UPDATE

Solutions for Success

Consultant/Vendor Sales Group
August 2003

Inside

Data with David

SBC VoIP Services

SBC's rapidly evolving our network from circuits to packets because more than half of our traffic is data today and that percentage will continue to grow. Ultimately, packets will be a more efficient way to transport voice as well. Over the next 10 years most of the technological advances will occur in the VoIP network not in the public switched telephone network. Our IP data backbone network is an important investment for SBC and integral to providing data services. With deployment of our OC 192 backbone, we will be able to handle traffic at 50 GB per second at peak. It will give us complete redundancy at every layer, from the on-ramps (Mini-POPs) to the core network.

Ron Fischer, SBC

SBC Long Distance News You Can Use

SBC Long Distance has had tremendous success with its entry into Long Distance in California. After just 5 months, we have over 2 million Long Distance lines and service installed. Others are advertising they will match our rates, offering their own promotions or offering special programs – the net result, your customers have more choices, less expensive alternatives, and a new partner they are already familiar and comfortable with.

MacGillivray Named President–BCS for SBC West

Robin MacGillivray, Senior Vice President-Strategic Process Improvement for SBC Operations, Inc., has been named President-Business Communications Services for SBC West. Robin, who is now responsible for all business market sales & customer services in California & Nevada, reports to **Ray Wilkins**, Group President of SBC Marketing & Sales, SBC Communications. She takes over for **Bob Ferguson,** who is the new President-Global Markets for SBC Operations, Inc. *More SBC Executive News on p. 10.*

SBC CVSG Resources For You

1. Website: sbc.com/cvsg
2. CV Webconnect (Password-Restricted)
3. CVSG Hotline – 1.800.552.5299
4. Breaking News on CVSG Listserver
5. SBC News Broadcasts (Next: Aug. 20)

(Call your Liaison Manager to get a Password to CV Webconnect or subscribe to Listserver or UPDATE and to attend Broadcasts in person or via the Internet.)

Vice President's Corner

Kari Watanabe
CVSG Vice President

Wi-Fi, LD, VoIP & More

Wow! There's so much exciting news with SBC and the Telecom Industry that it's hard to know where to begin. Everyone's talking about the hottest thing in Telecom – Wi-Fi (wireless fidelity). We featured it in our last UPDATE and have an indepth feature by Paul Bedell and other stories on Wi-Fi as well in this issue. Wi-Fi will be one of our main topics, along with Long Distance, Convergent and Electronic Billing and more on our Aug. 20th Streaming Media Broadcast. Be sure and sign up for it with a Liaison Manager, 1-800-552-5299. Another hot topic in UPDATE is Long Distance and the new Unlimited Long Distance Offer for Small Businesses. Read about it and the latest LD news in Ron Fischer's column. Recently, the Federal Communications Commission approved SBC offering Long Distance to business and residential customers in Nevada. SBC Long Distance offers service in Texas, Kansas, Oklahoma, Arkansas, Missouri, Connecticut and California. SBC is filing for approval in Illinois, Indiana, Ohio, Michigan and Wisconsin. Be sure to read Tom David's "Data With David" column featuring SBC Voice Over IP Services and how SBC is evolving our network from circuits to packets. Also in this issue, SBC's Chief Technology Officer Ross Ireland explains how SBC continues advanced technology investment and the significance of this to your clients. You'll want to read Jerry Hinek's thought-provoking piece on "Spyware" and Nancy Grover's revealing article on "Internet Worms." There's a Helpful Hints Tipsheet from the Vendor/Consultant Sales Center and many other stories that will enable you to become more efficient, secure and successful. Your success is our mission!

Kari

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SBC 125 Years of Service

SBC LONG DISTANCE NEWS YOU CAN USE

SBC Long Distance is able to provide service all over the U.S., with the exception of Illinois, Indiana, Ohio, Michigan, and Wisconsin – these states are currently in the process of filing for approval and hopefully will have Long Distance authority later this year. We offer a full line of products and services – domestic and international calling, calling card, toll free services with advanced features, account codes, electronic billing, hierarchical billing, shared bills with the SBC Local Exchange Company for small businesses with a single BTN, and a direct bill that includes all locations for voice and data for multi-location customers. To ensure we continue our strong performance in the Long Distance market, we have a number of programs that will benefit all types and sizes of businesses.

Unlimited Long Distance:

Introduced June 5, this new small business product is geared for businesses with 1-5 lines. The service provides for UNLIMITED outbound domestic direct dial usage for $20 per line per month. Based on our current low rates, the cross-over from a normal plan to the Unlimited plan is about 550 Minutes of Use/mo. International calling is provided at the normal rates associated with Domestic Saver 15 but can be enhanced with the Business International Saver Plan for $2.95 monthly recurring charge. Calling Card and Toll Free service are also offered at very attractive rates.

There are several required provisions:

◆ All lines on the BTN (all Working Telephone Numbers) must have the Unlimited Service.
◆ There are specified packages of local lines/features required.
◆ The lines cannot be utilized for Call Center applications, Broadcast fax, LD Internet, or auto-dialer applications.

New Local Unlimited packages also have been announced. These can all be combined to provide an UNLIMITED calling solution for your customers at very attractive "per line" rates.

Special Reduced Rates Packages:

Many of you are already familiar with the very special rates introduced in April. These include Small Business Calling Plans ranging from $.032 to $.039/minute for both Interstate and Calif. Intrastate calling. Similar great rates were offered for Toll Free calling and Calling Card (with their own special rate packages). Multi-location customers utilizing our High Volume Calling Plan were treated to unprecedented usage rates for switched and dedicated access options ($.019 – $.03/minute).

Connections Credit Promotion:

Ever heard of "FREE" Long Distance? SBC Long Distance is offering it for Small Businesses.

In one scenario, when access lines and long distance services are brought back to SBC from other carriers, SBC will offer 6 months (1 yr term) or 9 months (2 yr term) of FREE long distance service (FREE is defined as a credit being posted to the account equal to the Monthly Minimum Commitment of the Long Distance plan purchased).

In a second scenario, when Long Distance Services only are being moved to SBC Long Distance from other carriers, the customer will be provided with 6 months (1 yr term) or 9 months (2 yr term) of FREE Long Distance if they qualify by having a specified local service package and Internet services with SBC at the same location. FREE LD is defined as a credit being posted to the account equal to the Monthly Minimum Commitment of the Long Distance plan purchased.

Other Promotional Activity:

◆ Toll Free "No Risk": Waive Non-Recurring charges and the $5/Toll Free number Monthly Recurring charge for 3 months
◆ Dedicated Voice Access Rebate: Rebate the $250 Non-Recurring charge for DS1 Dedicated access provide by Williams.
◆ Access Line Winback: Provide a credit against LD usage based on the Non-Recurring charge of local access lines brought back to SBC from other carriers.

