste.

**Undo the last edit:** Shake iPhone, then tap Undo.

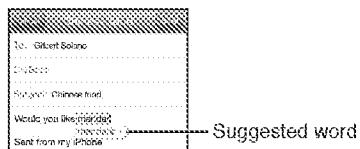
**Make text bold, italic, or underlined:** Select text, tap , then tap B/I/U (not always available).

**Get the definition of a word:** Select the word, then tap Define (not always available).

**Get alternative words:** Select a word, then tap Suggest (not always available).

## Auto-correction and spell checking

For many languages, iPhone uses the active dictionary to correct misspellings or make suggestions as you type. When iPhone suggests a word, you can accept the suggestion without interrupting your typing. For a list of supported languages, see [www.apple.com/iphone/specs.html](http://www.apple.com/iphone/specs.html).

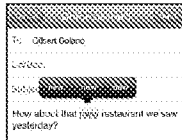


**Accept the suggestion:** Type a space, punctuation mark, or return character.

**Reject a suggestion:** Tap the "x" next to the suggestion.

Each time you reject a suggestion for the same word, iPhone becomes more likely to accept the word.

iPhone may also underline words you've already typed that might be misspelled.



**Replace a misspelled word:** Tap the underlined word, then tap the correct spelling. If the word you want doesn't appear, just retype it.

**Turn auto-correction or spell checking on or off:** Go to Settings > General > Keyboard.

### Shortcuts and your personal dictionary

Shortcuts lets you type just a few characters instead of a longer word or phrase. The expanded text appears whenever you type the shortcut. For example, the shortcut "omw" expands to "On my way!"

**Create a shortcut:** Go to Settings > General > Keyboard, then tap Add New Shortcut.

**Prevent iPhone from trying to correct a word or phrase:** Create a shortcut, but leave the Shortcut field blank.

**Edit a shortcut:** Go to Settings > General > Keyboard, then tap the shortcut.

**Use iCloud to keep your personal dictionary up to date on your other iOS devices:** Go to Settings > iCloud and turn on "Documents & Data."

### Keyboard layouts

You can use Settings to set the layouts for the onscreen keyboard or for an Apple Wireless Keyboard that you use with iPhone. The available layouts depend on the keyboard language. See Apple Wireless Keyboard below and Appendix B, International Keyboards, on page 143.

**Select keyboard layouts:** Go to Settings > General > International > Keyboards, select a language, then choose the layouts.

### Apple Wireless Keyboard


You can use an Apple Wireless Keyboard (available separately) for typing on iPhone. The Apple Wireless Keyboard connects via Bluetooth, so you must first pair it with iPhone. See Pairing Bluetooth devices on page 32.

Once the keyboard is paired, it connects whenever the keyboard is within range of iPhone—up to about 33 feet (10 meters). When a wireless keyboard is connected, the onscreen keyboard doesn't appear when you tap a text field. To save the battery, turn off the keyboard when not in use.

**Switch the language when using a wireless keyboard:** Press Command–Space bar to display a list of available languages. Press the Space bar again while holding down the Command key to choose a different language.

**Turn off a wireless keyboard:** Hold down the On/off switch on the keyboard until the green light goes off.

iPhone disconnects the keyboard when the keyboard is turned off or out of range.


**Unpair a wireless keyboard:** Go to Settings > Bluetooth, tap  next to the keyboard name, then tap "Forget this Device."

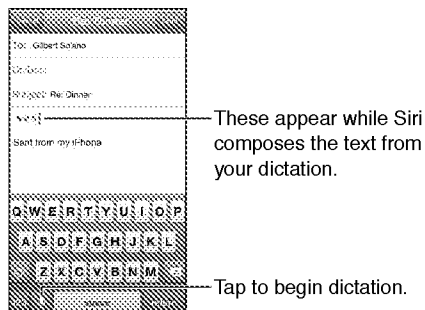
## Dictation


On iPhone 4S or later, you can dictate text instead of typing. To use dictation, Siri must be turned on and iPhone must be connected to the Internet. You can include punctuation and give commands to format your text.


**Note:** Cellular data charges may apply.

**Turn on dictation:** Go to Settings > General > Siri, then turn on Siri.

**Dictate text:** From the onscreen keyboard, tap , then speak. When you finish, tap Done.



To add text, tap  again and continue dictating. To insert text, tap to place the insertion point first. You can also replace selected text by dictating.

You can bring iPhone to your ear to start dictation, instead of tapping  on the keyboard. To finish, move iPhone back down in front of you.

**Add punctuation or format text:** Say the punctuation or formatting command.

For example, "Dear Mary comma the check is in the mail exclamation mark" results in "Dear Mary, the check is in the mail!"

Punctuation and formatting commands include:

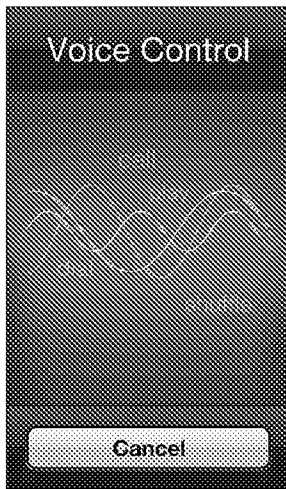
- quote ... end quote
- new paragraph
- cap—to capitalize the next word
- caps on ... caps off—to capitalize the first character of each word
- all caps—to make the next word all uppercase
- all caps on ... all caps off—to make the enclosed words all uppercase
- no caps on ... no caps off—to make the enclosed words all lowercase
- no space on ... no space off—to run a series of words together
- smiley—to insert :-)
- frowny—to insert :-(
- winky—to insert ;-)




## Voice Control

Voice Control lets you make phone calls and control music playback using voice commands. On iPhone 4S or later, you can also use Siri to control iPhone by voice. See Chapter 4, Siri, on page 36.

**Note:** Voice Control and Voice Control settings are not available when Siri is turned on.



**Use Voice Control:** Press and hold the Home button  until the Voice Control screen appears and you hear a beep. You can also press and hold the center button on your headset. See Apple headset on page 31.

For best results:

- Speak clearly and naturally.
- Say only iPhone commands, names, and numbers. Pause slightly between commands.
- Use full names.

Voice Control normally expects you to speak voice commands in the language that's set for iPhone (in Settings > General > International > Language). Voice Control settings let you change the language for speaking voice commands. Some languages are available in different dialects or accents.

**Change the language or country:** Go to Settings > General > International > Voice Control, then tap the language or country.

Voice Control for the Music app is always on, but you can prevent voice dialing when iPhone is locked.

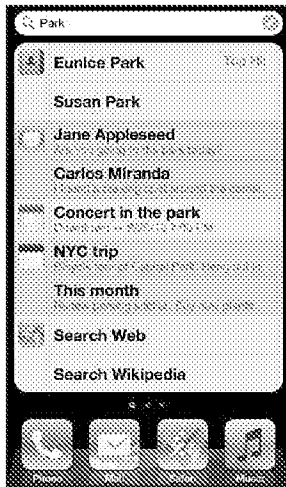
**Prevent voice dialing when iPhone is locked:** Go to Settings > General > Passcode Lock, then turn off Voice Dial (available only when Siri is turned off in Settings > General > Siri). To use voice dialing, you must first unlock iPhone.

For specific commands, see Making calls on page 43 and Siri and Voice Control on page 62.


For more about using Voice Control, including information about using Voice Control in different languages, go to [support.apple.com/kb/HT3597](http://support.apple.com/kb/HT3597).

## Searching

You can search many of the apps on iPhone, as well as Wikipedia and the web. Search an individual app, or search all the apps at once using Spotlight. Spotlight also searches the names of apps on iPhone—if you have a lot of apps, you might want to use Spotlight to locate and open them.



**Search an individual app:** Enter text in the search field.

**Search iPhone using Spotlight:** Swipe right from the first Home screen, or press the Home button  from any Home screen. Enter text in the search field.

Search results appear as you type. To dismiss the keyboard and see more results, tap Search. Tap an item in the list to open it. The icons let you know which apps the results are from.

iPhone may display a top hit for you, based on previous searches.

Spotlight searches the following:


- Contacts—All content
- Apps—Titles
- Music—Names of songs, artists, and albums, and the titles of podcasts and videos
- Podcasts—Titles
- Videos—Titles
- Audiobooks—Titles
- Notes—Text of notes
- Calendar (Events)—Event titles, invitees, locations, and notes
- Mail—To, From, and Subject fields of all accounts (the text of messages isn't searched)
- Reminders—Titles
- Messages—Names and text of messages

**Search the web or Wikipedia from Spotlight:** Scroll to the bottom of the search results, then tap Search Web or Search Wikipedia.

**Open an app from Search:** Enter all or part of the app name, then tap the app.

**Choose which items are searched, and the order they're searched:** Go to Settings > General > Spotlight Search.

## Notifications

To help make sure you don't miss important events, many iPhone apps can provide alerts. An alert can appear briefly as a banner at the top of the screen, which goes away if you don't respond to it, or as a notice in the center of the screen that remains until you acknowledge it. Some apps can also display badges on their icons on the Home screen, to let you know how many new items await—for example, how many new email messages you have. If there's a problem—such as a message that couldn't be sent—an exclamation mark  appears on the badge. A numbered badge on a folder shows the total number of alerts for all the apps in the folder.



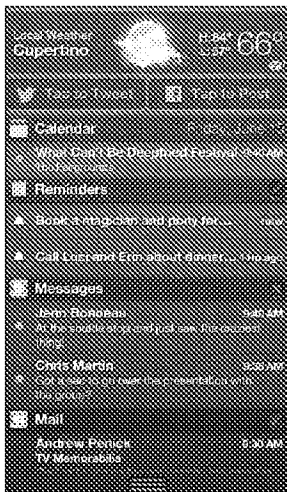
Alerts can also appear on the Lock screen.

**Respond to an alert when iPhone is locked:** Swipe the alert from left to right.


Notification Center displays all your alerts in one place. So if you weren't able to respond when you first received an alert, you can respond to them in Notification Center when you're ready. Alerts can include:

- Missed phone calls and voice messages
- New email
- New text messages
- Reminders
- Calendar events
- Friend requests (Game Center)

You can also get the local weather, and display your personal stock ticker. If you're signed in to your Twitter or Facebook account, you can post or tweet to your account from Notification Center.



**View Notification Center:** Swipe down from the top of the screen. Scroll the list to see additional alerts.

- *Respond to an alert:* Tap it.
- *Remove an alert:* Tap , then tap Clear.


**Manage alerts for your apps:** Go to Settings > Notifications. See Do Not Disturb and Notifications on page 132.

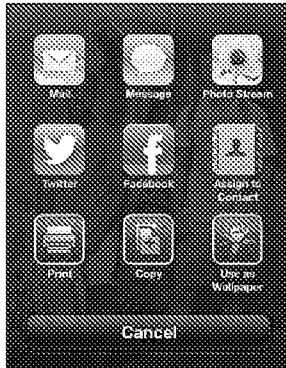
**Choose alert sounds, adjust the alert volume, or turn vibrate on or off:** Go to Settings > Sounds.

## Sharing

iPhone gives you lots of ways to share with other people.

### Sharing within apps

In many apps, tapping  displays options for sharing, as well as other actions such as printing or copying. The options vary depending on the app you're using.



## Facebook

Sign in to your Facebook account (or create a new account) in Settings to enable posting directly from many of the apps on iPhone.

**Sign in to or create a Facebook account:** Go to Settings > Facebook.

**Post from Notification Center:** Tap "Tap to Post."

**Post using Siri:** Say "Post to Facebook ...."

**Post an item from an app:** In most apps, tap . In Maps, tap , tap Share Location, then tap Facebook.

**Set options for Facebook:** Go to Settings > Facebook to:

- Update Contacts on iPhone with Facebook names and photos
- Allow apps (such as Calendar and Contacts) to use your account

**Install the Facebook app:** Go to Settings > Facebook, then tap Install.

## Twitter


Sign in to your Twitter account (or create a new account) in Settings to enable Tweets with attachments from many of the apps on iPhone.

**Sign in to or create a Twitter account:** Go to Settings > Twitter.

**Tweet from Notification Center:** Tap "Tap to Tweet."

**Tweet using Siri:** Say "Tweet ...."

**Tweet an item from an app:** View the item, tap , then tap Twitter. If  isn't showing, tap the screen. To include your location, tap Add Location.

**Tweet a location in Maps:** Tap the location pin, tap , tap Share Location, then tap Twitter.

When you're composing a Tweet, the number in the lower-right corner of the Tweet screen shows the number of characters remaining that you can enter. Attachments use some of a Tweet's 140 characters.

**Add Twitter user names and photos to your contacts:** Go to Settings > Twitter, then tap Update Contacts.

**Install the Twitter app:** Go to Settings > Twitter, then tap Install.


To learn how to use the Twitter app, open the app, tap Me, then tap Help.


## Connecting iPhone to a TV or other device

You can use AirPlay with Apple TV to stream content to an HDTV, or connect iPhone to your TV using cables.


### AirPlay


With AirPlay, you can stream music, photos, and video wirelessly to Apple TV and other AirPlay-enabled devices. The AirPlay controls appear when an AirPlay-enabled device is available on the same Wi-Fi network that iPhone is connected to. You can also mirror the contents of your iPhone screen on a TV.

**Stream content to an AirPlay-enabled device:** Tap , then choose the device.

**Access the AirPlay and volume controls while using any app:** When the screen is on, double-click the Home button  and scroll to the left end of the multitasking bar.



**Switch playback back to iPhone:** Tap , then choose iPhone

**Mirror the iPhone screen on a TV:** Tap  at the left end of the multitasking bar, choose an Apple TV, then tap Mirroring. A blue bar appears at the top of the iPhone screen when AirPlay mirroring is turned on. Everything on the iPhone screen appears on the TV.

### Connecting iPhone to a TV using a cable

Apple cables and adapters (available separately) may be used to connect iPhone to a TV, projector, or other external display. For more information, go to [support.apple.com/kb/HT4106](http://support.apple.com/kb/HT4106).

## Printing with AirPrint


AirPrint lets you print wirelessly to AirPrint-enabled printers from the following iOS apps:

- Mail—email messages and attachments that can be viewed in Quick Look
- Photos and Camera—photos
- Safari—webpages, PDFs, and other attachments that can be viewed in Quick Look
- iBooks—PDFs
- Maps—the portion of the map showing on the screen
- Notes—the currently displayed note

Other apps available from the App Store may also support AirPrint.

iPhone and the printer must be on the same Wi-Fi network. For more information about AirPrint, go to [support.apple.com/kb/HT4356](http://support.apple.com/kb/HT4356).

**Print a document:** Tap  or  (depending on the app you're using), then tap Print.

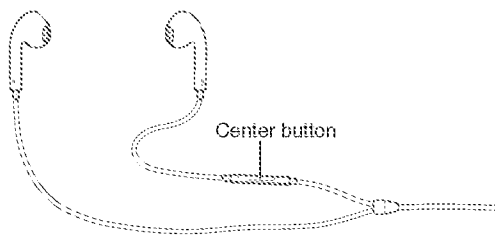
**See the status of a print job:** Double-click the Home button , then tap Print Center in the multitasking bar. The badge on the icon shows how many documents are ready to print, including the current one.





**Cancel a print job:** In Print Center, select the print job, if necessary, then tap Cancel Printing.

## Apple headset

The Apple EarPods with Remote and Mic (iPhone 5) and the Apple Earphones with Remote and Mic (iPhone 4S or earlier) feature a microphone, volume buttons, and an integrated button that allows you to answer and end calls, and control audio and video playback.



Plug in the headset to listen to music or make a phone call. Press the center button to control music playback and answer or end calls, even when iPhone is locked.

**Adjust the volume:** Press the  or  button.

**Use the center button to control music playback:**

- *Pause a song or video:* Press the center button. Press again to resume playback.
- *Skip to the next song:* Press the center button twice quickly.
- *Return to the previous song:* Press the center button three times quickly.
- *Fast-forward:* Press the center button twice quickly and hold.
- *Rewind:* Press the center button three times quickly and hold.

**Use the center button to answer or make phone calls:**

- *Answer an incoming call:* Press the center button.
- *End the current call:* Press the center button.
- *Decline an incoming call:* Press and hold the center button for about two seconds, then let go. Two low beeps confirm you declined the call.
- *Switch to an incoming or on-hold call, and put the current call on hold:* Press the center button. Press again to switch back to the first call.
- *Switch to an incoming or on-hold call, and end the current call:* Press and hold the center button for about two seconds, then let go. Two low beeps confirm you ended the first call.

**Use Siri or Voice Control:** Press and hold the center button.

See Chapter 4, Siri, on page 36 or Voice Control on page 26.

If you get a call while the headset is plugged in, you can hear the ringtone through both the iPhone speaker and the headset.

## Bluetooth devices

You can use iPhone with the Apple Wireless Keyboard and other Bluetooth devices, such as Bluetooth headsets, car kits, and stereo headphones. For supported Bluetooth profiles, go to [support.apple.com/kb/HT3647](http://support.apple.com/kb/HT3647).

### Pairing Bluetooth devices

**WARNING:** For important information about avoiding hearing loss and avoiding distraction while driving, see important safety information on page 146.

Before you can use a Bluetooth device with iPhone, you must first pair them.

#### Pair a Bluetooth device with iPhone:


- 1 Make the device discoverable.

See the documentation that came with the device. For an Apple Wireless Keyboard, press the On/off switch.

- 2 Go to Settings > Bluetooth and turn Bluetooth on.
- 3 Select the device and, if prompted, enter the passkey or PIN. See the instructions about the passkey or PIN that came with the device.




For information about using an Apple Wireless Keyboard, see *Apple Wireless Keyboard* on page 24.

To use a Bluetooth headset with iPhone, see the documentation that came with the device.

**Return audio output to iPhone when a Bluetooth headset is connected:** Turn off or unpair the device, or turn off Bluetooth in Settings > Bluetooth. Audio output returns to iPhone whenever the device is out of range. You can also use AirPlay  to switch audio output to iPhone. See *AirPlay* on page 30.


### Bluetooth status

After you pair a device with iPhone, the Bluetooth icon appears in the status bar at the top of the screen:

-  or : Bluetooth is on and paired with a device. (The color depends on the current color of the status bar.)
- : Bluetooth is on and paired with a device, but the device is out of range or turned off.
- *No Bluetooth icon:* Bluetooth is not paired with a device.

### Unpairing a Bluetooth device from iPhone

You can unpair a Bluetooth device if you don't want to use it with iPhone any more.

**Unpair a Bluetooth device:** Go to Settings > Bluetooth and turn on Bluetooth. Tap  next to the device name, then tap "Forget this Device."

## File sharing

You can use iTunes to transfer files between iPhone and your computer. You can also view files received as email attachments on iPhone. See *Reading mail* on page 51. If you have the same apps that work with iCloud on more than one device, you can use iCloud to automatically keep your documents up to date across all your devices. See *iCloud* on page 15.

**Transfer files using iTunes:** Connect iPhone to your computer using the included cable. In iTunes on your computer, select iPhone, then click the Apps button. Use the File Sharing section to transfer documents between iPhone and your computer. Apps that support file sharing appear in the File Sharing Apps list in iTunes. To delete a file, select the file in the Files list, then press the Delete key.

## Security features

Security features help protect the information on iPhone from being accessed by others.

### Passcodes and data protection

For security, you can set a passcode that you must enter each time you turn on or wake up iPhone, or when you access the passcode lock settings.

Setting a passcode turns on data protection, which uses your passcode as the key for encrypting mail messages and attachments stored on iPhone. (Some apps available from the App Store may also use data protection.) A notice at the bottom of the Passcode Lock screen in Settings shows that data protection is enabled.

*Important:* On an iPhone 3GS that didn't ship with iOS 4 or later, you must also restore iOS software to enable data protection. See *Updating and restoring iPhone software* on page 152.

**Set a passcode:** Go to Settings > General > Passcode Lock, then tap Turn Passcode On and enter a 4-digit passcode.

**Use a more secure passcode:** To increase security, turn off Simple Passcode and use a longer passcode with a combination of numbers, letters, punctuation, and special characters.

To unlock iPhone when it's protected by a combination passcode, you enter the passcode using the keyboard. If you prefer to unlock iPhone using the numeric keypad, you can set up a longer passcode using numbers only.

**Prevent access to Siri when iPhone is locked:** Go to Settings > General > Passcode Lock, then turn Siri off.

**Prevent voice dialing when iPhone is locked:** Go to Settings > General > Passcode Lock, then turn Voice Dial off. (Available only when Siri is turned off in Settings > General > Siri.)

See *Passcode Lock* on page 136.



## Find My iPhone

Find My iPhone can help you locate and secure your iPhone using the free Find My iPhone app on another iPhone, iPad, or iPod touch, or using a Mac or PC web browser signed in to [www.icloud.com](http://www.icloud.com).

Find My iPhone includes:

- *Play Sound*: Play a sound for two minutes.
- *Lost Mode*: You can immediately lock your missing iPhone with a passcode and send it a message displaying a contact number. iPhone also tracks and reports its location, so you can see where it's been when you check the Find My iPhone app.
- *Erase iPhone*: Protects your privacy by erasing all the information and media on your iPhone and restoring iPhone to its original factory settings.

*Important*: To use these features, Find My iPhone must have been turned on in iCloud settings on your iPhone before it was lost, and iPhone must be connected to the Internet.

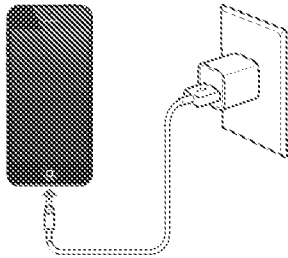
**Turn on Find My iPhone**: Go to Settings > iCloud, then turn on Find My iPhone.

## Battery

iPhone has an internal, lithium-ion rechargeable battery. For more information about the battery—including tips for maximizing battery life—go to [www.apple.com/batteries](http://www.apple.com/batteries).

**WARNING**: For important safety information about the battery and charging iPhone, see Important safety information on page 146.

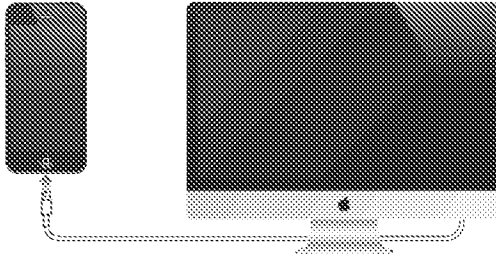
**Charge the battery**: Connect iPhone to a power outlet using the included cable and USB power adapter.



*Note*: Connecting iPhone to a power outlet can start an iCloud backup or wireless iTunes syncing. See Backing up iPhone on page 150 and Syncing with iTunes on page 16.

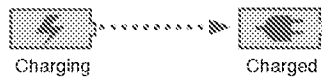
**Charge the battery and sync iPhone using a computer**: Connect iPhone to your computer using the included cable.

Unless your keyboard has a high-power USB 2.0 or 3.0 port, you must connect iPhone to a USB 2.0 or 3.0 port on your computer.



*important:* The iPhone battery may drain instead of charge if iPhone is connected to a computer that's turned off or is in sleep or standby mode.

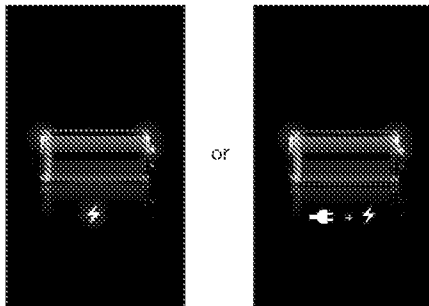
The battery icon in the upper-right corner shows the battery level or charging status.



**Display the percentage of battery charge:** Go to Settings > General > Usage and turn on the setting under Battery Usage.

If you charge the battery while syncing or using iPhone, it may take longer to charge.

*important:* If iPhone is very low on power, it may display one of the following images, indicating that iPhone needs to charge for up to ten minutes before you can use it. If iPhone is extremely low on power, the display may be blank for up to two minutes before one of the low-battery images appears.



Rechargeable batteries have a limited number of charge cycles and may eventually need to be replaced.

**Replace the battery:** The iPhone battery isn't user replaceable; it can be replaced only by an authorized service provider. See [www.apple.com/batteries/replacements.html](http://www.apple.com/batteries/replacements.html).

## What is Siri?

Siri is the intelligent personal assistant that helps you get things done just by talking. Siri understands natural speech, so you don't have to learn specific commands or remember keywords. You can ask things in different ways. For example, you can say "Set the alarm for 6:30 a.m." or "Wake me at 6:30 in the morning." Either way, Siri gets it.

**WARNING:** For important information about avoiding distraction while driving, see important safety information on page 146.

**Note:** Siri is available on iPhone 4S or later, and requires internet access. Cellular data charges may apply.

Siri lets you write and send a message, schedule a meeting, place a phone call, get directions, set a reminder, search the web, and much more—simply by talking naturally. Siri asks a question if it needs clarification or more information. Siri also uses information from your contacts, music library, calendars, reminders, and so forth to understand what you're talking about.

Siri works seamlessly with most of the built-in apps on iPhone, and uses Search and Location Services when needed. You can also ask Siri to open an app for you.


There's so much you can say to Siri—here are some more examples, for starters:

- Call Joe
- Set the timer for 30 minutes
- Directions to the nearest Apple store
- Is it going to rain tomorrow?
- Open Passbook
- Post to Facebook
- Tweet

## Using Siri

### Starting Siri

Siri comes to life with the press of a button.

**Start Siri:** Press the Home button  until Siri appears. If you didn't turn Siri on when you set up iPhone, go to Settings > General > Siri.

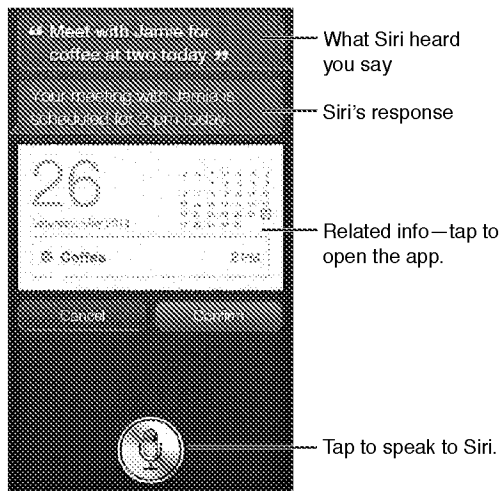
You'll hear two quick beeps and see "What can I help you with?" on the screen.





Just start speaking. The microphone icon lights up to let you know that Siri hears you talking. Once you've started a dialogue with Siri, tap the microphone icon to talk to it again.


Siri waits for you to stop speaking, but you can also tap the microphone icon to tell Siri you're done. This is useful when there's a lot of background noise. It can also speed up your conversation with Siri, since Siri won't have to wait for your pause.

When you stop speaking, Siri displays what it heard and provides a response. Siri often includes related info that might be useful. If the info is related to an app—for example, a text message you've composed, or a location you asked for—just tap the display to open the app for details and further action.



Siri may ask you for clarification in order to complete a request. For example, tell Siri to "Remind me to call mom," and Siri may ask "What time would you like me to remind you?"

**Cancel a request:** Say "cancel," tap , or press the Home button .

**Stop a phone call you started with Siri:** Before the Phone app opens, press the Home button . If Phone is already open, tap End.

### Telling Siri about yourself

The more Siri knows about you, the more it can use your information to help you. Siri gets your information from your personal info card ("My Info") in Contacts.


**Tell Siri who you are:** Go to Settings > General > Siri > My Info, then tap your name.

Put your home and work addresses on your card, so you can say things like “How do I get home?” and “Remind me to call Bob when I get to work.”

Siri also wants to know about the important people in your life, so put those relationships on your personal info card—Siri can help you. For example, the first time you tell Siri to call your sister, Siri asks you who your sister is (if you don’t already have that info on your card). Siri adds that relationship to your personal info card so it doesn’t have to ask next time.

Create cards in Contacts for all your important relationships, and include information such as phone numbers, email addresses, home and work addresses, and nicknames you like to use.

### Onscreen guide

Siri prompts you with examples of things you can say, right on screen. Ask Siri “what can you do” or tap  when Siri first appears. Siri displays a list of the apps it supports, with an example request. Tap an item in the list to see more examples.

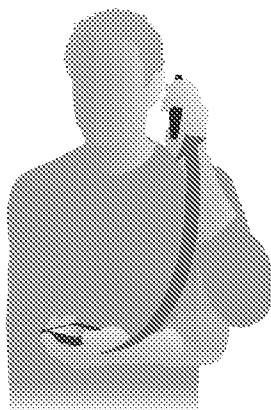


### Raise to Speak

You can start talking to Siri just by bringing iPhone to your ear, like making a phone call. If the screen isn’t on, first press the Sleep/Wake or Home button. You’ll hear two quick beeps to indicate Siri is listening. Then start talking.

**Turn on Raise to Speak:** Go to Settings > General > Siri.

If Siri doesn’t respond when you bring iPhone to your ear, start with the screen facing you, so your hand rotates on the way up.



## Handsfree Siri

You can use Siri with the headset that came with iPhone, and with other compatible wired or Bluetooth headsets.

**Talk to Siri using a headset:** Press and hold the center button (or the call button on a Bluetooth headset).

To continue a conversation with Siri, press and hold the button each time you want to talk.

When you use a headset, Siri speaks its responses to you. Siri reads back text messages and email messages that you've dictated before sending them. This gives you a chance to change the message if you want. Siri also reads back the subjects of reminders before creating them.

## Location Services

Because Siri knows locations (iPhone 4S or later) like "current," "home," and "work," it can remind you to do a certain task when you leave a location or arrive at a location. Tell Siri "Remind me to call my daughter when I leave the office," and Siri does just that.

Location information isn't tracked or stored outside iPhone. You can still use Siri if you turn Location Services off, but Siri won't do anything that requires location information.

**Turn off Location Services for Siri:** Go to Settings > Privacy > Location Services.

## Accessibility

Siri is accessible to blind and visually impaired users through VoiceOver, the screen reader built into iOS. VoiceOver describes aloud what's onscreen—including any text in Siri's responses—so you can use iPhone without seeing it.

**Turn on VoiceOver:** Go to Settings > General > Accessibility.

Turning on VoiceOver causes even your notifications to be read aloud for you. For more information, see *VoiceOver* on page 115.

## Setting options for Siri

**Turn Siri on or off:** Go to Settings > General > Siri.

**Note:** Turning Siri off resets Siri, and Siri forgets what it's learned about your voice.

**Set options for Siri:** Go to Settings > General > Siri.

- *Language:* Select the language you want to use with Siri.
- *Voice Feedback:* By default, Siri speaks its responses only when you hold iPhone to your ear or use Siri with a headset. If you want Siri to always speak its responses, set this option to Always.
- *My Info:* Let Siri know which card in Contacts contains your personal info. See *Telling Siri about yourself* on page 37.
- *Raise to Speak:* Talk to Siri by bringing iPhone to your ear when the screen is on. To turn this feature on or off, go to Settings > General > Siri.

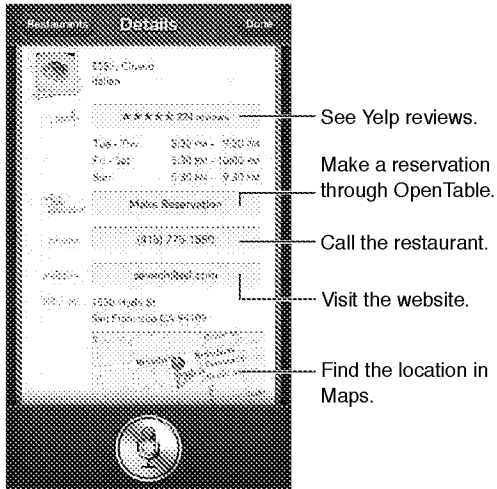
**Allow or prevent access to Siri when iPhone is locked with a passcode:** Go to Settings > General > Passcode Lock.

