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CONFIRMATION NO. 7699

22850
OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C.
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ALEXANDRIA, VA 22314

FILING RECEIPT



Date Mailed: 10/20/2008

Receipt is acknowledged of this provisional patent application. It will not be examined for patentability and will become abandoned not later than twelve months after its filing date. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections

Applicant(s)

Jorunn Tyso, Oslo, NORWAY;

Power of Attorney: The patent practitioners associated with Customer Number 22850

If Required, Foreign Filing License Granted: 10/16/2008

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is US 61/103,588

Projected Publication Date: None, application is not eligible for pre-grant publication

Non-Publication Request: No

Early Publication Request: No

Title

LAYERED MULTI-SITE

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PROVISIONAL APPLICATION COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION under 37 CFR 1.53(c).

Docket Number 332982US8PROV

INVENTOR(s)/APPLICANT(s)			
LAST NAME	FIRST NAME	MIDDLE INITIAL	RESIDENCE (CITY AND EITHER STATE OR FOREIGN COUNTRY)
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Additional inventors are named on separately numbered sheets attached hereto.

TITLE OF THE INVENTION (500 CHARACTERS MAX)

LAYERED MULTI-SITE

CORRESPONDENCE ADDRESS

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22850

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ENCLOSED APPLICATION PARTS

Specification *Number of Pages:* 10 CD(s), Number
 Drawing(s) *Number of Sheets:* 1 Other (specify):
 Application Data Sheet

METHOD OF PAYMENT

Application Size Fee (\$270 per each additional 50 sheets over 100): Number of Pages Filed: 11
 Applicant claims small entity status. See 37 CFR 1.27.
 A check or money order is enclosed to cover the Provisional Filing Fees
 Online credit card payment is being made to cover the Provisional Filing Fees in the amount of \$220.00

PROVISIONAL \$220.00
FILING FEE
AMOUNT

The Director is hereby authorized to charge filing fees and credit any overpayment to Deposit Account Number 15-0030

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

No.

Yes, the name of the U.S. Government agency and the Government contract number are:

Respectfully Submitted,

October 7, 2008

DATE

Edward Tracy

Bradley D. Lytle

Registration No. 40,073

PROVISIONAL APPLICATION FILING ONLY

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Registration No. 47,998
 Petitioner's Exhibit 1005
 Page 4 of 21

APPLICATION DATA SHEET

APPLICATION INFORMATION

Application Type:: PROVISIONAL
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CD-ROM or CD-R?:: NONE
Title:: LAYERED MULTI-SITE
Attorney Docket Number:: 332982US8PROV
Total Drawing Sheets:: 1

INVENTOR INFORMATION

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Field of the invention

The present invention relates generally to video conferencing and more specifically to a method and system for presenting several participants located at different endpoints on a single monitor by presenting a dynamic layered multi-site.

5

Background of the invention - prior art

In video communication, the persons communicated with are represented in a video stream that is displayed in its entirety on the video endpoint. As soon as more than two sites are communicating with each other, the sites are either shown one after another, e.g. voice switching, or in a matrix, e.g. spread out on one or multiple monitors.

10

Participants in a video conference experience some issues that are preventing the video conferencing from becoming a standard form of communication.

15

The experienced quality of a video conference is defined by the degree of “natural communication or tele-presence. This comprises optimal eye contact, sensation of being in the same room, life size representation of participants, being focussed on the same discussion.

20

Regarding eye contact, it is known that this plays a large role in conversational turn-taking, perceived attention and intent, and other aspects of group communication. Video conferencing systems may provide an incorrect impression that the remote interlocutor is avoiding eye contact.

25

As soon as more than one far end site (endpoint) is introduced on a monitor at the same time, the immersive sensation of the video gets harder as the participants on the monitor are often represented very different from each other.

The problems of their variation in representation are related to the following aspects.

The participants appear in a ‘window’ as opposed to being in the same room.

30

The participants are scaled differently, e.g. sites with several participants in a typical meeting room setup make every participant appear smaller next to participants joining from a personal endpoint with only one participant.

The appearance of the participants is confined within the borders of their own video stream, making everybody appear smaller than the screen would potentially allow.

The more sites that are presented on the screen, the harder it is to see the one who is talking.

Hence, a traditional multisite video conference is not of good quality in terms of experienced natural communication or tele-presence.

An object of the present invention is to use the screen more effectively by removing background and other irrelevant information during a video conference session.