SBC is serious about being the "only telecommunications provider" a customer needs. SBC offers local, Long Distance, Internet, Data/Voice CPE, and Network Professional and Management Services. We would be honored to speak with you about how we can help your clients be more effective and cost efficient. Please contact your Liaison Manager to obtain more information on how SBC in general and SBC Long Distance specifically can assist you and your clients. Liaison Managers can be reached at 1-800-552-5299.

Ron Fischer, Director of SBC Long Distance Business Marketing for SBC West Region, has been in the telecommunications industry for almost 25 years.

SBC Offers Big Savings For California Small Businesses With "Business Unlimited"

SBC just launched a new service package in California called, "Business Unlimited," featuring unlimited local and long distance calling as well as call management features – all for $58.99. And on one monthly bill! This "all-you-can-call" offer eliminates traditional per-minute calling fees, meeting small business demands for simplicity and cost certainty. As UPDATE was going to press, SBC was planning to offer an unlimited long distance offer in Nevada and one in the Southwest Region soon.

Autobytel Finds Solution With SBC

The Challenge

Autobytel, a leading Internet automotive marketing services company, used to host its own data center at their Irvine, CA corporate headquarters. But with continued growth and expansion, it was clear they'd surpass the physical capacity of their data center and require a secure, reliable server co-location facility.

They needed a data center that would meet the intense demands of a large e-business whose online presence is the most significant part of their business, an industry-leading service level agreement and a place that would withstand interruptions to network or power. They also wanted to have

direct access between their on-site data center and an SBC facility, competitive pricing and a provider with financial stability.

The Solution

SBC's Internet Data Center in Irvine with state-of-the-art security and multiple system redundancy offered the best solution. The SBC Family of Companies provide a high-speed fiber link for the connectivity as well as reliable voice and data services. With SBC PremierSERV Data Center Hosting, Autobytel now has the scalability and reliability it needs at a lower cost of ownership than other solutions.

"The costs of growing incrementally with SBC are much lower than the costs of growing organically within our own family,"

said Grant Leathers, Director of IT Operations for Autobytel.

Note: SBC E-Services relies on Hewlett-Packard equipment and services to offer Autobytel its 100% network uptime agreement.

SBC E-Services Now Offers Free Month of Service & Waives Installation Charges On Most Hosting Plans

SBC E-Services wants to help customers recently stranded by consolidations in the hosting industry by offering a Free Month of Service and Waiving Installation Charges on most hosting plans. The company, which has seen 41 percent customer growth in its hosting business over the past year, continues to invest in its Internet Data Centers and customers care processes.

August 2003

Enterprise VoIP traffic continues to grow at a healthy pace with customers purchasing LAN and IP telephony equipment, managed VoIP solutions, and continuing to open new branch offices or relocating to new office space. SBC is prepared to offer these medium-to-large and global customers interested in a *new* LAN and VoIP telephony solution a way to reduce their expenses related to the support required for an IP infrastructure utilizing internal resources.

Premises-based VoIP Solution

SBC PremierSERV℠ Total IP Communications Solution (TIPCS) provides an end-to-end solution for customers interested in a managed IP service that delivers an integrated LAN and IP telephony solution without the expenditure of capital. This unique turnkey package solution includes:

- SBC DataComm network design and installation services
- SBC local exchange carrier network transport services
- Cisco equipment
- Network Management Services (monitoring and maintenance) provided by SBC DataComm
- Competitive per-seat, per-month rate, all on a single, consolidated monthly invoice

With a TIPCS package, the customer pays a "per station" price, per month and receives a Cisco ICS 7750 Call Manager platform, a Cisco IP phone set, Cisco Unity voice mail, and SBC implementation/post sales support for the life of the contract (36 months). This service will be coupled with SBC network access, SBC transport, and SBC Internet Services billed on a single, consolidated invoice provided by SBC. SBC Capital Services, through an operating lease, will finance the DataComm CPE and services.

Why should I consider a VoIP solution?

SBC PremierSERV℠ Total IP Communication Solution provides you these features:

- Consolidation – run all of your communications devices over one network protocol and benefit from a single point of management, administration, and control.
- Optimization – combine your data servers using SBC PremierSERV℠ Total IP Communication Solution; use your data network for voice and data services.
- Cost Control – reduce your financial burden by leasing the equipment and service, providing you predictable pricing and single-vendor accountability.

- End-to-End Service Assurance-Benefit from a one-stop resource to keep your networks up and running at a level and degree that's right for you. With SBC PremierSERV℠ Total IP Communication Solution, we design, deliver, support, and manage your complete communications system from beginning to end.

How does VoIP work?

VoIP on the Cisco AVVID platform uses your corporate managed network to carry voice calls over the same local area network (LAN) as data traffic. These calls are routed to other locations using the ISDN PRI transport services provided through SBC's local network services to connect directly to the public switched telephone network (PSTN) or to other IP backbone networks. We also provide you with the level of network management and maintenance service you require for your AVVID IP platform.

What is included in the package?

The basic service offering consists of the following SBC products and services that will accommodate a single customer location with 35 to 200 users:

- Cisco ICS (Integrated Communication System) 7750 AVVID (architecture for voice, integrated data) Platform
  - Call Manager 3.x
  - Multiservice Route Processor 300
  - Two-port RJ-48 Multiflex Trunk T1 interface
  - ICS Unity Voice Mail (Message Waiting Indicator included for each set)
  - Choice of Cisco IP Sets (7910, 7940, 7960)
  - VPN Client License
- LAN Switches
  - Cisco Switches (3550 24-port Inline Power Switches)
  - GBIC ports & 10/100 Base T Ports
  - 1000Base-SX
- SBC Network/Transport Services
  - SBC ISDN-PRI
  - SBC DS-1
  - SBC Access lines for back-up
  - SBC Dedicated Internet Access (DIA) – Frame Relay
  - SBC Yahoo! DSL (optional in place of DIA)
- SBC DataComm Implementation Services
  - Staging, Coordination & Installation
  - DataComm Project Management
  - End User Training
- SBC PremierSERV℠ Maintenance Services
  - SBC PremierSERV℠ Data CPE Support Services Essential 8X5 Plus with Complete On-site
  - Software Support Services

- SBC PremierSERV℠ IP Telephony Advantage – Essential Network Management
  - Baseline Hardware/Operating system – Fault Management
  - Call Manager & Unity Voice Mail
  - Convergence Help Desk
- SBC Capital Services
  - CPE & Services will be financed on 36-month term Complete Leases
- SBC Global Managed Billing Services
  - SBC Global Managed Billing will provide consolidated billing services by paying the customer's leasing and SBC transport services and issuing the customer a single monthly invoice.