You can also disable Siri by turning on restrictions. See *Restrictions* on page 137.

## Restaurants

Siri works with Yelp, OpenTable, and others to provide information about restaurants and help you make reservations. Ask to find restaurants by cuisine, price, location, outdoor seating, or a combination of options. Siri can show you available photos, Yelp stars, price range, and reviews. Get more information by using the Yelp and OpenTable apps—iPhone prompts you to download them if you don't already have them installed.

**See detailed info about a restaurant:** Tap a restaurant that Siri suggests.

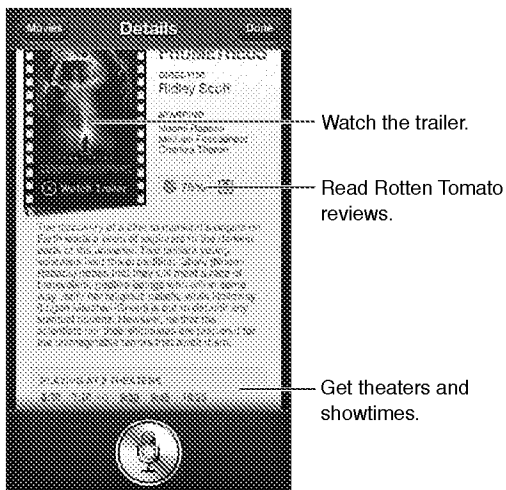


## Movies

Ask Siri about what movies are playing, or where you can see a specific movie. Find out when a film premiered, who directed it and what awards it won. Siri gives theater locations, show times, and Rotten Tomato reviews.

Siri works with Fandango to help you purchase tickets (for theaters that support it). Ask about showtimes for a movie, or tell Siri you want to buy tickets. When you tap Buy Tickets, Fandango opens if it's installed, or you'll be prompted to install the app from the App Store.

**See detailed info about a movie:** Tap a movie that Siri suggests.



## Sports

Siri knows a lot about sports—including baseball, basketball, football, soccer, and hockey. Ask Siri for game schedules, scores from the current season's games, or up-to-the minute scores from live games. Tell Siri to show you player stats and compare them against other players' stats. Siri tracks team records, too. Here are some things you might ask:

- What was the score of the last Giants game?
- What are the National League standings?
- When is the Chicago Cubs first game of the season?

## Dictation

When Siri is turned on, you can also dictate text. See Dictation on page 25.

Although you can compose email, text messages, and other text by talking directly with Siri, you might prefer dictation. Dictation lets you edit a message instead of replacing the entire text. Dictation also gives you more time to think while composing.

Siri understands a pause to mean you finished talking for the moment, and takes that opportunity to respond. While this lets you have a natural conversation with Siri, Siri might interrupt you before you're really done if you pause too long. With dictation, you can pause as much as you like, and resume talking when you're ready.


You can also start composing text using Siri, then continue using dictation. For example, you can create an email with Siri, then tap the draft to open the message in Mail. In Mail, you can complete or edit the message and make other changes, such as adding or removing recipients, revising the subject, or changing the account you're sending the email from.

## Correcting Siri

### If Siri is having trouble


Siri may sometimes have trouble understanding you—in a noisy environment, for example. If you speak with an accent, it can take Siri some time to get used to your voice. If Siri doesn't hear you exactly right, you can make corrections.

Siri shows what it heard you say, along with its response.

**Correct what Siri hears you say:** Tap the bubble showing what Siri heard you say. Edit your request by typing, or tap  on the keyboard to dictate.

For information about using dictation, see Dictation on page 41.

If some of the text is underlined in blue, tap it and Siri suggests some alternatives. Tap one of the suggestions, or replace the text by typing or dictating.

**Correct Siri by voice:** Tap , then restate or clarify your request. For example, "I meant Boston."

When correcting Siri, don't say what you *don't* want—just tell Siri what you *do* want.


**Correct a mail or text message:** If Siri asks if you want to send the message, say something like:

- Change it to: Call me tomorrow.
- Add: See you there question mark.
- No, send it to Bob.
- No. (to keep the message without sending it)
- Cancel.



To have Siri read the message to you, say “Read it back to me” or “Read me the message.” If it’s correct, say something like “Yes, send it.”

### Noisy environments

In a noisy environment, hold iPhone close to your mouth, but don’t talk directly into the bottom edge. Continue to speak clearly and naturally. Tap  when you finish speaking.

You can also try holding iPhone to your ear to speak to Siri.

### Network connection

Siri might tell you it’s having trouble connecting to the network. Because Siri relies on Apple servers for voice recognition and other services, you need to have a good 3G, 4G, or LTE cellular connection or a Wi-Fi connection to the Internet.

# Phone

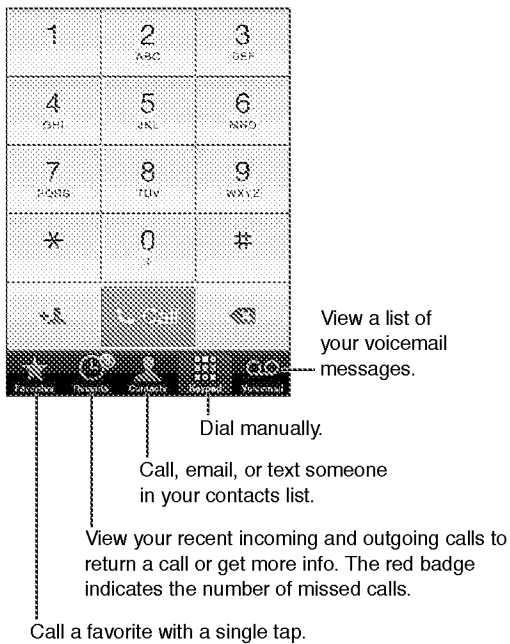
# 5



## Phone calls

### Making calls

Making a call on iPhone is as simple as tapping a name or number in your contacts, using Siri to say "call Bob" (iPhone 4S or later), tapping one of your favorites, or tapping a recent call to return it.




**WARNING:** For important information about avoiding distraction, see important safety information on page 146.

Buttons at the bottom of the Phone screen give you quick access to your favorites, recent calls, your contacts, and a numeric keypad for dialing manually.

**Manually dial a number:** Tap Keypad, enter the number, then tap Call.

- *Paste a number to the keypad:* Tap the screen above the keyboard, then tap Paste.
- *Enter a soft (2-second) pause:* Touch the "\*" key until a comma appears.
- *Enter a hard pause (to pause dialing until you tap the Dial button):* Touch the "#" key until a semicolon appears.
- *Redial the last number:* Tap Keypad, tap Call to display the number, then tap Call again.

**Add a contact to Favorites:** In Contacts, tap "Add to Favorites" at the bottom of a contact card. To delete or rearrange your favorites list, tap Edit.


**Use Siri or Voice Control:** Press and hold the Home button , say *call* or *dial*, then say the name or number. You can add *at home*, *work*, or *mobile*. See Chapter 4, Siri, on page 36 and Voice Control on page 26.


For best results, speak the full name of the person you're calling. When voice dialing a number, speak each digit separately—for example, *four one five, five five five, one two one two*. For the 800 area code in the U.S., you can say *eight hundred*.

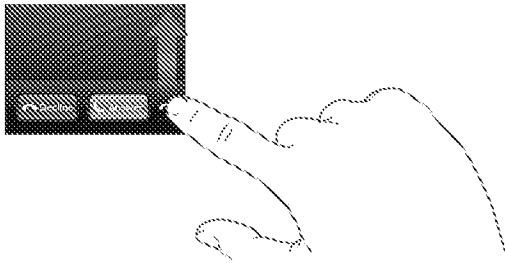
## Receiving calls

**Answer a call:** Tap Answer. If iPhone is locked, drag the slider. You can also press the center button on your headset.

**Silence a call:** Press the Sleep/Wake button or either volume button. You can still answer the call after silencing it, until it goes to voicemail.

**Reply to an incoming call with a text message:** Swipe  up, tap "Reply with Message," then choose a reply or tap Custom. To create your own default replies, go to Settings > Phone > "Reply with Message" and replace any of the default messages.

**Remind yourself to return an incoming call:** Swipe  up, tap Remind Me Later, then choose when you want to be reminded.



**Decline a call and send it directly to voicemail:** Do one of the following:

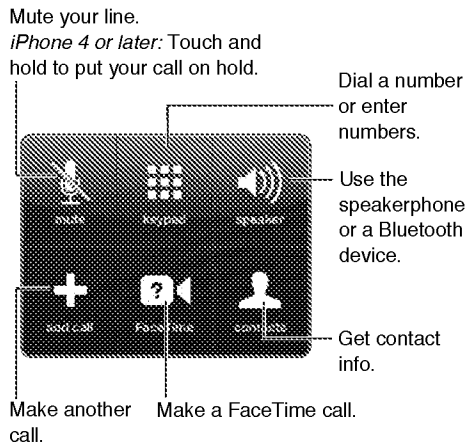
- Press the Sleep/Wake button twice quickly.
- Press and hold the center button on your headset for about two seconds. Two low beeps confirm that the call was declined.
- Tap Decline (if iPhone is awake when the call comes in).


**Block calls and maintain Wi-Fi access to the Internet:** Go to Settings and turn on Airplane Mode, then tap Wi-Fi to turn it on.

**Set iPhone to Do Not Disturb (🌙):** Go to Settings and turn on Do No Disturb. See Do Not Disturb and Notifications on page 132.

## While on a call

When you're on a call, the screen shows call options.



**Use another app during a call:** Press the Home button , then open the app. To return to the call, tap the green bar at the top of the screen.

**End a call:** Tap End. Or press the center button on your headset.

### Respond to a second incoming call:

- *Ignore the call and send it to voicemail:* Tap Ignore.
- *Put the first call on hold and answer the new one:* Tap Hold Call + Answer.
- *End the first call and answer the new one:* When using a GSM network, tap End Call + Answer. With a CDMA network, tap End Call and when the second call rings back, tap Answer, or drag the slider if the phone is locked.

If you're on a FaceTime video call, you can either end the video call and answer the incoming call, or decline the incoming call.


**Switch between calls:** Tap Swap. The active call is put on hold. With CDMA, you can't switch between calls if the second call was outgoing, but you can merge the calls. If you end the second call or the merged call, both calls are terminated.

**Merge calls:** Tap Merge Calls. With CDMA, you can't merge calls if the second call was incoming.

## Conference calls

With GSM, you can set up a conference call with up to five people at a time, depending on your carrier.

**Create a conference call:** While on a call, tap Add Call, make another call, then tap Merge Calls. Repeat to add more people to the conference.

- *Drop one person:* Tap Conference, tap  next to a person, then tap End Call.
- *Talk privately with one person:* Tap Conference, then tap Private next to the person. Tap Merge Calls to resume the conference.
- *Add an incoming caller:* Tap Hold Call + Answer, then tap Merge Calls.

**Note:** You can't make a FaceTime video call when you're on a conference call.

## Using a Bluetooth device

For information about using a Bluetooth device, see the documentation that came with the device. See *Pairing Bluetooth devices* on page 32.

### **Bypass your Bluetooth device:**

- Answer a call by tapping the iPhone screen.
- During a call, tap **Audio** and choose **iPhone** or **Speaker Phone**.
- Turn off Bluetooth in **Settings > Bluetooth**.
- Turn off the Bluetooth device, or move out of range. You must be within about 30 feet (10 meters) of a Bluetooth device for it to be connected to iPhone.

## Emergency calls


**Make an emergency call when iPhone is locked:** On the **Enter Passcode** screen, tap **Emergency Call**.

*Important:* iPhone can be used to make an emergency call in many locations, provided that cellular service is available, but it should not be relied on for emergencies. Some cellular networks may not accept an emergency call from iPhone if iPhone is not activated, if iPhone is not compatible with or configured to operate on a particular cellular network, or (when applicable) if iPhone does not have a SIM card or if the SIM card is PIN-locked.

In the U.S., location information (if available) is provided to emergency service providers when you dial 911.

With CDMA, when an emergency call ends, iPhone enters *emergency call mode* for a few minutes to allow a call back from emergency services. During this time, data transmission and text messages are blocked.

**Exit emergency call mode (CDMA):** Do one of the following:

- Tap the back button.
- Press the **Sleep/Wake** button or the **Home** button .
- Use the keypad to dial a non-emergency number.

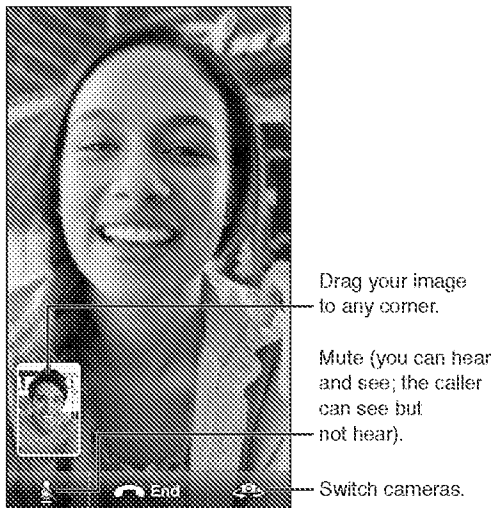
## FaceTime

With iPhone 4 or later, you can make a video call to someone with a Mac or other iOS device that supports FaceTime. The FaceTime camera lets you talk face-to-face; switch to the iSight camera on the back to share what you see around you.


**Note:** On iPhone 3GS or iPhone 4, you need a Wi-Fi connection to the Internet. On iPhone 4S or later, you can also make FaceTime calls over a cellular data connection. Cellular data charges may apply. To turn off FaceTime using cellular data, go to Settings > General > Cellular.

**Make a FaceTime call:** In Contacts, choose a name, tap FaceTime, then tap the phone number or email address that the person uses for FaceTime.

To call someone who has an iPhone 4 or later, you can start by making a voice call, then tap FaceTime.



**Note:** With FaceTime, your phone number is displayed even if caller ID is blocked or turned off.

**Use Siri or Voice Control:** Press and hold the Home button , then say "FaceTime," followed by the name of the person to call.


**Set up FaceTime options:** Go to Settings > FaceTime to:

- Turn FaceTime on or off
- Specify your Apple ID or an email address for receiving FaceTime calls

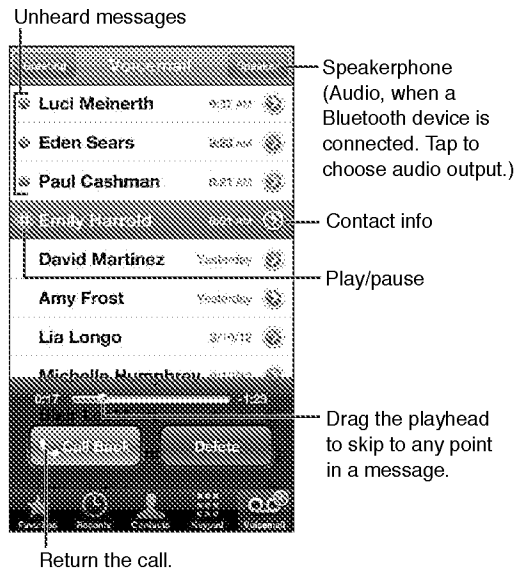
## Visual voicemail

Visual voicemail lets you see a list of your messages and choose which ones to listen to or delete, without having to listen to instructions or prior messages. The badge on the Voicemail icon tells you how many unheard messages you have.

**Set up visual voicemail:** The first time you tap Voicemail, you're prompted to create a voicemail password and record your voicemail greeting.

**Listen to a voicemail message:** Tap Voicemail, then tap a message. To listen again, select the message and tap . If visual voicemail isn't available with your service, tap Voicemail and follow the voice prompts.

**Check voicemail from another phone:** Dial your own number or your carrier's remote access number.



Messages are saved until you delete them or your carrier erases them.

**Delete a message:** Swipe or tap the message, then tap Delete.

**Note:** In some areas, deleted messages may be permanently erased by your carrier.

**Manage deleted messages:** Tap Deleted Messages (at the end of the messages list), then:

- *Listen to a deleted message:* Tap the message.
- *Undelete a message:* Tap the message and tap Undelete.
- *Delete messages permanently:* Tap Clear All.

**Change your greeting:** Tap Voicemail, tap Greeting, tap Custom, then tap Record and say your greeting. Or, to use your carrier's generic greeting, tap Default.

**Set an alert sound for new voicemail:** Go to Settings > Sounds, then tap New Voicemail.

**Note:** If the Ring/Silent switch is off, iPhone won't sound alerts.

**Change the voicemail password:** Go to Settings > Phone > Change Voicemail Password.

## Contacts

From a contact's info screen, a quick tap lets you make a phone call, create an email message, find the contact's location, and more. See Chapter 25, *Contacts*, on page 100.

## Call forwarding, call waiting, and caller ID

The following information applies only to GSM networks. For CDMA networks, contact your carrier for information about enabling and using these features. See [support.apple.com/kb/HT4515](http://support.apple.com/kb/HT4515).

**Turn call forwarding on or off:** Go to Settings > Phone > Call Forwarding. The Call Forwarding icon (⇌) appears in the status bar when call forwarding is on. You must be in range of the cellular network when you set iPhone to forward calls, or calls won't be forwarded. FaceTime calls are not forwarded.

**Turn call waiting on or off:** Go to Settings > Phone > Call Waiting. If you're on a call and call waiting is turned off, incoming calls go directly to voicemail.

**Turn caller ID on or off:** Go to Settings > Phone > Show My Caller ID.

**Note:** For FaceTime calls, your phone number is displayed even if caller ID is turned off.

## Ringtones, Ring/Silent switch, and vibrate

iPhone comes with ringtones that sound for incoming calls, Clock alarms, and the Clock timer. You can also purchase ringtones from songs in iTunes. See Chapter 22, iTunes Store, on page 94.

**Set the default ringtone:** Go to Settings > Sounds > Ringtone.

**Turn the ringer on or off:** Flip the switch on the side of iPhone.

*Important:* Clock alarms still sound even if you set the Ring/Silent switch to silent.

**Turn vibrate on or off:** Go to Settings > Sounds.

**Assign a different ringtone for a contact:** In Contacts, choose a contact, tap edit, then tap Ringtone and choose a ringtone.

For more information, see Sounds on page 139.

## International calls

For information about making international calls from your home area, including rates and other charges that may apply, contact your carrier or go to your carrier's website.

When traveling abroad, you may be able to use iPhone to make calls, send and receive text messages, and use apps that access the internet, depending on available networks.

**Enable international roaming:** Contact your carrier for information about availability and fees.

*Important:* Voice, text message, and data roaming charges may apply. To avoid charges when roaming, turn off Voice Roaming and Data Roaming.

If you have an iPhone 4S or later that's been activated to work on a CDMA network, you may be able to roam on GSM networks if the phone has a SIM card installed. When roaming on a GSM network, iPhone has access to GSM network features. Charges may apply. Contact your carrier for more information.

**Set network options:** Go to Settings > General > Cellular to:

- Turn data roaming on or off.
- Turn cellular data on or off.
- Turn voice roaming on or off (CDMA).
- Use GSM networks abroad (CDMA).



**Turn off cellular services:** Go to Settings, turn on Airplane Mode, then tap Wi-Fi and turn Wi-Fi on. Incoming phone calls are sent to voicemail. To resume cellular service, turn Airplane Mode off.

**Automatically add the prefix or country code for calls to the U.S.:** (GSM) Go to Settings > Phone, then turn on Dial Assist. This lets you use contacts and favorites to make calls while abroad.

**Choose a carrier:** Go to Settings > Carrier. This option is available only when you're traveling outside your service provider's network, and for carriers that have roaming agreements with your provider. See Carrier on page 133.

**Get voicemail when visual voicemail isn't available:** Dial your own number (with CDMA, add # after your number), or touch and hold "1" on the numeric keypad.

## Setting options for Phone

Go to Settings > Phone to:

- See the phone number for your iPhone
- Change the default text message replies for incoming calls
- Turn call forwarding, call waiting, and caller ID on or off (GSM)
- Turn TTY on or off
- Change your voicemail password (GSM)
- Require a PIN to unlock your SIM when you turn iPhone on (required by some carriers)

Go to Settings > FaceTime to:

- Turn FaceTime on or off
- Use your Apple ID for FaceTime
- Add an email address for FaceTime
- Turn cellular data on or off

Go to Settings > Sounds to:

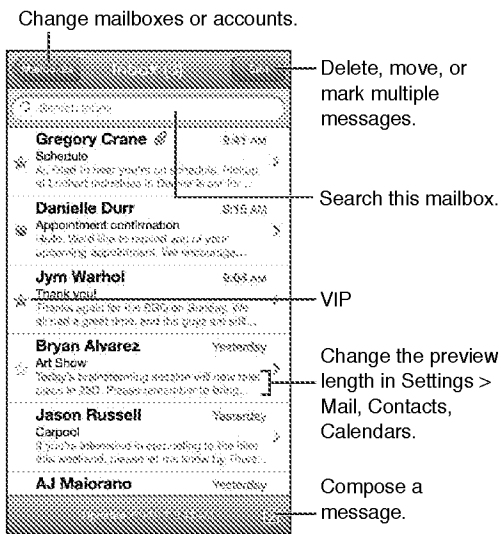
- Set ringtones and volume
- Set vibration options
- Set the sound for new voicemail

# Mail

# 6



## Reading mail



**Flag a message or mark it as unread:** Tap . To mark multiple messages at once, tap Edit while viewing the message list.

**Identify messages addressed specifically to you:** Go to Settings > Mail, Contacts, Calendars, then turn Show To/Cc Label on or off. Messages with your address in the To or Cc field are indicated with an icon in the message list.

**See all the recipients of a message:** Tap the word Details in the From field. Tap a recipient's name or email address to view the recipient's contact information or add them to Contacts or your VIP list.

**Prevent downloading remote images:** Go to Settings > Mail, Contacts, Calendars, then turn Load Remote Images off.

**Open a link:** Tap the link to use its default action, or touch and hold to see other actions. For example, for an address, you can show its location in Maps or add it to Contacts. For a web link, you can add it to Reading List.

**Open a meeting invitation or attachment:** Tap the item. If the attachment can be used by multiple apps, touch and hold to choose an app that works with the file.

**Save an attached photo or video:** Touch and hold the photo or video, then tap Save Image or Video. It's saved to your Camera Roll in the Photos app.

**Load new messages:** Pull the message list or mailbox list downward to refresh the list.

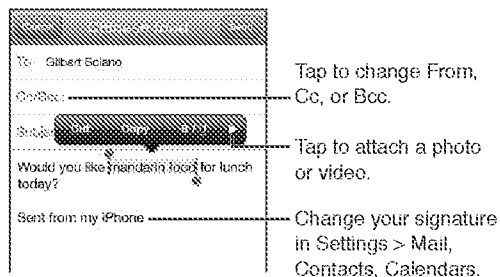
- *Set the number of older messages retrieved:* Go to Settings > Mail, Contacts, Calendars > Show.


**Turn off new message notifications for an account:** Go to Settings > Notifications > Mail > *account name*, then turn Notification Center off.

**Change the tones played by Mail:** Go to Settings > Sound.



- *Change the tone played for new mail in each account:* Go to Settings > Notifications > Mail > *account name* > New Mail Sound.
- *Change the tone played for new mail from VIPs:* Go to Settings > Notifications > Mail > VIP > New Mail Sound.


## Sending mail





**Compose a message:** Tap , then type a name or email address. After you enter recipients, you can drag to move them between fields, such as from To to Cc. If you have multiple mail accounts, tap From to change the account you're sending from.


**Automatically Bcc yourself on outgoing messages:** Go to Settings > Mail, Contacts, Calendars > Always Bcc Myself.


**Save a draft of a message:** Tap , then tap Save. The message is saved in the account's Drafts mailbox. Touch and hold  to see your saved drafts.

**Reply to a message:** Tap , then tap Reply. Files or images attached to the initial message aren't sent back. To include the attachments, forward the message instead of replying.

**Forward a message:** Open a message and tap , then tap Forward. This also forwards the message's attachments.

**Quote a portion of the message you're replying to or forwarding:** Touch and hold to select text. Drag the grab points to select the text you want to include in your reply, then tap .

- *Change the quote level:* Select the text to indent, tap  at least twice, then tap Quote Level.
- *Automatically increase the quote level when replying:* Go to Settings > Mail, Contacts, Calendars, then turn on Increase Quote Level.

**Send a photo or video in a message:** Tap the insertion point to display the selection buttons. Tap , tap Insert Photo or Video, then choose a photo or video from an album. You can also email multiple photos using Photos—see Sharing photos and videos on page 72.

**Change your email signature:** Go to Settings > Mail, Contacts, Calendars > Signature. If you have more than one mail account, tap Per Account to specify a different signature for each account.


## Organizing mail

**See messages from VIPs:** Go to the mailbox list (tap Mailboxes to get there), then tap VIP.


- *Add a person to the VIP list:* Tap the person's name or address in a From, To, or Cc/Bcc field, then tap Add to VIP.

**Group related messages together:** Go to Settings > Mail, Contacts, Calendars, then turn Organize by Thread on or off.

**Search messages:** Open a mailbox, scroll to the top, then enter text in the Search field. You can search the From, To, or the Subject field in the mailbox that's currently open. For mail accounts that support searching messages on the server, tap All to search From, To, Subject, and the message body.


**Delete a message:** If the message is open, Tap .

- *Delete a message without opening it:* Swipe over the message title, then tap Delete.
- *Delete multiple messages:* While viewing the message list, tap Edit.
- *Turn off deletion confirmation:* Go to Settings > Mail, Contacts, Calendars > Ask Before Deleting.

**Recover a message:** Go to the account's Trash mailbox, open the message, tap , then move the message to the account's Inbox or other folder.


- *Set how long your messages stay in Trash before being permanently deleted:* Go to Settings > Mail, Contacts, Calendars > *account name* > Account > Advanced.

**Turn archiving on or off:** Go to Settings > Mail, Contacts, Calendars > *account name* > Account > Advanced. Not all mail accounts support archiving. When you archive a message, it moves to the All Mail mailbox. To delete the message instead of archiving it, touch and hold Archive, then tap Delete.


**Move a message to a different mailbox:** While viewing the message, tap , then choose a destination. To move multiple messages at once, tap Edit while viewing the message list.

**Add, rename, or delete a mailbox:** In the mailbox list, tap Edit. Some mailboxes can't be renamed or deleted.

## Printing messages and attachments

**Print a message:** Tap , then tap Print.

**Print an inline image:** Touch and hold the image, then tap Save Image. Go to Photos and print the image from your Camera Roll album.

**Print an attachment:** Tap the attachment to open it in Quick Look, tap , then tap Print.

For more information about printing, see *Printing with AirPrint* on page 30.

## Mail accounts and settings

**Change Mail and mail account settings:** Go to Settings > Mail, Contacts, Calendars. You can set up:

- iCloud
- Microsoft Exchange and Outlook
- Google
- Yahoo!
- AOL
- Microsoft Hotmail
- Other POP and IMAP accounts

Settings vary based on the type of account you're setting up. Your Internet service provider or system administrator can provide the information you need to enter.

**Temporarily stop using an account:** Go to Settings > Mail, Contacts, Calendars, choose an account, then turn off mail service for the account. When the service is turned off, iPhone doesn't display or sync that information until you turn it back on. This is a good way to stop receiving work email while on vacation, for example.

**Delete an account:** Go to Settings > Mail, Contacts, Calendars, choose an account, then scroll down and tap Delete Account. All information synced with that account, such as bookmarks, mail, and notes, is removed.

**Set Push settings:** Go to Settings > Mail, Contacts, Calendars > Fetch New Data. Push delivers new information whenever it appears on the server and there's an Internet connection (some delays may occur). When Push is turned off, use the Fetch New Data setting to determine how often data is requested. The setting you choose here overrides individual account settings. For optimal battery life, don't fetch too often. Not all accounts support push.

**Send signed and encrypted messages:** Go to Settings > Mail, Contacts, Calendars > *account name* > Account > Advanced. Turn on S/MIME, then select certificates for signing and encrypting outgoing messages. To install certificates, you may get a configuration profile from your system administrator, download the certificates from the issuer's website using Safari, or receive them as mail attachments.

**Set advanced options:** Go to Settings > Mail, Contacts, Calendars > *account name* > Account > Advanced. Options vary depending on the account, and may include:

- Store drafts, sent messages, and deleted messages on iPhone
- Set how long deleted messages are kept before being permanently removed
- Adjust mail server settings
- Adjust SSL and password settings

Ask your Internet service provider or system administrator if you're not sure what the appropriate settings are for your account.

# Safari

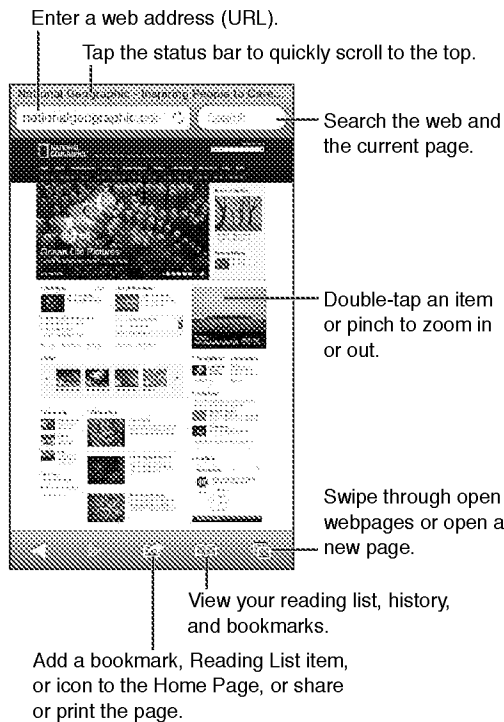
# 7





Safari features include:



- Reader—view articles without ads or clutter
- Reading list—collect articles to read later
- Full-screen mode—when viewing webpages in landscape orientation


Use iCloud to see pages you have open on other devices, and to keep your bookmarks and reading list up to date on your other devices.



**View a webpage:** Tap the address field (in the title bar), enter the URL, then tap Go.

- *Scroll a webpage:* Drag up, down, or sideways.
- *Scroll within a frame:* Drag two fingers inside the frame.
- *View in full-screen landscape:* Rotate iPhone, then tap .
- *Reload a webpage:* Tap  in the address field.

**Close a webpage:** Tap , then tap  by the page.



**See webpages you have open on your other devices:** Tap , then tap iCloud Tabs. To share webpages you have open on iPhone with your other devices using iCloud Tabs, go to Settings > iCloud and turn on Safari.

**Follow a link on a webpage:** Tap the link.



- *See a link's destination:* Touch and hold the link.
- *Open a link in a new tab:* Touch and hold the link, then tap "Open in New Page."

Detected data—such as phone numbers and email addresses—may also appear as links in webpages. Touch and hold a link to see the available options.

**View an article in Reader:** Tap the Reader button, if it appears in the address field.

- *Adjust the font size:* Tap  **A**.
- *Share the article:* Tap .  
*Note:* When you email an article from Reader, the full text of the article is sent, in addition to the link.
- *Return to normal view:* Tap Done.

**Use Reading List to collect webpages and read them later:**

- *Add the current webpage:* Tap , then tap "Add to Reading List." With iPhone 4 or later, the webpage is saved as well as the link, so you can read it even when you can't connect to the Internet.
- *Add the destination of a link:* Touch and hold the link, then tap "Add to Reading List."
- *View your reading list:* Tap , then tap Reading List.
- *Delete an item from your reading list:* Swipe the item, then tap Delete.


**Fill out a form:** Tap a text field to bring up the keyboard.

- *Move to a different text field:* Tap the text field, or tap Next or Previous.
- *Submit a form:* Tap Go, Search, or the link on the webpage to submit the form.
- *Enable AutoFill:* Go to Settings > Safari > AutoFill.


