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## FIRST VIRTUAL HOLDINGS INCORPORATED (A)

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*Mike Wade prepared this case under the supervision of Professor Sid Huff solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.*

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First Virtual Holdings Incorporated (FVHI, [www.firstvirtual.com](http://www.firstvirtual.com)) Chairman and CEO Lee Stein was driving along the San Diego Freeway thinking over the last 36 months. He felt satisfied that what was so recently just an idea, was now a reality. He knew that he was riding the crest of a wave, one which was about to change the face of commerce. It had become accepted wisdom that commerce on the Internet would blossom and flourish. The only real questions were when — and, after the dust settled — who would be left on the playing field? By any standard, the progress made by the company he co-founded had been spectacular. First Virtual had become one of the most recognized names in the nascent world of online commerce. The First Virtual Internet Payment System (FVIPS) had proven itself to be secure and efficient. Nothing, however, was guaranteed in this business, and Stein worried whether his company had the backing and the resources to make it through the inevitable industry shakeup.

### LEE STEIN AND FIRST VIRTUAL HOLDINGS INCORPORATED

Stein had not always been in the information technology business. In fact, by trade he was an accountant and lawyer. While Stein was attending the Villanova University School of Law in Pennsylvania he saw an episode of the Merv Griffin show between classes. The guest was Hollywood producer Allan Carr, who talked about his business manager. A career as a business manager sounded “pretty cool,” recalls Stein, who began knocking on doors in Hollywood after working for Coopers and Lybrand. “I was pretty highly trained,” he said. “And there was no downside. All somebody could say was no.”

Before long, Stein created his own company and signed his first client, Bo Goldman, an Academy Award-winning screenwriter for “One Flew Over the Cuckoo’s Nest” and later a Golden Globe winner for “Scent of a Woman.” Other well-known clients followed, including Gene Hackman, Matthew Broderick, Rod Stewart, Journey and Men at Work.

Stein was developing his entertainment practice in Beverly Hills when his wife, a CPA and then just 24, developed a degenerative inflammatory disease of the spine. The couple was devastated, but refused to accept the prognosis and began exploring alternative remedies, including practices from the Far East. Some remedies were just “kooky California” ideas, but primarily through yoga, she was able to conquer the disease. Eventually, the two studied meditation in Kathmandu with a Tibetan lama, as the experience with the illness led them to re-order their priorities to health and family.

By the mid-1980s, the couple sold their entertainment business and moved to San Diego. Stein became involved in a number of real estate ventures. He also acted as chairman of the San Diego Stadium Authority, home to the Padres and Chargers. A self-described “techno-junkie,” Stein was travelling to New York City when he began asking questions of a fellow traveller who was using a wireless device to communicate with the Internet. The other traveller was Einar Stefferud, a computer-savvy Internet veteran, MBA and expert on global messaging systems, who later jointly founded First Virtual with Stein. “He came out of a whole different world. And worlds collide. So we had to invest some serious effort in understanding each other, but we’ve always worked as a team,” says Stefferud.

Along with Stein and Stefferud, the other founding members of First Virtual were Nathaniel S. Borenstein Ph.D., the primary author of MIME, the Internet standard for multimedia and multilingual mail messages, and Marshall T. Rose Ph.D., a leader in the development and implementation of key global Internet standards. For a biography of the four founders, see Exhibit 1.

Despite Stein’s non-technical background, Stefferud credits Stein with the leadership role in bringing forth ideas during the founding group’s initial meetings in early 1994, and then in developing First Virtual’s business plan. “Lee became the hub of all the spokes to carry it forward,” as Stefferud put it.

Stein recalled those early discussions:

I was told that what we wanted to do was impossible. I was reminded that a lot of people had tried to build Internet commerce concepts before, and none had ever really worked. But I kept asking a series of questions, until somebody turned around and said, ‘Yeah, that could work.’ And then they turned my broad, goofy, upside-down concepts into reality.

Initiated by Dr. Borestein, the original idea was simple: sell jokes by electronic mail on the Internet. "Every time you turned on your machine, there would be a joke waiting for you. If you liked it, you'd pay a penny. If you didn't like it, you'd pay nothing," Stein explains. A penny a day collected from millions of Internet users could add up to significant numbers, the team realized. But the hang-up was the lack of a payment system. All four recognized the need for a secure, simple and widespread payment system for goods and services over the Internet, which led them into the business of electronic payment systems.