VoIP to Alleviate Moves, Adds, and Changes (MAC)

Moves, adds, and changes (MAC) in your telecommunications network cost time and money. Whether you're moving an employee from location A to location B, or adding a staff member, your office manager has to coordinate the transfer of the staff member's files and desk supplies with the phone connection. Quite often, the files and supplies arrive a few days before the phone connection. Through SBC PremierSERV℠ Total IP Communication Solution, MAC work is a thing of the past. Technicians will no longer be required to establish or switch a connection for a user as long as existing LAN connections are available. Each VoIP telephone set has a pre-assigned number. All that's necessary to move the phone number is to unplug the set from the original location and plug it in at the new location. The result is increased productivity and reduced cost and calls are still tracked by station for billing purposes.

Qualifying Questions for a SBC Total IP Communications Solution

These questions may be helpful for you when considering a SBC TIPCS solution for your client.

1. Is the client looking for a pure IP solution?
2. Does the client have between 35-200 stations?
3. Is the client interested in a new LAN?
4. Is the client interested in IP telephony equipment?
5. Is the client interested in a managed IP solution?
6. Is the client opening a new branch or moving to a new location?
7. Does the client have new locations opening?
8. What are their expected growth and relocation plans?
9. Is the client currently budgeted for PBX upgrades or replacement?
10. Is the client approaching the end of their current lease term for their current PBX equipment?
11. Is the client willing to upgrade existing services and replace existing CPE equipment that is required for this solution?

If you are already using some voice over IP service or plan on overlaying this VoIP service on an existing data LAN, TIPCS is **not** the right solution for you. SBC Data-Comm will need to perform a per-fee VoIP network assessment and design a custom SBC PremierSERV℠ VoIP solution. And while our SBC PremierSERV℠ Total IP Communication Solution offering provides you with complete support and management, there may be times that your specific environment may require a mix of services that complement the support you have in-house already. If that's the case, we will set up a custom SBC PremierSERV℠ solution that blends precisely with your environment to meet your specific needs.

IP Centrex Alternative

Customers looking for a pure IP solution, and do not have or want a premises-based managed IP CPE solution, may wish to consider SBC PremierSERV℠ Centrex IP. This product allows customers to add IP telephony features and applications across a designed, delivered and managed voice and data system, with little or no capital spending. It has been tariffed since late 2002 and is currently available in Sacramento and downtown Los Angeles.

Centrex IP delivers high reliability and cost savings as technicians are no longer required for physical moves. Your Centrex IP end users can plug in and be recognized as a Centrex extension wherever access to your LAN is available. In fact, Centrex IP end users can be remote and working from their home or a hotel room and still take advantage of their normal Centrex desktop features and capabilities. Remote users can connect to the corporate LAN via a broadband connection (although 56K dial-up will support IP calling) and with their personal computer, utilize it as a soft-phone with a head or handset. For the office, a variety of new IP telephones and legacy telephone gateways are available.

Where service is not available, currently a minimum of a 2,400 line term commitment is required to equip a central office for Centrex IP. Enhancements to this product are currently under consideration by SBC in order to deliver multimedia features such as click-to-dial and presence management in the near future. Presence management is the ability to view who in your organization is available to take a phone call, join a conference, participate in instant messaging, etc. The graphic user interface would likely present a list of names with a status symbol next to the name which indicates their current state, e.g., on-line or off-line. (See related article in the October 2001 Update at http://sbc.com/cvsg)

Network Management Services

Network Management	
Remote Monitoring/Alarming	Included
Configuration and MAC Management	Configuration included; MAC on Time & Materials basis
Fault Management	Included
Performance Reporting	Included
Technical Assistance	Included
Carrier Coordination Management	Included
Single Point of Contact Service	Included
Hardware Maintenance	
Hours of Coverage	8x5
Technical Phone Support and Response Times	8x5
◆ Help desk response	By phone – 80% of calls answered within 30 seconds
◆ Technician response	8x5x4 on site
◆ Parts response	8x5x4 on site
◆ Remote Diagnostics Support	Included
Parts	Included
Labor	Included
Notification by Web of status	Included
Web trouble ticket entry	Included
Geographic coverage	Contiguous United States
Consolidated Invoicing	Included
Billing	Global custom billing
Contract renewal	Manual
Help desk	24x7
Remote Diagnostics	Included
Warranty	Maintenance included

Accessories – uninterrupted power supply services, relay racks; unified messaging, IVR, and other enhancements can be added to the system.

Summary

SBC offers an extensive portfolio of IP telephony services, making the decision to migrate from two costly voice and data networks to a single, streamlined IP-based network an easier one. IP telephony consolidates voice, data and video over a single IP network infrastructure. The advantages this presents are significant as shown below:

- ◆ Convenient – Easily able to add voice and/or data services
- ◆ Lower total cost – Equipment is obtained via an operating lease
- ◆ Ability to purchase end-to-end telecommunication solution – CPE offered via joint marketing with DataComm.
- ◆ Scalable – Price is based on "per user" basis
- ◆ Flexible – Additional connecting services easily added

SBC PremierSERV℠ Total IP Communication Solution helps your customers implement VoIP from the ground up. SBC provides a unique package solution that includes SBC DataComm network design and installation services, SBC local exchange carrier network transport services, and the Cisco equipment, monitoring, and maintenance provided by SBC DataComm. Charges associated with equipment and network management services are billed at a competitive per-seat, per month rate. And this is all on a single, consolidated monthly invoice.

For further information please contact your Liaison Manager at 800-552-5299.

Tom David
Liaison Manager
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Paul Bedell, SBC

An Inside Look At Wi-Fi – The Hottest Technology in Telecom

"High Five For Wi-Fi!"

Introduction

It's finally happening. The two hottest technologies on Planet Earth, wireless and the Web, are finally merging, as expected.

A wireless LAN (WLAN) is a data transmission system designed to provide location-independent network access between computing devices via radio waves rather than a cabled infrastructure.

802.11b is a WLAN standard known by the nickname "Wi-Fi", for "wireless fidelity". After being just a plaything for home hobbyists and technophiles since 1999, Wi-Fi is now moving onto the turf of corporate America. Put simply, Wi-Fi is a radio signal that beams Internet connections out 300 feet from a wireless base station (also known as a "hot spot"), to an 802.11b-enabled computer terminal. Attach a broadband modem to the base station and any nearby computers equipped with Wi-Fi adapters can log on to the Net.

In 1999, 802.11b became the standard wireless Ethernet networking technology for both business and home. The Wi-Fi Organization was created to ensure interoperability between 802.11b products. With a realistic throughput of 2.5-4 Mbps, Wi-Fi is fast enough for most network applications and tolerable for file transfers. The data rates supported by the original 802.11 standard were too slow to support most general business requirements and slowed adoption of WLANs. With 802.11b, WLANs are now able to achieve wireless performance and throughput comparable to "wired" Ethernet LAN transmissions.