**Search the web, the current webpage, or a searchable PDF:** Enter text in the search field.


- *Search the web:* Tap one of the suggestions that appear, or tap Search.
- *Find the search text on the current webpage or PDF:* Scroll to the bottom of the screen, then tap the entry below On This Page.


The first instance is highlighted. To find later instances, tap .

**Bookmark the current webpage:** Tap , then tap Bookmark.

When you save a bookmark, you can edit its title. By default, bookmarks are saved at the top level of Bookmarks. To choose a different folder, tap Bookmarks on the Add Bookmarks screen.

**Create an icon on the Home screen:** Tap , then tap "Add to Home Screen." Safari adds an icon for the current webpage to your Home Screen. Unless the webpage has a custom icon, that image is also used for the web clip icon on the Home screen. Web clips are backed up by iCloud and iTunes, but they aren't pushed to other devices by iCloud or synced by iTunes.

**Share or copy a link for the current webpage:** Tap , then tap Mail, Message, Twitter, Facebook, or Copy.

**Print the current webpage:** Tap , then tap Print. See Printing with AirPrint on page 30.

**Use iCloud to keep your bookmarks and reading list up to date on your other devices:** Go to Settings > iCloud and turn on Safari. See iCloud on page 15.

**Set options for Safari:** Go to Settings > Safari. Options include:

- Search engine
- AutoFill for filling out forms
- Opening links in a new page or in the background
- Private browsing to help protect private information and block some websites from tracking your behavior
- Clearing history, cookies, and data
- Cellular data for Reading List
- Fraud warning





## Getting music

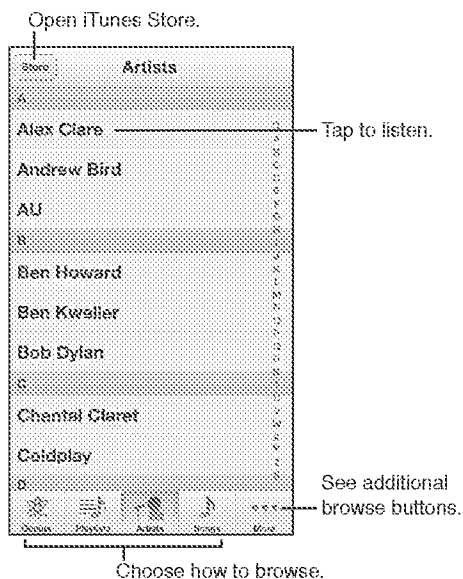
### Get music and other audio content onto iPhone:

- *Purchase and download from the iTunes Store:* In Music, tap Store. See Chapter 22, iTunes Store, on page 94.
- *Automatically download music purchased on your other iOS devices and computers:* See iCloud on page 15.
- *Sync content with iTunes on your computer:* See Syncing with iTunes on page 16.
- *Use iTunes Match to store your music library in iCloud:* See iTunes Match on page 62.

## Playing music

**WARNING:** For important information about avoiding hearing loss, see important safety information on page 146.

You can listen to audio from the built-in speaker, headphones attached to the headset jack, or wireless Bluetooth stereo headphones paired with iPhone. When headphones are attached or paired, no sound comes from the speaker.



**Play a track:** Browse by playlist, artist, song, or other category, then tap the track.

- *See additional browse buttons:* Tap More.
- *Change which browse buttons appear at the bottom:* Tap More, tap Edit, then drag an icon over the button you want to replace.

The Now Playing screen shows you what's playing, and provides playback controls.



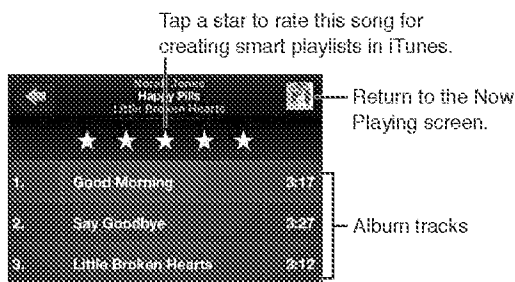
Lyrics appear on the Now Playing screen if you've added them to the song using the song's Info window in iTunes and you've synced music using iTunes. (Lyrics aren't supported by iTunes Match.)

**Display additional controls (iPhone 4S or earlier):** Tap the album artwork on the Now Playing screen to display the scrubber bar and playhead, and the Repeat, Genius, and Shuffle buttons.



**Skip to any point in a song:** Drag the playhead along the scrubber bar. Slide your finger down to slow down the scrub rate.

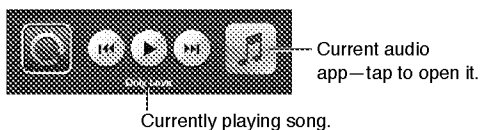
**Shake to shuffle:** Shake iPhone to turn on shuffle, and to change songs. To turn Shake to Shuffle on or off, go to Settings > Music.


**See all tracks on the album containing the current song:** Tap To play a track, tap it.



**Search music (titles, artists, albums, and composers):** While browsing, tap the status bar to reveal the search field at the top of the screen, then enter your search text. You can also search audio content from the Home screen. See Searching on page 27.

**Display audio controls while in another app:** Double-click the Home button , then swipe the multitasking bar to the right. Swipe right again to display a volume control and the AirPlay button  (when in range of an Apple TV or AirPlay speakers).



**Display audio controls while the screen is locked:** Double-click the Home button .



**Play music on AirPlay speakers or Apple TV:** Tap . See AirPlay on page 30.

## Cover Flow

When you rotate iPhone, your music content appears in Cover Flow.



**Browse albums in Cover Flow:** Drag left or right.

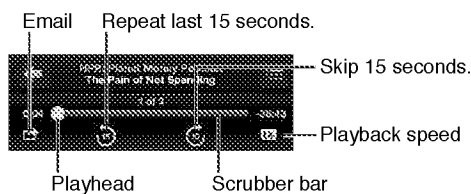
- *See the tracks on an album:* Tap the album artwork or . Drag up or down to scroll; tap a track to play it.
- *Return to the artwork:* Tap the title bar, or tap  again.

## Podcasts and audiobooks

On iPhone 5, podcast and audiobook controls and info appear on the Now Playing screen when you begin playback.

**Note:** The Podcasts app is available for free in the App Store. See Chapter 31, Podcasts, on page 113. If you install the Podcasts app, podcast content and controls are removed from Music.


**Show or hide the controls and info (iPhone 4S or earlier):** Tap the center of the screen.






**Get more podcast episodes:** Tap Podcasts (tap More first, if Podcasts isn't visible), then tap a podcast to see available episodes. To download more episodes, tap Get More Episodes.

**Hide lyrics and podcast info:** Go to Settings > Music, then turn off Lyrics & Podcasts Info.

## Playlists

**Create a playlist:** View Playlists, tap Add Playlist near the top of the list, then enter a title. Tap  to add songs and videos, then tap Done.

**Edit a playlist:** Select the playlist to edit, then tap Edit.

- *Add more songs:* Tap .
- *Delete a song:* Tap . Deleting a song from a playlist doesn't delete it from iPhone.
- *Change the song order:* Drag .

New and changed playlists are copied to your iTunes library the next time you sync iPhone with your computer, or via iCloud if you've subscribed to iTunes Match.

**Clear or delete a playlist:** Select the playlist, then tap Clear or Delete.

**Delete a song from iPhone:** In Songs, swipe the song, then tap Delete.


The song is deleted from iPhone, but not from your iTunes library on your Mac or PC, or from iCloud.


## Genius


A Genius playlist is a collection of songs from your library that go together. Genius is a free service, but it requires an Apple ID.

A Genius Mix is a selection of songs of the same kind of music, recreated from your library each time you listen to the mix.



**Use Genius on iPhone:** Turn on Genius in iTunes on your computer, then sync iPhone with iTunes. Genius Mixes are synced automatically, unless you manually manage your music. You can also sync Genius playlists.

**Browse and play Genius Mixes:** Tap Genius (tap More first, if Genius isn't visible). Swipe left or right to access other mixes. To play a mix, tap .

**Make a Genius playlist:** View Playlists, then tap Genius Playlist and choose a song. Or, from the Now Playing screen, tap the screen to display the controls, then tap .

- *Replace the playlist using a different song:* Tap New and pick a song.
- *Refresh the playlist:* Tap Refresh.
- *Save the playlist:* Tap Save. The playlist is saved with the title of the song you picked and marked by .

**Edit a saved Genius playlist:** Tap the playlist, then tap Edit.

- *Delete a song:* Tap .
- *Change the song order:* Drag .


**Delete a saved Genius playlist:** Tap the Genius playlist, then tap Delete.

Genius playlists created on iPhone are copied to your computer when you sync with iTunes.

**Note:** Once a Genius playlist is synced to iTunes, you can't delete it directly from iPhone. Use iTunes to edit the playlist name, stop syncing, or delete the playlist.

## Siri and Voice Control

You can use Siri (iPhone 4S or later) or Voice Control to control music playback. See Chapter 4, Siri, on page 36 and Voice Control on page 26.

**Use Siri or Voice Control:** Press and hold the Home button .

- *Play or pause music:* Say “play” or “play music.” To pause, say “pause,” “pause music,” or “stop.” You can also say “next song” or “previous song.”
- *Play an album, artist, or playlist:* Say “play,” then say “album,” “artist,” or “playlist” and the name.
- *Shuffle the current playlist:* Say “shuffle.”
- *Find out more about the current song:* Say “what’s playing,” “who sings this song,” or “who is this song by.”
- *Use Genius to play similar songs:* Say “Genius” or “play more songs like this.”

## iTunes Match

iTunes Match stores your music library in iCloud—including songs imported from CDs—and lets you play your collection on iPhone and your other iOS devices and computers. iTunes Match is offered as a paid subscription. To find out where it’s available, see [support.apple.com/kb/HT5085](http://support.apple.com/kb/HT5085).

**Subscribe to iTunes Match:** In iTunes on your computer, go to Store > Turn On iTunes Match, then click the Subscribe button.


Once you subscribe, iTunes adds your music, playlists, and Genius Mixes to iCloud. Your songs that match music already in the iTunes Store are automatically available in iCloud. Other songs are uploaded. You can download and play matched songs at up to iTunes Plus quality (256 kbps DRM-free AAC), even if your original was of lower quality. For more information, see [www.apple.com/icloud/features](http://www.apple.com/icloud/features).


**Turn on iTunes Match:** Go to Settings > Music.

Turning on iTunes Match removes synced music from iPhone, and disables Genius Mixes and Genius Playlists.

**Note:** If “Use Cellular Data for iTunes” in Settings > General > Cellular is on, cellular data charges may apply.

Songs are downloaded to iPhone when you play them. You can also download songs and albums manually.

**Download a song or album to iPhone:** While browsing, tap .

**Note:** When iTunes Match is on, downloaded music is automatically removed from iPhone when space is needed, starting with the oldest and least played songs. iCloud icons () reappear for removed songs and albums, showing that the songs and albums are still available through iCloud, but not stored locally on iPhone.

**Manually remove a song or album:** Swipe sideways across the song or album, then tap Delete.

**Show only music that’s been downloaded from iCloud:** Go to Settings > Music, then turn off Show All Music (available only when iTunes Match is turned on).

**Manage your devices using iTunes Match or Automatic Downloads:** In iTunes on your computer, go to Store > View My Apple ID. Sign in, then click Manage Devices in the “iTunes in the Cloud” section.

## Home Sharing

Home Sharing lets you play music, movies, and TV shows from the iTunes library on your Mac or PC. iPhone and your computer must be on the same Wi-Fi network.

**Note:** Home Sharing requires iTunes 10.2 or later, available at [www.itunes.com/download](http://www.itunes.com/download). Bonus content, such as digital booklets and iTunes Extras, can't be shared.

### Play music from your iTunes library on iPhone:

- 1 In iTunes on your computer, choose File > Home Sharing > Turn On Home Sharing. Log in, then click Create Home Share.
- 2 On iPhone, go to Settings > Music, then log in to Home Sharing using the same Apple ID and password.
- 3 In Music, tap More, then tap Shared and choose your computer's library.

**Return to content on iPhone:** Tap Shared and choose My iPhone.

## Music settings

Go to Settings > Music to set options for Music, including:

- Shake to Shuffle
- Sound Check (to normalize the volume level of your audio content)
- Equalization (EQ)

**Note:** EQ affects all sound output, including the headset jack and AirPlay. EQ settings generally apply only to music played from the Music app.

The Late Night setting applies to all audio output—video as well as music. Late Night compresses the dynamic range of the audio output, reducing the volume of loud passages and increasing the volume of quiet passages. You might want to use this setting when listening to music on an airplane or in some other noisy environment, for example.

- Lyrics and podcast info
- Grouping by album artist
- iTunes Match
- Home Sharing

**Set the volume limit:** Go to Settings > Music > Volume Limit, then adjust the volume slider.

**Note:** In European Union countries, you can limit the maximum headset volume to the European Union recommended level. Go to Settings > Music > Volume Limit, then turn on EU Volume Limit.

**Restrict changes to the volume limit:** Go to Settings > General > Restrictions > Volume Limit, then tap Don't Allow Changes.

# Messages

# 9

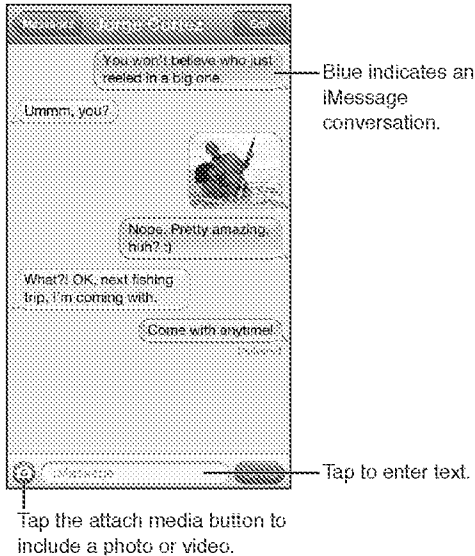


## Sending and receiving messages

**WARNING:** For important information about avoiding distraction while driving, see important safety information on page 146.

Messages lets you exchange text messages with other SMS and MMS devices via your cellular connection, and with other iOS devices using iMessage.


iMessage is an Apple service that lets you send unlimited messages over Wi-Fi (as well as cellular connections) to other iOS and OS X Mountain Lion users. With iMessage, you can see when other people are typing, and let them know when you've read their messages. iMessages are displayed on all of your iOS devices logged in to the same account, so you can start a conversation on one of your devices, and continue it on another device. iMessages are encrypted for security.



**Start a text conversation:** Tap , then tap and choose a contact, search your contacts by entering a name, or enter a phone number or email address manually. Enter a message, then tap Send.


An alert badge appears if a message can't be sent. Tap the alert in a conversation to try sending the message again. Double-tap to send the message as an SMS text message.

**Resume a conversation:** Tap the conversation in the Messages list.


**Use picture characters:** Go to Settings > General > Keyboard > Keyboards > Add New Keyboard, then tap Emoji to make that keyboard available. Then while typing a message, tap  to bring up the Emoji keyboard. See Special input methods on page 144.

**See a person's contact info:** Scroll to the top (tap the status bar) to see actions you can perform, such as making a FaceTime call.

**See earlier messages in the conversation:** Scroll to the top (tap the status bar). Tap Load Earlier Messages if needed.

**Send messages to a group (iMessage and MMS):** Tap , then enter multiple recipients. With MMS, group messaging must also be turned on in Settings > Messages, and replies are sent only to you—they aren't copied to the other people in the group.

## Managing conversations

Conversations are saved in the Messages list. A blue dot  indicates unread messages. Tap a conversation to view or continue it.

**Forward a conversation:** Tap Edit, select parts to include, then tap Forward.

**Edit a conversation:** Tap Edit, select the parts to delete, then tap Delete. To clear all text and attachments without deleting the conversation, tap Clear All.


**Delete a conversation:** In the Messages list, swipe the conversation, then tap Delete.


**Search a conversation:** Tap the top of the screen to display the search field, then enter the text you're looking for. You can also search conversations from the Home screen. See Searching on page 27.

**Add someone to your contacts list:** Tap a phone number in the Messages list, then tap "Add to Contacts."


## Sharing photos, videos, and other info


With iMessage or MMS, you can send and receive photos and videos, and send locations, contact info, and voice memos. The size limit of attachments is determined by your service provider—iPhone may compress photo and video attachments when needed.

**Send a photo or video:** Tap .

**Send a location:** In Maps, tap  for a location, tap Share Location, then tap Message.

**Send contact info:** In Contacts, choose a contact, tap Share Contact, then tap Message.

**Send a voice memo:** In Voice Memos, tap , tap the voice memo, tap Share, then tap Message.

**Save a photo or video you receive to your Camera Roll album:** Tap the photo or video, then tap .

**Copy a photo or video:** Touch and hold the attachment, then tap Copy.

**Add someone to your contacts from the Messages list:** Tap the phone number or email address, tap the status bar to scroll to the top, then tap "Add Contact."

**Save contact info you receive:** Tap the contact bubble, then tap Create New Contact or "Add to Existing Contact."



## Messages settings

Go to Settings > Messages to set options for Messages, including:

- Turning iMessage on or off
- Notifying others when you've read their messages
- Specifying an Apple ID or email address to use with Messages
- SMS and MMS options
- Showing the Subject field
- Showing the character count

**Manage notifications for messages:** See Do Not Disturb and Notifications on page 132.

**Set the alert sound for incoming text messages:** See Sounds on page 139.

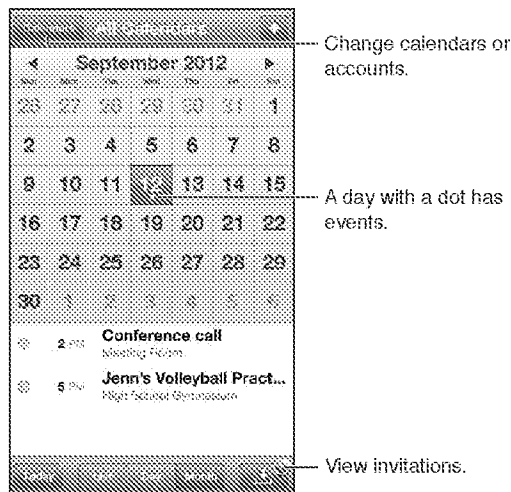
# Calendar

# 10



## At a glance

iPhone makes it easy to stay on schedule. You can view calendars individually, or view several calendars at once.



**View or edit an event:** Tap the event. You can:

- Set a primary and secondary alert
- Change the event's date, time, or duration
- Move an event to a different calendar
- Invite others to attend events on iCloud, Microsoft Exchange, and CalDAV calendars
- Delete the event

You can also move an event by holding it down and dragging it to a new time, or by adjusting the grab points.

**Add an event:** Tap and enter event information, then tap Done.

- *Set the default calendar for new events:* Go to Settings > Mail, Contacts, Calendars > Default Calendar.
- *Set default alert times for birthdays and events:* Go to Settings > Mail, Contacts, Calendars > Default Alert Times.

**Search for events:** Tap List, then enter text in the search field. The titles, invitees, locations, and notes for the calendars you're viewing are searched. You can also search calendar events from the Home screen. See Searching on page 27.


**Set the calendar alert tone:** Go to Settings > Sounds > Calendar Alerts.

**View by week:** Rotate iPhone sideways.

**Import events from a calendar file:** If you receive an .ics calendar file in Mail, open the message and tap the calendar file to import all of the events it contains. You can also import an .ics file published on the web by tapping a link to the file. Some .ics files subscribe you to a calendar instead of adding events to your calendar. See Working with multiple calendars below.

If you have an iCloud account, a Microsoft Exchange account, or a supported CalDAV account, you can send and receive meeting invitations.

**Invite others to an event:** Tap an event, tap Edit, then tap Invitees to select people from Contacts.

**Respond to an invitation:** Tap an invitation in the calendar. Or tap  to display the Event screen, then tap an invitation. You can view information about the organizer and other invitees. If you add comments (which may not be available for all calendars) your comments can be seen by the organizer but not other attendees.

**Accept an event without marking the time as reserved:** Tap the event, then tap Availability and select "free." The event stays on your calendar, but doesn't appear as busy to others who send you invitations.

## Working with multiple calendars

You can view individual calendars, or several calendars at once. You can subscribe to iCloud, Google, Yahoo!, or iCalendar calendars, as well as your Facebook events and birthdays.

**Turn on iCloud, Google, Exchange, or Yahoo! calendars:** Go to Settings > Mail, Contacts, Calendars, tap an account, then turn on Calendar.

**Add a CalDAV account:** Go to Settings > Mail, Contacts, Calendars, tap Add an Account, then tap Other. Under Calendars, tap Add CalDAV Account.

**View Facebook events:** Go to Settings > Facebook, then sign in to your Facebook account and turn on access to Calendar.

**Select calendars to view:** Tap Calendars, then tap to select the calendars you want to view. The events for all selected calendars appear in one view.

**View the Birthdays calendar:** Tap Calendars, then tap Birthdays to include birthdays from your Contacts with your events. If you've set up a Facebook account, you can also include your Facebook friends' birthdays.

You can subscribe to any calendar that uses the iCalendar (.ics) format. Supported calendar-based services include iCloud, Yahoo!, Google, and the Calendar application in OS X. You can read events from a subscribed calendar on iPhone, but you can't edit events or create new ones.

**Subscribe to a calendar:** Go to Settings > Mail, Contacts, Calendars, then tap Add Account. Tap Other, then tap Add Subscribed Calendar. Enter the server and filename of the .ics file to subscribe to. You can also subscribe to an iCalendar (.ics) calendar published on the web, by tapping a link to the calendar.

## Sharing iCloud calendars

You can share an iCloud calendar with other iCloud users. When you share a calendar, others can view it, and you can let them add or change events, too. You can also share a read-only version that anyone can view.

**Create an iCloud calendar:** Tap Calendars, tap Edit, then tap Add Calendar.

**Share an iCloud calendar:** Tap Calendars, tap Edit, then tap the iCloud calendar you want to share. Tap Add Person, then choose someone from Contacts. The person will receive an email invitation to join the calendar, but they need an Apple ID and iCloud account in order to accept.

**Turn off notifications for shared calendars:** Go to Settings > Mail, Contacts, Calendars and turn off Shared Calendar Alerts.

**Change a person's access to a shared calendar:** Tap Calendars, tap Edit, tap the shared calendar, then tap a person you're sharing with. You can turn off their ability to edit the calendar, resend the invitation to join the calendar, or stop sharing the calendar with them.

**Share a read-only calendar with anyone:** Tap Calendars, tap Edit, then tap the iCloud calendar you want to share. Turn on Public Calendar, then tap Share Link to copy or send the URL for the calendar. Anyone can use the URL to subscribe to your calendar using a compatible app, such as Calendar for iOS or OS X.

## Calendar settings

There are several settings in Settings > Mail, Contacts, Calendars that affect Calendar and your calendar accounts. These include:

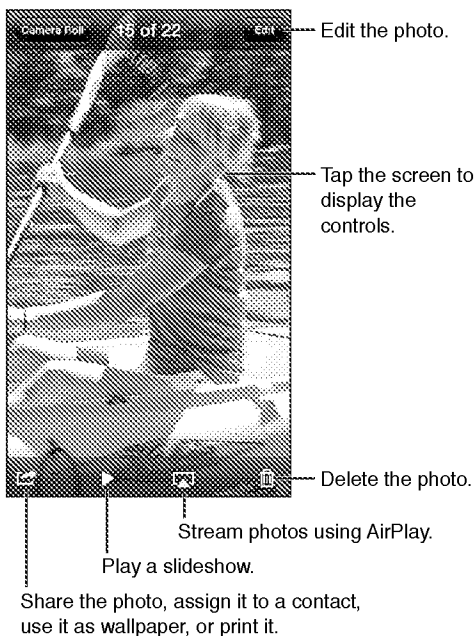
- Syncing of past events (future events are always synced)
- Alert tone played for new meeting invitations
- Calendar time zone support, to show dates and times using a different time zone



## Viewing photos and videos

Photos lets you view photos and videos on iPhone, in your:


- Camera Roll album—photos and videos you took on iPhone, or saved from an email, text message, webpage, or screenshot
- Photo Stream albums—photos in My Photo Stream and your shared photo streams (see Photo Stream on page 71)
- Photo Library and other albums synced from your computer (see Syncing with iTunes on page 16)



**View photos and videos:** Tap an album, then tap a thumbnail.


- *See the next or previous photo or video:* Swipe left or right.
- *Zoom in or out:* Double-tap or pinch.
- *Pan a photo:* Drag it.
- *Play a video:* Tap ► in the center of the screen. To change between full-screen and fit-to-screen viewing, double-tap the screen.

Albums you sync with iPhoto 8.0 (iLife '09) or later, or Aperture v3.0.2 or later, can be viewed by events or by faces. You can also view photos by location, if they were taken with a camera that supports geotagging.

**View a slideshow:** Tap a thumbnail, then tap . Select options, then tap Start Slideshow. To stop the slideshow, tap the screen. To set other options, go to Settings > Photos & Camera.

**Stream a slideshow or video to a TV:** See AirPlay on page 30.



## Organizing photos and videos

**Create an album:** Tap Albums, tap , enter a name, then tap Save. Select items to add to the album, then tap Done.

**Note:** Albums created on iPhone aren't synced back to your computer.

**Add items to an album:** When viewing thumbnails, tap Edit, select items, then tap Add To.

**Manage albums:** Tap Edit:

- *Rename an album:* Select the album, then enter a new name.
- *Rearrange albums:* Drag 
- *Delete an album:* Tap .

Only albums created on iPhone can be renamed or deleted.

## Photo Stream

With Photo Stream, a feature of iCloud (see iCloud on page 15), photos you take on iPhone automatically appear on your other devices set up with Photo Stream, including your Mac or PC. Photo Stream also lets you share select photos with friends and family, directly to their devices or on the web.

### About Photo Stream

When Photo Stream is turned on, photos you take on iPhone (as well as any other photos added to your Camera Roll) appear in your photo stream after you leave the Camera app and iPhone is connected to the Internet via Wi-Fi. These photos appear in the My Photo Stream album on iPhone and on your other devices set up with Photo Stream.

**Turn on Photo Stream:** Go to Settings > iCloud > Photo Stream.

Photos added to your photo stream from your other iCloud devices also appear in My Photo Stream. iPhone and other iOS devices can keep up to 1000 of your most recent photos in My Photo Stream. Your computers can keep all your Photo Stream photos permanently.

**Note:** Photo Stream photos don't count against your iCloud storage.

**Manage photo stream contents:** In a photo stream album, tap Edit.

- *Save photos to iPhone:* Select the photos, then tap Save.
- *Share, print, copy, or save photos to your Camera Roll album:* Select the photos, then tap Share.
- *Delete photos:* Select the photos, then tap Delete.


**Note:** Although deleted photos are removed from photo streams on your devices, the original photos remain in the Camera Roll album on the device they originated from. Photos saved to a device or computer from a photo stream are also not deleted. To delete photos from Photo Stream, you need iOS 5.1 or later on iPhone and your other iOS devices. See [support.apple.com/kb/HT4486](http://support.apple.com/kb/HT4486).


## Shared photo streams

Shared photo streams let you share selected photos with just the people you choose. iOS 6 and OS X Mountain Lion users can subscribe to your shared photo streams, view the latest photos you've added, "like" individual photos, and leave comments—right from their devices. You can also create a public website for a shared photo stream, to share your photos with others over the web.


**Note:** Shared photo streams work over both Wi-Fi and cellular networks. Cellular data charges may apply.

**Turn on Shared Photo Streams:** Go to Settings > iCloud > Photo Stream.

**Create a shared photo stream:** Tap Photo Stream, then tap . To invite other iOS 6 or OS X Mountain Lion users to subscribe to your shared photo stream, enter their email addresses. To post the photo stream on icloud.com, turn on Public Website. Name the album, then tap Create.

**Add photos to a shared photo stream:** Select a photo, tap , tap Photo Stream, then select the shared photo stream. To add several photos from an album, tap Edit, select the photos, then tap Share.



**Delete photos from a shared photo stream:** Tap the shared photo stream, tap Edit, select the photos, then tap Delete.

**Edit a shared photo stream:** Tap Photo Stream, then tap . You can:

- Rename the photo stream
- Add or remove subscribers, and resend an invitation
- Create a public website, and share the link
- Delete the photo stream

## Sharing photos and videos

You can share photos in email, text messages (MMS or iMessage), photo streams, Twitter posts, and Facebook. Videos can be shared in email and text messages (MMS or iMessage), and on YouTube.


**Share or copy a photo or video:** Choose a photo or video, then tap . If you don't see , tap the screen to show the controls.

The size limit of attachments is determined by your service provider. iPhone may compress photo and video attachments, if necessary.

You can also copy photos and videos, and then paste them into an email or text message (MMS or iMessage).

**Share or copy multiple photos and videos:** While viewing thumbnails, tap Edit, select the photos or videos, then tap Share.


**Save a photo or video from:**

- *Email:* Tap to download it if necessary, tap the photo or touch and hold the video, then tap Save.
- *Text message:* Tap the item in the conversation, tap , then tap Save to Camera Roll.
- *Webpage (photo only):* Touch and hold the photo, then tap Save Image.

Photos and videos that you receive, or that you save from a webpage, are saved to your Camera Roll album.

## Printing photos

### Print to AirPrint-enabled printers:

- *Print a single photo:* Tap , then tap Print.
- *Print multiple photos:* While viewing a photo album, tap Edit, select the photos, tap Share, then tap Print.

See Printing with AirPrint on page 30.




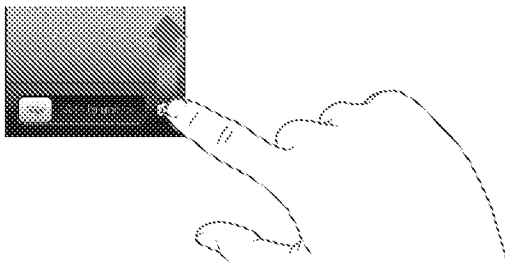
# Camera

# 12

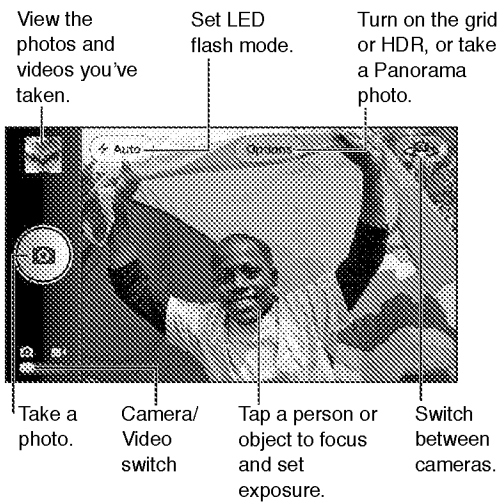


## At a glance


To quickly open Camera when iPhone is locked, swipe  up.




With iPhone, you can take both still photos and videos. In addition to the iSight camera on the back, there's a FaceTime camera on the front for FaceTime calls and self-portraits. An LED flash on the back gives you extra light when you need it.





A rectangle briefly appears where the camera is focused and setting the exposure. When you photograph people with iPhone 4S or later, iPhone uses face detection to automatically focus on and balance the exposure across up to 10 faces. A rectangle appears for each face detected.


**Take a photo:** Tap  or press either volume button.

- *Zoom in or out:* Pinch the screen (iSight camera only).

**Take a panorama photo (iPhone 4S or later):** Tap Options, then tap Panorama. Point iPhone where you want to start, then tap . Pan slowly in the direction of the arrow, holding iPhone steady. Try to keep the arrow directly on top of the horizontal line. When you finish, tap Done.

- *Reverse the panning direction:* Tap the arrow.

**Record a video:** Switch to , then tap  or press either volume button to start or stop recording.

- *Capture a still photo while recording:* Tap .