The company was built from the ground up to be a true virtual business. Its founders were based in San Diego, Orange County, Silicon Valley, New Jersey and Michigan. The company had no physical offices for its first 15 months of operation. In fact, for awhile no two members of the company had the same zip codes or area codes. Their business cards contained only e-mail addresses and phone numbers. The servers were set up in a high security EDS facility near Cleveland; work-at-home customer service representatives were hired to answer customer service requests by email while the data lines were routed to an MCI facility in Atlanta; marketing was handled from Washington D.C.; public relations was based in San Diego. The company itself was registered in Cheyenne, Wyoming. Certainly not your typical organization.

Although the arrangement was flexible and allowed the founders to remain in their physical locations, the initial employees decided to consolidate most of the company's day-to-day operations in San Diego in late 1995. They found that the more mundane aspects of the organization were hampered by physical distances. It was more difficult, for example to maintain employee morale, schedule meetings, keep people up to date and so on. Stein noted,

There wasn't a big problem when individuals or small groups worked remotely, they would check in regularly so there would be a constant dialogue. The problem was when clusters of people worked together at a remote site. We would miss all the hallway and water cooler talk.

President Keith Kendrick added, "e-mail is no substitute for face to face meetings in any company, even one as 'virtual' as us." By the summer of 1997, the company employed 96 people organized into five functional groups under CEO Stein and new President Keith Kendrick, and ran all of its day-to-day operations from San Diego. Images of Lee Stein and First Virtual's San Diego offices are provided in Exhibit 2.

FVHI launched its first major product, the First Virtual Internet Payment System (FVIPS) in October 1994. By September 1996, the FVIPS was being used by 2,650 merchants and 180,000 consumers in 166 countries.

### **The First Virtual Internet Payment System (FVIPS)**

The FVIPS is based on the principle that no method of data security is truly secure, and that only non-sensitive information should be sent over the Internet. Using the FVIPS, buyers can make purchases using their credit cards, yet never send their credit card numbers over the Internet.

The first step for those who want to use the FVIPS is to send credit card information to First Virtual by traditional means, namely telephone, fax or mail. They are then assigned a "VirtualPIN", which is a series of alphanumeric characters. They use the VirtualPIN as an alias for their credit card numbers to make purchases on the Internet.

The system works as follows. When making a purchase, the buyer sends his or her VirtualPIN to a participating online vendor. The vendor then forwards the buyer's VirtualPIN along with the amount and a brief description of the purchase to FVHI. FVHI uses the buyer's VirtualPIN and its internal network to look up the buyer's email address.

First Virtual then sends an e-mail to the buyer confirming the amount of the purchase. The buyer returns the e-mail to FVHI either confirming the sale, "Yes," or not, "No." If the sale is confirmed by the buyer, FVHI charges the buyer's credit card for the amount of the transaction (via a network not directly connected to the Internet) and sends a confirmation number to the vendor. The vendor then closes the transaction and provides the service, or in the case of goods, ships the merchandise to the buyer.

The buyer also has the option of replying with the word, "Fraud." If a buyer replies to a confirmation request with the word, "Fraud," the sale is automatically cancelled and the matter is turned over to FVHI for investigation.

At no time during this process is the buyer's credit card information typed into a computer connected to the Internet. Nor does any sensitive information pass through the vendor, further reducing the chance of fraud.

Unlike competing systems, the FVIPS does not rely on encryption of data, nor does it require the buyer to use special software or hardware to function. First Virtual's founders envisioned credit card companies having the ability to automatically create and distribute VirtualPINs, thereby creating mass distribution and eliminating the need for the consumer to take any action.

Merchants who wish to become sellers using the FVIPS can sign up at the company's Web site. First Virtual has two categories of merchants: Express Merchants and Pioneer Merchants. Express Merchants are typically larger and more established with existing credit card merchant accounts; Express Merchants also have to pass First Virtual's credit

approval process. Pioneer Merchants, on the other hand, are typically smaller merchants that might not otherwise qualify for a credit card merchant account.

Merchants pay First Virtual 29 cents per transaction plus two per cent of the transaction price for each sale. Express Merchants receive payment from First Virtual after three to four days. Pioneer Merchants are paid after 90 days (the legal limit in the U.S. for reversing credit card charges).

As of September 30, 1997, the company had processed over 430,000 FVIPS transactions and had registered more than 3,800 merchants and 240,000 consumers in over 160 countries.