802.11b is a half-duplex protocol. Users can send or receive, but not both at the same time. This makes Wi-Fi transmissions similar to basic e-mail transmissions. Wi-Fi also uses the same 2.4 Ghz radio spectrum as many cordless phones (and baby monitors), so plenty of opportunity exists for (co-channel) interference. Co-channel interference defines interference caused by two devices transmitting at the same frequency. When a wireless terminal receives the signal from both transmitters, the result will be a garbled signal or no signal at all. Because Wi-Fi transmissions operate in the 2.4 Ghz range, 900 Mhz cordless phones should be used when operating an 802.11b device in the same area.

When the IEEE ratified the 802.11a and 802.11b wireless networking standards in 1999, the goal was to create a standards-based technology that could span multiple physical encoding types, frequencies and applications. The idea was to model the way that the 802.3 Ethernet standard has been successfully applied to 10-, 100-, 1000-, and now 10,000 Mbps technology over fiber and various kinds of copper (not including 10 GigE). Just a few years later, we have at our disposal a wide selection of 11-Mbps 802.11b products from a multitude of vendors. But what about 802.11a?

The 802.11b standard was designed to operate in the 2.4-GHz ISM (Industrial, Scientific and Medical) band using direct-sequence spread-spectrum technology. The 802.11a standard, on the other hand, was designed to operate in the more recently allocated 5-GHz UNII (Unlicensed National Information Infrastructure) band. And unlike 802.11b, the 802.11a standard departs from the traditional spread-spectrum technology, instead using a frequency division multiplexing scheme that's intended to be friendlier to office environments.

The 802.11a standard, which supports data rates of up to 54 Mbps, is the Fast Ethernet analog to 802.11b, which supports data rates of up to 11 Mbps. Like Ethernet and Fast Ethernet, 802.11b and 802.11a use an identical MAC (Media Access Control).

The 802.11a standard is designed to operate in the 5-GHz frequency range. Specifically, the FCC has allocated 300 MHz of spectrum for unlicensed operation in the 5-GHz block, 200 MHz of which is at 5.15 MHz to 5.35 MHz, with the other 100 MHz at 5.725 MHz to 5.825 MHz.

Along with standards bodies activities, wireless industry leaders have united to form the Wireless Ethernet Compatibility Alliance (WECA). WECA's mission is to certify cross-vendor interoperability and compatibility of IEEE 802.11b wireless networking products and to promote that standard for the enterprise, the small business, and the home. WECA members include WLAN semiconductor manufacturers, WLAN providers, computer systems vendors, and software makers. Membership includes companies such as 3Com, Aironet, Apple, Breezecom, Cabletron, Hewlett-Packard, Dell, Fujitsu, IBM, Intersil, Lucent Technologies, Nokia, Samsung, Wayport and Zoom.

The Competitive Advantage of Wireless

The work environment of 2003 is characterized by an increasingly mobile workforce and flatter organizations. Employees are equipped with notebook computers and spend more of their time working in teams that traverse functional, organization, and geographic boundaries. This fact is underscored when mergers occur, and companies suddenly find their business and employee bases stretched across nations or across the world. The productivity of today's workers often occurs in meetings and away from their desks, so users need access to the corporate network far beyond their personal desktops. WLANs fit well in this work environment, giving mobile workers much-needed freedom in the way that they access the network.

WLANs free users from dependence on hard-wired access to the network backbone, giving them anytime, anywhere network access. This freedom to "roam" offers numerous user benefits for a variety of work environments, such as:

- Immediate bedside access to patient information for doctors and hospital staff

- Easy, real-time network access for on-site consultants or auditors in corporate offices

- Improved database access for roving supervisors such as production line managers, warehouse auditors or construction engineers

- Simplified network configuration with minimal I.T. staff involvement for temporary setups such as trade shows or conference rooms

- Faster access to customer information for service vendors and retailers, resulting in better service and improved customer satisfaction

- Location-independent access for network administrators, for easier on-site troubleshooting and support

- Real-time access to study group meetings and research links for students

- Factory floor workers can access part and process specifications without impractical or impossible wired network connections. Wireless connections with real-time sensing would allow a remote engineer to diagnose and maintain the health and welfare of manufacturing equipment, even on an environmentally hostile factory floor. (Imagine an environment with a multitude of overhead piping, racks or robotic machinery)

- Warehouse inventories can be carried out and verified quickly and effectively with wireless scanners connected to the main inventory database. Even wireless "smart" price tags, complete with liquid crystal display (LCD) readouts, could allow merchants to virtually eliminate discrepancies between stock-point pricing and scanned prices at the checkout lane.

The wireless market is expanding rapidly as businesses discover the productivity benefits of going wire-free. According to Frost and Sullivan, the wireless LAN industry is expected to grow to $1.6B in 2005. To date, WLANs have been primarily implemented in vertical applications such as manufacturing facilities, warehouses and retail stores. The majority of future wireless LAN growth is expected to be in healthcare facilities, educational institutions and corporate office spaces. In the corporation, conference rooms, public areas and branch offices are likely venues for WLANs.

The lure of Wi-Fi's benefits is proving hard to resist to businesses willing to venture onto the wireless edge. From General Motors to United Parcel Service (UPS), companies are using Wi-Fi for mission-critical jobs in factories, trucks, stores and even hospitals.

WLANs provide a benefit for IT managers as well, allowing them to design, deploy and enhance networks without regard to the availability of wiring. This saves both effort and dollars. A white paper released by 3Com in 2000 claimed that the benefits of WLAN deployments can add up to as much as $16,000 per user – measured in worker productivity, organizational efficiency, revenue gain and cost savings - over "wired" alternatives. At a high level, WLAN operational advantages include:

- Mobility that improves productivity with real-time access to information – regardless of worker location – for faster and more efficient decision making
- Cost effective network setup for hard-to-wire locations such as older buildings and solid-wall structures
- Reduced cost of ownership – particularly in dynamic environments requiring frequent structural (i.e. cube/office) modifications – thanks to minimal wiring and installation costs per device and user

The list of possibilities is almost endless, and only limited to the imagination of the application designer.

Wi-Fi Operations and "Hot Spots"

802.11 defines two pieces of equipment: a wireless terminal, which is usually a PC equipped with a wireless network interface card (NIC), and an access point (AP) or "hot spot", which acts as the bridge between the wireless and wired networks. An access point usually consists of a radio, a wired network interface (e.g., 802.3 and/or PSTN link), and bridging software conforming to the 802.1d bridging standard. The access point is the base station for the wireless network, aggregating access for multiple wireless terminals onto the wired network (LAN or the Internet). Wireless terminals –

also known as "end stations" – can be 802.11b-compatible PC cards (wireless NICs) in desktop or laptop computers, or embedded solutions in non-PC clients such as an 802.11-based telephone handset. Wireless network adapters (wireless "NICs") come in two major form factors: PC cards for laptops, and USB cards for desktop computers. In addition, there are PCI adapters that let the users plug a PC card into a PCI slot. PCI slot adapters are often finicky about working correctly in anything but Windows 98/SE/ME. If using Windows XP or Windows 2000, the USB version is best if the user is seeking to play it safe.