When you take a photo or start a video recording, iPhone makes a shutter sound. You can control the volume with the volume buttons, or mute the sound using the Ring/Silent switch.

**Note:** In some countries, muting iPhone does not prevent the shutter sound.

If Location Services is turned on, photos and videos are tagged with location data that can be used by other apps and photo-sharing websites. See Privacy on page 140.

#### **Set the focus and exposure:**



- *Set the focus and exposure for the next shot:* Tap the object on the screen. Face detection is temporarily turned off.
- *Lock the focus and exposure:* Touch and hold the screen until the rectangle pulses. AE/AF Lock is displayed at the bottom of the screen, and the focus and exposure remain locked until you tap the screen again.

**Take a screenshot:** Press and release the Sleep/Wake button and the Home button  at the same time. The screenshot is added to your Camera Roll album.

## HDR photos

HDR (iPhone 4 or later) combines three separate exposures into a single “high dynamic range” photo. For best results, iPhone and the subject should be stationary.





**Turn on HDR:** Tap Option, then set HDR. When HDR is on, the flash is turned off.


**Keep the normal photo in addition to the HDR version:** Go to Settings > Photos & Camera. When you keep both versions,   appears in the upper-left corner of the HDR photo when viewed in your Camera Roll album with the controls visible.

## Viewing, sharing, and printing

The photos and videos you take with Camera are saved in your Camera Roll album. If you have Photo Stream turned on, new photos also appear in your Photo Stream album and are streamed to your other iOS devices and computers. See Photo Stream on page 71.

**View your Camera Roll album:** Swipe to the right, or tap the thumbnail image. You can also view your Camera Roll album in the Photos app.

- *Show or hide the controls while viewing a photo or video:* Tap the screen.
- *Share a photo or video:* Tap . To send multiple photos or videos, tap  while viewing thumbnails, select the items, then tap Share.
- *Print a photo:* Tap . See Printing with AirPrint on page 30.
- *Delete a photo or video:* Tap .

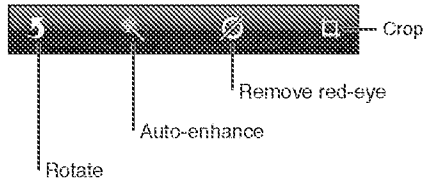
**Return to the camera:** Tap .

**Upload photos and videos to your computer:** Connect iPhone to your computer.

- *Mac:* Select the photos and videos you want, then click the Import or Download button in iPhoto or other supported photo application on your computer.
- *PC:* Follow the instructions that came with your photo application.

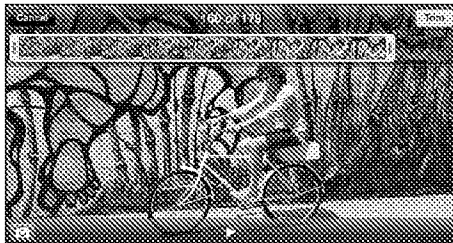
If you delete photos or videos from iPhone when you upload them to your computer, they're removed from your Camera Roll album. You can use the Photos settings pane in iTunes to sync photos and videos to the Photos app on iPhone (videos can be synced only with a Mac). See Syncing with iTunes on page 16.

## Editing photos and trimming videos



**Edit a photo:** While viewing a photo in full screen, tap Edit, then tap a tool.

- *Auto-enhance:* Enhancing improves a photo's overall darkness or lightness, color saturation, and other qualities. If you decide against the enhancement, tap the tool again (even if you saved the changes).
- *Remove red-eye:* Tap each eye that needs correcting.
- *Crop:* Drag the corners of the grid, drag the photo to reposition it, then tap Crop. To set a specific ratio, tap Constrain.

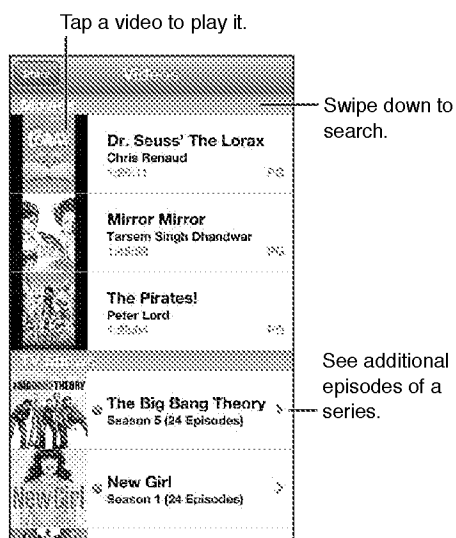


**Trim a video:** While viewing a video, tap the screen to display the controls. Drag either end of the frame viewer at the top, then tap Trim.

*Important:* If you choose Trim Original, the trimmed frames are permanently deleted from the original video. If you choose "Save as New Clip," a new trimmed video clip is saved in your Camera Roll album and the original video is unaffected.



Use the Videos app to watch movies, TV shows, and music videos. To watch video podcasts, install the free Podcasts app from the App Store. See Chapter 31, Podcasts, on page 113. To watch videos you record using Camera on iPhone, open the Photos app.

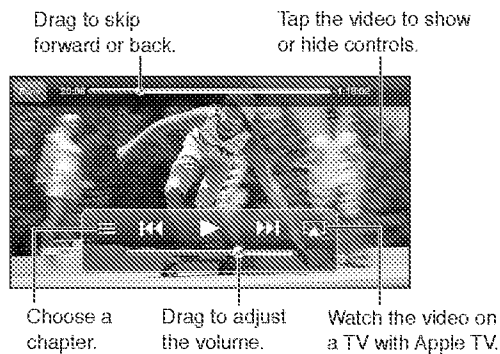


**WARNING:** For important information about avoiding hearing loss, see important safety information on page 146.

### Get videos:

- *Buy or rent videos from the iTunes store (not available in all areas):* Open the iTunes app on iPhone and tap Videos. See Chapter 22, iTunes Store, on page 94.
- *Transfer videos from your computer:* Connect iPhone, then sync videos in iTunes on your computer. See Syncing with iTunes on page 16.
- *Stream videos from your computer:* Turn on Home Sharing in iTunes on your computer. Then, on iPhone, go to Settings > Videos and enter the Apple ID and password you used to set up Home Sharing on your computer. Then, open Videos on iPhone and tap Shared at the top of the list of videos.

**Convert a video to work with iPhone:** If you try to add a video from iTunes to iPhone and a message says the video can't play on iPhone, you can convert the video. Select the video in your iTunes library and choose File > Create New Version > "Create iPod or iPhone Version." Then add the converted video to iPhone.



**Watch a video:** Tap the video in the list of videos.

- *Scale the video to fill the screen or fit to the screen:* Tap or . Or, double-tap the video to scale without showing the controls.
- *Start over from the beginning:* If the video contains chapters, drag the playhead along the scrubber bar all the way to the left. If there are no chapters, tap .
- *Skip to the next or previous chapter (if available):* Tap or . You can also press the center button or equivalent on a compatible headset two times (skip to next) or three times (skip to previous).
- *Rewind or fast-forward:* Touch and hold or .
- *Select a different audio language (if available):* Tap , then choose a language from the Audio list.
- *Show or hide subtitles (if available):* Tap , then choose a language, or Off, from the Subtitles list.
- *Show or hide closed captioning (if available):* Go to Settings > Videos.
- *Watch the video on a TV:* See Connecting iPhone to a TV or other device on page 30.

**Set a sleep timer:** Open the Clock app and tap Timer, then swipe to set the number of hours and minutes. Tap When Timer Ends and choose Stop Playing, tap Set, then tap Start to start the timer. When the timer ends, iPhone stops playing music or video, closes any other open app, and then locks itself.

**Delete a video:** Swipe left or right over the video in the list. Deleting a video (other than a rented movie) from iPhone doesn't delete it from your iTunes library.

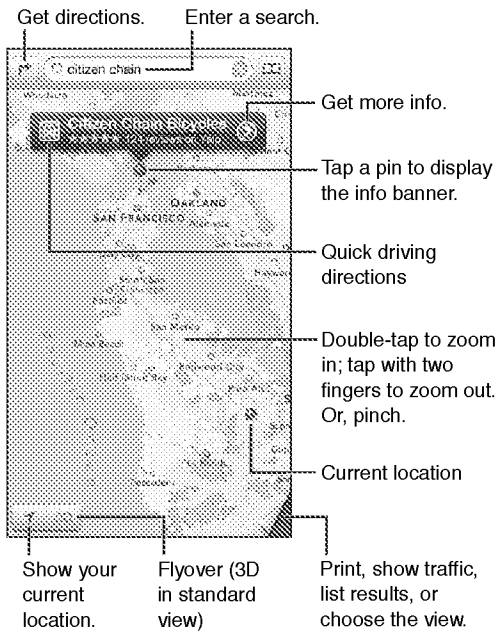
*important:* If you delete a rented movie from iPhone, it's deleted permanently and cannot be transferred back to your computer.

When you delete a video (other than a rented movie) from iPhone, it isn't deleted from your iTunes library on your computer, and you can sync the video back to iPhone later. If you don't want to sync the video back to iPhone, set iTunes to not sync the video. See Syncing with iTunes on page 16.



## Finding locations

**WARNING:** For important information about navigating safely and avoiding distraction while driving, see important safety information on page 146.




*important:* Maps, directions, 3D, Flyover, and location-based apps depend on data services. These data services are subject to change and may not be available in all areas, resulting in maps, directions, 3D, Flyover, or location-based information that may be unavailable, inaccurate, or incomplete. Compare the information provided on iPhone to your surroundings, and defer to posted signs to resolve any discrepancies. Some Maps features require Location Services. See Privacy on page 140.


**Find a location:** Tap the search field, then type an address or other information, such as:


- Intersection (“8th and market”)
- Area (“greenwich village”)
- Landmark (“guggenheim”)
- Zip code
- Business (“movies,” “restaurants san francisco ca,” “apple inc new york”)

Or, tap one of the suggestions in the list below the search field.

**Navigate maps:**

- *Move up or down, left or right:* Drag the screen.
- *Rotate the map:* Rotate two fingers on the screen. A compass appears in the upper-right corner to show the map’s orientation.
- *Return to the north-facing orientation:* Tap .

**Find the location of a contact, or of a bookmarked or recent search:** Tap .

**Get and share info about a location:** Tap the pin to display the info banner, then tap . When available, you can get reviews and photos from Yelp. You can also get directions, contact the business, visit the home page, add the business to your contacts, share the location, or bookmark the location.



- *Read reviews:* Tap Reviews. To use other Yelp features, tap the buttons beneath the reviews.
- *See photos:* Tap Photos.
- *Email, text, tweet, or post a location to Facebook:* Tap Share Location. To tweet or post to Facebook, you must be signed in to your accounts. See Sharing on page 29.


**Use the drop pin to mark a location:** Touch and hold the map until the drop pin appears.


**Choose standard, hybrid, or satellite view:** Tap the lower-right corner.



**Report a problem:** Tap the lower-right corner.



## Getting directions

**Get driving directions:** Tap , tap , enter the starting and ending locations, then tap Route. Or, choose a location or a route from the list, when available. If multiple routes appear, tap the one you want to take. Tap Start to begin.

- *Hear turn-by-turn directions (iPhone 4S or later):* Tap Start.  
Maps follows your progress and speaks turn-by-turn directions to your destination. To show or hide the controls, tap the screen.  
If iPhone auto-locks, Maps stays onscreen and continues to announce instructions. You can also open another app and continue to get turn-by-turn directions. To return to Maps, tap the banner across the top of the screen.
- *View turn-by-turn directions (iPhone 4 or earlier):* Tap Start, then swipe left to see the next instruction.
- *Return to the route overview:* Tap Overview.
- *View the directions as a list:* Tap  on the Overview screen.
- *Stop turn-by-turn directions:* Tap End.

**Get quick driving directions from your current location:** Tap  on the banner of your destination, then tap Directions To Here.

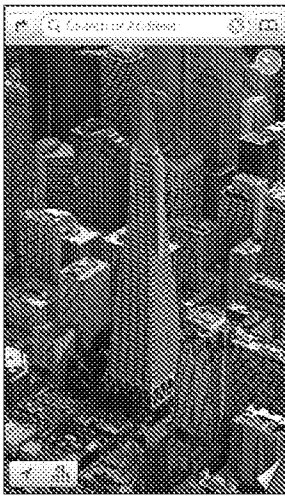
**Get walking directions:** Tap , tap , enter the starting and ending locations, then tap Route. Or, choose a location or a route from the list, when available. Tap Start, then swipe left to see the next instruction.

**Get public transit directions:** Tap , tap , enter the starting and ending locations, then tap Route. Or, choose a location or a route from the list, when available. Download and open the routing apps for the transit services you want to use.


**Show traffic conditions:** Tap the bottom-right corner of the screen, then tap Show Traffic. Orange dots show slowdowns, and red dots show stop-and-go traffic. To see an incident report, tap a marker.

## 3D and Flyover

On iPhone 4S or later, use 3D (standard view) or Flyover (satellite or hybrid view) for three-dimensional views of many cities around the world. You can navigate in the usual ways, and zoom in to see buildings. You can also adjust the camera angle.



The Transamerica Pyramid Building is a registered service mark of Transamerica Corporation.

**Use 3D or Flyover:** Zoom in until **3D** or  becomes active, then tap the button. Or, drag two fingers up. You can switch between 3D and Flyover by tapping the lower-right corner and changing views.

**Adjust the camera angle:** Drag two fingers up or down.

## Maps settings

**Set options for Maps:** Go to Settings > Maps. Settings include:

- Navigation voice volume (iPhone 4S or later)
- Miles or kilometers for distance
- Language and size of labels

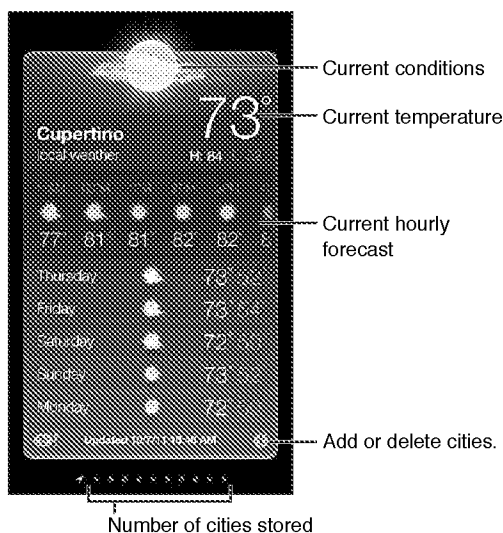


# Weather


# 15






Get the current temperature and six-day forecast for one or more cities around the world, with hourly forecasts for the next 12 hours. Weather also uses Location Services to get the forecast for your current location.



If the weather board is light blue, it's daytime in that city. Dark purple indicates nighttime.

**Manage your list of cities:** Tap , then add a city or make other changes. Tap Done when you finish.

- *Add a city:* Tap . Enter a city or zip code, then tap Search.
- *Rearrange the order of cities:* Drag  up or down.
- *Delete a city:* Tap , then tap Delete.
- *Choose Fahrenheit or Celsius:* Tap °F or °C.


**See weather for another city:** Swipe left or right.

The leftmost screen shows your local weather.

**View the current hourly forecast:**

- *iPhone 5:* Swipe the hourly display left or right.
- *iPhone 4S or earlier:* Tap Hourly.

**Turn local weather on or off:** Go to Settings > Privacy > Location Services. See Privacy on page 140.

**See information about a city at yahoo.com:** Tap .

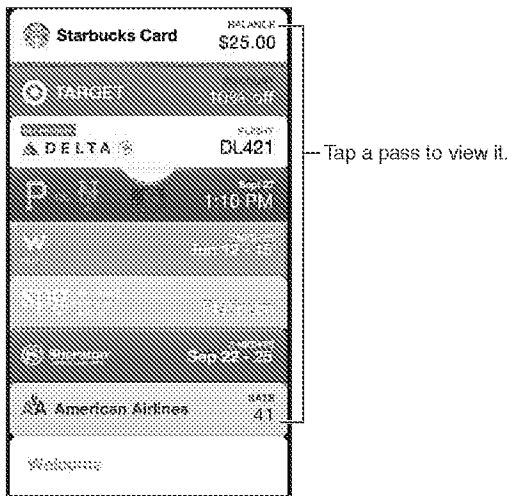
**Use iCloud to push your list of cities to your other iOS devices:** Go to Settings > iCloud > Documents & Data, then turn on Documents & Data (it's on by default). See iCloud on page 15.

# Passbook

# 16



Use Passbook to keep boarding passes, movie tickets, coupons, gift cards, and more, all in one place. Add passes from airlines, theaters, stores, and other participating merchants. Scan a pass on iPhone to check in for a flight, get in to a movie, or redeem a coupon.



Passes can include useful information, such as the balance on your coffee card, a coupon's expiration date, or your seat number for a concert. Some passes may also appear on your Lock screen when you wake iPhone at the right time or place—for example, when you reach the airport for a flight you're taking. (Location Services must be on in Settings > Privacy > Location Services.)

**Add a pass to Passbook:** You can add a pass from an app, email or Messages message, or website when you make a purchase or receive a coupon or gift. For example, tap Add to Passbook in the Fandango app when you purchase a ticket for a theater that supports scannable passes.

**Find apps that support Passbook in the App Store:** Tap "Apps for Passbook" on the Welcome pass. See [www.itunes.com/passbookapps](http://www.itunes.com/passbookapps).

**Use a pass:** If an alert for a pass appears on the lock screen, slide the alert to display the pass. Or, open Passbook, select the pass, then present the barcode on the pass to the scanner.



**View more information:** Tap ⓘ.

Passes are usually updated automatically. To refresh a pass manually, tap ⓘ, then pull the pass downward.

**Delete a pass:** Tap ⓘ, then tap 🗑️.

**Prevent passes from appearing on your Lock screen:** Go to Settings > General > Passcode Lock and tap Turn Passcode On. Then go to Allow Access When Locked and turn Passbook off. To prevent a specific pass from appearing on your Lock screen, tap ⓘ, then turn off Show On Lock Screen.

**Set notification options:** Go to Settings > Notifications > Passbook.

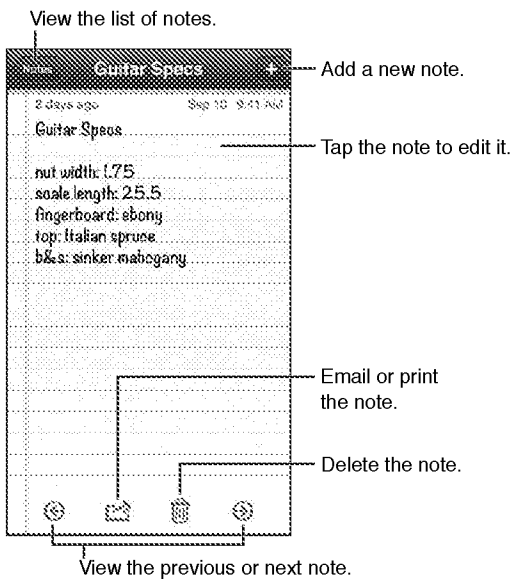
**Include passes on your other iPhone or iPod touch:** Go to Settings > iCloud and turn on Passbook.

# Notes

# 17



Type notes on iPhone, and iCloud makes them available on your other iOS devices and Mac computers. You can also read and create notes in other accounts, such as Gmail or Yahoo!.



**Use iCloud to keep your notes up to date on your iOS devices and Mac computers:**

- *If you use an icloud.com, me.com, or mac.com email address for iCloud:* Go to Settings > iCloud and turn on Notes.
- *If you use a Gmail or other IMAP account for iCloud:* Go to Settings > Mail, Contacts, Calendars and turn on Notes for the account.


**Choose the default account for new notes:** Go to Settings > Notes.

**Create a note in a specific account:** Tap Accounts and select the account, then tap **+** to create the note. If you don't see the Accounts button, tap the Notes button first.

**See only notes in a specific account:** Tap Accounts and choose the account. If you don't see the Accounts button, tap Notes first.

**Delete a note while viewing the list of notes:** Swipe left or right across the note in the list.

**Search for notes:** While viewing the list of notes, scroll to the top of the list to reveal the search field. Tap in the field and type what you're looking for. You can also search for notes from the Home screen. See Searching on page 27.

**Print or email a note:** While reading the note, tap . To email the note, iPhone must be set up for email. See Setting up mail and other accounts on page 14.

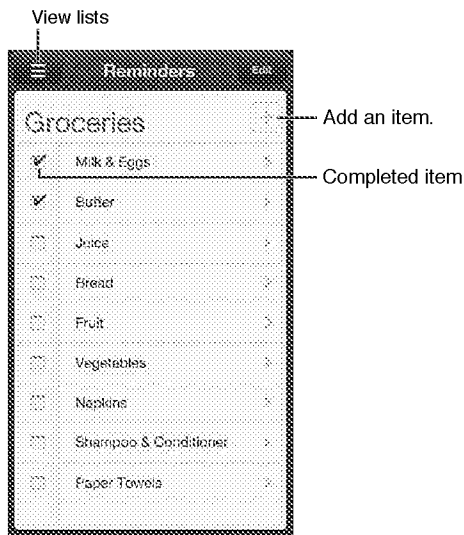
**Change the font:** Go to Settings > Notes.

# Reminders

# 18




Reminders lets you keep track of all the things you need to do.



**See reminder details:** Tap a reminder. You can:


- Change or delete it
- Set a due date
- Set a priority
- Add notes
- Move it to a different list

Reminders can alert you when you arrive at or leave a location.

**Add a location alert:** While entering a reminder, tap , then turn on “Remind Me At a Location.”

To use a different location, tap your current location. Locations in the list include addresses from your personal info card in Contacts, such as the home and work addresses you’ve added. To use a different address, tap Enter an Address.

**Note:** Location reminders are not available on iPhone 3GS. You cannot set locations for reminders in Microsoft Exchange and Outlook accounts.

**Search your reminders:** Tap  to see the search field, or search from the Home screen. Reminders are searched by name. You can also use Siri to find or add reminders.

**Turn off reminder notifications:** Go to Settings > Notifications. For information, see Do Not Disturb and Notifications on page 132.

**Set the tone played for notifications:** Go to Settings > Sounds.

**Keep your reminders up to date on other devices:** Go to Settings > iCloud, then turn on Reminders. To keep up to date with Reminders on OS X Mountain Lion, turn on iCloud on your Mac, too. Some other types of accounts, such as Exchange, also support Reminders. Go to Settings > Mail, Contacts, Calendars and turn on Reminders for the accounts you want to use.

**Set a default list for new reminders:** Go to Settings > Mail, Contacts, Calendars, then under Reminders, tap Default List.

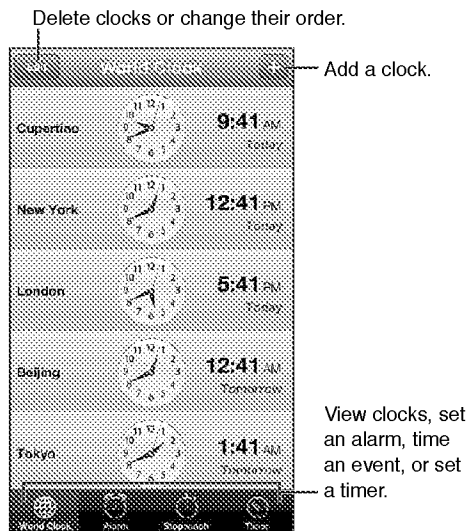



# Clock



# 19





You can add clocks to show the time in other major cities and time zones around the world.



**Add a clock:** Tap , then type the name of a city or choose a city from the list. If you don't see the city you're looking for, try a major city in the same time zone.

**Organize clocks:** Tap Edit, then drag  to move or tap  to delete.

**Set an alarm:** Tap Alarm, then tap .

**Change an alarm:** Tap Edit, then tap  to change settings or tap  to delete.

**Set a sleep timer for iPhone:** Set a timer, tap When Timer Ends, and choose Stop Playing.


# Stocks




# 20




Keep track of your stocks, see the change in value over time, and get news about your investments.



**Manage your stock list:** Tap , then add stocks or make other changes. When you finish, tap Done.

- *Add an item:* Tap . Enter a symbol, company name, fund name, or index, then tap Search.
- *Delete an item:* Tap .
- *Rearrange the order of items:* Drag  up or down.

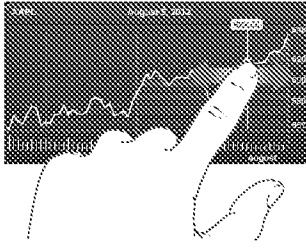
### View stock info:

- *Switch the display to percentage change, price change, or market capitalization:* Tap any of the values along the right side of the screen.
- *See the summary, chart, or news:* Swipe the info beneath the stock list. Tap a news headline to view the article in Safari. To change the chart's time period, tap 1d, 1w, 1m, 3m, 6m, 1y, or 2y.
- *Add a news article to your reading list:* Touch and hold the news headline, then tap Add to Reading List.
- *See more stock information at yahoo.com:* Tap .

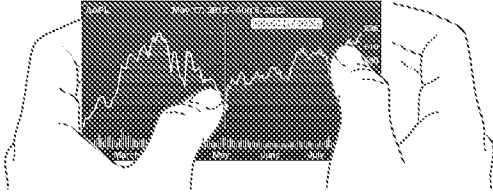
Quotes may be delayed 20 minutes or more, depending upon the reporting service. To display your stocks as a ticker in Notification Center, see Notifications on page 28.

**View a full-screen chart:** Rotate iPhone to landscape orientation.

- *See the value at a specific date or time:* Touch the chart with one finger.



- *See the difference in value over time:* Touch the chart with two fingers.



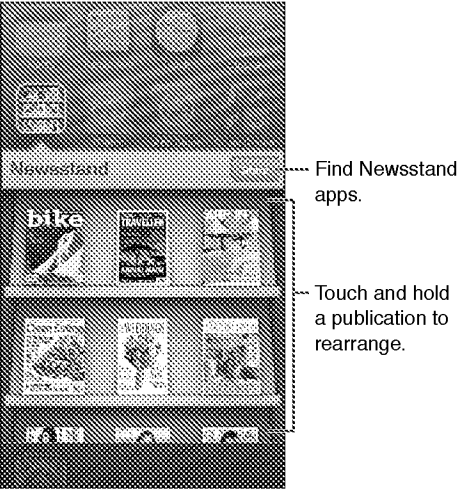
**Use iCloud to keep your stock list up to date on your iOS devices:** Go to Settings > iCloud > Documents & Data, then turn on Documents & Data (it's on by default). See iCloud on page 15.

# Newsstand

# 21



Newsstand organizes your magazine and newspaper apps and lets you know when new issues are ready for reading.



Newsstand organizes magazine and newspaper apps with a shelf for easy access.

**Find Newsstand apps:** Tap Newsstand to reveal the shelf, then tap Store. When you purchase a newsstand app, it's added to your shelf. After the app is downloaded, open it to view its issues and subscription options. Subscriptions are In-App purchases, billed to your store account.

**Turn off automatically downloading new issues:** Go to Settings > Newsstand. If an app supports it, Newsstand downloads new issues when connected to Wi-Fi.



## At a glance

Use the iTunes Store to add music, movies, and TV shows to iPhone.



Use iTunes Store to:

- Find music, TV shows, movies, tones, and more, by browsing or searching
- See your personal Genius recommendations
- Download previous purchases

**Note:** You need an Internet connection and an Apple ID to use the iTunes Store.

**Browse content:** Tap one of the categories. Tap Genres to refine the listings. To see more information about an item, tap it.

**Search for content:** Tap Search, then tap the search field and enter one or more words, then tap Search.


**Preview an item:** Tap a song or video to play a sample.

**Purchase an item:** Tap the item's price (or tap Free), then tap again to buy it. If you already purchased the item, "Download" appears instead of the price and you won't be charged again. To see the progress of items being downloaded, tap Downloads at the bottom of the screen.

**Rent a movie:** In some areas, certain movies are available to rent. You have 30 days to begin viewing a rented movie. Once you've started playing it, you can watch it as many times as you want in 24 hours. After these time limits, the movie is deleted.

**Download a previous purchase:** Tap More, then tap Purchased. To automatically download purchases made on other devices, go to Settings > iTunes & App Stores.

**Redeem a gift card or code:** Tap any category (such as music), scroll to the bottom, then tap Redeem.

**Send a gift:** While viewing the item you want to give as a gift, tap , then tap Gift.

**View or edit your account:** Go to Settings > iTunes & App Stores, tap your Apple ID, then tap View Apple ID. Tap an item to edit it. To change your password, tap the Apple ID field.

**Turn iTunes Match on or off:** Go to Settings > iTunes & App Stores. iTunes Match is a subscription service that stores all of your music in iCloud so you can access it from wherever you are.

**Sign in using a different Apple ID:** Go to Settings > iTunes & App Stores, tap your account name, then tap Sign Out. The next time you download an app, you can enter a different Apple ID.

**Download purchases using the cellular network:** Go to Settings > iTunes & App Stores > Use Cellular Data. Downloading purchases and using iTunes Match over the cellular network may incur charges from your carrier.

## Changing the browse buttons

You can replace and rearrange the buttons at the bottom of the screen. For example, if you often download tones but don't watch many TV shows, you could replace those buttons.

**Change the browse buttons:** Tap More, tap Edit, then drag a button to the bottom of the screen, over the button you want to replace. When you finish, tap Done.

# App Store

# 23



## At a glance

Use the App Store to browse, purchase, and download apps to iPhone.



Use the App Store to:

- Find new free or purchased apps by browsing or searching
- Download updates and previous purchases
- Redeem a gift card or download code
- Recommend an app to a friend
- Manage your App Store account


**Note:** You need an Internet connection and an Apple ID to use the App Store.

**Purchase an app:** Tap the app's price (or tap Free), then tap Buy Now. If you already purchased the app, "install" appears instead of the price. You won't be charged to download it again. While an app is being downloaded, its icon appears on the Home screen with a progress indicator.

**Download a previous purchase:** Tap Updates, then tap Purchased. To automatically download new purchases made on other devices, go to Settings > iTunes & App Stores.

**Download updated apps:** Tap Updates. Tap an app to read about the new version, then tap Update to download it. Or tap Update All to download all the apps in the list.

**Redeem a gift card or download code:** Tap Featured, scroll to the bottom, then tap Redeem.

**Tell a friend about an app:** Find the app, then tap  and select how you want to share it.



**View and edit your account:** Go to Settings > iTunes & App Stores, tap your Apple ID, then tap View Apple ID. You can turn subscribe to iTunes newsletters, and view Apple's privacy policy. To change your password, tap the Apple ID field.

**Sign in using a different Apple ID:** Go to Settings > iTunes & App Stores, tap your account name, then tap Sign Out. The next time you download an app, you can enter a different Apple ID.

**Create a new Apple ID:** Go to Settings > iTunes & App Stores, then tap Create New Apple ID and follow the onscreen instructions.

**Download purchases using the cellular network:** Go to Settings > iTunes & App Stores > Use Cellular Data. Downloading purchases over the cellular network may incur charges from your carrier. Newsstand apps update only over Wi-Fi.

## Deleting apps

**Delete an App Store app:** Touch and hold its icon on the Home screen until the icon starts to jiggle, then tap . You can't delete built-in apps. When you finish, press the Home button .

Deleting an app also deletes all of its data. You can re-download any app you've purchased from the App Store, free of charge.

For information about erasing all of your apps, data, and settings, see [Reset](#) on page 138.



