

## Stuart J. Lipoff

Mr. Lipoff is a consultant with a practice in TIME (telecommunications, information technology, media, electronics, and ebusiness) industries and technologies. He draws upon his 30+ years of experience in a wide variety of technologies and industries to assist clients with knowledge based consulting services involving complex business decisions. Clients turn to him for his unique ability to combine a deep understanding of industry dynamics with his equal depth in the underlying technologies. Because he is at home in either the board room or the laboratory, the services he provides range from top line revenue enhancement to operations and capital efficiency improvement working across all levels of the client organization.

Mr. Lipoff was employed 25 years by Arthur D Little, Inc (ADL) as VP and Director of Communications, Information Technology, and Electronics (CIE); 4 years by Bell & Howell Communications Company as a Section Manager, and 3 years by Motorola's Communications Division as a Project Engineer. At ADL he was responsible for the firm's global CIE practice. At both Bell & Howell and Motorola, he had project design responsibility for wireless communications and paging products.

Stuart Lipoff has Bachelor's Degrees in Electrical Engineering and in Engineering Physics, both from Lehigh University. He also has received a Masters Degree in Electrical Engineering from Northeastern University, and a MBA degree from Suffolk University.

Mr. Lipoff is a fellow of the IEEE Consumer Electronics, Communications, Computer, Circuits, and Vehicular Technology groups. He served as a member of the IEEE Consumer Electronics Society Board of Governors, and was the Boston Chapter Chairman of the IEEE Vehicular Technology Society. He has served as 1996-7 President of the IEEE Consumer Electronics Society, VP of Publications, and VP of Industry and Standards. He is currently historian for The IEEE Consumer Technology Society (formerly Consumer Electronics Society). He has also chaired the search committee for Sony supported Mazura Ibuka Award in consumer electronics. As Vice President and Standards Group Chairman of the Association of Computer Users, he served as the ACU representative to The ANSI X3 Standards group. For the Federal Communications Commission's Citizens advisory committee on CB radio (PURAC), he served as Chairman of the task group on user rule compliance. He has been elected to membership in the Society of Cable Television Engineers (SCTE), Cable TV Pioneers, The Association of Computing Machinery (ACM), and The Society of Motion Picture and Television Engineers (SMPTE).

Stuart Lipoff holds a FCC General Radiotelephone License and a Certificate in Data Processing (CDP) from the ACM supported Institute for the Certification of Computing Professionals (ICCP). He is a registered professional engineer (by examination) in The Commonwealth of Massachusetts and the state of Nevada.

Mr. Lipoff is a named inventor on seven USA patents and has published articles in Electronics Design, Microwaves, EDN, The Proceedings of the Frequency Control Symposium, Optical Spectra, and numerous IEEE publications. He has presented papers at many IEEE and other meetings. In the fall of 2000, he served as general program chair for The IEEE Vehicular Technology Conference on advanced wireless communications technology. He has organized sessions at The International Conference on Consumer Electronics and was the 1984 program chairman. He conducted an eight week IEEE sponsored short course on Fiber Optics Systems Design. In 1984, he was awarded IEEE's Centennial Medal and in 2000 IEEE's Millennium Metal.

He has served as a member of the USA advisory board to the National Science Museum of Israel and has presented a short course on international product development strategies as a faculty

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member of Technion Institute of Management in Israel. He has also served as a member of the board of directors of The Massachusetts Future Problem Solving Program.

Mr Lipoff is internationally recognized as an authority and opinion leader in new economy related businesses and technology. Citations supporting his recognition can be found on his web site at <http://www.lipoff.org>.

Some examples of projects he has performed with a card media and security focus in the broadcasting, cable TV, computer products, consumer electronics, media, telecommunications, and wireless communications sectors include:

- For a pre-revenue startup electronic wallet venture, Chameleon Networks, he served as the CTO and has been interacting with several 1st tier cellular handset and PDA OEMs exploring the integration of this electronic wallet technology into next generation products
- For The Next Generation Network Architecture (NGNA) LLC (Comcast, Cox, and Time-Warner) he led the project that developed a vision and supporting architecture for the cable industry backoffice, outside plant, and in-home network supporting advanced applications such as digital rights management content downloads and associated conditional access systems. The project involved exploration of security tokens, including Smart Cards, to support renewable security means.
- For a consortium of cable TV operators, The Multimedia Network Cable Systems Group (MCNS), he led a project that resulted in the North American standard for high speed cable modem service to the home. This standard has been just adopted by ITU as international standard J112. This effort involved the integration into the cablemodem system a security architecture that was designed to be compatible with both cablemodem and digital video set-top boxes employing removeable smart cards.
- For a firm considering resale of wireless PCS services, we developed a range of enhanced and value added services that would allow additional high margin revenue as well as led to greater market share. The key to offering these services was to integrate unique features into the handset many of which were enabled by smart card technology.
- For a project jointly funded by Mastercard and VISA, he performed a cost benefit analysis of two technical alternatives to deter credit card counterfeiting. This analysis required the development of complex mathematical models incorporating non-linear equations, recursive solutions, and stochastic formulations to forecast fraud and project cost/benefit
- For an association of credit card issuers, he has performed several projects related to security properties of card media. These projects have involved the consideration and evaluation of technologies including: magnetic watermark, smart cards, optical storage cards, and holographic storage cards.
- For an operator of a credit card authorization network, he performed a task investigating new card media technologies and their contribution to system security and impact upon

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operational logistics. This study involved consideration of SMART CARD, optical storage card, card calculators, and other developing technology.

- For Mastercard International, he has provided technical support to two Smart Pilots being conducted by Mastercard in Southern Florida and Washington, DC areas. The support included:
  - Development of pilot test plans and data collection and analysis approach
  - Development of functional, performance, and reliability specifications for the card and associated terminal hardware
  - Performing failure analysis on failed cards to determine the cause of failure
  - Performing laboratory and desktop analysis to assure security and integrity of the data
  - Performing accelerated life and stress testing to determine reliability of the cards and associated acceptors
- Under contract to several trade associations representing the grocery industry, including the: Uniform Code Council, Grocery Manufacturers Association, and Food Marketing Institute; he has researched technology and developed a systems recommendation to permit compatible electronic data interchange between suppliers and retail stores at the store level. This project included consideration of Smart Card and digital signature technology employing public and private encryption keys to insure message integrity and authorship.
- For The New York Metropolitan Transit Authority (MTA), he supported a major project to develop recommendations for an automatic fare collection system. The project involved investigation of Smart Card and other pre-paid card media and compatible reading equipment. The technology review considered tradeoffs in cost, security, resistance to tampering, ease of use, reliability, and range of features/functions.
- For a multi-client group of financial industry firms, he contributed to the development of innovative new services and products mediated by developing technologies and telecommunications services.
- For The French Ministry of Industry he performed a study to identify applications and markets for key French Technology including the semiconductor based Smart Credit Card. Of particular interest was the application of this technology to home videotex terminals for shopping and banking services.
- In support of a project for the U.S. Office of Technology Assessment, he provided technology inputs to the project team on the capabilities and limitations of technology in supporting the cashless society.

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- For the New York City MTA, he participated in the design of a requirements specification for an automatic fare collection system. A key contribution to this project by Mr. Lipoff was consideration of the security aspects of the media and access control systems.
- For the United State Post Office, as part of a project to automate the retail post office lobby, he developed system specifications for secure vending equipment and the associated alarm requirements.