An access point is not needed for two wireless computers to communicate, but it is vital for free communication between wired and wireless networks. As walls and distance are inserted between the user and the access point, the speed will drop. Users shouldn't expect to place more than a few walls between themselves and the "hot spot".

Thousands of enterprising do-it-yourselfers have deployed antennas to create their own hot spots. They've even joined together to form networks so that the public can zap e-mail messages and surf the Net for free, no matter where they are. From the streets of Sydney to mountain areas outside Seattle, around 5000 free hot spots have emerged since 2000. More than 18 million people worldwide have logged on, and the numbers are growing daily. See Figure 1 for a typical hot spot configuration.

Two Modes

The 802.11 standard defines two operating modes: infrastructure mode and ad hoc mode.

In infrastructure mode, the wireless network consists of at least one access point (hot spot) connected to a wired network infrastructure (distribution system). The "wired network infrastructure" can be a LAN and/or a link to the PSTN, and ultimately the Internet. This connection can be implemented via SBC DSL service, or other high-speed services such as SBC's GigaMAN. A set of wireless end stations connects to the access point via 802.11b radio waves. This configuration is called a Basic Service Set (BSS). An Extended Service Set (ESS) is a set of two or more BSSs forming a single subnetwork. Since most corporate WLANs require access to the wired LAN for services (file servers, printers, Internet links), they will operate in infrastructure mode. If service areas overlap, handoffs can occur similar to how this is done in a cellular or PCS network (calls in progress are "moved" from one base station area to another, seamlessly).

Ad hoc mode (also known as an Independent Basic Service Set, or IBSS) is simply a set of 802.11 wireless stations that communicate directly with one another without using an access point or any connection to a wired network. This mode is useful for quickly and easily setting up a wireless network anywhere that a wireless infrastructure does not exist or is not required for services. Ad hoc mode would be useful in a conference room, a hotel room, convention center, or airport, or where access to the wired network is barred (such as for consultants at a client site).

Ad-Hoc mode is effectively wireless peer-to-peer networking. This would be similar to music file sharing on the Internet (i.e. Napster), except in much closer quarters

Figure 1: Typical Hot Spot Configuration
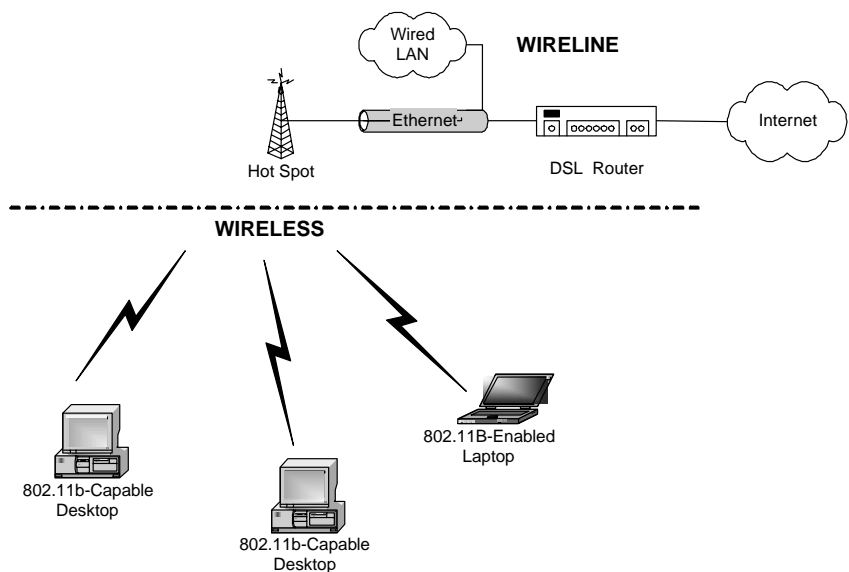
versus through the expanse of the Internet. In the ad-hoc network, computers are brought together to form a network "on the fly". There is no structure to the network; there are no fixed points, and usually every node (computer) is able to communicate with every other node. An example of an ad-hoc 802.11b network would be a meeting where employees bring laptop computers together to communicate and share design or financial information. To maintain order in these types of networks, one computer is usually "elected" as the base stationmaster of the network, with the others being slaves. This is accomplished by using the spokesman election algorithm ("SEA").

Association, Cellular Architectures, and Roaming

The 802.11 media access control (MAC) layer (OSI layer 2) is responsible for how a client terminal associates with an access point. When an 802.11 client enters the range of one or more APs, it chooses an access point to associate with (also called joining a Basic Service Set), based on received signal strength. Once "accepted" by the access point, the client tunes to the radio channel to which the access point is set. Periodically it surveys all 802.11 channels in order to assess whether a different access point would provide it with better performance characteristics. If it determines this is the case, it reassociates with the new access point, tuning to the radio channel to which that access point is set.

Reassociation usually occurs because the wireless station has physically moved away from the original access point, causing the signal to weaken. In other cases, reassociation occurs due to a change in radio characteristics in the building, or due simply to high network traffic on the original access point. In the latter case, this function is known as "load balancing," since its primary function is to distribute the total WLAN load most efficiently across the available wireless infrastructure.

This process of dynamically associating and reassociating with access points allows network managers to set up WLANs with very broad coverage by creating a series of overlapping 802.11b "cells" throughout a building or across a campus. This is similar to macro cellular design in carrier-grade cellular/PCS networks. To be successful, the IT manager ideally will employ "channel reuse," taking care to set up each access point on an 802.11 DSSS channel that does not overlap with a channel used by a neighboring access point.

Tech Specs

The three physical layers originally defined in the 802.11 standard included two spread-spectrum radio techniques and a diffuse infrared specification. The radio-based standards operate within the 2.4 GHz ISM band. These frequency bands are recognized by international regulatory agencies, such as the FCC (USA), ETSI (Europe), and the MKK (Japan) for unlicensed radio operations. 802.11-based products do not require user licensing or special training. Spread-spectrum techniques satisfy regulatory requirements, increase reliability and boost throughput. They also allow many unrelated products to share the spectrum without explicit cooperation and with minimal interference.

The original 802.11 wireless standard defined data rates of 1 Mbps and 2 Mbps via radio waves using frequency hopping spread spectrum (FHSS) or direct sequence spread spectrum (DSSS). It is important to note that FHSS and DSSS are fundamentally different signaling mechanisms and will not interoperate with one another.

Using the frequency hopping technique, the 2.4 GHz band is divided into 75 one-MHz subchannels. The sending and receiving stations agree on a hopping pattern, and data is sent over a sequence of the sub-channels. Each "session" (transmission) within the 802.11 network occurs over a different hopping pattern, and the patterns are designed to minimize the chance of two senders using the same subchannel simultaneously. FHSS techniques allow for a relatively simple radio design, but are limited to speeds of no higher than 2 Mbps. This limitation is driven primarily by FCC regulations that force FHSS systems to spread their usage across the entire 2.4 GHz band. This means sessions must hop often, which leads to a high amount of hopping overhead.