# Game Center

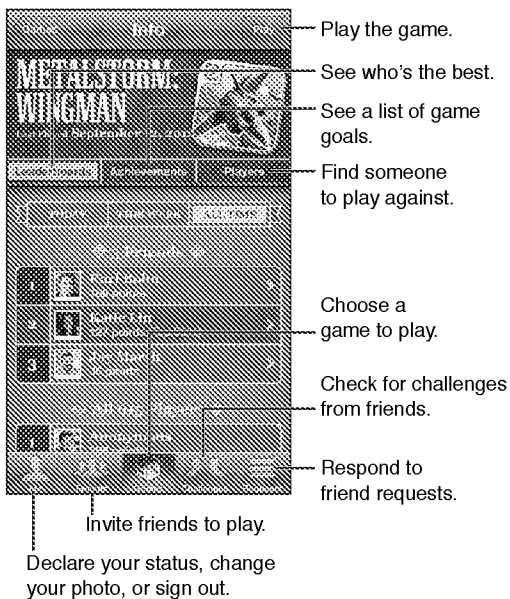
# 24



## At a glance

Game Center lets you play your favorite games with friends who have an iPhone, iPad, iPod touch, or a Mac with OS X Mountain Lion.


**WARNING:** For important information about avoiding repetitive motion injuries, see Important safety information on page 146.



**Sign in:** Open Game Center. If you see your nickname and photo at the top of the screen, you're already signed in. If not, enter your Apple ID and password, then tap Sign In. You can use the same Apple ID you use for iCloud, App Store, or iTunes Store purchases, or tap Create New Account if you want a separate Apple ID for gaming.

**Purchase a game:** Tap Games, then tap a recommended game or tap Find Game Center Games.



**Play a game:** Tap Games, choose a game, then tap Play.

**Return to Game Center after playing:** Press the Home button , then tap Game Center on the Home screen.

**Sign out:** Tap Me, tap the Account banner, then tap Sign Out. You don't need to sign out each time you quit Game Center.

## Playing with friends

**Invite friends to a multiplayer game:** Tap Friends, choose a friend, choose a game, then tap Play. If the game allows or requires more players, choose additional players, then tap Next. Send your invitation, then wait for the others to accept. When everyone is ready, start the game. If a friend isn't available or doesn't respond to your invitation, you can tap Auto-Match to have Game Center find another player for you, or tap Invite Friend to invite someone else.

**Send a friend request:** Tap Friends or Requests, tap , then enter your friend's email address or Game Center nickname. To browse your contacts, tap . To add several friends in one request, type Return after each address.

**Challenge someone to outdo you:** Tap one of your scores or achievements, then tap Challenge Friends.

**See the games a friend plays and check your friend's scores:** Tap Friends, tap your friend's name, then tap Games or Points.

**Purchase a game your friend has:** Tap Friends, then tap the name of your friend. Tap the game in your friend's list of games, then tap the price at the top of the screen.

**See a list of a friend's friends:** Tap Friends, tap the friend's name, then tap Friends just below their picture.

**Remove a friend:** Tap Friends, tap a name, then tap Unfriend.

**Keep your email address private:** Turn off Public Profile in your Game Center account settings. See "Game Center settings" below.

**Disable multiplayer activity or friend requests:** Go to Settings > General > Restrictions and turn off Multiplayer Games or Adding Friends. If the switches are disabled, tap Enable Restrictions (at the top) first.

**Report offensive or inappropriate behavior:** Tap Friends, tap the person's name, then tap "Report a Problem."

## Game Center settings

Some Game Center settings are associated with the Apple ID you use to sign in. Others are in the Settings app on iPhone.

**Change Game Center settings for your Apple ID:** Sign in with your Apple ID, tap Me, tap the Account banner, then choose View Account.

**Specify which notifications you want for Game Center:** Go to Settings > Notifications > Game Center. If Game Center doesn't appear, turn on Notifications.

**Change restrictions for Game Center:** Go to Settings > General > Restrictions.

# Contacts

# 25



## At a glance

iPhone lets you easily access and edit your contact lists from personal, business, and organizational accounts.



**Set your My Info card:** Go to Settings > Mail, Contacts, Calendars, then tap My Info and select the contact card with your name and information. The My Info card is used by Siri and other apps. Use the related persons fields to define relationships you want Siri to know about, so you can say things like “call my sister.”


**Search contacts:** Tap the search field at the top of the contact list and enter your search. You can also search your contacts from the Home screen. See Searching on page 27.

**Share a contact:** Tap a contact, then tap Share Contact. You can send the contact info by email or message.

**Add a contact:** Tap +. You can't add contacts to a directory you're only viewing, such as a Microsoft Exchange Global Address List.



**Add a contact to your Favorites list:** Choose a contact, then scroll down and tap the Add to Favorites button. The Favorites list is used by Do Not Disturb. See Do Not Disturb and Notifications on page 132.

**Add a phone number to Contacts when dialing:** In Phone, tap Keypad, enter a number, then tap +. Tap Create New Contact or tap “Add to Existing Contact” and choose a contact.

**Add a recent caller to Contacts:** In Phone, tap Recents and tap  next to the number. Then tap Create New Contact, or tap "Add to Existing Contact" and choose a contact.

**Delete a contact:** Choose a contact, then tap Edit. Scroll down and tap Delete Contact.

**Edit a contact:** Choose a contact, then tap Edit. You can:

- *Add a new field:* Tap , then choose or enter a label for the field.
- *Change a field label:* Tap the label and choose a different one. To add a new field, tap Add Custom Label.
- *Change the ringtone or text tone for the contact:* Tap the ringtone or text tone field, then choose a new sound. To change the default tone for contacts, go to Settings > Sounds.
- *Change how iPhone vibrates for call or messages from the contact:* Tap the ringtone or text tone vibration field, then select a vibration pattern. If you don't see the vibration field, tap Edit and add it. For information about creating custom vibration patterns, see Sounds on page 139.
- *Assign a photo to the contact:* Tap Add Photo. You can take a photo with the camera or use an existing photo.
- *Update contact info using Twitter:* Go to Settings > Twitter > Update Contacts. Contacts are matched using email addresses. For friends that you're following, their contact card is updated with their Twitter user name and photo.
- *Update contact info using Facebook:* Go to Settings > Facebook > Update Contacts. Contacts are matched using email addresses. For each match in your friend list, their contact card is updated with their Facebook user name and photo.
- *Enter a pause in a telephone number:* Tap , then tap Pause or Wait. Each pause lasts two seconds. Each wait stops dialing until you tap Dial again. Use these to automate dialing of an extension or passcode, for example.

## Adding contacts

In addition to entering contacts, you can:

- *Use your iCloud contacts:* Go to Settings > iCloud, then turn on Contacts.
- *Import your Facebook Friends:* Go to Settings > Facebook, then turn on Contacts in the "Allow These Apps to Use Your Accounts" list. This creates a Facebook group in Contacts.
- *Access a Microsoft Exchange Global Address List:* Go to Settings > Mail, Contacts, Calendars, then tap your Exchange account and turn on Contacts.
- *Set up an LDAP or CardDAV account to access business or school directories:* Go to Settings > Mail, Contacts, Calendars > Add Account > Other. Then tap "Add LDAP Account" or "Add CardDAV Account" and enter the account information.
- *Sync contacts from your computer, Yahoo!, or Google:* In iTunes on your computer, turn on contact syncing in the device info pane. For information, see iTunes Help.
- *Import contacts from a SIM card (GSM):* Go to Settings > Mail, Contacts, Calendars > Import SIM Contacts.
- *Import contacts from a vCard:* Tap a .vcf attachment in an email or message, or on a webpage.

**Search a GAL, CardDAV, or LDAP server:** Tap Groups, tap the directory you want to search, then enter your search.

**Save contact information from a GAL, LDAP, or CardDAV server:** Search for the contact you want to add, then tap Add Contact.

**Show or hide a group:** Tap Groups then select the groups you want to see. This button only appears if you have more than one source of contacts.


When you have contacts from multiple sources, you might have multiple entries for the same person. To keep redundant contacts from appearing in the All Contacts list, contacts from different sources that have the same name are linked and displayed as a single *unified contact*. When you view a unified contact, the title Unified Info appears at the top of the screen.

**Link a contact:** Edit a contact, tap Edit, then tap Link Contact and choose the contact entry to link to.

Linked contacts aren't merged. If you change or add information in a unified contact, the changes are copied to each source account where that information already exists.

If you link contacts with different first or last names, the names on the individual cards won't change, but only one name appears on the unified card. To choose which name appears when you view the unified card, tap Edit, tap the linked card with the name you prefer, then tap Use This Name For Unified Card.

**View contact information from a source account:** Tap one of the source accounts.

**Unlink a contact:** Tap Edit, tap , then tap Unlink.

## Contacts settings

To change Contacts settings, go to Settings > Mail, Contacts, Calendars. Available options let you:

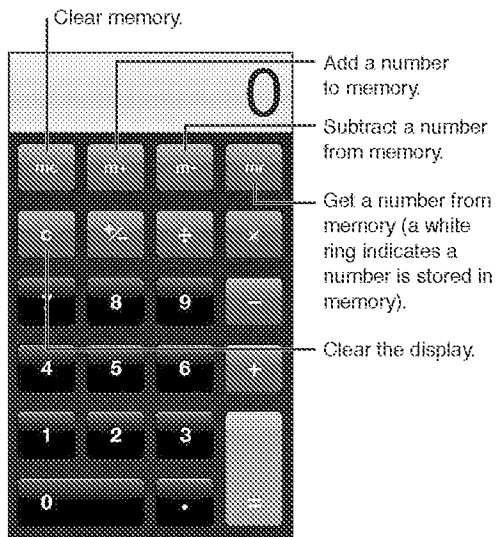
- Change how contacts are sorted
- Display contacts by first or last name
- Set a default account for new contacts
- Set your My Info card

# Calculator

# 26



Tap numbers and functions in Calculator just as you would with a standard calculator.



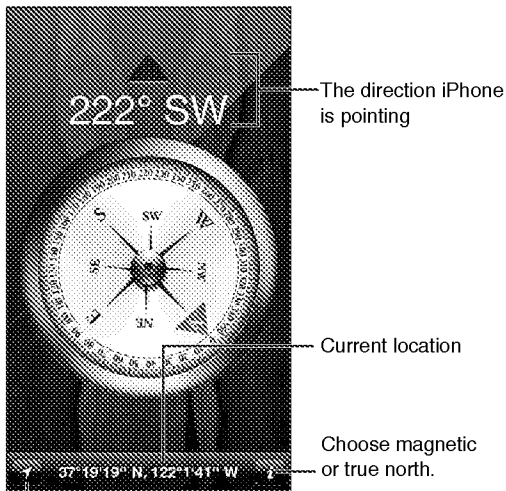
Use the scientific calculator: Rotate iPhone to landscape orientation.

# Compass

# 27



Find a direction or your current heading, see your latitude and longitude, or show your location and heading in Maps.



Show your current location in Maps.

**Find the direction your iPhone is pointing:** Hold iPhone flat in your hand, level with the ground.

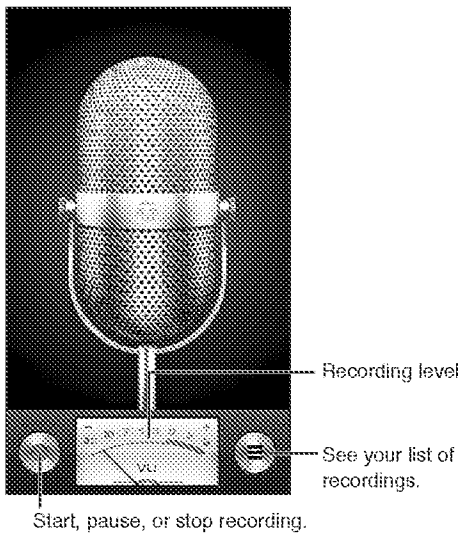
If Location Services is turned off when you open Compass, you may be asked to turn it on. You can use Compass without turning on Location Services. See Privacy on page 140.




*important:* The accuracy of the compass can be affected by magnetic or environmental interference; even the magnets in the iPhone earbuds can cause a deviation. Use the digital compass only for basic navigation assistance and don't rely on it to determine precise location, proximity, distance, or direction.



## At a glance

Voice Memos lets you use iPhone as a portable recording device using the built-in microphone, iPhone or Bluetooth headset mic, or supported external microphone.




**Make a recording:** Tap  or press the center button on your headset. Tap  to pause or  to stop recording, or press the center button on your headset.




Recordings using the built-in microphone are mono, but you can record stereo using an external stereo microphone that works with the iPhone headset jack, or with the Lightning connector (iPhone 5) or 30-pin dock connector (earlier iPhone models). Look for accessories marked with the Apple "Made for iPhone" or "Works with iPhone" logo.

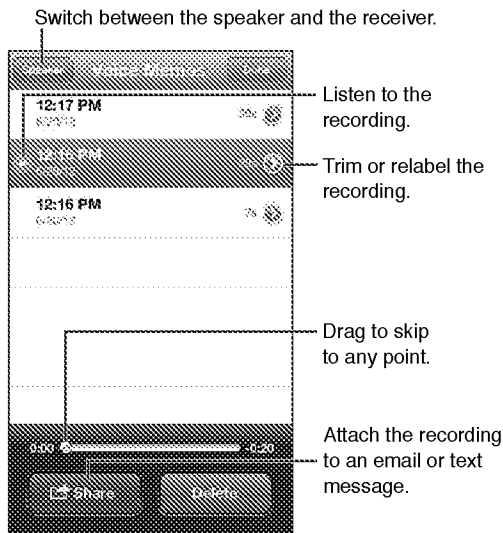
**Adjust the recording level:** Move the microphone closer to or further away from what you're recording. For better recording quality, the loudest level on the level meter should be between -3 dB and 0 dB.



**Play or mute the start/stop tone:** Use the iPhone volume buttons to turn the volume all the way down.

**Use another app while recording:** Press the Home button  and open an app. To return to Voice Memos, tap the red bar at the top of the screen.



**Play a recording:** Tap , tap a recording, then tap . Tap  to pause.



**Trim a recording:** Tap  next to the recording, then tap Trim Memo. Drag the edges of the audio region, then tap  to preview. Adjust if necessary, then tap Trim Voice Memo to save. The portions you trim can't be recovered.

## Sharing voice memos with your computer

You can sync voice memos with the primary iTunes library on your computer, then listen to memos on your computer or sync them with another iPhone or iPod touch.

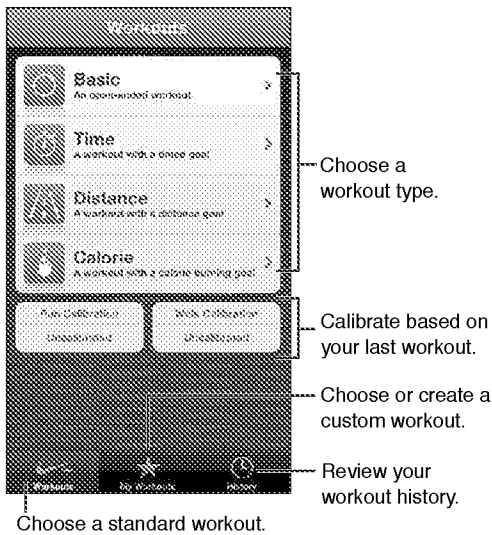
When you delete a synced memo from iTunes, it stays on the device where it was recorded, but is deleted from any other iPhone or iPod touch you synced. If you delete a synced memo on iPhone, it's copied back to iPhone the next time you sync with iTunes, but you can't sync that copy back to iTunes a second time.

**Sync voice memos with iTunes:** Connect iPhone to your computer, then in iTunes select iPhone. Select Music at the top of the screen (between Apps and Movies), select Sync Music, select "Include voice memos," and click Apply.

Voice memos synced from iPhone to your computer appear in the Music list and in the Voice Memos playlist in iTunes. Memos synced from your computer appear in the Voice Memos app on iPhone, but not in the Music app.



With a Nike + iPod Sensor (sold separately), the Nike + iPod app provides audible feedback on your speed, distance, time elapsed, and calories burned during a run or walk.



The Nike + iPod app doesn't appear on the Home screen until you turn it on.

**Turn on Nike + iPod:** Go to Settings > Nike + iPod.

Nike + iPod collects workout data from a wireless sensor (sold separately) that you attach to your shoe. Before you use it the first time, you need to link your sensor to iPhone.

**Link your sensor to iPhone:** Attach the sensor to your shoe, then go to Settings > Nike + iPod > Sensor.

**Start a workout:** Tap Workouts, and choose a workout.

- *Pause a workout:* Wake iPhone and tap on the lock screen. Tap when you're ready to continue.
- *End a workout:* Wake iPhone, tap , then tap End Workout.

**Change workout settings:** Go to Settings > Nike + iPod.

**Calibrate Nike + iPod:** Record a workout over a known distance of at least a quarter mile (400 meters). Then, after you tap End Workout, tap Calibrate on the workout summary screen and enter the actual distance you covered.

**Reset to the default calibration:** Go to Settings > Nike + iPod.

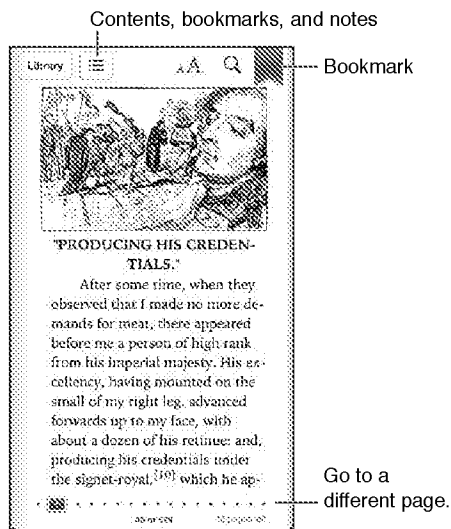
**Send workout data to nikeplus.com:** With iPhone connected to the Internet, open Nike + iPod, tap History, then tap "Send to Nike+."

**See your workouts on nikeplus.com:** In Safari, go to [nikeplus.com](http://nikeplus.com), log in to your account, and follow the onscreen instructions.



## At a glance

iBooks is a great way to read and buy books. Download the free iBooks app from the App Store, and then enjoy everything from classics to bestsellers.



To download the iBooks app and use the iBookstore, you need an Internet connection and an Apple ID.

**Visit the iBookstore:** In iBooks, tap Store to:

- Find books by browsing or searching
- Get a sample of a book to see if you like it
- Read and write reviews, and see current bestsellers
- Tell a friend about a book via Facebook, Twitter, iMessage, or email

**Purchase a book:** Find one you want, tap the price, then tap again to get it.

**Get information about a book:** You can read a summary of the book, read reviews, and try a sample of the book before buying it. After buying a book, you can write a review of your own.





**Download a previous purchase:** If you download a book you've previously purchased, you won't be charged again. To automatically download items purchased on other devices, go to Settings > iTunes & App Stores. For information about purchased books and iCloud, see Organizing the bookshelf on page 111.

**Update a book:** If there's an update to a book you've downloaded, a badge notifies you of the new version. To see and download the updated book, tap Purchased, then tap Updates.












## Reading books

Each book has a particular set of features, based on its contents and format. Some of the features described below might not be available in the book you're reading.






**Open a book:** Tap the book you want to read. If you don't see it, swipe the shelf left or right to see other collections.

- *Show the controls:* Tap near the center of the page.
- *Enlarge an image:* Double-tap the image. In some books, touch and hold to display a magnifying glass you can use to view an image.
- *Go to a specific page:* Use the page navigation controls at the bottom of the screen. Or, tap  and enter a page number, then tap the page number in the search results.
- *Look up a word:* Double-tap a word, then tap Define in the menu that appears. Definitions aren't available for all languages.
- *View the table of contents:* Tap . With some books, you can also pinch to see the the table of contents.
- *Add or remove a bookmark:* Tap . Tap again to remove the bookmark. You don't need to add a bookmark when you close the book, because iBooks remembers where you left off. You can have multiple bookmarks—to see them all, tap , then tap Bookmarks.

**Annotate a book:** You can add notes and highlights to a book.

- *Add a highlight:* Double-tap a word, use the grab points to adjust the selection, then tap Highlight and choose a style.
- *Share highlighted text:* Tap the highlighted text, then tap . If the book you're reading is from the iBookstore, a link to the book is included.
- *Remove a highlight:* Tap the highlighted text, then tap .
- *Add a note:* Double-tap a word, then tap Note.
- *Remove a note:* Delete its text. To remove the note and its highlight, tap the highlighted text, then tap .
- *See all your notes:* Tap , then tap Notes. Tap  to print or email your notes.
- *Delete notes:* Tap the center of the screen to display the controls, tap , then tap Notes. Tap , then tap Edit Notes. Select the notes you want to delete, then tap Delete.
- *Share your notes:* Tap the center of the screen to display the controls, tap , then tap Notes. Tap , then tap Edit Notes. Select the notes you want to share, then tap Share.
- *Share a link to a book:* Tap the center of the screen to display the controls, then tap . Tap , then tap Share Book.

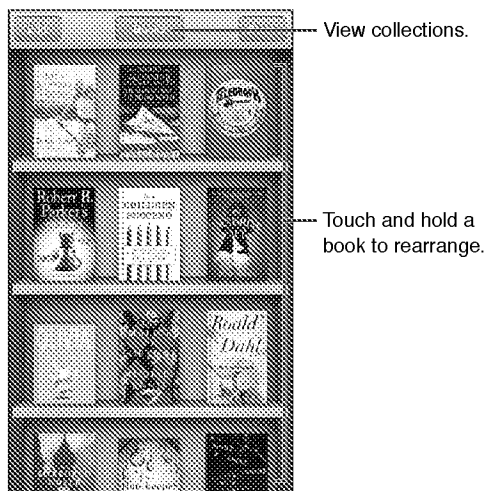
**Change a book's appearance:** Many books let you change the font, font size, and page color.

- *Change the font or font size:* Tap the center of the screen to display the controls, then tap . Some books allow you to change the font size only when iPhone is in portrait orientation.
- *Change the color of the page and text:* Tap the center of the screen to display the controls, tap , then tap Themes and choose White, Sepia, or Night. This setting applies to all books that support it.
- *Change the brightness:* Tap the center of the screen to display the controls, then tap . If you don't see , tap  first.

- *Change how pages are displayed:* Tap the center of the screen to display the controls, tap **AA**, then tap Themes and choose Book, Full Screen, or Scroll.
- *Turn justification and hyphenation on or off:* Go to Settings > iBooks. PDFs and some books can't be justified or hyphenated.


## Organizing the bookshelf

Use the bookshelf to browse your books and PDFs. You can also organize items into collections.




**Move a book or PDF to a collection:** Tap Edit. Select the items you want to move, then tap Move and select a collection.

**View and manage collections:** Tap the name of the current collection at the top of the screen. You can't edit or remove the built-in collections.

**Sort the bookshelf:** Tap the status bar to scroll to the top of the screen, then tap  and select a sort method at the bottom of the screen.

**Delete items from the bookshelf:** Tap Edit, then tap each item that you want to delete, so that a checkmark appears. Tap Delete, then tap Done.

- *Delete this copy:* Removes the item from iPhone, but it still appears on the bookshelf and can be downloaded again.
- *Delete from all devices:* Removes the item from all of your iOS devices and from the bookshelf. You can download it again from Purchases in the iBookstore. See *At a glance* on page 109.

**Search for a book:** Go to the bookshelf. Tap the status bar to scroll to the top of the screen, then tap . Searching looks for the title and the author's name.

**Download a book from iCloud:** Books you've purchased that aren't on iPhone appear with an iCloud badge. To download the book, tap its cover. To see all of your purchases, go to the Purchased Books collection.

- *Hide purchases on the bookshelf:* To show or hide purchased books that aren't on iPhone, go to Settings > iBooks > Show All Purchases. You can download purchases from the iBookstore. See *At a glance* on page 109.

## Syncing books and PDFs

Use iTunes to sync your books and PDFs between iPhone and your computer, and to buy books from the iTunes Store. When iPhone is connected to your computer, the Books pane lets you select which items to sync. You can also find DRM-free ePub books and PDFs on the web and add them to your iTunes library.


**Sync a book or PDF to iPhone:** In iTunes on your computer, choose File > Add to Library and select the file. Then sync.

**Add a book or PDF to iBooks without syncing:** If the book or PDF isn't too large, email it to yourself from your computer. Open the email message on iPhone, then touch and hold the attachment and choose "Open in iBooks."

## Printing or emailing a PDF

You can use iBooks to email a copy of a PDF, or to print all or a portion of the PDF to an AirPrint printer.

**Email a PDF:** Open the PDF, tap  then choose Email Document.

**Print a PDF:** Open the PDF, tap  then choose Print. For more information, see [Printing with AirPrint](#) on page 30.

## iBooks settings

iBooks stores your purchases, collections, bookmarks, notes, and current page information in iCloud, so you can read books seamlessly across all your iOS devices. iBooks saves information about all of your books when you open or quit the app. Information about individual books is also saved when you open or close the book.

**Turn syncing on or off:** Go to Settings > iBooks. You can sync collections and bookmarks.

Some books might access video or audio that's stored on the web. If iPhone has a cellular data connection, playing these files may incur carrier charges.

**Turn online content access on or off:** Go to Settings > iBooks > Online Content.

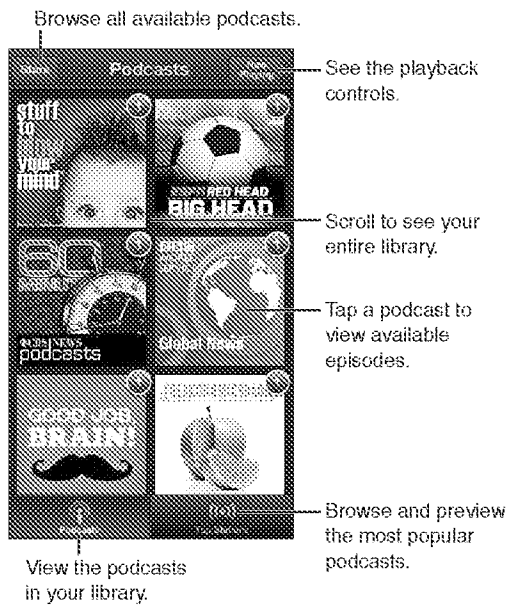
**Change the direction the page turns when you tap the left margin:** Go to Settings > iBooks > Both Margins Advance.

# Podcasts

# 31



Download the free Podcasts app from the App Store, then browse, subscribe to, and play your favorite audio and video podcasts.

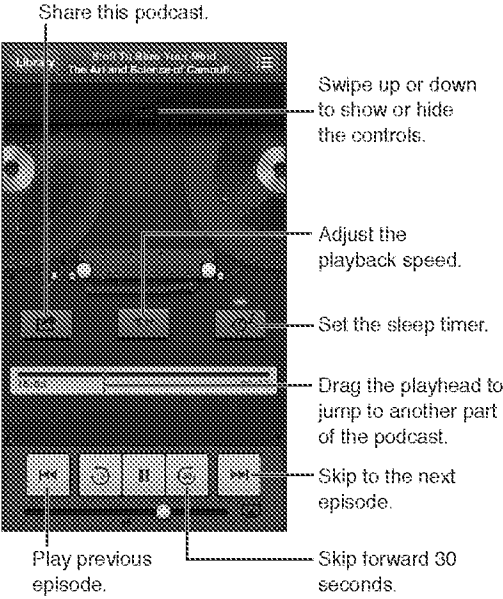


## Get podcasts:

- *Browse the full catalog:* Tap Catalog, then tap any podcast that interests you.
- *Browse the most popular podcasts:* Tap Top Stations (if you don't see it, tap Library first). Swipe left or right to change the category, or swipe up or down to browse the current category. Tap a podcast to preview the latest episode, or tap to see a list of episodes.
- *Stream an episode:* Tap any episode.
- *Download an episode so you can listen to it when you're not connected to Wi-Fi:* Tap next to any episode.
- *Subscribe to a podcast to always get the latest episode:* If you're browsing the catalog, tap a podcast to see the list of episodes, then tap Subscribe. If you've already downloaded an episode, tap the podcast in your library, then tap it again at the top of the list of episodes, and turn on Subscription.
- *Automatically get the latest episode of a subscribed podcast:* Tap the podcast in your library, tap it again at the top of the episode list, then turn on Auto-Download.



**Control audio playback:** To see all of the playback controls, swipe the artwork upward.



**Control video playback:** Tap the screen while you're watching a video podcast.

## Accessibility features

iPhone incorporates these accessibility features:

- VoiceOver
- Call audio routing
- Siri voice assistant
- Zoom magnification
- Large Text
- Invert Colors
- Speak Selection
- Speak Auto-text
- Mono Audio and balance
- Hearing aids and Hearing Aid Mode
- Assignable ringtones and vibrations
- LED Flash for Alerts
- Guided Access
- AssistiveTouch
- Support for braille displays
- Playback of closed-captioned content

**Turn on accessibility features using iPhone:** Go to Settings > General > Accessibility.

**Turn on accessibility features using iTunes:** Connect iPhone to your computer and select iPhone in the iTunes device list. Click Summary, then click Configure Universal Access at the bottom of the Summary screen.

For more information about iPhone accessibility features, go to [www.apple.com/accessibility](http://www.apple.com/accessibility).

Large Text can only be turned on or off in iPhone settings. See Large Text on page 125.

## VoiceOver

VoiceOver describes aloud what appears onscreen, so you can use iPhone without seeing it.

VoiceOver tells you about each item on the screen as you select it. When you select an item, the VoiceOver cursor (a black rectangle) encloses it and VoiceOver speaks the name or describes the item.

Touch the screen or drag your fingers to hear different items on the screen. When you select text, VoiceOver reads the text. If you turn on Speak Hints, VoiceOver may tell you the name of the item and provide instructions—for example, “double-tap to open.” To interact with items on the screen, such as buttons and links, use the gestures described in Learning VoiceOver gestures on page 118.

When you go to a new screen, VoiceOver plays a sound, then selects and speaks the first item on the screen (typically in the upper-left corner). VoiceOver also lets you know when the display changes to landscape or portrait orientation, and when the screen becomes locked or unlocked.

**Note:** VoiceOver speaks in the language specified in International settings, which may be influenced by the Region Format setting in Settings > General > International. VoiceOver is available in many languages, but not all.

### VoiceOver basics


*Important:* VoiceOver changes the gestures you use to control iPhone. Once VoiceOver is turned on, you must use VoiceOver gestures to operate iPhone—even to turn VoiceOver off again and resume standard operation.

**Turn VoiceOver on or off:** Go to Settings > General > Accessibility > VoiceOver. You can also set Triple-click Home to turn VoiceOver on or off. See Triple-click Home on page 124.

**Explore the screen:** Drag your finger over the screen. VoiceOver speaks each item you touch. Lift your finger to leave an item selected.

- *Select an item:* Tap it, or lift your finger while dragging over it.
- *Select the next or previous item:* Swipe right or left with one finger. Item order is left-to-right, top-to-bottom.
- *Select the item above or below:* Use the rotor to turn on Vertical Navigation, then swipe up or down with one finger.
- *Select the first or last item on the screen:* Swipe up or down with four fingers.
- *Select an item by name:* Triple-tap with two fingers anywhere on the screen to open the Item Chooser. Then type a name in the search field, or swipe right or left to move through the list alphabetically, or tap the table index to the right of the list and swipe up or down to move quickly through the list of items.
- *Change the name of the selected item so it's easier to find:* Tap and hold with two fingers anywhere on the screen.
- *Speak the text of the selected item:* Set the rotor control to characters or words, then swipe down or up with one finger.
- *Turn spoken hints on or off:* Go to Settings > General > Accessibility > VoiceOver.
- *Include phonetic spelling:* Go to Settings > General > Accessibility > VoiceOver > Use Phonetics.
- *Speak the entire screen from the top:* Swipe up with two fingers.
- *Speak from the current item to the bottom of the screen:* Swipe down with two fingers.
- *Stop speaking:* Tap once with two fingers. Tap again with two fingers to resume speaking. Speaking resumes when you select another item.
- *Mute VoiceOver:* Triple-tap with three fingers. Triple-tap again with three fingers to turn speaking back on. To turn off only VoiceOver sounds, set the Ring/Silent switch to Silent. If an external keyboard is connected, you can also press the Control key on the keyboard to mute or unmute VoiceOver.