5

Objects and summary of the invention

An object of the present invention is to provide a method and a device for presenting several participants located at different endpoints on a single monitor by displaying a dynamic layered multi-site.

10 This is achieved by a method for presenting a plurality of participants in a video conference on one monitor in such a way that participants located at at least three endpoints seems to be located in the same room, and where the person currently talking is highlighted on the monitor. The method is characterized by the following steps performed in an MCU connected to said endpoints through a network:

- 15 - receiving video signals comprising sound- and image data of the participants at each endpoint;
- processing and extracting received image data from each endpoint in such a way that the images of each participant appears to have the same size, colour balance, contrast and intensity;
- 20 - interpreting received sound data from each endpoint in such a way that the endpoint currently generating most sound is marked as an active endpoint;
- transmitting processed video signals to the endpoints in such a way that all participants appears removed from their respective surroundings and resized for being displayed together on one monitor connected to each of said endpoint, and
- 25 where the participant at the active endpoint is highlighted.

Detailed description of a preferred embodiment

The method according to the invention is for presenting a plurality of participants in a video conference on a single monitor in such a way that participants located at at

30 least three endpoints seems to be located in the same room.

This is achieved by merging video images from each end point in such a way that the participants appear to be sitting in the same room. The person currently talking is highlighted on the monitor.

The invention will in the following be described in more detail with reference to the

35 figures, in which:

Figure 1 illustrates a plurality of participants located at different locations merged and presented on a single monitor, and

Figure 2 shows the system with end points connected together in a video conference network.

5 Simultaneous videoconferencing among three or more remote points, i.e. multipoint videoconferencing is possible by means of a Multipoint Control Unit (MCU). This is a “bridge” that interconnects calls from several sources (in a similar way as in the audio conference call). All parties call the MCU unit, or alternatively the MCU unit can call the parties which are going to participate. There are MCU bridges for IP
10 and ISDN-based videoconferencing. Some MCUs are implemented in software, and others are a combination of hardware and software. An MCU is characterised according to number of simultaneous calls it can handle, its ability to conduct transposing of data rates and protocols, and features such as ‘Continuous Presence’, in which multiple parties can be seen on-screen at once.

15 Figure 1 illustrates the concept of the present invention where a plurality of participants located at different end point locations are merged and presented on a single monitor.

In order to do so, pictures from the different end points are processed by performing a method comprising different steps performed in an MCU connected to said
20 endpoints.

The first step of the inventive method is to receive video signals comprising sound- and image data of the participants at each endpoint, e.g. from end points 1 to 3.

Such video signals may comprise one or more participants at each endpoint including the conference room or surroundings they are located in.

25 The video signals may also just comprise data of the bodies of the participants in the case where the surroundings have already been removed at the endpoints. In this case the endpoint comprises means for extracting image data from each participant from the background in such a way that only the participant is included in the image data. The surroundings can be extracted from an image by applying a blue- or
30 greenscreen behind the participant(s) that are filmed at the endpoint together with depth information.

The second step is to process and extract image data of participants from their backgrounds, if this has not already been done at one or more endpoints as said above, and processing the extracted image data in such a way that the images of
35 each participant appears to have similar appearance.

This second step can be performed with several sub-steps including extracting the participants from the image data. For doing this, the MCU processes the received image data by extracting each participant from the background surroundings in the image in such a way that only the bodies of the participants are included in the extracted image data.

As mentioned, and in order to reduce the amount of data transferred from endpoints to the MCU, the received video signals may be partly pre-processed at the endpoints, and comprise only image data of the participants, where the participants from one or more endpoints are already extracted from the background image in such a way that only the body of the participants are included in the image data received by the MCU. In this case the MCU will not have to process image data already extracted, but will continue with the processing of the image data of each participant for making them appear to have the same appearance by comparing the data.

There are different known ways of extracting only the image data of one or more participants from the background of an image. One way of doing this is by using techniques comprising a synthetic blue screen by using an algorithm that analyzes different parameters of the background image. Another way is to use pattern recognition for recognizing faces and bodies. Depth information for each pixel in an image is also a feasible way of extracting image data belonging to the background.

Chroma key is probably the best known technique for removing the background for a main object, i.e. participant, in an image. This technique is for mixing two images or frames together, in which a colour (or a small colour range) from one image is removed (or made transparent), revealing another image behind it. Chroma key is also referred to as colour keying, colour-separation overlay, bluescreen, or greenscreen. This technique has the advantage of being simple to comprehend and yield good quality images.