Conversely, the direct sequence signaling technique (DSSS) divides the 2.4 GHz band into (14) twenty-two MHz channels. Data is sent across one of these 22 MHz channels without hopping to other channels.

The key contribution of the 802.11b addition to the wireless LAN standard was to standardize the physical layer support of two new speeds, 5.5 Mbps and 11 Mbps. To accomplish this, DSSS had to be selected as the sole physical layer technique for the 802.11b standard since (as noted above) frequency hopping cannot support the higher speeds without violating current FCC regulations. The implication is that 802.11b systems will interoperate with 1 Mbps and 2 Mbps 802.11 DSSS systems, but will not work with 1 Mbps and 2 Mbps 802.11 FHSS systems.

The Security Issue

802.11 provides for MAC layer (OSI layer 2) access control and encryption mechanisms, which are known as Wired Equivalent Privacy (WEP), with the objective of providing wireless LANs with security that's equivalent to their wired counterparts. For the access control, the ESSID (also known as a WLAN Service Area ID) is programmed into each access point and is required knowledge in order for a wireless client to associate with an access point. In addition, there is provision for a table of MAC addresses called an Access Control List to be included in the access point, restricting access to clients whose MAC addresses are on the list.

Any Wi-Fi network adapter (wireless NIC) coming within range of another 802.11b network adapter or access point can instantly connect and join the network unless WEP is enabled. WEP is secure enough for most homes and businesses, but it can still be hacked. There are several flaws in WEP making is unusable for high-security applications. Hackers can fairly easily decode WEP-encrypted information after monitoring an active network for less than one day. WEP will also slow down the wireless network. A 20-50% reduction in speed will occur, depending on the products being used. The speed reduction problem is often the result of an access point (hot spot) that doesn't have enough processing power. With WEP enabled, expect total throughput of approximately 2.5-3.5 Mbps.

Encryption comes in 64-bit and 128-bit key varieties. All nodes must be at the same encryption level with the same key in order to operate. 40-bit and 64-bit encryption is the same thing, it's just a matter of how the manufacturer decided to label the product. Often, 128-bit cards can be placed in 40/64-bit mode. In addition, when encryption is in use, the access point will issue an encrypted challenge packet to any client attempting to associate with it. The client must use its key to encrypt the correct response in order to authenticate itself and gain network access.

Beyond Layer 2, 802.11 WLANs support the same security standards supported by other 802 LANs for access control (such as network operating system logins) and encryption (such as IPSec or application-level encryption). These higher-layer technologies can be used to create end-to-end secure networks encompassing both wired LAN and WLAN components.The wireless piece of the network can gain unique additional security from the 802.11 feature set.

Money won't flow from Wi-Fi as a business model until security becomes "industrial grade". Corporations are postponing rollouts in strategic areas until they're convinced that hackers, corporate spies and competitors can't intercept wireless data transmissions. GM has deployed Wi-Fi in 90 manufacturing plants, but is holding off on Wi-Fi deployment at their headquarters until 2004. Executives are worried that until new encryption is in place, guests at a Marriott Hotel across the street could log onto GM's network and make off with critical memos and budgets. In 2001, a consulting firm in Chicago discovered that numerous Wi-Fi transmissions could be intercepted in Chicago's Loop business district, by using an empty Pringles can as a directional receiving antenna, connected into a Wi-Fi enabled laptop computer.

Industry analysts say a raft of "airtight" Wi-Fi security systems will be out in 2004. The downside is that this type of delay – or news of major security breaches – could damage public confidence in Wi-Fi technology.

Integration With Macro Wireless Networks

Motorola, Nokia and Ericsson are working on Wi-Fi phones that would allow users to move from Wi-Fi to cellular and PCS networks without even noticing. These phones should be available in late 2004. Eventually, Wi-Fi could even feed information into smart networks in the home or factory to automatically monitor climate controls or industrial supply chains.

This is the predominant issue that's churning these days: when and how Wi-Fi can be integrated into existing "macro" wireless networks operated by cellular and PCS carriers. Some industry analysts speculate that Wi-Fi could either supplant or complement the drive to 3G services in the wireless world. Either way, there would be major implications to roaming in terms of operations, billing, compatibility and pricing. This will be a major challenge to the wireless industry as a whole in the coming year or so.

Hype or Reality?

Granted, there is an abundance of hype surrounding Wi-Fi in 2003. Telecom industry veterans recognize hype when they see it (think ATM in the early '90s). These days, almost every single issue of Network World has a Wi-Fi-related article on the cover. Telephony magazine has frequent writeups as well. Even Business Week ran an April cover story on Wi-Fi. But it's not all hype.

Since 2001, scores of networks have launched, causing the number of commercial hot spots to rise to 16,000 across the U.S. Starbucks has jumped into Wi-Fi by partnering with T-Mobile Wireless to offer consumers Wi-Fi surfing at more than 2100 coffee shops for around $30 per month (standalone price. Bundled price is $20/month). Per Lauren McCadney, Assistant Vice President of Wi-Fi Market Strategy at SBC Communications, the T-Mobile strategy is akin to "putting the cart before the horse, due to its targeting of the mass market and the casual user." With this type of strategy, T-Mobile will either have to charge a high price to Wi-Fi users, or have a huge amount of users to justify the expense of implementing hot spots at so many coffee shops. We believe it's better to start by targeting a specific user set. Our research indicates that it's best to turn up hot spots in support of business travelers at venues such as hotels, restaurants and convention centers".

McDonalds has deployed Wi-Fi at 10 restaurants in New York and plans to add a hundred more hot spots by December, 2003. The idea isn't necessarily to make money on Wi-Fi service, which goes for $3 per hour. The plan is to attract new customers and boost sales. McDonalds is also offering a free hour of Wi-Fi access with each Extra Value Meal.

Technology bigs are joining the fray as well. Intel is spending $300M to market its Centrino computer chips, which come equipped for Wi-Fi. In March 2003, Cisco Systems agreed to spend $500M for Linksys, a Wi-Fi equipment maker. For the first time, that will put Cisco into head-to-head competition with Microsoft Corp., which began development of Wi-Fi network gear last year. And Cometa Networks, a joint venture made up of Intel, IBM and AT&T, is building a nationwide network of 20,000 hot spots over the next three years! And as more companies join the frenzy, the prices for Wi-Fi equipment will continue to plummet.

The Business Perspective

The challenge facing the telecom industry is to transform Wi-Fi into a global business. This will involve transforming a conglomeration of hit-or-miss hot spots into coherent, dependable networks. It means developing billing systems, roaming agreements, and technical standards. The major (landline) carriers are now tackling these problems. According to a source at Intel, the goal is to take Wi-Fi from being a wireless rogue activity to an industrial-strength solution that corporations can depend on.