**Adjust the speaking voice:** You can adjust the characteristics of the VoiceOver speaking voice to make it easier for you to understand:

- *Change the speaking volume:* Use the volume buttons on iPhone. You can also add volume to the rotor and swipe up and down to adjust; see *Using the VoiceOver rotor control* on page 119.
- *Change the speaking rate:* Go to Settings > General > Accessibility > VoiceOver and drag the Speaking Rate slider. You can also add Speech Rate to the rotor, then swipe up or down to adjust.
- *Use pitch change:* VoiceOver uses a higher pitch when speaking the first item of a group (such as a list or table) and a lower pitch when speaking the last item of a group. Go to Settings > General > Accessibility > VoiceOver > Use Pitch Change.
- *Change the language for iPhone:* Go to Settings > General > International > Language. VoiceOver pronunciation of some languages is affected by Settings > General > International > Region Format.
- *Change pronunciation:* Set the rotor to Language, then swipe up or down. Language is available in the rotor only if you select more than one pronunciation.
- *Select the pronunciations available in the language rotor:* Go to Settings > General > Accessibility > VoiceOver > Language Rotor. To change the position of a language in the list, drag  up or down.
- *Change the basic reading voice:* Go to Settings > General > Accessibility > VoiceOver > Use Compact Voice.

### Using iPhone with VoiceOver

**Unlock iPhone:** Select the Unlock slide, then double-tap the screen.


**“Tap” to activate the selected item:** Double-tap anywhere on the screen.


**“Double-tap” the selected item:** Triple-tap anywhere on the screen.

**Adjust a slider:** Select the slider, then swipe up or down with one finger.

**Use a standard gesture when VoiceOver is turned on:** Double-tap and hold your finger on the screen. A series of tones indicates that normal gestures are in force. They remain in effect until you lift your finger, when VoiceOver gestures resume.

**Scroll a list or area of the screen:** Swipe up or down with three fingers. When paging through a list, VoiceOver speaks the range of items displayed (for example, “showing rows 5 through 10”).

- *Scroll continuously through a list:* Double-tap and hold. When you hear a series of tones, move your finger up or down to scroll the list. Continuous scrolling stops when you lift your finger.
- *Use a list index:* Some lists have an alphabetical index along the right side. The index can't be selected by swiping between items; you must touch the index directly to select it. With the index selected, swipe up or down to move along the index. You can also double-tap, then slide your finger up or down.
- *Reorder a list:* You can change the order of items in some lists, such as the Rotor and Language Rotor items in Accessibility settings. Select  on the right side of an item, double-tap and hold until you hear a sound, then drag up or down. VoiceOver speaks the item you've moved above or below, depending on the direction you're dragging.

**Rearrange your Home screen:** On the Home screen, select the icon you want to move. Double-tap and hold the icon, then drag it. VoiceOver speaks the row and column position as you drag the icon. Release the icon when it's in the location you want. You can drag additional icons. Drag an item to the left or right edge of the screen to move it to a different page of the Home screen. When you finish, press the Home button .

**Speak the iPhone status information:** Tap the top of the screen to hear information about the time, battery life, Wi-Fi signal strength, and more.

**Speak notifications:** Go to Settings > General > Accessibility > VoiceOver and turn on Speak Notifications. Notifications, including the text of incoming text messages, are spoken as they occur, even if iPhone is locked. Unacknowledged notifications are repeated when you unlock iPhone.

**Turn the screen curtain on or off:** Tap four times with three fingers. When the screen curtain is on, the screen contents are active even though the display is turned off.

### Learning VoiceOver gestures

When VoiceOver is turned on, the standard touchscreen gestures have different effects. These and some additional gestures let you move around the screen and control individual items when they're selected. VoiceOver gestures include two- and three-finger gestures to tap or swipe. For best results when using two- and three-finger gestures, relax and let your fingers touch the screen with some space between them.

You can use different techniques to enter VoiceOver gestures. For example, you can enter a two-finger tap using two fingers from one hand, or one finger from each hand. You can also use your thumbs. Many find the "split-tap" gesture especially effective: instead of selecting an item and double-tapping, you can touch and hold an item with one finger, then tap the screen with another finger. Try different techniques to discover which works best for you.

If your gestures don't work, try quicker movements, especially for double-tapping and swiping gestures. To swipe, try quickly brushing the screen with your finger or fingers. When VoiceOver is turned on, the VoiceOver Practice button appears, which gives you a chance to practice VoiceOver gestures before proceeding.

**Practice VoiceOver gestures:** Go to Settings > General > Accessibility > VoiceOver, then tap VoiceOver Practice. When you finish practicing, tap Done. If you don't see the VoiceOver Practice button, make sure VoiceOver is turned on.

Here's a summary of key VoiceOver gestures:

#### Navigate and read

- *Tap:* Speak the item.
- *Swipe right or left:* Select the next or previous item.
- *Swipe up or down:* Depends on the Rotor Control setting. See Using the VoiceOver rotor control on page 119.
- *Two-finger tap:* Stop speaking the current item.
- *Two-finger flick up:* Read all from the top of the screen.
- *Two-finger flick down:* Read all from the current position.
- *Two-finger "scrub":* Move two fingers back and forth three times quickly (making a "z") to dismiss an alert or go back to the previous screen.
- *Three-finger swipe up or down:* Scroll one page at a time.
- *Three-finger swipe right or left:* Go to the next or previous page (such as the Home screen, Stocks, or Safari).
- *Three-finger tap:* Speak additional information, such as position within a list or whether text is selected.
- *Four-finger tap at top of screen:* Select the first item on the page.
- *Four-finger tap at bottom of screen:* Select the last item on the page.

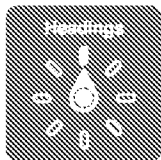
## Activate

- *Double-tap:* Activate the selected item.
- *Triple-tap:* Double-tap an item.
- *Split-tap:* As an alternative to selecting an item and double-tapping to activate it, touch an item with one finger, and then tap the screen with another.
- *Double-tap and hold (1 second) + standard gesture:* Use a standard gesture. The double-tap and hold gesture tells iPhone to interpret the next gesture as standard. For example, you can double-tap and hold, and then without lifting your finger, drag your finger to slide a switch.
- *Two-finger double-tap:* Answer or end a call. Play or pause in Music, Videos, Voice Memos, or Photos. Take a photo in Camera. Start or pause recording in Camera or Voice Memos. Start or stop the stopwatch.
- *Two-finger double-tap and hold:* Change an item's label to make it easier to find.
- *Two-finger triple-tap:* Open the Item Chooser.
- *Three-finger triple-tap:* Mute or unmute VoiceOver.
- *Three-finger quadruple-tap:* Turn the screen curtain on or off.

## Using the VoiceOver rotor control

Use the rotor to choose what happens when you swipe up or down with VoiceOver turned on.

**Operate the rotor:** Rotate two fingers on the iPhone screen around a point between them.



**Change the options included in the rotor:** Go to Settings > General > Accessibility > VoiceOver > Rotor and select the options you want to be available using the rotor.

The effect of the rotor setting depends on what you're doing. For example, if you're reading an email, you can use the rotor to switch between hearing text spoken word-by-word or character-by-character when you swipe up or down. If you're browsing a webpage, you can set the rotor to speak all the text (either word-by-word or character-by-character), or to jump from one item to another of a certain type, such as headers or links.

When you use an Apple Wireless Keyboard to control VoiceOver, a speech rotor lets you adjust settings such as volume, speech rate, use of pitch or phonetics, typing echo, and reading of punctuation. See *Controlling VoiceOver using an Apple Wireless Keyboard* on page 122.

## Entering and editing text with VoiceOver

When you enter an editable text field, you can use the onscreen keyboard or an external keyboard connected to iPhone to enter text.

**Enter text:** Select an editable text field, double-tap to display the insertion point and the onscreen keyboard, then type characters.

- *Standard typing:* Select a key on the keyboard by swiping left or right, then double-tap to enter the character. Or move your finger around the keyboard to select a key and, while continuing to touch the key with one finger, tap the screen with another finger. VoiceOver speaks the key when it's selected, and again when the character is entered.

- *Touch typing:* Touch a key on the keyboard to select it, then lift your finger to enter the character. If you touch the wrong key, slide your finger to the key you want. VoiceOver speaks the character for each key as you touch it, but doesn't enter a character until you lift your finger.
- *Choose standard or touch typing:* With VoiceOver turned on and a key selected on the keyboard, use the rotor to select Typing Mode, then swipe up or down.

**Move the insertion point:** Swipe up or down to move the insertion point forward or backward in the text. Use the rotor to choose whether you want to move the insertion point by character, by word, or by line.


VoiceOver makes a sound when the insertion point moves, and speaks the character, word, or line that the insertion point moves across. When moving forward by words, the insertion point is placed at the end of each word, before the space or punctuation that follows. When moving backward, the insertion point is placed at the end of the preceding word, before the space or punctuation that follows it.

**Move the insertion point past the punctuation at the end of a word or sentence:** Use the rotor to switch back to character mode.

When moving the insertion point by line, VoiceOver speaks each line as you move across it. When moving forward, the insertion point is placed at the beginning of the next line (except when you reach the last line of a paragraph, when the insertion point is moved to the end of the line just spoken). When moving backward, the insertion point is placed at the beginning of the line that's spoken.

**Change typing feedback:** Go to Settings > General > Accessibility > VoiceOver > Typing Feedback.

**Use phonetics in typing feedback:** Go to Settings > General > Accessibility > VoiceOver > Use Phonetics. Text is read character by character. VoiceOver first speaks the character, then its phonetic equivalent—for example, "f" and then "foxtrot."

**Delete a character:** Select , then double-tap or split-tap. You must do this even when touch typing. To delete multiple characters, touch and hold the Delete key, then tap the screen with another finger once for each character you want to delete. VoiceOver speaks the character as it's deleted. If Use Pitch Change is turned on, VoiceOver speaks deleted characters in a lower pitch.

**Select text:** Set the rotor to Edit, swipe up or down to choose Select or Select All, then double tap. If you chose Select, the word closest to the insertion point is selected when you double-tap. If you chose Select All, all text is selected. Pinch to increase or decrease the selection.

**Cut, copy, or paste:** Make sure the rotor is set to Edit. With text selected, swipe up or down to choose Cut, Copy, or Paste, then double-tap.

**Undo:** Shake iPhone, swipe left or right to choose the action to undo, then double-tap.

**Enter an accented character:** In standard typing mode, select the plain character, then double-tap and hold until you hear a sound indicating alternate characters have appeared. Drag left or right to select and hear the choices. Release your finger to enter the current selection.

**Change the keyboard language:** Set the rotor to Language, then swipe up or down. Choose "default language" to use the language specified in International settings. The Language rotor appears only if you select more than one language in Settings > General > Accessibility > VoiceOver > Language Rotor.

## Making phone calls with VoiceOver

**Answer or end a call:** Double-tap the screen with two fingers.

When a phone call is established with VoiceOver on, the screen displays the numeric keypad by default, instead of showing call options.


**Display call options:** Select the Hide Keypad button in the lower-right corner and double-tap.

**Display the numeric keypad again:** Select the Keypad button near the center of the screen and double-tap.

## Using VoiceOver with Safari

When you search the web in Safari with VoiceOver on, the Search Results rotor items lets you hear the list of suggested search phrases.

**Search the web:** Select the search field, enter your search, then swipe right or left to move down or up the list of suggested search phrases. Then double-tap the screen to search the web using the selected phrase.

**Set the rotor options for web browsing:** Go to Settings > General > Accessibility > VoiceOver > Rotor. Tap to select or deselect options, or drag  up to reposition an item.

**Skip images while navigating:** Go to Settings > General > Accessibility > VoiceOver > Navigate Images. You can choose to skip all images or only those without descriptions.

**Reduce page clutter for easier reading and navigation:** Select the Reader item in the Safari address field (not available for all pages).

## Using VoiceOver with Maps

You can use VoiceOver to explore a region, browse points of interest, follow roads, zoom in or out, select a pin, or get information about a location.

**Explore the map:** Drag your finger around the screen, or swipe left or right to move to another item.

**Zoom in or out:** Select the map, set the rotor to Zoom, then swipe up or down with one finger.

**Pan the map:** Swipe with three fingers.

**Browse visible points of interest:** Set the rotor to Points of Interest, then swipe up or down with one finger.

**Follow a road:** Hold your finger down on the road, wait until you hear “pause to follow,” then move your finger along the road while listening to the guide tone. The pitch increases when you stray from the road.

**Select a pin:** Touch a pin, or swipe left or right to select the pin.

**Get information about a location:** With a pin selected, double-tap to display the information flag. Swipe left or right to select the More Info button, then double-tap to display the information page.

**Hear location cues as you move about:** Turn on tracking with heading to hear street names and points of interest as you approach them.



## Editing videos and voice memos with VoiceOver

You can use VoiceOver gestures to trim Camera videos and Voice Memo recordings.

**Trim a voice memo:** On the Voice Memos screen, select the button to the right of the memo you want to trim, then double-tap. Then select Trim Memo and double-tap. Select the beginning or end of the trim tool. Swipe up to drag right, or swipe down to drag left. VoiceOver announces the amount of time the current position will trim from the recording. To complete the trim, select Trim Voice Memo and double-tap.

**Trim a video:** While viewing a video in Photos, double-tap the screen to display the video controls, then select the beginning or end of the trim tool. Then swipe up to drag to the right, or swipe down to drag to the left. VoiceOver announces the amount of time the current position will trim from the recording. To complete the trim, select Trim and double-tap.

## Controlling VoiceOver using an Apple Wireless Keyboard

You can control VoiceOver using an Apple Wireless Keyboard paired with iPhone. See [Apple Wireless Keyboard](#) on page 24.

VoiceOver Help speaks keys or keyboard commands as you type them. You can use VoiceOver Help to learn the keyboard layout and the actions associated with key combinations.

Use VoiceOver keyboard commands to navigate the screen, select items, read screen contents, adjust the rotor, and perform other VoiceOver actions. Most keyboard commands use the Control-Option key combination, abbreviated in the table below as "VO."

### VoiceOver keyboard commands

VO = Control-Option

- *Read all, starting from the current position:* VO-A
- *Read from the top:* VO-B
- *Move to the status bar:* VO-M
- *Press the Home button:* VO-H
- *Select the next or previous item:* VO-Right Arrow or VO-Left Arrow
- *Tap an item:* VO-Space bar
- *Open the Item Chooser:* VO-I
- *Double-tap with two fingers:* VO-"-"
- *Select the next or previous item specified by the rotor:* VO-Up Arrow or VO-Down Arrow
- *Adjust the speech rotor:* VO-Command-Left Arrow or VO-Command-Right Arrow
- *Adjust the setting specified by the speech rotor:* VO-Command-Up Arrow or VO-Command-Down Arrow
- *Mute or unmute VoiceOver:* VO-S
- *Switch apps:* Command-Tab or Command-Shift-Tab
- *Turn the screen curtain on or off:* VO-Shift-S
- *Turn on VoiceOver help:* VO-K
- *Return to the previous screen, or turn off VoiceOver help:* Escape

### Quick Nav

Turn on Quick Nav to control VoiceOver using the arrow keys.

- *Turn Quick Nav on or off:* Left Arrow-Right Arrow
- *Select the next or previous item:* Right Arrow or Left Arrow

- *Select the next or previous item specified by the rotor:* Up Arrow or Down Arrow
- *Select the first or last item:* Control–Up Arrow or Control–Down Arrow
- *"Tap" an item:* Up Arrow–Down Arrow
- *Scroll up, down, left, or right:* Option–Up Arrow, Option–Down Arrow, Option–Left Arrow, or Option–Right Arrow
- *Adjust the rotor:* Up Arrow–Left Arrow or Up Arrow–Right Arrow

You can also use the number keys on an Apple Wireless Keyboard to dial a phone number in Phone or enter numbers in Calculator.

### Single-letter Quick Nav for the web

When you view a webpage with Quick Nav enabled, you can use the following keys on the keyboard to navigate the page quickly. Typing the key moves to the next item of the indicated type. To move to the previous item, hold the Shift key as you type the letter.

- *Heading:* H
- *Link:* L
- *Text field:* R
- *Button:* B
- *Form control:* C
- *Image:* I
- *Table:* T
- *Static text:* S
- *ARIA landmark:* W
- *List:* X
- *Item of the same type:* M
- *Level 1 heading:* 1
- *Level 2 heading:* 2
- *Level 3 heading:* 3
- *Level 4 heading:* 4
- *Level 5 heading:* 5
- *Level 6 heading:* 6

### Using a braille display with VoiceOver

You can use a refreshable Bluetooth braille display to read VoiceOver output in braille, and you can use a braille display with input keys and other controls to control iPhone when VoiceOver is turned on. iPhone works with many wireless braille displays. For a list of supported displays, go to [www.apple.com/accessibility/iphone/braille-display.html](http://www.apple.com/accessibility/iphone/braille-display.html).

**Set up a braille display:** Turn on the display, then go to Settings > Bluetooth and turn on Bluetooth. Then, go to Settings > General > Accessibility > VoiceOver > Braille and choose the display.

**Turn contracted or eight-dot braille on or off:** Go to Settings > General > Accessibility > VoiceOver > Braille.

For information about common braille commands for VoiceOver navigation, and for information specific to certain displays, go to [support.apple.com/kb/HT4400](http://support.apple.com/kb/HT4400).

The braille display uses the language that's set for Voice Control. This is normally the language set for iPhone in Settings > International > Language. You can use the VoiceOver language setting to set a different language for VoiceOver and braille displays.

**Set the language for VoiceOver:** Go to Settings > General > International > Voice Control, then choose the language.

If you change the language for iPhone, you may need to reset the language for VoiceOver and your braille display.

You can set the leftmost or rightmost cell of your braille display to provide system status and other information:

- Announcement History contains an unread message
- The current Announcement History message hasn't been read
- VoiceOver speech is muted
- The iPhone battery is low (less than 20% charge)
- iPhone is in landscape orientation
- The screen display is turned off
- The current line contains additional text to the left
- The current line contains additional text to the right

**Set the leftmost or rightmost cell to display status information:** Go to Settings > General > Accessibility > VoiceOver > Braille > Status Cell, and tap Left or Right.

**See an expanded description of the status cell:** On your braille display, press the status cell's router button.

## Routing the audio of incoming calls

You can have the audio of incoming calls automatically routed to a headset or speaker phone instead of the iPhone receiver.

**Reroute audio for incoming calls:** Go to Settings > General > Accessibility > Incoming Calls and choose where you want to hear your calls.

## Siri

With Siri, you can do things with your iPhone, such as opening apps, just by asking, and VoiceOver can read Siri responses to you. For information, see Chapter 4, Siri, on page 36.

## Triple-click Home

Triple-click Home lets you turn some Accessibility features on or off by pressing the Home button  quickly three times. You can use Triple-click Home for:

- VoiceOver
- Invert Colors
- Zoom
- AssistiveTouch
- Hearing Aid Control
- Guided Access (Triple-click Home starts Guided Access if it's already turned on. See Guided Access on page 127.)

**Set the Triple-click Home function:** Go to Settings > General > Accessibility > Triple-click Home. If you select more than one, you're asked which one you want to control whenever you triple-click the Home button.

**Slow down the click speed:** Go to Settings > General > Accessibility > Home-click Speed.

## Zoom

Many apps let you zoom in or out on specific items. For example, you can double-tap or pinch to expand webpage columns in Safari. But, there's also a Zoom accessibility feature that lets you magnify the entire screen of any app you're using. And, you can use Zoom together with VoiceOver.

**Turn Zoom on or off:** Go to Settings > General > Accessibility > Zoom. Or, use Triple-click Home. See Triple-click Home on page 124.

**Zoom in or out:** Double-tap the screen with three fingers.

**Vary the magnification:** With three fingers, tap and drag up or down. The tap-and-drag gesture is similar to a double-tap, except you don't lift your fingers on the second tap—instead, drag your fingers on the screen. Once you start dragging, you can drag with a single finger. iPhone returns to the adjusted magnification when you zoom out and in again using the three-finger double-tap.

**Pan around the screen:** While zoomed in, drag the screen with three fingers. Once you start dragging, you can drag with a single finger so that you can see more of the screen. Or, hold a single finger near the edge of the display to pan to that side. Move your finger closer to the edge to pan more quickly. When you open a new screen, Zoom goes to the top-middle of the screen.

While using Zoom with an Apple Wireless Keyboard (see Apple Wireless Keyboard on page 24), the screen image follows the insertion point, keeping it in the center of the display.

## Large Text

Large Text lets you increase the text size in alerts, and in Calendar, Contacts, Mail, Messages, and Notes.

**Set the text size:** Go to Settings > General > Accessibility > Large Text.

## Invert Colors

Sometimes, inverting the colors on the iPhone screen may make it easier to read. When Invert Colors is turned on, the screen looks like a photographic negative.

**Invert the screen's colors:** Go to Settings > General > Accessibility > Invert Colors.

## Speak Selection

Even with VoiceOver turned off, you can have iPhone read aloud any text you select. iPhone analyzes the text to determine the language, then reads it to you using the appropriate pronunciation.

**Turn on Speak Selection:** Go to Settings > General > Accessibility > Speak Selection. There you can also:

- Adjust the speaking rate
- Choose to have individual words highlighted as they're read

**Have text read to you:** Select the text, then tap Speak.

## Speak Auto-text

Speak Auto-text speaks the text corrections and suggestions iPhone makes when you type.

**Turn Speak Auto-text on or off:** Go to Settings > General > Accessibility > Speak Auto-text.

Speak Auto-text also works with VoiceOver and Zoom.

## Mono Audio

Mono Audio combines the left and right stereo channels into a mono signal played through both channels. You can adjust the balance of the mono signal for greater volume on the right or left.

**Turn Mono Audio on or off and adjust the balance:** Go to Settings > General > Accessibility > Mono Audio.

## Hearing aids

### Made for iPhone hearing aids

If you have a Made for iPhone hearing aid (available for iPhone 4S and later), you can adjust its settings on iPhone to suit your listening needs.

**Adjust your hearing aid settings:** Go to Settings > General > Accessibility > Hearing Aids, or set Triple-Click Home to open Hearing Aid Control. See Triple-click Home on page 124.

### Hearing aid compatibility

The FCC has adopted hearing aid compatibility (HAC) rules for digital wireless phones. These rules require certain phones to be tested and rated under the American National Standard Institute (ANSI) C63.19-2007 hearing aid compatibility standards.

The ANSI standard for hearing aid compatibility contains two types of ratings:

- An "M" rating for reduced radio frequency interference to enable acoustic coupling with hearing aids that are not operating in telecoil mode
- A "T" rating for inductive coupling with hearing aids operating in telecoil mode

These ratings are given on a scale from one to four, where four is the most compatible. A phone is considered hearing aid compatible under FCC rules if it is rated M3 or M4 for acoustic coupling and T3 or T4 for inductive coupling.

For iPhone hearing aid compatibility ratings, go to [www.apple.com/support/hac](http://www.apple.com/support/hac).

Hearing aid compatibility ratings don't guarantee that a particular hearing aid works with a particular phone. Some hearing aids may work well with phones that don't meet particular ratings. To ensure interoperability between a hearing aid and a phone, try using them together before purchase.

This phone has been tested and rated for use with hearing aids for some of the wireless technologies it uses. However, there may be some newer wireless technologies used in this phone that have not been tested yet for use with hearing aids. It is important to try the different features of this phone thoroughly and in different locations, using your hearing aid or cochlear implant, to determine if you hear any interfering noise. Consult your service provider or Apple for information on hearing aid compatibility. If you have questions about return or exchange policies, consult your service provider or phone retailer.

### Hearing Aid Mode

iPhone has a Hearing Aid Mode that, when activated, may reduce interference with some hearing aid models. Hearing Aid Mode reduces the transmission power of the cellular radio in the GSM 1900 MHz band and may result in decreased 2G cellular coverage.

**Activate Hearing Aid Mode:** Go to Settings > General > Accessibility > Hearing Aids.

### Assignable ringtones and vibrations

You can assign distinctive ringtones to people in your contacts list for audible caller ID. You can also assign vibration patterns for notifications from specific apps, for phone calls, for FaceTime calls or messages from special contacts, and to alert you of a variety of other events, including new voicemail, new mail, sent mail, Tweet, Facebook Post, and reminders. Choose from existing patterns, or create new ones. See Sounds on page 139.

You can purchase ringtones from the iTunes Store on iPhone. See Chapter 22, iTunes Store, on page 94.

### LED Flash for Alerts

If you can't hear the sounds that announce incoming calls and other alerts, you can have iPhone flash its LED (next to the camera lens on the back of the iPhone). This works only when iPhone is locked or asleep. Available for iPhone 4 or later.

**Turn on LED Flash for Alerts:** Go to Settings > General > Accessibility > LED Flash for Alerts.

### Guided Access

Guided Access helps someone using iPhone to stay focused on a particular task. Guided Access limits iPhone to a single app, and lets you control which app features are available. Use Guided Access to:

- Temporarily restrict iPhone to a particular app
- Disable areas of the screen that aren't relevant to a task, or areas where an accidental gesture might cause a distraction
- Disable the iPhone hardware buttons

**Use Guided Access:** Go to Settings > General > Accessibility > Guided Access, where you can:

- Turn Guided Access on or off
- Set a passcode that controls the use of Guided Access and prevents someone from leaving an active session
- Set whether iPhone can go to sleep during a session

**Start a Guided Access session:** Open the app you want to run, then triple-click the Home button. Adjust settings for the session, then click Start.

- *Disable app controls and areas of the app screen:* Circle any part of the screen you want to disable. You can use the handles to adjust the area.
- *Ignore all screen touches:* Turn off Touch.
- *Keep iPhone from switching from portrait to landscape or from responding to any other motions:* Turn off Motion.

**End a Guided Access session:** Triple-click the Home button and enter the Guided Access passcode.

## AssistiveTouch

AssistiveTouch helps you use iPhone if you have difficulty touching the screen or pressing the buttons. You can use a compatible adaptive accessory (such as a joystick) together with AssistiveTouch to control iPhone. You can also use AssistiveTouch without an accessory to perform gestures that are difficult for you.

**Turn on AssistiveTouch:** Go to Settings > General > Accessibility > AssistiveTouch. To set Triple-click Home to turn AssistiveTouch on or off, go to Settings > General > Accessibility > Triple-click Home.

**Adjust the tracking speed (with accessory attached):** Go to Settings > General > Accessibility > AssistiveTouch > Touch speed.

**Show or hide the AssistiveTouch menu:** Click the secondary button on your accessory.

**Move the menu button:** Drag it to any edge of the screen.

**Hide the menu button (with accessory attached):** Go to Settings > General > Accessibility > AssistiveTouch > Always Show Menu.

**Perform a swipe or drag that uses 2, 3, 4, or 5 fingers:** Tap the menu button, tap Gestures, and then tap the number of digits needed for the gesture. When the corresponding circles appear on the screen, swipe or drag in the direction required by the gesture. When you finish, tap the menu button.

**Perform a pinch gesture:** Tap the menu button, tap Favorites, and then tap Pinch. When the pinch circles appear, touch anywhere on the screen to move the pinch circles, then drag the pinch circles in or out to perform a pinch gesture. When you finish, tap the menu button.

**Create your own gesture:** Tap the menu button, tap Favorites, and then tap an empty gesture placeholder. Or, go to Settings > General > Accessibility > AssistiveTouch > Create New Gesture.

**Lock or rotate the screen, adjust iPhone volume, or simulate shaking iPhone:** Tap the menu button, then tap Device.


**Simulate pressing the Home button:** Tap the menu button, then tap Home.

**Exit a menu without performing a gesture:** Tap anywhere outside the menu.

## TTY support

You can use the iPhone TTY Adapter cable (sold separately in many areas) to connect iPhone to a TTY machine. Go to [www.apple.com/store](http://www.apple.com/store) (may not be available in all areas) or check with your local Apple retailer.

**Connect iPhone to a TTY machine:** Go to Settings > Phone and turn TTY on, and then connect iPhone to your TTY machine using the iPhone TTY Adapter.

When TTY on iPhone is turned on, the TTY icon  appears in the status bar at the top of the screen. For information about using a particular TTY machine, see the documentation that came with the machine.

## Assignable ringtones

You can assign distinctive ringtones to people in your contacts list for audible caller ID. You can purchase ringtones from the iTunes Store on iPhone. See Chapter 22, iTunes Store, on page 94.

## Visual voicemail

The play and pause controls in visual voicemail let you control the playback of messages. Drag the playhead on the scrubber bar to repeat a portion of the message that's hard to understand. See Visual voicemail on page 47.

## Widescreen keyboards

Many apps, including Mail, Safari, Messages, Notes, and Contacts, let you rotate iPhone when you're typing, so you can use a larger keyboard.

## Large phone keypad

Make phone calls simply by tapping entries in your contacts and favorites lists. When you need to dial a number, iPhone's large numeric keypad makes it easy. See Phone calls on page 43.

## Voice Control

Voice Control lets you make phone calls and control Music playback using voice commands. See Making calls on page 43, and Siri and Voice Control on page 62.

## Closed captioning

**Turn on closed captioning for videos:** Go to Settings > Videos > Closed Captioning.

Not all video content includes closed captions.

## Accessibility in OS X

Take advantage of the accessibility features in OS X when you use iTunes to sync information and content from your iTunes library to iPhone. In the Finder, choose Help > Help Center, then search for "accessibility."

For more information about iPhone and OS X accessibility features, go to [www.apple.com/accessibility](http://www.apple.com/accessibility).





Settings lets you configure iPhone, set app options, add accounts, and set other preferences. See other chapters for information about settings for the built-in apps. For example, for Safari settings, see Chapter 7, Safari, on page 55.

## Airplane mode

Airplane mode disables the wireless features in order to reduce potential interference with aircraft operation and other electrical equipment.

**Turn on airplane mode:** Go to Settings and turn on airplane mode.

When airplane mode is on, appears in the status bar at the top of the screen. No phone, Wi-Fi, or Bluetooth signals are emitted from iPhone, and GPS reception is turned off. You won't be able to use apps or features that depend on these signals, such as connecting to the Internet, placing or receiving phone calls or messages, getting visual voicemail, and so on. If allowed by the aircraft operator and applicable laws and regulations, you can use iPhone and apps that don't require these signals.

If Wi-Fi is available and allowed by the aircraft operator and applicable laws and regulations, go to Settings > Wi-Fi to turn it on. You can also turn on Bluetooth in Settings > Bluetooth.

## Wi-Fi

### Joining Wi-Fi networks



Wi-Fi settings determine whether iPhone uses local Wi-Fi networks to connect to the Internet. When iPhone is joined to a Wi-Fi network, the Wi-Fi icon in the status bar at the top of the screen shows signal strength. The more bars you see, the stronger the signal. If no Wi-Fi networks are available, or if you've turned Wi-Fi off, then iPhone connects to the Internet via your cellular data network when available.

Once you join a Wi-Fi network, iPhone connects to it whenever the network is in range. If more than one previously used network is in range, iPhone joins the one last used.

You can also use iPhone to set up a new AirPort base station that provides Wi-Fi services to your home or office. See *Setting up an AirPort base station*, on page 131.

**Turn Wi-Fi on or off:** Go to Settings > Wi-Fi. You can:

- *Set iPhone to ask if you want to join a new network:* Turn "Ask to Join Networks" on or off. If "Ask to Join Networks" is off, you must manually join a network to connect to the Internet when a previously used network isn't available.


- *Forget a network, so iPhone doesn't join it:* Tap  next to a network you've joined before. Then tap "Forget this Network."
- *Join a closed Wi-Fi network:* In the list of network names, tap Other, then enter the name of the closed network. You must already know the network name, password, and security type to connect to a closed network.
- *Adjust the settings for connecting to a Wi-Fi network:* Tap  next to a network. You can set an HTTP proxy, define static network settings, turn on BootP, or renew the settings provided by a DHCP server.