Primatte is a high-end chroma key technology used in motion picture, television and photographic host applications to remove solid coloured backgrounds (usually greenscreen or bluescreen since these colour values are far away from the colour value of the skin) and replace them with transparency to facilitate replacement of the background. It uses a unique algorithm based on three multi-faced polyhedrons floating in RGB colourspace that are used to isolate colour regions in the foreground image. Primatte is often referred to as a compositing technology and is usually used as a plug-in for image editing software.

When the images of the participants in the video conference are extracted from the background image, they will be subjected to further processing in the MCU by processing the image data of the participants in such a way that the images of each participant located at the endpoints are scaled to the same size, and adjusted to have

similar colour balance, contrast and intensity by comparing the image data received from each endpoint and finding a mean value for said parameters.

5 The resulting images of the participants will then be presented aligned horizontally and overlapped on a monitor. This process is performed dynamically according to the number of participants in the video conference.

10 Figure 1 illustrates visually the process performed for presenting participants located at different endpoint on a single monitor. As seen from the figure, the participants at endpoints 1 through 3 have different sizes, and different number of participants at the endpoints. When they are presented merged on one monitor, the image data from each end point has been processed and scaled such that all participants appear to have the same size on the monitor. The single monitor shows all participants aligned horizontally, scaled to the same sized and possibly overlapped, giving the impression that they are located in the same conference room.

15 If the number of participants is too great to fit the width of the monitor without being overlapped, the images of the participants will be adjusted by being partly overlapped to be fitted to the width.

20 The processing of the image data received from the endpoints is performed dynamically and the processing will be adjusted according to the number of participants in the video conference, e.g. when one or more participants leave an ongoing conference, the images on the monitor will present the remaining participants more spaced apart by dynamically adjusting the images of the participants to fit to the width of the screen, i.e. according to the aspect ratio. Visa versa, the participants will be placed closer together on the monitor when more participants joint the video conference.

25 The colour balance, contrast and intensity from each endpoint will also be dynamically adjusted by comparing image data received from each endpoint and finding a mean value for said parameters. The images from each endpoint will then be adjusted according to said mean value before the processed images are merged and sent to the monitor. The method will therefore consider and adjust for varying light conditions at each end point.

30 A sub step of the inventive method is to interpret received sound data from each endpoint in such a way that the endpoint currently generating most sound is marked as an active endpoint.

35 An active endpoint means that the participant(s) at this endpoint is assumed to be speaking at the moment.

If there are more than one participant located at an active endpoint, all participants may be marked as active or just the participant currently speaking. Local processing means at the endpoint can determine which participant that is currently talking, and send this information to the MCU.

5 One way of showing that a certain participant currently is talking is to place that participant, at endpoint marked as active, in front of the others. Another way of highlighting the participant is by making borders around the participant. Yet another way is to soften the other participants that are not currently talking, i.e. at endpoint not marked as active.

10 For achieving a visually pleasing effect, a delay between the transitions from one active endpoint to another can be introduced. This will enable fading out the highlighted active participant, and fading in the next highlighted active participant.

The last step of the inventive method is to present processed video signals on said single monitor at respective endpoints showing video images of the participants at other endpoints than the endpoint receiving the video signals, and where all
15 participants in the video conference, appear removed from their surroundings and seems to be located in the same room.

Figure 2 show the system with end points connected together in a video conference network. The system comprises three endpoints and an MCU connected together.
20 The network shown is Internet, but it could be any type of network.

Each endpoint comprises at least a camera with means for recording images and sound from the endpoint, a computer, and a monitor, all connected together through interfaces. The monitor is the means for displaying the other participants in the video conference. The computer is further connected to said MCU that is managing
25 an ongoing conference, and is carrying out the inventive method.

Each endpoint sends image and sound data of the participants in a video conference to the MCU, and the MCU processes the data before sending the resulting processed video signals to respective endpoints. The participants at the endpoints receiving the resulting processed video signals will not be included in the merged image, only the
30 other participants that are not located in the same room.

As mentioned above each endpoint may comprise means for extracting image data from each participant from the background in such a way that only the participant is included in the image data. In this case, this will be carried out by means, e.g. blue-
35 or greenscreen, located at the endpoints including said computer, thus reducing the amount of data sent to the MCU.

If the MCU receives video signals from an endpoint where participants have not been extracted from the background, the MCU will perform this process.