## SECURITY

Lee Stein commented on security concerns:

We may be subject to a one-off attack. In such an attack, a person would have to eavesdrop on a consumer's electronic mail to intercept his or her VirtualPIN. But since the VirtualPIN can be used only with the First Virtual system, the attacker would have to be able to intercept the user's electronic mail, read the confirmation message from First Virtual's computers, and send out a fraudulent reply. A single user can be targeted, but a large scale attack would be very difficult . . . there are too many packets moving . . . to too many different machines.

Director of Development Winn Rindfleisch described the FVIPS as procedural security, not technical security. "Many people think we're anti-encryption, which isn't true at all. In fact, we use encryption and digital signatures when we send messages to our merchants so they know the message is coming from First Virtual." Director of Strategic Business Initiatives Chris Wand added, "If we thought we needed encryption, or that buyers would be comfortable using it, we'd have it. Our challenge in this area is to create a system, which combines convenience for the user, along with a sufficient number of built in 'levels of inconvenience' to deter hackers and minimize the risk of wide spread, automated fraud."

Furthermore, Stein pointed out, "If somebody's account is compromised, the worst thing that happens is that the consumer notices the fraudulent transaction on his or her credit card bill and declines the charge. Put it this way: Our charge-back ratio, which is usually tied to fraud, is extremely low." Stein added,

The biggest misconception is that the words 'security' and 'encryption' are identical, or even closely related. A more balanced perspective on discussions of Internet commerce can often be obtained by replacing

‘computer’ and ‘encryption’ with ‘automobile’ and ‘door lock.’ The mere existence of a door lock does not imply that the ignition keys (or a wallet) should be left inside the car. In general, it is safest to lock your car *and* remove your valuables. Similarly, while encryption can provide a modicum of additional security on the Internet, it is far more important to consider what is being encrypted, and not to encrypt anything that is better kept off the Internet in the first place. In the system we developed, the worst case would be that a single user’s account is compromised; in encryption-based systems, however, if a criminal cracks the code, the consequences would be widespread and catastrophic.

FVHI is so confident that its system is safe that it has published the means by which a hacker could break in, though none has yet been able to do so. To prove that sensitive data is susceptible to being intercepted before it is encrypted, First Virtual wrote and distributed a program that simulates how a hacker could circumvent most encryption systems by monitoring keystrokes and checking for input that resembles credit card information. On security concerns, Stein concluded,

We have two advantages over our competition. First of all, technically, we have the right stuff. Our scientists have come up with a significant number of patches to deal with the difficulties of achieving reliable, automated email communications across a myriad e-mail client programs, hundreds of ISPs and loosely implemented e-mail standards in over 160 countries. Our technicians can answer virtually any questions users might have. Fortunately, we don’t get many, which brings me to my second point. Unlike other systems out there, ours is simple to understand and simple to use. If you know how to send and receive email, you can buy and sell on the Internet using First Virtual. Other companies have a heck of a time explaining complex encryption mechanisms, public/private keys, key lifetimes and so on to their customers, most of whom are Internet novices.

“Their electronic mail protocol is a pretty low-tech solution to doing Internet commerce, but it has the advantage that it’s pretty easy to understand exactly what the likely risks are — unlike some crypto-gizmo protocols,” said Alan Bawden, a computer researcher in Cambridge, Massachusetts. “There are risks, the biggest probably being that you have to trust them (First Virtual) with your credit card number. But I probably take a bigger risk when I hand my credit card to the teen-age clerk at the local hardware store.”

Stein put it more bluntly: “There has been so much noise out there about this coming software encryption stuff. We believe in encryption and use it here at First Virtual — all of our employees use public key encryption on a daily basis. But the truth is that

many users can't even figure out how to use Web browsers, let alone turn on and use sophisticated features like encryption.”

## **STRATEGIC ALLIANCES**

From the beginning, FVHI's founders recognized that making good strategic alliances with established industry players was critical to its success. They realized that the winners in the race for the Internet commerce market would not necessarily be the companies with the best products, but those who had the largest share of the market. With this in mind, they strove to develop relationships with the biggest and the best in the business.

### **Strategic Investors:**

#### First USA Paymentech, Inc.

- The third largest processor of bank card transactions in the U.S., processing US\$30.9 billion in sales volume and 574 million transactions during 1996.
- Agreed to offer a free 90-day trial VirtualPIN to its credit card customers.
- A First Virtual investor.