Some corporations aren't waiting for an industrial-strength version of Wi-Fi to hit the streets. The potential effectiveness is so compelling that many companies are inventing custom-built systems. UPS is equipping its worldwide distribution centers with wireless networks at a cost of $120M. The company says that as loaders and packers scan packages, the information zips instantly to the UPS network, leading to a 35% productivity gain. IBM is developing Wi-Fi powered systems to monitor the minute-by-minute operations of distant machines, from potato fryers at restaurants to air conditioners in data centers. Installing a carrier-grade hot spot costs only $2,000 in 2003, one-fifth what it cost two years ago. Home gear prices are also falling fast. More than 50 companies are in the Wi-Fi chip market alone, according to estimates by Gartner, Inc. A wave of mergers and acquisitions is likely given the fact that the tech powerhouses are now joining the race to make Wi-Fi a ubiquitous, profitable business.

If the effort to groom Wi-Fi for business is successful, it could literally lift the Internet into the air. A constellation of dependable Wi-Fi hot spots could dramatically extend the range and expanse of the Web, changing its very nature. Wi-Fi connections to the Internet cost only one-fourth as much as the wired infrastructure companies use today.

Key business barometers are still untested. It's not known if corporate and consumer users will spend $30-$50 per month for access to a nationwide grid of Wi-Fi hot spots. Also unknown is whether the estimated number of subscriptions will justify the network investment. Bottom line: Can anyone make money in the home networking or wireless world? To make Wi-Fi viable as a business, the job now is to build it into a solid pillar of the networked world.

But to date, few commercial hot spots have thrived and analysts have major doubts about the new ventures at Boeing and McDonalds. Why? Because currently, no carrier can offer seamless nationwide coverage; security is still tenuous; and many potential users feel it costs too much.

The Reality: Wi-Fi Is Going Sky High

Other activities that are causing the Wi-Fi star to rise:

◆ By early 2004, more than 100 Boeing jets are scheduled to be equipped with Wi-Fi. For $25 or so per flight, laptop users can log on to the Net while soaring at 35,000 feet – conducting e-commerce, managing company inventories, or even making voice calls over the Web (VoIP). Boeing is so pumped on the new technology that over the next decade it hopes to outfit nearly 4000 planes with Wi-Fi service via its Connexion business unit.

- The consumer electronics industry is counting on Wi-Fi as well, to link a host of appliances in the home. Techno hobbyists are already sending MP3 songs and videos from their computers to TVs and stereos via Wi-Fi. This could become even easier over the next two years as the new generation of Wi-Fi (802.11a/f/g) rolls out, raising connection speeds to 54 megabits, equivalent to an hour of MP3 music – per second!

- Dell, Toshiba and TiVo are building Wi-Fi into computers and digital recording devices. Over 90% of new laptops will be Wi-Fi ready by 2005, up from 35% by year-end 2003.

- Wi-Fi is getting a boost from the increasing popularity of broadband, which is growing at 30% in 2003. Why? Because Wi-Fi is an inexpensive way to connect several household computers to a single high-speed Internet connection. This is what today's "home networking" is all about.

- At least four commercial Wi-Fi networks are in operation or under development in the U.S. They include T-Mobile, Toshiba, Boingo Wireless and Cometa Networks. Cometa is backed by IBM, Intel and AT&T. These initiatives will raise awareness of the technology while simultaneously lowering prices.

- Wi-Fi technology is advancing fast. Intel and MeshNetworks are developing antennas that can reach for miles instead of today's 300 feet. Coming soon: Wi-Fi-ready cell phones, PDAs and hot spots on trains and buses.

- Prices are dropping fast. An antenna for a laptop now costs just $46, down from $189 four years ago.

- Wi-Fi has grassroots appeal. Pioneers in Portland (OR), New York, Barcelona and Sydney continue to expand community networks in parks, bars and coffee shops. There are now 5000 of these free networks worldwide.

- Wi-Fi is becoming so pervasive these days that even some nationally known campgrounds ("Yogi Bear") are advertising Wi-Fi access using the official Wi-Fi symbol,

Wi-Fi CERTIFIED

Conclusion
Wi-Fi isn't about to become a rock-solid standard until hot spots are viewed as dependable. This has pushed more than 100 Intel engineers on a mission across the world: they're labeling hot spots across the globe as "Centrino certified". The objective is to unify the Wi-Fi world around Intel's brand, giving Centrino the Wi-Fi equivalent of the Good Housekeeping Seal of Approval. Wi-Fi represents a disruptive force in today's tech economy. But if history is any indicator, it will ultimately pay huge dividends.

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"Well done is better than well said."
Ben Franklin

SBC Lights Up Mission Bay – One of Nation's Largest Fiber-to-the-Premises Communities

Next-generation network from SBC capable of transporting voice, data and video services to Mission Bay residents in San Francisco

Project Overview
SBC Communications Inc., working with Catellus Development Corporation, is deploying in the Mission Bay community, a next-generation fiber to the premises (FTTP) network capable of providing voice, data and video services via a fiber network direct to the end-user. Recently, SBC began offering residents of the Mission Bay community voice and Internet services over its fiber network, which will enable applications ranging from streaming video and audio to interactive video games and video conferencing, as well as access to a community-based Intranet portal known as mbconnect.net.

About Mission Bay
Mission Bay is a new 300-acre redevelopment effort south of downtown San Francisco, which when fully complete, will include nearly 6,000 residential units. Two years ago, SBC started working with Catellus to equip the Mission Bay development with the latest in fiber optic technology.

Initial Fiber Network Offerings at Mission Bay
- Internet Access. Since, from a technical perspective there is virtually no speed degradation over fiber, Mission Bay residents should receive Internet access speeds at the high end of the package they order.
- Voice Services. Residents will have the ability to order up to four phone lines.

Mission Bay FTTP Capabilities
From a technology standpoint, the fiber platform SBC deployed is capable of delivering nearly unlimited bandwidth for video, voice and data/Internet applications. The fiber network is capable of delivering video services, including emerging bandwidth-enabled services like video-on-demand and HDTV (high-definition television). Additionally, the FTTP architecture in Mission Bay is capable of supporting VoIP.

Mission Bay Fiber Architecture
SBC is using BPON (broadband passive optical network), a FTTP architecture, to deliver services at Mission Bay. BPON utilizes a Passive Optical Network (PON) and Wave Division Multiplexing (WDM), and can deliver very high bandwidth to residences.

About FTTP Technologies
Advanced fiber-optic systems can be used as an alternative to the copper wires that connect most homes and businesses to telecom networks. In addition to providing more capabilities, fiber-optics offer enhanced network reliability and service quality.