### Setting up an AirPort base station

An AirPort base station provides a Wi-Fi connection to your home, school, or small business network. You can use iPhone to set up a new AirPort Express, AirPort Extreme, or Time Capsule base station.

**Use the AirPort Setup Assistant:** Go to Settings > Wi-Fi. Under "Set up an AirPort base station," tap the name of the base station you want to set up. Then follow the onscreen instructions.

If the base station you want to set up isn't listed, make sure that it has power, that you're within range, and that it hasn't already been configured. You can only set up base stations that are new or have been reset. Some older AirPort base stations cannot be set up using an iOS device. For setup instructions, see the documentation that came with the base station.

**Manage an AirPort network:** If iPhone is connected to an AirPort base station, tap  next to the network name. If you haven't already downloaded AirPort Utility, the App Store opens so you can get it.

### Bluetooth

iPhone can connect wirelessly to Bluetooth devices such as headsets, headphones, and car kits for music listening and hands-free talking. You can also connect the Apple Wireless Keyboard with Bluetooth. See *Apple Wireless Keyboard* on page 24.

**Turn Bluetooth on or off:** Go to Settings > Bluetooth.

**Connect to a Bluetooth device:** Tap the device in the Devices list, then follow the onscreen instructions to connect to it. See the documentation that came with the device for information about Bluetooth pairing.

### VPN

Your organization may use a VPN to communicate private information securely over a non-private network. You may need to configure VPN, for example, to access your work email. This setting appears when you have VPN configured on iPhone, allowing you to turn VPN on or off. See *Cellular* on page 135.

## Personal Hotspot


You can use Personal Hotspot (iPhone 4 or later) to share an Internet connection with a computer or other device—such as an iPod touch, iPad, or other iPhone—connected to your iPhone via Wi-Fi. You can also use Personal Hotspot to share an Internet connection with a computer connected to iPhone via Bluetooth or USB. Personal Hotspot works only if iPhone is connected to the Internet over the cellular data network.

**Note:** This feature may not be available in all areas. Additional fees may apply. Contact your carrier for more information.

**Share an Internet connection:** Go to Settings > General > Cellular and tap Set Up Personal Hotspot—if it appears—to set up the service with your carrier.

After you turn on Personal Hotspot, other devices can connect in the following ways:

- *Wi-Fi:* On the device, choose your iPhone from the list of available Wi-Fi networks.
- *USB:* Connect your iPhone to your computer using the cable that came with it. In your computer's Network preferences, choose iPhone and configure the network settings.
- *Bluetooth:* On iPhone, go to Settings > Bluetooth and turn on Bluetooth. To pair and connect iPhone with your device, refer to the documentation that came with your computer.

**Note:** When a device is connected, a blue band appears at the top of the iPhone screen. The Personal Hotspot icon  appears in the status bar of iOS devices using Personal Hotspot.

**Change the Wi-Fi password for iPhone:** Go to Settings > Personal Hotspot > Wi-Fi Password, then enter a password of at least 8 characters.

**Monitor your cellular data network usage:** Go to Settings > General > Usage > Cellular Usage.

## Do Not Disturb and Notifications

Push notifications appear in Notification Center and alert you to new information, even when the associated app isn't running. Notifications vary by app, but may include text or sound alerts, and a numbered badge on the app icon on the Home screen.

**Turn off all notifications:** Go to Settings and turn on Do Not Disturb. If it's on and iPhone is locked, all notifications and calls are silenced, but alarms will still sound. You can set the following options in Settings > Notifications > Do Not Disturb:

- *Automatically turn on Do Not Disturb:* Turn on Scheduled, then set the time when you don't want to be disturbed. iPhone automatically turns on Do Not Disturb during this period each day.
- *Allow some phone calls during Do Not Disturb:* When Do Not Disturb is on, ringing is silenced. To allow calls from some callers to ring, tap Allow Calls From. You can allow calls from your Favorites list, or from other Contacts groups you define. For information about Favorites, see Chapter 25, Contacts, on page 100.
- *Allow persistent callers to ring through:* Turn on Repeated Calls. If the same caller (based on their Caller ID) calls you again within three minutes, iPhone will ring.

**Turn an app's notifications on or off:** Go to Settings > Notifications. Tap an item in the list, then turn notifications on or off for that item. Apps that have notifications turned off appear in the Not In Notification Center list.

**Change how notifications appear:** Go to Settings > Notifications. You can:

- *Change the number of notifications:* Choose an item in the In Notification Center list. To set how many notifications of this type appear in Notification Center, tap Show.
- *Change the alert styles:* Choose an item in the In Notification Center list. Choose an alert style, or select None to turn off alerts and banners. Notifications will still appear in Notification Center.
- *Change the order of notifications:* Tap Edit. Drag the notifications into the order you want. To turn off a notification, drag it to the Not In Notification Center list.
- *Display numbered badges on apps with notifications:* Choose an item in the In Notification Center list and turn on Badge App icon.
- *Hide alerts from an app when iPhone is locked:* Choose the app in the In Notification Center list, then turn off "View in Lock Screen."

Some apps have additional options. For example, Messages lets you specify whether to include message previews in the notification.

**Remove Post and Tweet from Notification Center:** These sharing options appear only if you have Facebook or Twitter accounts configured. To remove these buttons, go to Settings > Notifications and turn off the Share Widget.

**Show government alerts in Notification Center:** Choose the alerts you want to see from the Government Alerts list. Government alerts are not available in all areas, vary by carrier and iPhone model, and may not work under all conditions. For example, in the United States, iPhone 4S or later can receive presidential alerts and you can turn AMBER and Emergency Alerts (which includes both Severe and Extreme Imminent Threat alerts) on or off. In Japan, iPhone 4 or later can receive Emergency Earthquake Alerts from the Japan Meteorological Agency.

## Carrier

This setting appears on GSM networks when you're outside your carrier's network and other local carrier data networks are available to use for your phone calls, visual voicemail, and cellular network Internet connections. You can make calls only on carriers that have a roaming agreement with your carrier. Additional fees may apply. Roaming charges may be billed to you by the other carrier, through your carrier.

**Select a carrier:** Go to Settings > Carrier and select the network you want to use.

Once you select a network, iPhone uses only that network. If the network is unavailable, "No service" appears on the iPhone.

## General

General settings include network, sharing, security, and other settings. You can also find information about your iPhone, and reset various iPhone settings.

## About

**Display information about iPhone:** Go to Settings > General > About. The items you can view include:

- Available storage space
- Serial number
- iOS version
- Network addresses
- IMEI (International Mobile Equipment Identity)
- ICCID (Integrated Circuit Card Identifier, or Smart Card) for GSM networks
- MEID (Mobile Equipment Identifier) for CDMA networks
- Legal notices, license, and regulatory marks

To copy the serial number and other identifiers, touch and hold the identifier until Copy appears.

**Change the device name:** Go to Settings > General > About, then tap Name. The device name is used by both iTunes and iCloud.

To help Apple improve products and services, iPhone sends diagnostic and usage data. This data does not personally identify you but may include location information.

**View or turn off diagnostic information:** Go to Settings > General > About > Diagnostics & Usage.

**Restrict or reset Ad Tracking:** Go to Settings > General > About > Advertising. Turn on Limit Ad Tracking to prevent apps from accessing your iPhone's advertising identifier. For more information, tap Learn More.

## Software Update

Software Update lets you download and install iOS updates from Apple.

**Update to the latest iOS version:** Go to Settings > General > Software Update.

If a newer version of iOS is available, follow the onscreen instructions to download and install it.

## Usage

**View usage information:** Go to Settings > General > Usage. You can:

- See your cellular usage and reset statistics
- View and delete iCloud backups, turn off backing up the Camera Roll, and buy additional storage
- View each app's storage
- Display battery level as a percentage
- See the elapsed time since iPhone has been charged

## Siri

**Enable Siri:** Go to Settings > General > Siri.

For information about using Siri and changing Siri settings, see Setting options for Siri on page 39.

## Cellular

Use Cellular settings to turn cellular data and roaming on or off, to set up Personal Hotspot, and to set cellular data options.

When an app needs to use the Internet, iPhone does the following, in order, until connected:

- Connects over the most recently used available Wi-Fi network.
- Shows a list of Wi-Fi networks in range, and connects using the one you choose.
- Connects over the cellular data network, if available.

If iPhone is connected to the Internet via the cellular data network, the **LTE**, **4G**, **3G**, **E**, or **Ⓜ** icon appears in the status bar.

LTE, 4G and 3G service on GSM cellular networks support simultaneous voice and data communications. For all other cellular connections, you can't use Internet services while you're talking on the phone unless iPhone also has a Wi-Fi connection to the Internet. Depending on your network connection, you may not be able to receive calls while iPhone transfers data over the cellular network—when downloading a webpage, for example.

*GSM networks:* On an EDGE or GPRS connection, incoming calls may go directly to voicemail during data transfers. For incoming calls that you answer, data transfers are paused.

*CDMA networks:* On EV-DO connections, data transfers are paused when you answer incoming calls. On 1xRTT connections, incoming calls may go directly to voicemail during data transfers. For incoming calls that you answer, data transfers are paused.

Data transfer resumes when you end the call.

If Cellular Data is off, all data services use only Wi-Fi—including email, web browsing, push notifications, and other services. If Cellular Data is on, carrier charges may apply. For example, using certain features and services that transfer data, such as Siri and Messages, could result in charges to your data plan.

**Turn Cellular Data on or off:** Go to Settings > General > Cellular. The following options may also be available:

- *Turn Voice Roaming on or off (CDMA):* Turn Voice Roaming off to avoid charges from using other carrier's networks. When your carrier's network isn't available, iPhone won't have cellular (data or voice) service.
- *Turn Data Roaming on or off:* Data Roaming permits Internet access over a cellular data network when you're in an area not covered by your carrier's network. When you're traveling, you can turn off Data Roaming to avoid roaming charges. See Carrier on page 133.
- *Enable or disable 3G:* Using 3G loads Internet data faster in some cases, but may decrease battery performance. If you're making a lot of phone calls, you may want to turn 3G off to extend battery life. This option is not available in all areas.

**Set up Personal Hotspot:** Go to Settings > General > Cellular > Set Up Personal Hotspot. Personal Hotspot shares iPhone's Internet connection with your computer and other iOS devices. See Personal Hotspot on page 132.

**Set when cellular data is used:** Go to Settings > General > Cellular, then turn cellular data on or off for iCloud Documents, iTunes, FaceTime, Passbook Updates, or Reading List. If a setting is off, iPhone will use only Wi-Fi for that service. The iTunes settings includes both iTunes Match and automatic downloads from the iTunes Store and the App Store.

## VPN

VPNs used within organizations allow you to communicate private information securely over a non-private network. You may need to configure VPN, for example, to access your work email. Ask the network's administrator for the settings necessary to configure VPN for your network. After one or more VPN settings are defined you can:

- *Turn VPN on or off:* Go to Settings > VPN.
- *Switch between VPNs:* Go to Settings > General > VPN, then choose a configuration.

See also Appendix A, *iPhone in Business*, on page 141.

## iTunes Wi-Fi Sync

You can sync iPhone with iTunes on a computer that's connected to the same Wi-Fi network.

**Enable iTunes Wi-Fi Sync:** To set up Wi-Fi syncing for the first time, connect iPhone to the computer that you want to sync with. For instructions see *Syncing with iTunes* on page 16.

After you configure Wi-Fi Sync, iPhone automatically syncs with iTunes once a day, when:

- iPhone is connected to a power source,
- iPhone and your computer are both connected to the same Wi-Fi network, and
- iTunes on your computer is running.

## Spotlight Search

The Spotlight Search setting lets you specify the content areas searched by Search, and rearrange the order of the results.

**Set which content areas are searched by Search:** Go to Settings > General > Spotlight Search, then select the items to search. You can also change the order of the result categories.

## Auto-Lock

Locking iPhone turns off the display in order to save the battery and prevent unintended operation of iPhone. You can still receive calls and text messages, and you can adjust the volume and use the mic button on your headset while listening to music or on a call.

**Set the amount of time before iPhone locks:** Go to Settings > General > Auto-Lock, then choose a time.

## Passcode Lock

By default, iPhone doesn't require you to enter a passcode to unlock it.

**Set a passcode:** Go to Settings > General > Passcode Lock and set a 4-digit passcode. To increase security, turn off Simple Passcode and use a longer passcode.

If you forget your passcode, you must restore the iPhone software. See *Updating and restoring iPhone software* on page 152.

**Allow access when iPhone is locked:** Go to Settings > General > Passcode Lock. You can use the following without unlocking iPhone:

- Siri (See *Setting options for Siri* on page 39.)
- Voice Dial (This setting is available only when Siri is turned off.)
- Reply with Message (See *Receiving calls* on page 44.)
- Passbook (See *Chapter 16, Passbook*, on page 84.)

**Erase data after ten failed passcode attempts:** Go to Settings > General > Passcode Lock and tap Erase Data. After ten failed passcode attempts, all settings are reset, and all your information and media are erased by removing the encryption key to the data (which is encrypted using 256-bit AES encryption).

### Restrictions

You can set restrictions for some apps and for purchased content. For example, parents can restrict explicit music from being seen on playlists, or prevent the installation of apps.


**Turn on restrictions:** Go to Settings > General > Restrictions, then tap Enable Restrictions. You'll be asked to define a restrictions passcode that's necessary in order to change the settings you make. This is distinct from the passcode for unlocking iPhone.

*Important:* If you forget your restrictions passcode, you must restore the iPhone software. See *Updating and restoring iPhone software* on page 152.

You can set restrictions for the following apps:

- Safari
- Camera (and apps that use the camera)
- FaceTime
- iTunes Store
- iBookstore
- Siri (including voice command and dictation)

You can also restrict the following:

- *Installing Apps:* The App Store is disabled and its icon is removed from the Home screen. You cannot install apps on iPhone.
- *Deleting Apps:* You cannot delete apps from iPhone.  doesn't appear on app icons when you're customizing the Home screen.
- *Explicit Language:* Siri attempts to replace explicit words you speak by replacing them with asterisks and beep sounds
- *Privacy:* The privacy settings for Location Services, Contacts, Calendars, Reminders, Photos, Bluetooth Sharing, Twitter, and Facebook can each be locked.
- *Accounts:* The current Mail, Contacts, Calendar settings are locked. You cannot add, modify, or delete accounts. You also cannot modify iCloud settings.
- *Find My Friends:* The current Find My Friends settings are locked. This option is available when the Find My Friends app is installed.
- *Volume Limit:* The current sound volume limit setting is locked.
- *In-App Purchases:* When In-App Purchases is turned off, you can't purchase additional content or functionality for apps you download from the App Store.
- *Require Passwords:* Requires you to enter your Apple ID for in-app purchases after the time period you specify.
- *Content Restrictions:* Tap Ratings For, then select a country from the list. Then set restrictions for music, podcasts, movies, TV shows, and apps. Content that doesn't meet the rating you select won't appear on iPhone.
- *Multiplayer Games:* When Multiplayer Games is off, you can't request a match, send or receive invitations to play games, or add friends in Game Center.
- *Adding Friends:* When Adding Friends is off, you can't make or receive friend requests in Game Center. If Multiplayer Games is turned on, you can continue to play with existing friends.



## Date & Time

These settings affect the time shown in the status bar at the top of the screen, and in world clocks and calendars.

**Set whether iPhone shows 24-hour time or 12-hour time:** Go to Settings > General > Date & Time, then turn 24-Hour Time on or off. (24-Hour Time may not be available in all areas.)

**Set whether iPhone updates the date and time automatically:** Go to Settings > General > Date & Time, then turn Set Automatically on or off. If you set iPhone to update the time automatically, it gets the correct time over the cellular network and updates it for the time zone you're in. Some carriers don't support network time, so in some areas iPhone may not be able to automatically determine the local time.

**Set the date and time manually:** Go to Settings > General > Date & Time, then turn Set Automatically off. Tap Time Zone to set your time zone. Tap the Date & Time button, then tap Set Date & Time.

## Keyboard

You can turn on keyboards for writing in different languages, and you can turn typing features, such as spell-checking, on or off. For information about the keyboard, see [Typing on page 22](#).

For information about international keyboards, see [Appendix B, International Keyboards, on page 143](#).

## International

Go to Settings > General > International to set the following:

- The language for iPhone
- The calendar format
- The language for Voice Control
- The keyboards you use
- The date, time, and telephone number formats

## Accessibility

Go to Settings > General > Accessibility and turn on the features you want. See [Chapter 32, Accessibility, on page 115](#).

## Profiles

This setting appears if you install one or more profiles on iPhone. Tap Profiles to see information about the profiles you've installed. For more information see [Using configuration profiles on page 141](#).

## Reset

You can reset the word dictionary, network settings, home screen layout, and location warnings. You can also erase all of your content and settings.

**Reset iPhone:** Go to Settings > General > Reset, then choose an option:

- *Reset all settings:* All your preferences and settings are reset.
- *Erase all content and settings:* Your information, and settings are removed. iPhone cannot be used until it's set up again.

- *Reset network settings:* When you reset network settings, your list of previously used networks and VPN settings not installed by a configuration profile are removed. Wi-Fi is turned off and then back on, disconnecting you from any network you're on. The Wi-Fi and "Ask to Join Networks" settings remain turned on. To remove VPN settings installed by a configuration profile, go to Settings > General > Profile, then select the profile and tap Remove. This also removes other settings or accounts provided by the profile.
- *Reset the keyboard dictionary:* You add words to the keyboard dictionary by rejecting words iPhone suggests as you type. Resetting the keyboard dictionary erases all words you've added.
- *Reset the Home screen layout:* Returns the built-in apps to their original layout on the Home screen.
- *Reset location and privacy:* Resets the location services and privacy settings to their factory defaults.

## Sounds

You can set iPhone to play a sound whenever you get a new message, email, call, Tweet, Facebook post, voicemail, or reminder. You can also set sounds for appointments, sending an email, pressing keys, and locking iPhone.

For information about silencing iPhone see Ring/Silent switch on page 10.

**Change sound settings:** Go to Settings > Sounds. Available options include:

- Set whether iPhone vibrates when get a call.
- Set whether iPhone vibrates when you turn on silent mode.
- Adjust the ringer and alerts volume.
- Prevent the side buttons from changing the ringer volume.
- Set the ringtone. To set a ringtone for a person, go to their card in Contacts.
- Set alert and other tones.
- Turn on keyboard clicks and a sound for when when iPhone locks.

**Set vibration patterns:** Go to Settings > Sounds and choose an item from the Sounds and Vibration Patterns list. Tap Vibration to select a pattern.

- *Define a custom vibration pattern:* Tap an item in the Sounds and Vibrations list, then tap Vibration. Tap Create New Vibration then define the pattern by touching and tapping the screen.

## Brightness & Wallpaper


Screen brightness affects battery life. Dim the screen to extend the time before you need to recharge iPhone, or use Auto-Brightness.

**Adjust the screen brightness:** Go to Settings > Brightness & Wallpaper and drag the slider. If Auto-Brightness is on, iPhone adjusts the screen brightness for current light conditions using the built-in ambient light sensor.


Wallpaper settings let you set an image or photo as wallpaper for the Lock screen or Home screen. See Changing the wallpaper on page 21.

## Privacy

Privacy settings let you see and control which apps and system services have access to Location Services, and to contacts, calendars, reminders, and photos.

Location Services lets location-based apps such as Reminders, Maps, and Camera gather and use data indicating your location. Your approximate location is determined using available information from cellular network data, local Wi-Fi networks (if you have Wi-Fi turned on), and GPS (may not be available in all areas). The location data collected by Apple isn't collected in a form that personally identifies you. When an app is using Location Services,  appears in the menu bar.

**Turn Location Services on or off:** Go to Settings > Privacy > Location Services. You can turn it off for some or for all apps and services. If you turn off Location Services, you're prompted to turn it on again the next time an app or service tries to use it.

**Turn Location Services off for system services:** Several system services, such as compass calibration and location-based iAds, use Location Services. To see their status, turn them on or off, or show  in the menu bar when these services use your location, go to Settings > Privacy > Location Services > System Services.

**Turn off access to private information:** Go to Settings > Privacy. You can see which apps have requested and been granted access to the following information:

- Contacts
- Calendar
- Reminders
- Photos
- Bluetooth Sharing
- Twitter
- Facebook

You can turn off each app's access to each category of information. Review the terms and privacy policy for each third-party app to understand how it uses the data it's requesting.

With support for secure access to corporate networks, directories, and Microsoft Exchange, iPhone is ready to go to work. For detailed information about using iPhone in business, go to [www.apple.com/iphone/business](http://www.apple.com/iphone/business).

## Using configuration profiles

If you're in an enterprise environment, you may be able to set up accounts and other items on iPhone by installing a configuration profile. Configuration profiles let your administrator set up your iPhone to use the information systems at your company, school, or organization. For example, a configuration profile might set up your iPhone to access the Microsoft Exchange servers at work, so iPhone can access your Exchange email, calendars, and contacts, and it may turn on Passcode Lock to help keep the information secure.

Your administrator may distribute configuration profiles by email, by putting them on a secure webpage, or by installing them directly on iPhone for you. Your administrator may have you install a profile that ties your iPhone to a mobile device management server, which allows your administrator to configure your settings remotely.

**Install configuration profiles:** On iPhone, open the email message or download the configuration profiles from the website your administrator provides. When you open a configuration profile, installation begins.

*Important:* You may be asked whether a configuration profile is trusted. If in doubt, ask your administrator before installing the configuration profile.

You can't change the settings defined by a configuration profile. If you want to change settings, you must first remove the configuration profile, or install a new configuration profile with the new settings.

**Remove a configuration profile:** Go to Settings > General > Profile, then select the configuration profile and tap Remove.

Removing a configuration profile deletes the settings and all other information installed by the profile.

## Setting up Microsoft Exchange accounts

Microsoft Exchange provides email, contact, tasks, and calendar information that you can automatically sync wirelessly to iPhone. You can set up an Exchange account directly on iPhone.

**Set up an Exchange account on iPhone:** Go to Settings > Mail, Contacts, Calendars. Tap Add Account, then tap Microsoft Exchange. Ask your service provider or administrator what settings you should use.

## VPN access

VPN (virtual private network) provides secure access over the Internet to private networks, such as the network at your company or school. Use Network settings on iPhone to configure and turn on VPN. Ask your administrator what settings you should use.

VPN can also be set up automatically by a configuration profile. When VPN is set up by a configuration profile, iPhone may turn VPN on automatically whenever it's needed. For more information, contact your administrator.

## LDAP and CardDAV accounts

When you set up an LDAP account, you can view and search for contacts on your organization's LDAP server. The server appears as a new group in Contacts. Because LDAP contacts aren't downloaded to iPhone, you must have an Internet connection to view them. Check with your administrator for account settings and other requirements (such as VPN).

When you set up a CardDAV account, your account contacts are synced with iPhone over the air. You may also be able to search for contacts on your organization's CardDAV server.

**Set up an LDAP or CardDAV account:** Go to Settings > Mail, Contacts, Calendars, then tap Add Account. Tap Other. Ask your service provider or administrator what settings you should use.



# International Keyboards





## Using international keyboards



International keyboards let you type text in many different languages, including Asian languages and languages written from right to left. For a list of supported keyboards, go to [www.apple.com/iphone/specs.html](http://www.apple.com/iphone/specs.html).

**Manage keyboards:** Go to Settings > General > International > Keyboards.

- *Add a keyboard:* Tap Add New Keyboard, then choose a keyboard from the list. Repeat to add more keyboards.
- *Remove a keyboard:* Tap Edit, tap  next to the keyboard you want to remove, then tap Delete.
- *Edit your keyboard list:* Tap Edit, then drag  next to a keyboard to a new place in the list.

To enter text in a different language, switch keyboards.

**Switch keyboards while typing:** Touch and hold the Globe key  to show all your enabled keyboards. To choose a keyboard, slide your finger to the name of the keyboard, then release. The Globe key  appears only if you enable more than one keyboard.

You can also just tap . When you tap , the name of the newly activated keyboard appears briefly. Continue tapping to access other enabled keyboards.

Many keyboards provide letters, numbers, and symbols that aren't visible on the keyboard.

**Enter accented letters or other characters:** Touch and hold the related letter, number, or symbol, then slide to choose a variant. For example:

- *On a Thai keyboard:* Choose native numbers by touching and holding the related Arabic number.
- *On a Chinese, Japanese, or Arabic keyboard:* Suggested characters or candidates appear at the top of the keyboard. Tap a candidate to enter it, or flick left to see more candidates.

**Use the extended candidate list:** Tap the up arrow at the right to view the full candidate list.

- *Scroll the list:* Flick up or down.
- *Return to the short list:* Tap the down arrow.

When using certain Chinese or Japanese keyboards, you can create a shortcut for word and input pairs. The shortcut is added to your personal dictionary. When you type a shortcut while using a supported keyboard, the paired word or input is substituted for the shortcut.

**Turn shortcuts on or off:** Go to Settings > General > Keyboard > Shortcuts. Shortcuts are available for:

- Simplified Chinese: Pinyin
- Traditional Chinese: Pinyin and Zhuyin
- Japanese: Romaji and 50 Key

## Special input methods

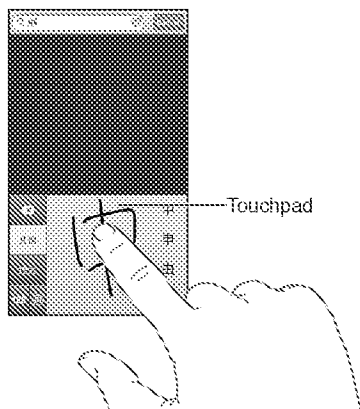
You can use keyboards to enter some languages in different ways. A few examples are Chinese Cangjie and Wubihua, Japanese Kana, and Facemarks. You can also use your finger or a stylus to write Chinese characters on the screen.

**Build Chinese characters from the component Cangjie keys:** As you type, suggested characters appear. Tap a character to choose it, or continue typing up to five components to see more options.

**Build Chinese Wubihua (stroke) characters:** Use the keypad to build Chinese characters using up to five strokes, in the correct writing sequence: horizontal, vertical, left falling, right falling, and hook. For example, the Chinese character 圈 (circle) should begin with the vertical stroke 丨.

- As you type, suggested Chinese characters appear (the most commonly used characters appear first). Tap a character to choose it.
- If you're not sure of the correct stroke, enter an asterisk (\*). To see more character options, type another stroke, or scroll through the character list.
- Tap the match key (匹配) to show only characters that match exactly what you typed.

**Write Chinese characters:** Write Chinese characters directly on the screen with your finger when Simplified or Traditional Chinese handwriting formats are turned on. As you write character strokes, iPhone recognizes them and shows matching characters in a list, with the closest match at the top. When you choose a character, its likely follow-on characters appear in the list as additional choices




Some complex characters, such as 纒 (part of the name for the Hong Kong International Airport), 𩚑 (elevator), and 𩚑 (particle used in Cantonese), can be typed by writing two or more component characters in sequence. Tap the character to replace the characters you typed. Roman characters are also recognized.

**Type Japanese kana:** Use the Kana keypad to select syllables. For more syllable options, tap the arrow key and select another syllable or word from the window.

**Type Japanese romaji:** Use the Romaji keyboard to type syllables. Alternative choices appear along the top of the keyboard, tap one to type it. For more syllable options, tap the arrow key and select another syllable or word from the window.

**Type facemarks or emoticons:** Use the Japanese Kana keyboard and tap the ^\_ ^ key. Or you can:

- Use the Japanese Romaji keyboard (QWERTY-Japanese layout): Tap the Number key 123, then tap the ^\_ ^ key.

- Use the Chinese (Simplified or Traditional) Pinyin or (Traditional) Zhuyin keyboard: Tap the Symbols key , then tap the ^\_ key.



# Safety, Handling, & Support



## Important safety information



**WARNING:** Failure to follow these safety instructions could result in fire, electric shock, or other injuries, or damage to iPhone or other property. Read all the safety information below before using iPhone.

**Handling** Handle iPhone with care. It is made of metal, glass, and plastic and has sensitive electronic components inside. iPhone can be damaged if dropped, burned, punctured, or crushed, or if it comes in contact with liquid. Don't use a damaged iPhone, such as one with a cracked screen, as it may cause injury. If you're concerned about scratching, consider using a case.

**Repairing** Don't open iPhone and don't attempt to repair iPhone by yourself. Disassembling iPhone may cause injury to you or damage to iPhone. If iPhone is damaged, malfunctions, or comes in contact with liquid, contact Apple or an Apple Authorized Service Provider. You can find more information about getting service at [www.apple.com/support/iphone/service/faq](http://www.apple.com/support/iphone/service/faq).

**Battery** Don't attempt to replace the iPhone battery yourself—you may damage the battery, which could cause overheating and injury. The lithium-ion battery in iPhone should be replaced only by Apple or an Apple Authorized Service Provider, and must be recycled or disposed of separately from household waste. Don't incinerate the battery. For information about battery recycling and replacement, go to [www.apple.com/batteries](http://www.apple.com/batteries).

**Distraction** Using iPhone in some circumstances can distract you and may cause a dangerous situation. Observe rules that prohibit or restrict the use of mobile phones or headphones (for example, avoid texting while driving a car or using headphones while riding a bicycle).

**Navigation** Maps, directions, Flyover, and location-based apps depend on data services. These data services are subject to change and may not be available in all areas, resulting in maps, directions, Flyover, or location-based information that may be unavailable, inaccurate, or incomplete. Compare the information provided on iPhone to your surroundings, and defer to posted signs to resolve any discrepancies. Some Maps features require Location Services. See Privacy on page 140. Use common sense when navigating.

**Charging** Charge iPhone with the included USB cable and power adapter or other third-party “Made for iPhone” cables and power adapters that are compatible with USB 2.0 or power adapters compliant with one or more of the following standards EN 301489-34, IEC 62684, YD/T 1591-2009, CNS 15285, ITU L.1000, or another applicable mobile phone power adapter interoperability standard. An iPhone Micro USB Adapter (available separately in some areas) or other adapter may be needed to connect iPhone to some compatible power adapters. Using damaged cables or chargers, or charging when moisture is present, can cause electric shock. When you use the Apple USB Power Adapter to charge iPhone, make sure that the AC plug or AC power cord is fully inserted into the adapter before you plug it into a power outlet. Power adapters may become warm during normal use, and prolonged contact may cause injury. Always allow adequate ventilation around power adapters when using them.

**Note:** Only micro USB power adapters in certain regions that comply with applicable mobile phone power adapter interoperability standards are compatible. Please contact the power adapter manufacturer to find out if your micro USB power adapter complies with these standards.

**Hearing loss** Listening to sound at high volumes may damage your hearing. Background noise, as well as continued exposure to high volume levels, can make sounds seem quieter than they actually are. Turn on the audio and check the volume before inserting anything in your ear. For more information about hearing loss, see [www.apple.com/sound](http://www.apple.com/sound). For information about how to set a maximum volume limit on iPhone, see Music settings on page 63.



**WARNING:** To prevent possible hearing damage, do not listen at high volume levels for long periods.

**Apple headsets** The headsets sold with iPhone 4S or later in China (identifiable by dark insulating rings on the plug) are designed to comply with Chinese standards and are compatible with iPhone 4S or later, iPad 2 or later, and iPod touch 5th generation. Use only compatible headsets with your device.

**Radio signals** iPhone uses radio signals to connect to wireless networks. For information about the amount of power used to transmit these signals, and about steps you can take to minimize exposure, see Settings > General > About > Legal > RF Exposure.

**Radio frequency interference** Observe signs and notices that prohibit or restrict the use of mobile phones (for example, in healthcare facilities or blasting areas). Although iPhone is designed, tested, and manufactured to comply with regulations governing radio frequency emissions, such emissions from iPhone can negatively affect the operation of other electronic equipment, causing them to malfunction. Turn off iPhone or use Airplane Mode to turn off the iPhone wireless transmitters when use is prohibited, such as while traveling in aircraft, or when asked to do so by authorities.