#### Next Century Communications Corporation

- Marketing and lobbying firm specializing in direct response marketing, promotional and fund-raising campaigns.
- A First Virtual investor.

#### Sybase, Incorporated

- Sixth largest independent software company in the world. Developer of database, middleware and tools products for four major client/server market segments: new media, online transaction processing, mass deployment and data warehousing.
- A First Virtual investor.

#### GE Capital Corporation

- Diversified financial services company with assets of over US\$185 billion. Provides mid-market and specialized financing, specialty insurance and a

variety of consumer services such as car loans, home mortgages and credit cards.

- A First Virtual investor.

#### First Data Corporation

- Provides credit card and other information processing services to financial institutions, government agencies, insurance companies, merchants and consumers through its network in 120 countries around the world.
- 5.9 billion credit and debit card transactions processed and revenue of US\$4.9 billion in 1996.
- A First Virtual investor.

#### **Online Commerce Providers:**

#### Microsoft Corporation

- Microsoft Corp. chose the FVIPS as one of the payment methods for its new Merchant Server software. The Merchant Server software offers easy-to-use templates and other tools to minimize the development costs associated with Internet storefront development. It allows merchants of any size to build an online presence.

#### Sun Microsystems, Inc.

- The FVIPS will be a 'Java cassette' included in the latest version of the Java Commerce Toolkit. The toolkit is a set of software tools used by Java developers to create Java language-based commercial projects, such as online shopping malls, home banking and electronic brokerage.

#### The Vision Factory

- The Vision Factory's most well known product is Cat@log, a software package used by professional developers to design and operate web-based storefronts.
- The Vision Factory will integrate the FVIPS as a payment method in the latest version of Cat@log.



**First Virtual Customers:**InterNIC

- The FVIPS was chosen to provide online payment for InterNIC domain name registration services.

The Electronic Frontier Foundation (EFF)

- The EFF represents and protects civil liberties of Internet users. The organization has been at the forefront of legal and policy battles to ensure that individual rights are protected online.
- The EFF chose the FVIPS to process online donations.

Saatchi and Saatchi

- Saatchi and Saatchi teamed up with FVHI to create the VirtualTAG, an interactive point-of-sale banner. The VirtualTAG is a multilevel banner that allows potential buyers to purchase products and services without leaving the Web page on which they found the banner.

**OTHER INTERNET COMMERCE PAYMENT SYSTEMS**

By the beginning of 1996, there were dozens of payment systems vying for a place in the Internet commerce spectrum. Some specialized in very small transactions, called micropayments, typically a few cents or even fractions of a cent. These systems were primarily designed to pay for small amounts of information, generally one-time access to a particular Web page or site. Other payment systems incorporated traditional payment means such as credit card or cheque but provided strong security features to allow safe passage of sensitive information. Still others, were proprietary systems that required users to open accounts with special online banks.

**Micropayment Systems**

Millicent, NetBank and Digicash are three companies that have designed systems to sponsor micropayments. These payments might be made to purchase up-to-the-minute financial data, download a daily joke, picture, newspaper or magazine article or other online information, much of which is currently free.

Millicent was developed by Digital Equipment Corporation to facilitate anonymous microcommerce online. (Digital defines microcommerce as purchases of less than one

cent). Millicents come in 'scrips,' which are basically small, transitory, prepaid accounts that can be purchased from participating 'brokers.' A scrip worth, say, \$5 is sent to a vendor, who returns a new scrip worth \$4.995 in return for allowing the user to view the contents of the vendor's Web page. Since the dollar amount of each transaction is small, no elaborate security features are built into the Millicent system.

NetBank offers a similar system where users trade Netcash certificates anonymously online to purchase low value goods and services. The Netcash certificates can be purchased and redeemed from NetBank, a Maryland-based company.

Digicash, based in the Netherlands offers 'ecash' and 'cyberbucks' to pay for online goods and services. Unlike Millicent and Netbank, Digicash uses complex encryption algorithms to encode its ecash and cyberbucks when travelling over the Internet. As a consequence, larger anonymous transactions are possible. Digicash is also a leader in card security technology and is working with Visa and MasterCard on a smart card design.

### **Cybercash**

Cybercash uses encryption technology to allow real-time secure credit card transactions, electronic cheques and microtransactions on the Internet. The company has support from the Internet Architecture Board, the World Wide Web Consortium, CommerceNet, the Electronic Funds Transfer Association, Netscape, First Data Corp., and the National Automated Clearing House Association.