CLAIMS

1. Method for presenting a plurality of participants in a video conference on a single monitor in such a way that the participants located at at least two endpoints seems to be located in the same room,
5 c h a r a c t e r i z e d i n that the following steps are performed:
 - receiving video signals comprising sound- and image data of the participants at each endpoint;
 - 10 - interpreting received data and processing the data by extracting image data of participants from their backgrounds, if this has not already been done at one or more endpoints, and processing the extracted image data in such a way that the images of each participant appears to have similar appearance;
 - 15 - presenting processed video signals on said single monitor at respective endpoints showing video images of the participants at other endpoints than the endpoint receiving the video signals, and where all participants in the video conference, appear removed from their surroundings and seems to be located in the same room.
20
2. Method according to claim 1, c h a r a c t e r i z e d i n that the method further comprises a step of interpreting received sound data from each endpoint in such a way that the endpoint currently generating most sound, denoting a participant currently talking, is marked as an active endpoint.
25
3. Method according to claim 1, c h a r a c t e r i z e d i n that the method is performed in an MCU connected to said endpoints through a network.
4. Method according to claim 1, c h a r a c t e r i z e d i n that the method is
30 performed at the endpoints.
5. Method according to claim 1, c h a r a c t e r i z e d i n that the received video signals comprise image data of the participants, where the participants from one or more endpoints are extracted from the background surroundings in the image in such a way that only the body of the participants are included
35 in the image data received.

- 5
6. Method according to claim 3, characterized in that the MCU processes received image data by extracting each participant from the background surroundings in the image in such a way that only the body of the participants are included in the extracted image data.
- 10
7. Method according to claim 1, characterized in that the image data are processed and extracted from the background image by using techniques comprising a synthetic bluescreen and by using an algorithm that analyzes the background image and depth information.
- 15
8. Method according to claim 1, characterized in that the participants are presented aligned horizontally and overlapped on the monitor, and where this is performed dynamically according to the number of participants in the video conference.
- 20
9. Method according to claim 3, characterized in that the MCU processes the image data of the participants in such a way that the images of each participant located at the endpoints are scaled to the same size by comparison, and adjusted to have similar colour balance, contrast and intensity by comparing image data received from each endpoint and finding a mean value for said parameters for adjusting the images from each endpoint according to said mean value.
- 25
10. Method according to claim 1 and 2, characterized in that the participant at the endpoint marked as active is highlighted on the monitor.
- 30
11. Method according to claim 1 and 2, characterized in that the endpoint marked as active is highlighted by making borders around the participant.
- 35
12. Method according to claim 1 and 2, characterized in that the endpoint marked as active is highlighted by softening the participants that are not active.
13. Method according to claim 1 and 2, characterized in that the endpoint marked as active is placed in front of the other participants.

- 5
14. Method according to claim 1 and 2, c h a r a c t e r i z e d i n that a delay is introduced between an active participant and the next active participant, thus enabling fading out the highlighted active participant, and fading in the next highlighted active participant.
- 10
15. System for presenting a plurality of participants in a video conference on a single monitor in such a way that the participants located at at least two endpoints seems to be located in the same room, c h a r a c t e r i z e d i n that the system comprises an MCU connected to said endpoints through a network, and with means for performing the method according to claims 1 to 14.
- 15
16. System according to claim 15, c h a r a c t e r i z e d i n that the endpoint comprises means for extracting image data from each participant from the background in such a way that only the participant is included in the image data.
- 20
17. System according to claim 15, c h a r a c t e r i z e d i n that the MCU comprises means for extracting image data from each participant from the background in such a way that only the participant is included in the image data.
- 25
18. System according to claim 16, c h a r a c t e r i z e d i n that the image data is extracted by applying a blue- or greenscreen behind the participant(s) being filmed at the endpoint together with depth information.

ABSTRACT

The present invention relates to video conferencing with more than three participants, and more specifically to a method and system for presenting all participants located at different endpoints on a single monitor by presenting a dynamic layered multi-site with highlighting of the participant currently talking.