**Medical devices** iPhone contains radios that emit electromagnetic fields. These electromagnetic fields may interfere with pacemakers or other medical devices. If you wear a pacemaker, maintain at least 6 inches (approximately 15 cm) of separation between your pacemaker and iPhone. If you suspect iPhone is interfering with your pacemaker or any other medical device, stop using iPhone and consult your physician for information specific to your medical device. iPhone has magnets near the bottom, and the included headphones also have magnets in the earbuds, which may interfere with pacemakers, defibrillators or other medical devices. Maintain at least 6 inches (approximately 15 cm) of separation between your pacemaker or defibrillator and iPhone or the earbuds.

**Medical conditions** If you have any other medical condition that you believe could be affected by iPhone (for example, seizures, blackouts, eyestrain, or headaches), consult with your physician prior to using iPhone.

**Explosive atmospheres** Do not charge or use iPhone in any area with a potentially explosive atmosphere, such as at a fueling area, or in areas where the air contains chemicals or particles (such as grain, dust, or metal powders). Obey all signs and instructions.

**Repetitive motion** When you perform repetitive activities such as typing or playing games on iPhone, you may experience occasional discomfort in your hands, arms, wrists, shoulders, neck, or other parts of your body. If you experience discomfort, stop using iPhone and consult a physician.

**High-consequence activities** This device is not intended for use where the failure of the device could lead to death, personal injury, or severe environmental damage.

**Choking hazard** Some iPhone accessories may present a choking hazard to small children. Keep these accessories away from small children.

### Important handling information

**Cleaning** Clean iPhone immediately if it comes in contact with anything that may cause stains—such as dirt, ink, makeup, or lotions. To clean:

- Disconnect all cables and turn iPhone off (press and hold the Sleep/Wake button, then slide the onscreen slider).
- Use a soft, lint-free cloth.
- Avoid getting moisture in openings.
- Don't use cleaning products or compressed air.

The front or back cover of iPhone may be made of glass with a fingerprint-resistant oleophobic (oil repellent) coating. This coating wears over time with normal usage. Cleaning products and abrasive materials will further diminish the coating, and may scratch the glass. Abrasive media may also scratch iPhone.

**Using connectors, ports, and buttons** Never force a connector into a port or apply excessive pressure to a button, because this may cause damage that is not covered under the warranty. If the connector and port don't join with reasonable ease, they probably don't match. Check for obstructions and make sure that the connector matches the port and that you have positioned the connector correctly in relation to the port.

**Lightning** Discoloration of the Lightning plug after regular use is normal. Dirt, debris, and exposure to liquids may cause discoloration. To remove the discoloration or if the cable becomes warm during use or won't charge or sync your iPhone, disconnect the Lightning cable from your computer or power adapter and clean it with a soft, dry, lint-free cloth. Do not use liquids or cleaning products when cleaning the Lightning connector.

**Operating temperature** iPhone is designed to work in ambient temperatures between 32° and 95° F (0° and 35° C) and stored in temperatures between -4° and 113° F (-20° and 45° C). iPhone can be damaged and battery life shortened if stored or operated outside of these temperature ranges. Avoid exposing iPhone to dramatic changes in temperature or humidity. When you're using iPhone or charging the battery, it is normal for iPhone to get warm.

If the interior temperature of iPhone exceeds normal operating temperatures (for example, in a hot car or in direct sunlight for extended periods of time), you may experience the following as it attempts to regulate its temperature:

- iPhone stops charging.
- The screen dims.
- A temperature warning screen appears.
- Some apps may close.

*Important:* You may not be able to use iPhone while the temperature warning screen is displayed. If iPhone can't regulate its internal temperature, it goes into deep sleep mode until it cools. Move iPhone to a cooler location out of direct sunlight and wait a few minutes before trying to use iPhone again.

For more information, go to [support.apple.com/kb/HT2101](http://support.apple.com/kb/HT2101).


### iPhone Support site

Comprehensive support information is available online at [www.apple.com/support/iphone](http://www.apple.com/support/iphone). To contact Apple for personalized support (not available in all areas), see [www.apple.com/support/contact](http://www.apple.com/support/contact).

### Restarting or resetting iPhone


If something isn't working right, try restarting iPhone, forcing an app to close, or resetting iPhone.

**Restart iPhone:** Hold down the Sleep/Wake button until the red slider appears. Slide your finger across the slider to turn off iPhone. To turn iPhone back on, hold down the Sleep/Wake button until the Apple logo appears.

**Force an app to close:** Hold down the Sleep/Wake button for a few seconds until a red slider appears, then hold down the Home button  until the app closes.

You can also remove an app from the recents list to force it to close. See *Opening and switching between apps* on page 17.

If you can't turn off iPhone or if the problem continues, you may need to reset iPhone. A reset should be done only if turning iPhone off and on doesn't resolve the problem.

**Reset iPhone:** Hold down the Sleep/Wake button and the Home button  at the same time for at least ten seconds, until the Apple logo appears.

### "Wrong Passcode" or "iPhone is disabled" appears

If you forget your passcode or iPhone displays an alert that it is disabled, see "iOS: Wrong passcode results in red disabled screen" at [support.apple.com/kb/HT1212](http://support.apple.com/kb/HT1212).

### "This accessory is not supported by iPhone" appears

The accessory you attached may not work with iPhone. Make sure the USB cable and connectors are free of debris, and refer to the documentation that came with the accessory.

## Can't view email attachments

If iPhone can't view email attachments, try the following:

- *View an attached file:* Tap the attachment to open it in Quick Look. You may need to wait while it downloads before viewing.
- *Save an attached photo or video:* Tap the attachment to open it in Quick Look. You may need to wait while it downloads before viewing.

Quick Look supports the following document types:

- *.doc, .docx*—Microsoft Word
- *.htm, .html*—webpage
- *.key*—Keynote
- *.numbers*—Numbers
- *.pages*—Pages
- *.pdf*—Preview, Adobe Acrobat
- *.ppt, .pptx*—Microsoft PowerPoint
- *.rtf*—Rich Text Format
- *.txt*—text
- *.vcf*—contact information
- *.xls, .xlsx*—Microsoft Excel

For additional troubleshooting information, go to [www.apple.com/support/iphone](http://www.apple.com/support/iphone).

## Backing up iPhone

You can use iCloud or iTunes to automatically back up iPhone. If you choose to back up using iCloud, you can't also use iTunes to automatically back up to your computer, but you can use iTunes to manually back up to your computer.

### Backing up with iCloud

iCloud backs up to iPhone daily over Wi-Fi, when it's connected to a power source and is locked. The date and time of the last backup is listed at the bottom of the Storage & Backup screen.

iCloud backs up your:

- Purchased music, TV shows, apps, and books
- Photos and videos in your Camera Roll
- iPhone settings
- App data
- Home screen and app organization
- Messages (iMessage, SMS, and MMS)
- Ringtones

**Note:** Purchased music is not backed up in all areas and TV shows are not available in all areas.

If you didn't enable iCloud backup when you first set up iPhone, you can turn it on in iCloud settings.

**Turn on iCloud backups:** Go to Settings > iCloud, then log in with your Apple ID and password, if required. Go to Storage & Backup, then turn on iCloud Backup.

**Back up immediately:** Go to Settings > iCloud > Storage & Backup, then tap Back Up Now.

**Manage your backups:** Go to Settings > iCloud > Storage & Backup, then tap Manage Storage. Tap the name of your iPhone.

**Turn Camera Roll backup on or off:** Go to Settings > iCloud > Storage & Backup, then tap Manage Storage. Tap the name of your iPhone, then turn Camera Roll backup on or off.

**View the devices being backed up:** Go to Settings > iCloud > Storage & Backup > Manage Storage.

**Stop iCloud backups:** Go to Settings > iCloud > Storage & Backup > Backup, then turn off iCloud Backup.

Music that isn't purchased in iTunes isn't backed up in iCloud. You have to use iTunes to back up and restore that content. See *Syncing with iTunes* on page 16.

*Important:* Backups for music or TV show purchases are not available in all areas. Previous purchases may be unavailable if they are no longer in the iTunes Store, App Store, or iBookstore.

Purchased content, as well as Photo Stream content, doesn't count against your 5 GB of free iCloud storage.

### Backing up with iTunes

iTunes creates a backup of photos in your Camera Roll or Saved Photos album, and backups of text messages, notes, call history, your Favorites list, sound settings, and more. Media files, such as songs, and some photos, aren't backed up, but can be restored by syncing with iTunes.

When you connect iPhone to the computer you normally sync with, iTunes creates a backup each time you:

- *Sync with iTunes:* iTunes syncs iPhone each time you connect iPhone to your computer. iTunes won't automatically back up an iPhone that isn't configured to sync with that computer. See *Syncing with iTunes* on page 16.
- *Update or restore iPhone:* iTunes always backs up iPhone before updating and restoring.

iTunes can also encrypt iPhone backups to secure your data.

**Encrypt iPhone backups:** Select "Encrypt iPhone backup" in the iTunes Summary pane.

**Restore iPhone files and settings:** Connect iPhone to the computer you normally sync with, select iPhone in the iTunes window, and click Restore in the Summary pane.

For more information about backups, go to [support.apple.com/kb/HT1766](http://support.apple.com/kb/HT1766).

### Removing an iTunes backup

You can remove an iPhone backup from the list of backups in iTunes. You may want to do this, for example, if a backup was created on someone else's computer.

#### Remove a backup:

- 1 In iTunes, open iTunes Preferences.
  - *Mac:* Choose iTunes > Preferences.
  - *Windows:* Choose Edit > Preferences.
- 2 Click Devices (iPhone doesn't need to be connected).
- 3 Select the backup you want to remove, then click Delete Backup.
- 4 Click Delete, to confirm you wish to remove the selected backup, then click OK.

## Updating and restoring iPhone software

You can update iPhone software in Settings, or by using iTunes. You can also erase or restore iPhone, and then use iCloud or iTunes to restore from a backup.

Deleted data is no longer accessible through the iPhone user interface, but it isn't erased from iPhone. For information about erasing all content and settings, see [Reset](#) on page 138.

### Updating iPhone

You can update software in iPhone Settings or by using iTunes.

**Update wirelessly on iPhone:** Go to Settings > General > Software Update. iPhone checks for available software updates.

**Update software in iTunes:** iTunes checks for available software updates each time you sync iPhone using iTunes. See [Syncing with iTunes](#) on page 16.

For more information about updating iPhone software, go to [support.apple.com/kb/HT4623](http://support.apple.com/kb/HT4623).

### Restoring iPhone

You can use iCloud or iTunes to restore iPhone from a backup.

**Restore from an iCloud backup:** Reset iPhone to erase all settings and information. Sign in to iCloud and choose Restore from a Backup in the Setup Assistant. See [Reset](#) on page 138.

**Restore from an iTunes backup:** Connect iPhone to the computer you normally sync with, select iPhone in the iTunes window, and click Restore in the Summary pane.

When the iPhone software is restored, you can either set it up as a new iPhone, or restore your music, videos, app data, and other content from a backup.

For more information about restoring iPhone software, go to [support.apple.com/kb/HT1414](http://support.apple.com/kb/HT1414).

## Learning more, service, and support

This table describes where to get more iPhone-related safety, software, and service information.

Information	Location
Using iPhone safely	See <a href="#">Important safety information</a> on page 146.
iPhone service and support, tips, forums, and Apple software downloads	Go to <a href="http://www.apple.com/support/iphone">www.apple.com/support/iphone</a> .
Service and support from your carrier	Contact your carrier or go to your carrier's website.
The latest information about iPhone	Go to <a href="http://www.apple.com/iphone">www.apple.com/iphone</a> .
Managing your Apple ID account	Go to <a href="http://appleid.apple.com">appleid.apple.com</a> .
Using iCloud	Go to <a href="http://www.apple.com/support/icloud">www.apple.com/support/icloud</a> .
Using iTunes	Open iTunes and choose Help > iTunes Help. For an online iTunes tutorial (may not be available in all areas), go to <a href="http://www.apple.com/support/itunes">www.apple.com/support/itunes</a> .
Using other Apple iOS apps	Go to <a href="http://www.apple.com/support/ios">www.apple.com/support/ios</a> .
Finding your iPhone serial number, IMEI, ICCID, or MEID	You can find your iPhone serial number, International Mobile Equipment Identity (IMEI), ICCID, or Mobile Equipment Identifier (MEID) on the iPhone packaging. Or, on iPhone, choose Settings > General > About. For more information, go to <a href="http://support.apple.com/kb/ht4061">support.apple.com/kb/ht4061</a> .

iPhone/iPad	iPhone
Obtaining warranty service	First follow the advice in this guide. Then go to <a href="http://www.apple.com/support/iphone">www.apple.com/support/iphone</a> .
Viewing iPhone regulatory information	On iPhone, go to Settings > General > About > Legal > Regulatory.
Battery replacement service	Go to <a href="http://www.apple.com/batteries/replacements.html">www.apple.com/batteries/replacements.html</a> .
Using iPhone in an enterprise environment	Go to <a href="http://www.apple.com/iphone/business">www.apple.com/iphone/business</a> to learn more about the enterprise features of iPhone, including Microsoft Exchange, IMAP, CalDAV, CardDAV, VPN, and more.

## Using iPhone in an enterprise environment

Go to [www.apple.com/iphone/business](http://www.apple.com/iphone/business) to learn more about the enterprise features of iPhone, including Microsoft Exchange, IMAP, CalDAV, CardDAV, VPN, and more.

## Using iPhone with other carriers

Some carriers let you unlock iPhone for use with their network. To see if your carrier offers this option, go to [support.apple.com/kb/HT1937](http://support.apple.com/kb/HT1937).

Contact your carrier for authorization and setup information. You need to connect iPhone to iTunes to complete the process. Additional fees may apply.

For more information, go to [support.apple.com/kb/HT5014](http://support.apple.com/kb/HT5014).

## Disposal and recycling information

**Apple Recycling Program (available in some areas):** For free recycling of your old mobile phone, a prepaid shipping label, and instructions, see [www.apple.com/recycling](http://www.apple.com/recycling).

**iPhone disposal and recycling:** You must dispose of iPhone properly according to local laws and regulations. Because iPhone contains electronic components and a battery, iPhone must be disposed of separately from household waste. When iPhone reaches its end of life, contact local authorities to learn about disposal and recycling options, or simply drop it off at your local Apple retail store or return it to Apple. The battery will be removed and recycled in an environmentally friendly manner. For more information, see [www.apple.com/recycling](http://www.apple.com/recycling).

**Battery replacement:** The lithium-ion battery in iPhone should be replaced only by Apple or an Apple Authorized Service Provider, and must be recycled or disposed of separately from household waste. For more information about battery replacement services, go to [www.apple.com/batteries/replacements.html](http://www.apple.com/batteries/replacements.html).

### Battery Charger Efficiency





## Türkiye

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur.

台灣



廢電池請回收

## European Union—Disposal Information



The symbol above means that according to local laws and regulations your product and/or its battery shall be disposed of separately from household waste. When this product reaches its end of life, take it to a collection point designated by local authorities. The separate collection and recycling of your product and/or its battery at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment.

**Union Européenne—informations sur l'élimination:** Le symbole ci-dessus signifie que, conformément aux lois et réglementations locales, vous devez jeter votre produit et/ou sa batterie séparément des ordures ménagères. Lorsque ce produit arrive en fin de vie, apportez-le à un point de collecte désigné par les autorités locales. La collecte séparée et le recyclage de votre produit et/ou de sa batterie lors de sa mise au rebut aideront à préserver les ressources naturelles et à s'assurer qu'il est recyclé de manière à protéger la santé humaine et l'environnement.

**Europäische Union—Informationen zur Entsorgung:** Das oben aufgeführte Symbol weist darauf hin, dass dieses Produkt und/oder die damit verwendete Batterie den geltenden gesetzlichen Vorschriften entsprechend und vom Hausmüll getrennt entsorgt werden muss. Geben Sie dieses Produkt zur Entsorgung bei einer offiziellen Sammelstelle ab. Durch getrenntes Sammeln und Recycling werden die Rohstoffreserven geschont und es ist sichergestellt, dass beim Recycling des Produkts und/oder der Batterie alle Bestimmungen zum Schutz von Gesundheit und Umwelt eingehalten werden.

**Unione Europea—informazioni per lo smaltimento:** Il simbolo qui sopra significa che, in base alle leggi e alle normative locali, il prodotto e/o la sua batteria dovrebbero essere riciclati separatamente dai rifiuti domestici. Quando il prodotto diventa inutilizzabile, portalo nel punto di raccolta stabilito dalle autorità locali. La raccolta separata e il riciclaggio del prodotto e/o della sua batteria al momento dello smaltimento aiutano a conservare le risorse naturali e assicurano che il riciclaggio avvenga nel rispetto della salute umana e dell'ambiente.

**Europeiska unionen—information om kassering:** Symbolen ovan betyder att produkten och/eller dess batteri enligt lokala lagar och bestämmelser inte får kastas tillsammans med hushållsavfallet. När produkten har tjänat ut måste den tas till en återvinningstation som utsetts av lokala myndigheter. Genom att låta den uttjänta produkten och/eller dess batteri tas om hand för återvinning hjälper du till att spara naturresurser och skydda hälsa och miljö.

*Brasil—Informações sobre descarte e reciclagem*



O símbolo acima indica que este produto e/ou sua bateria não devem ser descartadas no lixo doméstico. Quando decidir descartar este produto e/ou sua bateria, faça-o de acordo com as leis e diretrizes ambientais locais. Para informações sobre o programa de reciclagem da Apple, pontos de coleta e telefone de informações, visite [www.apple.com/br/environment](http://www.apple.com/br/environment).

*Apple and the environment*

At Apple, we recognize our responsibility to minimize the environmental impacts of our operations and products. For more information, go to [www.apple.com/environment](http://www.apple.com/environment).

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019-2520/2013-01

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CC: patentcenter\_eofficeaction@uspto.gov  
SUBJECT: USPTO: Patent Electronic System - Correspondence Notification for Customer Number 24341

Wed Dec 20 05:01:02 EST 2023

Dear Patent Center Customer:

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Morgan, Lewis &Bockius LLP (PA)  
1400 Page Mill Road  
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Application	Document	Mailroom Date	Attorney Docket No.
18197070	NOA	12/20/2023	104402-5074-US
18197070	892	12/20/2023	104402-5074-US

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## ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION # <b>18/197,070</b>	RECEIPT DATE / TIME <b>03/20/2024 07:40:08 PM Z ET</b>	ATTORNEY DOCKET # <b>104402-5074-US</b>
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### Title of Invention

METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

### Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	5568	FILED BY	Benjamin Pezzner
PATENT CENTER #	64772283	FILING DATE	05/14/2023
CUSTOMER #	24341	FIRST NAMED INVENTOR	Paresh K. Patel
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

### Documents

**TOTAL DOCUMENTS: 1**

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
web85b.pdf	3	Issue Fee Payment (PTO-85B)	58 KB

### Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
web85b.pdf	D0EE8730AF14C632AE5161FE4AD47204BB654901C47FDF581 18ADC48FBEB1F896C9F17AE8DEAD9AAE243D1B7C5F1AD1F 1B0C87037279F6683F91C71CAD1BFB9D

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## ELECTRONIC PAYMENT RECEIPT

APPLICATION # <b>18/197,070</b>	RECEIPT DATE / TIME <b>03/20/2024 07:40:08 PM Z ET</b>	ATTORNEY DOCKET # <b>104402-5074-US</b>
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PATENT CENTER #	64772283	AUTHORIZED BY	-
CUSTOMER #	24341	FILING DATE	05/14/2023
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Paresh K. Patel

### Payment Information

PAYMENT METHOD <b>CARD / 8177</b>	PAYMENT TRANSACTION ID <b>E20243JJ40289400</b>	PAYMENT AUTHORIZED BY <b>Benjamin Pezzner</b>
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FEE CODE	DESCRIPTION	ITEM PRICE(\$)	QUANTITY	ITEM TOTAL(\$)
2501	UTILITY ISSUE FEE	480.00	1	480.00
			<b>TOTAL AMOUNT:</b>	<b>\$480.00</b>

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## ISSUE FEE TRANSMITTAL FORM

<b>APPLICATION #</b> 18197070	<b>FILING DATE</b> 05/14/2023	<b>FIRST NAMED INVENTOR</b> Paresh Patel	<b>ATTORNEY DOCKET #</b> 104402-5074-US
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### Title of Invention

METHOD AND SYSTEM FOR PRESENTING REPRESENTATIONS OF PAYMENT ACCEPTING UNIT EVENTS

### Application Information

<b>APPLICATION TYPE</b>	Nonprovisional Application under 35 USC 111(a)	<b>DATE DUE</b>	03/20/2024
<b>CONFIRMATION #</b>	5568	<b>ISSUE FEE DUE</b>	\$ 480
<b>EXAMINER</b>	FRANTZY POINVIL	<b>PUBLICATION DUE</b>	\$ 0
<b>GROUP ART UNIT</b>	3698	<b>TOTAL FEES DUE</b>	\$480
<b>CLASS - SUBCLASS</b>	705/044000	<b>PREV. PAID FEE</b>	\$ 0
<b>ENTITY STATUS</b>	Small		

### 1. CHANGE OF CORRESPONDENCE ADDRESS AND/OR INDICATION OF FEE ADDRESS (37 CFR 1.33 & 1.363)

#### Correspondence Address

CURRENT ADDRESS

#### Maintenance Fee Address

CURRENT ADDRESS



Change of correspondence address requested, system generated AIA/122-PC form attached



Fee address indication requested, system generated SB/47-PC form attached

## 2. ENTITY STATUS

### Change in Entity Status

#### NEW STATUS

## 3. THE FOLLOWING FEES ARE SUBMITTED



Issue Fee



Publication Fee

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## 5. FIRM AND/OR ATTORNEY NAMES TO BE PRINTED

**NOTE: If no name is listed, no name will be printed**

For printing on the patent front page, list to be displayed as entered

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## 6. ASSIGNEE NAME(S) AND RESIDENCE DATA TO BE PRINTED

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<u>DOC CODE</u>	<u>DOC DATE</u>	<u>MISCELLANEOUS</u>
<input type="checkbox"/> 1449	<u>12/19/2023</u>	<input type="checkbox"/> Continuing Data
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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO. Includes application details for 18/197,070 and 24341 7590, inventor Paresh K. Patel, attorney 104402-5074-US, examiner POINVIL, FRANTZY, art unit 3698, notification date 04/03/2024, and delivery mode ELECTRONIC.

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

donald.mixon@morganlewis.com
padocketingdepartment@morganlewis.com

<b>Corrected Notice of Allowability</b>	<b>Application No.</b> 18/197,070	<b>Applicant(s)</b> Patel, Paresh K.	
	<b>Examiner</b> FRANTZY POINVIL	<b>Art Unit</b> 3698	<b>AIA (FITF) Status</b> Yes

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1.  This communication is responsive to the Information Disclosure Statement (IDS) iof 12/19/2023.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
2.  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
3.  The allowed claim(s) is/are 1-20. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).
4.  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All      b)  Some\*      c)  None of the:
1.  Certified copies of the priority documents have been received.
  2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3.  Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5.  CORRECTED DRAWINGS (as "replacement sheets") must be submitted.  
 including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6.  DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. <input type="checkbox"/> Notice of References Cited (PTO-892)</li> <li>2. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br/>Paper No./Mail Date <u>12/19/2023</u>.</li> <li>3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br/>of Biological Material _____.</li> <li>4. <input type="checkbox"/> Interview Summary (PTO-413),<br/>Paper No./Mail Date. _____.</li> </ol> | <ol style="list-style-type: none"> <li>5. <input type="checkbox"/> Examiner's Amendment/Comment</li> <li>6. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance</li> <li>7. <input checked="" type="checkbox"/> Other <u>PTO-90C</u>.</li> </ol> |
|--|---|

/FRANTZY POINVIL/  
Primary Examiner, Art Unit 3698



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<b>APPLICATION NO./ CONTROL NO.</b>	<b>FILING DATE</b>	<b>FIRST NAMED INVENTOR/ PATENT IN REEXAMINATION</b>	<b>ATTORNEY DOCKET NO.</b>
18/197,070	05/14/2023	Patel, Paresh K.	104402-5074-US

<b>Morgan, Lewis &amp; Bockius LLP (PA)</b> 1400 Page Mill Road Palo Alto, CA 94304-1124	<b>EXAMINER</b>	
	FRANTZY POINVIL	
	<b>ART UNIT</b>	<b>PAPER</b>
	3698	20240328

**DATE MAILED:** \_\_\_\_\_

**Please find below and/or attached an Office communication concerning this application or proceeding.**

**Commissioner for Patents**

1. The Information Disclosure Statement (IDS) filed 12/19/2023 has been acknowledged and entered by the Examiner. The application has been forwarded to Publication Branch.

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to FRANTZY POINVIL whose telephone number is (571)272-6797. The examiner can normally be reached on M-Th 7:00AM to 5:30PM. Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Anderson can be reached at 571-270-0508. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/FRANTZY POINVIL/  
 Primary Examiner, Art Unit 3698

# PRINTER RUSH (PTO ASSISTANCE)

Application: 18197070

Examiner: Poinvil

GAU: 3698

From:

Location: RTFM

Creation Date: 03/22/2024

Week Date: 12/18/2023

<u>DOC CODE</u>	<u>DOC DATE</u>	<u>MISCELLANEOUS</u>
<input type="checkbox"/> 1449	<u>12/19/2023</u>	<input type="checkbox"/> Continuing Data
<input checked="" type="checkbox"/> IDS		<input type="checkbox"/> Foreign Priority
<input type="checkbox"/> CLM		<input type="checkbox"/> Document Legibility
<input type="checkbox"/> IIFW/FWCLM		<input type="checkbox"/> Fees
<input type="checkbox"/> SRFW		<input type="checkbox"/> Petition (TC)
<input type="checkbox"/> DRW		<input type="checkbox"/> Other
<input type="checkbox"/> OATH		
<input type="checkbox"/> 312		
<input type="checkbox"/> SPEC		

**[RUSH] Message:**

Please respond to the 12/19/23 IDS.

THANK YOU

**[XRUSH] Response:**

The Information Disclosure Statement (IDS) filed 12/19/2023 has been acknowledged and entered by the Examiner.

Initials: /E.P./



INFORMATION DISCLOSURE STATEMENT BY APPLICANT  Substitute for Form 1449-PTO				<b>Electronically filed December 19, 2023</b>	
				Application Number	18/197,070
				Filing Date	May 14, 2023
				First Named Inventor	Paresh K. Patel
				Art Unit	3698
				Examiner Name	Frantzy POINVIL
Sheet	1	of	16	Attorney Docket Number	104402-5074-US

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No.	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
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Examiner Signature	/FRANTZY POINVIL/	Date Considered	03/28/2024
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DB2/ 47128514.1

Petitioner Exhibit 1002-4779

INFORMATION DISCLOSURE STATEMENT BY APPLICANT  Substitute for Form 1449-PTO				<b>Electronically filed December 19, 2023</b>	
				Application Number	18/197,070
				Filing Date	May 14, 2023
				First Named Inventor	Paresh K. Patel
				Art Unit	3698
				Examiner Name	Frantzy POINVIL
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Examiner Signature	/FRANTZY POINVIL/	Date Considered	03/28/2024
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Petitioner Exhibit 1002-4780

INFORMATION DISCLOSURE STATEMENT BY APPLICANT  Substitute for Form 1449-PTO				<b>Electronically filed December 19, 2023</b>			
				Application Number		18/197,070	
				Filing Date		May 14, 2023	
				First Named Inventor		Paresh K. Patel	
				Art Unit		3698	
				Examiner Name		Frantzy POINVIL	
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Examiner Signature	/FRANTZY POINVIL/	Date Considered	03/28/2024
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Petitioner Exhibit 1002-4781

INFORMATION DISCLOSURE STATEMENT BY APPLICANT  Substitute for Form 1449-PTO				<b>Electronically filed December 19, 2023</b>	
				Application Number	18/197,070
				Filing Date	May 14, 2023
				First Named Inventor	Paresh K. Patel
				Art Unit	3698
				Examiner Name	Frantzy POINVIL
Sheet	4	of	16	Attorney Docket Number	104402-5074-US

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Examiner Signature	/FRANTZY POINVIL/	Date Considered	03/28/2024
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Petitioner Exhibit 1002-4782

INFORMATION DISCLOSURE STATEMENT BY APPLICANT  Substitute for Form 1449-PTO				<b>Electronically filed December 19, 2023</b>			
				Application Number		18/197,070	
				Filing Date		May 14, 2023	
				First Named Inventor		Paresh K. Patel	
				Art Unit		3698	
				Examiner Name		Frantzy POINVIL	
Sheet	5	of	16	Attorney Docket Number	104402-5074-US		

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Examiner Signature	/FRANTZY POINVIL/	Date Considered	03/28/2024
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Petitioner Exhibit 1002-4783

INFORMATION DISCLOSURE STATEMENT BY APPLICANT  Substitute for Form 1449-PTO				<b>Electronically filed December 19, 2023</b>	
				Application Number	18/197,070
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Petitioner Exhibit 1002-4791

INFORMATION DISCLOSURE STATEMENT BY APPLICANT  Substitute for Form 1449-PTO				<b>Electronically filed December 19, 2023</b>	
				Application Number	18/197,070
				Filing Date	May 14, 2023
				First Named Inventor	Paresh K. Patel
				Art Unit	3698
				Examiner Name	Frantzy POINVIL
Sheet	14	of	16	Attorney Docket Number	104402-5074-US

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Examiner Signature	/FRANTZY POINVIL/	Date Considered	03/28/2024
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Petitioner Exhibit 1002-4792

INFORMATION DISCLOSURE STATEMENT BY APPLICANT  Substitute for Form 1449-PTO				<b>Electronically filed December 19, 2023</b>			
				Application Number		18/197,070	
				Filing Date		May 14, 2023	
				First Named Inventor		Paresh K. Patel	
				Art Unit		3698	
				Examiner Name		Frantzy POINVIL	
Sheet	15	of	16	Attorney Docket Number	104402-5074-US		

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Examiner Signature	/FRANTZY POINVIL/	Date Considered	03/28/2024
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Petitioner Exhibit 1002-4793

INFORMATION DISCLOSURE STATEMENT BY APPLICANT  Substitute for Form 1449-PTO				<b>Electronically filed December 19, 2023</b>	
				Application Number	18/197,070
				Filing Date	May 14, 2023
				First Named Inventor	Paresh K. Patel
				Art Unit	3698
				Examiner Name	Frantzy POINVIL
Sheet	16	of	16	Attorney Docket Number	104402-5074-US

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Examiner Signature	/FRANTZY POINVIL/	Date Considered	03/28/2024
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Petitioner Exhibit 1002-4794



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Application	Document	Mailroom Date	Attorney Docket No.
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18197070	1449	04/03/2024	104402-5074-US

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/197,070	04/30/2024	11972423	104402-5074-US	5568

24341 7590 04/10/2024  
Morgan, Lewis & Bockius LLP (PA)  
1400 Page Mill Road  
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#### **Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)** (application filed on or after May 29, 2000)

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If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

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**INVENTOR(s)** (Please see PATENT CENTER site <https://patentcenter.uspto.gov> for additional inventors):

Paresh K. Patel, Portland, OR;

**APPLICANT(s)** (Please see PATENT CENTER site <https://patentcenter.uspto.gov> for additional applicants):

PAYRANGE INC., Portland, OR;

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APPLICATION NO.	ISSUE DATE	PATENT NO.
18/197,070	30-Apr-2024	11972423

Morgan, Lewis & Bockius LLP (PA)  
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