The system is based on the 'Cybercash Wallet,' a browser plug-in, through which users can make purchases using their credit cards, electronic cheques (see below for a description of the PayNow electronic cheque system) or electronic cash for small purchases. Credit card purchases are made using data encryption and digital signatures compatible with the emerging Secure Electronic Transaction (SET) standard. Cybercash and Netscape have collaborated closely to develop a secure payment system for Netscape's new line of SuiteSpot servers and Communicator browsers. Cybercash embarked on a widespread television advertising campaign in the summer of 1997.

### **PayNow**

The PayNow Secure Electronic Check Service is a system that allows Internet users to pay for goods and services online using their bank chequing accounts. Bank account numbers are encrypted, then sent across the Internet to vendors who, in turn, pass them along to a clearing house that debits the user's bank account for the value of the purchase. In early 1997, the system was being used to allow utility company customers to pay for recurring monthly expenses online. By the end of 1997, the system is expected

to be able to handle the purchase of services and hard goods, as well as peer-to-peer and business-to-business transfers.

### **Smart Cards and Mondex**

Smart cards look like regular credit or debit cards except that they include a tiny computer chip imbedded in the card itself. This chip can be used to store and process information of various kinds. On the Mondex smart card, the chip stores a binary representation of actual cash, along with the user's digital signature. Hence, this type of smart card is often called a "stored value" card. When inserted into a special reader device connected to the user's computer, the card can be used to download funds from the user's bank account. These funds can then be spent online or offline in regular stores, or transferred from card to card using a small transfer unit. The idea behind smart cards is to create a system as convenient as cash, but far more secure. While the use of digital signatures makes the cash stored on such a card more secure than conventional cash, nonetheless, if a person loses their stored value card they have lost the cash that was stored on it.

The leader in the stored value cash cards is Mondex. Mondex is 51 per cent owned by MasterCard and 49 per cent owned by a consortium of British and International corporations, including: National Westminster Bank, Ulster Bank, and Midland Bank, Scotiabank, Credit Union Central of Canada, The National Bank of Canada, Bank of Montreal, Canada Trust, Le Mouvement des caisses Desjardins, Toronto-Dominion Bank, Royal Bank of Canada, Canadian Imperial Bank of Commerce, The Hongkong and Shanghai Banking Corporation, Wells Fargo, AT&T, Chase Manhattan, First Chicago NBD, Australia and New Zealand Banking Group, Commonwealth Bank of Australia, National Australia Bank, Westpac Banking Corporation (Australia), ANZ Banking Group (New Zealand), Bank of New Zealand, Countrywide Banking Corporation, The National Bank of New Zealand, ASB Bank and Westpac Banking Corporation (New Zealand).

The key components of a Mondex chip are an 8-bit CPU, a 16K ROM, 512 bytes of RAM (and 8K EEPROM for data storage). The Mondex chip has a clock speed of up to 10 MHz and is about 20 mm square.

The first Mondex product specification was issued in April 1994. Currently more than 450 companies in over 40 countries are working with these specifications to develop cards and compatible products such as point-of-sale readers, bank cash machines, desktop readers and wallet-size balance readers.

Mondex cards have sophisticated security features built into the design to help prevent unauthorized use or duplication. Cardholders have unique 'digital signatures' and have the ability to 'lock' their cards when they are not being used.

Mondex cards are currently in the advanced trial stage. One such trial is going on in Guelph, Ontario. At the end of July 1997, there were over 7,500 cardholders in Guelph, or one in 20 residents. To date, about \$1,000,000 of electronic value has been issued to the cardholders. In March 1997, the first full month following the launch of Mondex, the average amount of electronic cash issued on a daily basis was \$15,339.

Smart Cards are not expected to be in widespread circulation until mid- to late 1998.

### **Proprietary Systems**

Many servers and Internet Service Providers (ISPs) such as Prodigy, CompuServe and America On-Line (AOL) operate their own proprietary online payment systems.

### **Traditional Payment Methods**

Many users mistrust information sent across open networks such as the Internet. There will continue to be a large percentage of Internet users who will avoid purchases on the Internet entirely, preferring to stick to more traditional methods of payment such as telephone, fax, mail or face-to-face.

There are also users that are comfortable sending payment information over the Internet either using security features integrated into popular Web browsers such as Netscape Communicator and Microsoft Internet Explorer or with no security at all.