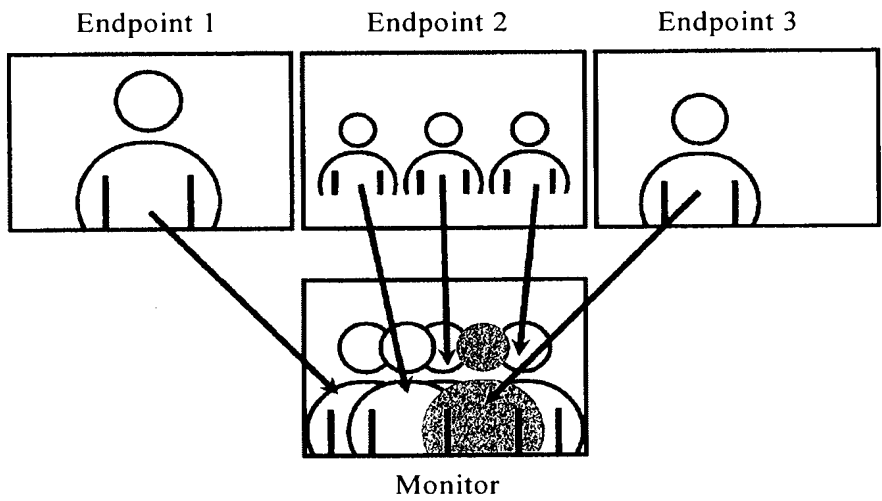


Fig. 1

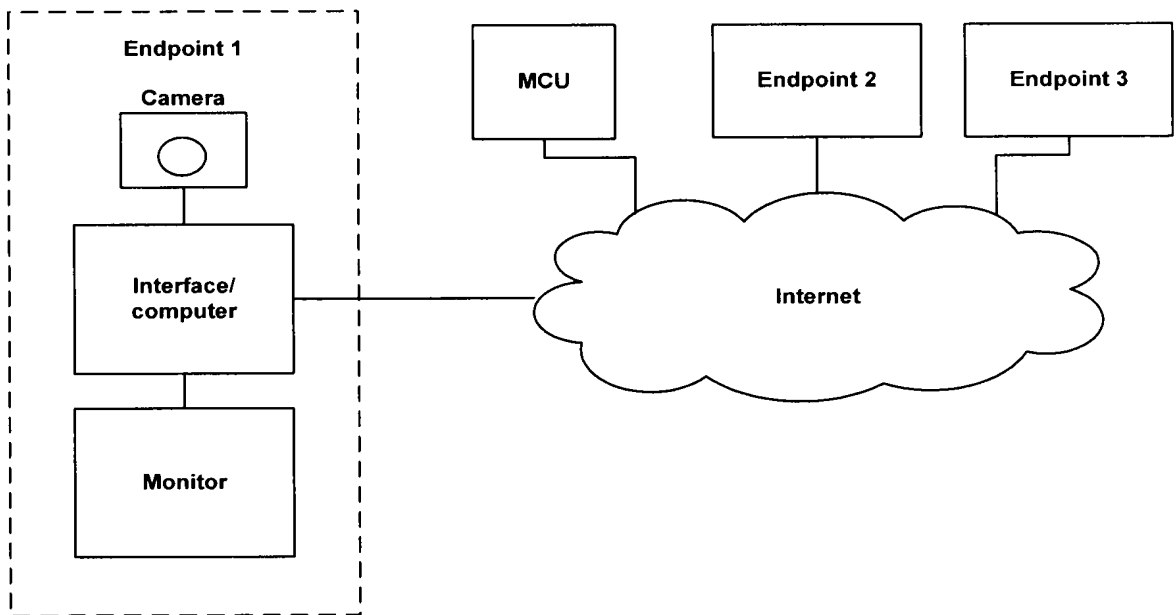


Fig. 2

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	LAYERED MULTI-SITE
First Named Inventor/Applicant Name:	Jorunn Tysso
Filer:	Marvin Jay Spivak/Dustin Goodin
Attorney Docket Number:	332982US8PROV

Filed as Large Entity

Provisional Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Provisional application filing	1005	1	220	220

Pages:

Claims:

Miscellaneous-Filing:

Petition:

Patent-Appeals-and-Interference:

Post-Allowance-and-Post-Issuance:

Extension-of-Time:

Petitioner's Exhibit 1005

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				220

Electronic Acknowledgement Receipt

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First Named Inventor/Applicant Name:	Jorunn Tysso
Customer Number:	22850
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Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part (.zip)	Pages (if appl.)

1		332982USProvisional.pdf	536044 481dc3804ce483309f3ef596afac4797c267f937	yes	14
Multipart Description/PDF files in .zip description					
		Document Description	Start	End	
		Provisional Cover Sheet (SB16)	1	1	
		Application Data Sheet	2	3	
		Specification	4	9	
		Claims	10	12	
		Abstract	13	13	
		Drawings-only black and white line drawings	14	14	
Warnings:					
Information:					
2	Fee Worksheet (PTO-06)	fee-info.pdf	29388 d45698:cf0bfc32ac0c9cd61cc5bd0016dd987e3	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			565432		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					