### **The Secure Electronic Transaction (SET) Standard**

The SET standard is a technical specification for securing credit card transactions over the Internet. The SET specification is jointly being developed by Visa and MasterCard with input and support from IBM, Microsoft, Netscape, Oracle, GTE and VeriSign. The system is based on advanced encryption technology to encode credit card information, and uses digital signatures or certificates to identify credit card holders (See Exhibit 3 for a description of public key encryption and digital certificates). The integrity of the system is designed to equal a traditional point-of-sale purchase in which the buyer, merchant and credit card are physically present. Most suppliers of electronic commerce software have made a commitment to build in support for SET-based transactions.

Once widely released, the SET standard is expected to be popular with merchants since traditional credit card processing fees will be reduced, perhaps by as much as one per cent.

Constant delays in the final end-user introduction of the SET system have caused tensions to emerge between the co-sponsors. MasterCard is using a prerelease version of the SET standard in certain markets, while Visa recommends its credit card holders not to use the system until the final product is released. Technical problems have

delayed SET's debut, which was originally slated for late 1996. SET is now not expected to be rolled out until mid-1998.

## MARKETING

First Virtual had a three-fold strategy for marketing the FVIPS to buyers and merchants. First, through press releases and traditional PR channels, FVHI hoped to attract the attention of journalists who would then publicize the company in the press. So far, articles concerning First Virtual and CEO Lee Stein have appeared in *Business Week*, *Newsweek*, *Fortune*, the *Economist*, the *New York Times*, the *San José Mercury News* and more. Second, the marketing department targeted large transaction processors who might be interested in extending their business online. Third, they targeted third-party integrators such as AOL, and large ISPs.

However, it should be noted that for much of its history, First Virtual lacked a formal marketing and sales effort. Part of the reason for this was that First Virtual believed it was essential to have a stable, scalable infrastructure in place before significant marketing was undertaken. First Virtual did not want to be in a position of not being able to meet demand.

## FINANCIAL INFORMATION

For the year ended December 31, 1996, FVHI revenues increased over 250 per cent to \$696,000 from \$198,000 for the year ended December 31, 1995. Revenues for the year ended December 31, 1996, include \$150,000 in consulting revenues received from a strategic partner. Net loss for 1996 was \$10.7 million as compared to a net loss of \$2.3 million for 1995. Net loss per share was \$1.25 based on weighted average shares outstanding of 8,524,068, as compared to a net loss of \$0.30 per share for 1995 based on weighted average shares outstanding of 7,599,106. See Exhibit 4 for FVHI's Statements of Operations and Exhibit 5 for FVHI's Condensed Balance Sheets.

Commenting on the results, Chairman Stein said, "We are at an exciting stage in the development of our company. First Virtual sees a market opportunity in providing solutions for Internet commerce. We are using a portion of the Initial Public Offering (IPO) proceeds to develop both the technology and the organizational infrastructure necessary to take advantage of this opportunity."

First Virtual received its major initial financing from several strategic investors including First USA Paymentech, GE Capital and First Data Corporation, who together invested \$12.5 million between December 1994 and August 1996. First Virtual Holdings Inc. went public on the NASDAQ exchange on December 13, 1996. The offering was for 2 million shares at \$9.00 a share. The gross amount raised by the offering was \$18 million (\$15 million net), and the stock price closed at \$9.00 after the day. Exhibit 7 charts First Virtual's stock price from December 1996 to October 1997.

Even though IPO Network ranks First Virtual among the bottom 10 per cent of offerings in 1996 and 1997, CFO John Stachowiak notes that bad timing was mostly to blame.

The final months of 1996 were a bad time for technology stock offerings. The euphoria generated over a number of high profile IPOs earlier in the year had fizzled. Investors were becoming more cautious about investing in new technologies. Besides that, while we were on the road promoting the offering about a week before the IPO, Allen Greenspan came forward and issued a warning about unsustainably high stock prices. This sent the market reeling. Two other companies about to go public dropped out, but we hung in there. Against the odds, our placement was completed.

### **CURRENT ISSUES AND PLANS FOR THE FUTURE**

FVHI had achieved remarkable growth since its inception. The FVHI user base and transaction volume had doubled about every six weeks. As part of a continuing development program, the company planned to internationalize the FVIPS to include multiple language and currency support, to develop better support for microtransactions, better support for the sale of hard goods, add additional mechanisms for buyers to pay into and sellers to receive payment from the FVIPS system. They also planned to open the system to participation by multiple processors and acquirers in the banking world.

The company was also exploring future products which were complementary to the FVIPS model. One area where the company had invested a significant amount of R&D was the VirtualTAG ([www.virtualtag.com](http://www.virtualtag.com), [www.virtualadz.com](http://www.virtualadz.com)). The VirtualTAG was an interactive, multi-level Internet banner advertisement. Because it was multi-layered, a buyer could make purchases through a VirtualTAG without leaving the page on which they found it.

Despite the growth and the new product ideas, First Virtual's future was certainly not guaranteed. The company was still a long way from profitability. Widespread acceptance of the FVIPS would be necessary to guarantee its success, and the market was crowded with alternate payment schemes and players. It was still to be determined whether the FVIPS was the payment system most suitable to the Internet of the future. Questions remained about the tradeoff between security and convenience. How much convenience would consumers be willing to sacrifice for security? Despite FVHI's successes, retail electronic commerce on the Internet had been below most analysts' expectations.

As he exited the freeway and approached First Virtual's offices, Lee Stein wondered briefly where the company would be next year at this time. Stein knew that in an Internet-based business such as his, one year was equivalent to five to 10 years in a "real" business — so trying to think a year ahead was long-range planning indeed.

**Exhibit 1****FIRST VIRTUAL'S FOUNDERS**

**Nathaniel S. Borenstein, Ph.D.**, Primary author of MIME, the Internet standard for multimedia and multilingual mail messages, Borenstein has served as an advisor to national and international agencies. He is a member of the Electronic Frontier Foundation, holds a Ph.D. in computer science from Carnegie-Mellon University and is the author of two books on multimedia and software.

**Marshall T. Rose, Ph.D.**, Dr. Rose is a leader in the development and implementation of key global standards for electronic messaging and network management. He is the author of seven highly-regarded books on Internet technology. Dr. Rose holds a Ph.D. in information and computer science from the University of California, Irvine and is the former Area director for network management on the Internet Engineering Steering Group, one of a dozen people responsible for overseeing the global Internet standardization process.

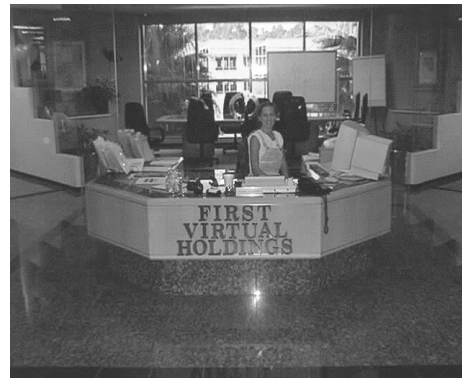
**Einar A. Stefferud, M.B.A.**, A key contributor to the development of the global Internet since 1975, he is considered to be one of the leading experts on global messaging systems. He has been active in international standards activities through the American National Standards Institute (ANSI) and the International Federation of Information Processing. Named by *Communications Week* as one of the top 10 visionaries in the computer-communications industry, he is an adjunct professor of Information and computer science at University of California, Irvine, and holds an M.B.A. from UCLA.

**Lee H. Stein, J.D.**, An attorney and accountant, he also serves as chairman of Stein & Stein Incorporated, a California-based firm which provided management services to luminaries in the entertainment and music industries. He has been a successful investor in West Coast real estate. He has served as chairman of the Jack Murphy Stadium Authority, San Diego, California and a director of the Scripps Foundation for Medicine and Science, La Jolla, California.

Source: *First Virtual Web pages: [www.firstvirtual.com](http://www.firstvirtual.com)*

Exhibit 2

FIRST VIRTUAL OFFICES IN SAN DIEGO



FIRST VIRTUAL CEO LEE STEIN





### Exhibit 3

#### PUBLIC KEY ENCRYPTION AND DIGITAL CERTIFICATES

In a public key system a key pair is mathematically generated, consisting of a public key and a private key. The key pair is generated so that a message may be encrypted with one key and decrypted with the other (either key can be used for encryption). The message *cannot* be decrypted using the same key that was used to encrypt it. Each user's public key is usually made widely available to anyone wishing to send an encrypted message while the user's private key is kept secret.

For example, if Frank wishes to send an encrypted message to Tony, he would encrypt his message using Tony's public key. After the message has been encrypted using Tony's public key, it can only be decrypted using Tony's private key. Not even Frank could get his message back.

The great advantage of this kind of cryptography is that, unlike conventional cryptosystems, it is not necessary to find a secure means of transmitting the encryption key to the intended recipient of the message. Another useful feature of such cryptosystems is the ability to "sign" messages by encrypting them with the sender's private key. Anyone can then decrypt the message with the sender's public key, and can be sure that only the owner of that public key could have encrypted the message (with the corresponding private key). This is referred to as providing a digital signature.

For example, not only does Frank want to send an encrypted message to Tony, but he wants to assure Tony that it is really he who is sending the message. So, Frank encrypts the message using Tony's public key then re-encrypts it using his own private key. When Tony receives the message, he first decrypts it using Frank's public key, thus proving that it could only have come from Frank, then he decrypts the message itself using his own private key.

In practice, it is not usually necessary to encrypt an entire message in order to insure a digital signature — rather, a small portion of "signed" data attached to the full message is sufficient. This approach is often termed a "digital certificate."

## Exhibit 4

**FIRST VIRTUAL HOLDINGS INCORPORATED  
STATEMENTS OF OPERATIONS**

|   | Three months ended<br>December 31, |           | Year ended<br>December 31, |             |
|---|------------------------------------|-----------|----------------------------|-------------|
|   | 1996                               | 1995      | 1996                       | 1995        |
| Revenues                                | \$197,604                          | \$110,672 | \$695,866                  | \$197,902   |
| Operating expenses:                     |                                    |           |                            |             |
| - Marketing and sales                   | 1,091,539                          | 104,314   | 1,836,545                  | 346,400     |
| - R&D                                   | 1,747,770                          | 339,951   | 3,248,958                  | 530,809     |
| - G&A                                   | 2,126,807                          | 263,007   | 6,431,286                  | 1,522,784   |
| Total op. expenses                      | 4,966,116                          | 707,272   | 11,516,789                 | 2,399,993   |
| Loss from operations                    | (4,768,512)                        | (596,600) | (10,820,923)               | (2,202,091) |
| Int. income (expense)                   | 58,886                             | (15,833)  | 130,983                    | (67,890)    |
| Net loss                                | (4,709,626)                        | (612,433) | (10,689,940)               | (2,269,981) |
| Net loss per share                      | (0.54)                             | (0.07)    | (1.25)                     | (0.30)      |
| Shares used in<br>per share computation | 8,769,491                          | 8,668,046 | 8,524,068                  | 7,599,106   |

## Exhibit 5

**FIRST VIRTUAL HOLDINGS INCORPORATED  
CONDENSED BALANCE SHEETS**

|  | <b>For the year ended<br/>December 31,</b> |             |
|--|--|-------------|
|  | <b>1996</b>                                | <b>1995</b> |
| <b>Assets</b>                                  |  |             |
| Current assets:                                |  |             |
| - Cash and cash equivalents                    | \$17,127,971                               | \$2,091,651 |
| - Short-term investment, available-for-sale    | 200,000                                    | —           |
| - Accounts receivable                          | 88,278                                     | —           |
| - Prepaid expenses and other                   | 83,840                                     | 10,953      |
| Total current assets                           | 17,500,089                                 | 2,102,604   |
| Furniture and equipment, net                   | 1,964,635                                  | 304,320     |
| Information technology, net                    | 59,226                                     | 113,333     |
| Organization and other costs, net              | 105,798                                    | 50,569      |
| Deposits and other                             | 62,80                                      | 4,000       |
| Total assets                                   | \$19,692,557                               | \$2,574,826 |
| <b>Liabilities and stockholders' equity</b>    |  |             |
| Current liabilities:                           |  |             |
| - Accounts payable                             | \$1,626,198                                | \$513,893   |
| - Accrued compensation and related liabilities | 372,739                                    | 8,170       |
| - Accrued interest                             | 196,340                                    | 100,340     |
| - Deferred revenue                             | 64,683                                     | —           |
| - Current portion, amount due to stockholder   | 400,000                                    | —           |
| Other accrued liabilities                      | 576,077                                    | —           |
| Total current liabilities                      | 3,236,037                                  | 622,403     |
| Amount due to stockholder                      | 312,500                                    | —           |
| Notes payable to stockholders                  | 1,200,000                                  | 1,200,000   |
| Total stockholders' equity                     | 14,944,020                                 | 752,423     |
| Total liabilities and stockholders' equity     | \$19,692,557                               | \$2,574,826 |

Exhibit 6

SHARE PRICE IN US\$ PER SHARE