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SBC Enhances Wireless Connectivity Offerings for Education, Medical Industries

Schools, hospitals now can converge voice, data onto a single WLAN

Building on its experience in tailoring wireless local access network (WLAN) offerings to key industry vertical markets, SBC Communications has announced new powerful, converged wireless applications for the education and medical industries.

Now, for the first time, the company is providing a single source for schools and hospitals to converge their voice and data traffic onto a single, fully managed wireless network, and as a result gain significant mobility, productivity, and cost-savings benefits.

Based on wireless fidelity ("Wi-Fi") technology, the new offerings bring together both wireless phones and wireless data connectivity on a single network to enhance safety and security, and provide greater communications efficiencies for students, teachers, and healthcare professionals across the company's 13-state service territory.

"The medical and education fields, in particular, have unique communications challenges and strong needs to stay connected anywhere in their own environments," said Ray Wilkins Jr., group president, Marketing and Sales, SBC Communications. "To address their unique needs, we have enhanced our WLAN solutions so that they can tap into the latest communications technologies to improve the safety, security, and efficiency of their organizations – without having to implement and maintain two separate networks for voice and data."

The WLAN packages are built on the latest 802.11 technology, and allow users to easily move about non-wired areas, while still remaining seamlessly connected to their voice and data network, the Internet, and the public telecommunications network through wireless connection points.

This type of technology continues to increase in demand and in popularity. According to EduVentures, a leading U.S. educational consulting firm, the nation's more than 110,000 public schools combined spend nearly $6.2 billion a year on technology needs. Of that, about $500 million is spent on wireless technologies, but that is expected to quadruple by next year. And in a report published last year, analyst firm Frost & Sullivan projected U.S. hospitals to spend nearly $295 million on WLAN technologies by 2005.

The new WLAN service offerings mark the latest milestone in the company's SBC

PremierSERV℠ Solutions strategic initiatives to enable a wider range of businesses to take advantage of the cost savings and efficiencies of voice and data communications network packages that include transport, equipment, and management.

This technology also enables customers in the medical and education fields to outsource network operations to maximize network performance, while reducing the need for capital expenditures and in-house service management.

EDUCATION

To maintain the highest level of safety within the K-12 school setting among administrators, students and parents, educational facilities need efficient and reliable communication services during both emergency and non-emergency situations.

The SBC PremierSERV WLAN Solution for School Safety and Increased Efficiency is designed specifically to address these unique needs. The solution is powered by Cisco Systems Aironet WLAN equipment, combined with SBC transport service and ongoing management. Schools and school districts also can use SpectraLink NetLink Wireless Telephones in conjunction with the WLAN solution.

Wireless phones enable teachers and administrators, for example, to increase communications with parents and each other from anywhere on a WLAN-enabled school campus. They could also use the phones to text-message other teachers and administrators or to call 9-1-1 in the event of an emergency.

As a result of the added efficiency, teachers can spend more time per day teaching students, instead of walking to the office, trying to physically locate other teachers, or running school errands that could be accomplished with a quick phone call.

MEDICAL

Reliable communication and customer service also is paramount in the healthcare industry to ensure quality patient care and efficient operations.

"Our new converged wireless communications options for the healthcare industry can dramatically enhance patient care, and provide powerful, reliable networks that are ideal for operation of a large healthcare campus," Wilkins said. "Our SBC Premier-SERV WLAN Solution for Enhanced Patient Care and Efficiency clearly addresses these critical needs."

The offerings feature Cisco Aironet WLAN equipment and SpectraLink NetLink Wireless Telephones, which can be used in telemetry areas, Intensive Care Units

(ICUs), emergency rooms, and other units where traditional cellular phones can interfere with highly sensitive medical monitors and equipment. This means the phones can be used in hospital rooms as well as sensitive areas that do not normally allow cellular activity, such as the radiology department. Also, hospital visitors who spend countless hours in waiting rooms can now move freely throughout the hospital while staying wireless-ly connected to hospital staff as they wait.

Additionally, SBC companies are offering the new SBC High Bandwidth Healthcare Solution that is based on SONET technology designed to deliver ultra-fast, reliable transfer of large amounts of data for medical industry applications, such as high-resolution x-rays and other images between facilities within a specific area.

The new medical and education offerings are backed by SBC companies' thousands of data, Internet and e-Services employees, including 3,500 engineers from SBC Data-Comm, all with advanced certifications in voice, data, security and other technologies.

SBC Executive News

Fred Chang, Ph.D., SBC's President of Technology Strategy, has been named to an expert committee that will conduct a comprehensive study on the role and current scope of research and development in the communications industry. The special committee is being formed by the Computer Science and Telecommunications Board, an operational organization of the National Academy of Sciences. The committee will explore current trends affecting the role of telecom R&D by taking a holistic view of the current environment and evaluating everything from basic research to advanced standard-setting practices. Work being conducted at the university level also will be evaluated to determine the level of academic involvement currently being applied to the industry. Following the completion of its research, the committee will provide a report recommending ways to improve the United States' status as a leader in the world of telecom.

Ed Glotzbach, Executive Vice President and CIO of SBC Operations, has announced his retirement. **John Stankey**, president and CEO of SBC Southwest, has become Senior Executive Vice President and CIO of SBC Communications. **Bill Blase**, President and CEO of SBC SNET, has been named President and CEO of SBC Southwest. **Michele Macauda**, Vice President-Network Services for SBC SNET, has been named President & CEO of SBC SNET.

SBC Continues Advanced Technology Investment

Even though SBC has reduced capital expenditures by 50% over 2000 levels, it continues to invest in advanced technologies that will pave the way for exciting new products and services in the years ahead.

SBC's Chief Technology Officer Ross Ireland gave that message recently at the telecom industry's SUPERCOMM 2003 conference in Atlanta.

"SBC's strategy is to develop the most powerful, advanced network of its type to serve as the platform for the next-generation services our customers will demand," Ireland said.

This effort revolves around evolving SBC's network in several ways, Ireland said. Today's network is increasingly:

- IP-based packet-switched rather than circuit switched
- Optical rather than electrical
- Data rather than voice-centric

As a matter of fact, in some of SBC's states today, data comprises 90 percent of total network traffic.

Customers are looking for advanced data and voice services to be delivered not only regionally, but nationally, he said. And larger business customers will insist they are backed up with agreements that guarantee exceptionally high levels of reliability, quality of service, and security.

Ireland addressed three key technology priorities for SBC in 2003:

Completing the Buildout of our National Data and IP Backbones

National data and IP backbones will enable SBC to provide emerging services like Voice Over IP and IP-VPNs (Virtual Private Networks) to our large and mid-size business accounts. SBC is nearing completion of these networks of the future that connect the top cities in our territory with the top 30 outside of our territory.

The OC-192 IP national backbone, including the largest California locations and out-of-region locations, will be operational later this month. The Midwest portion will be completed later in the year as we get long distance approvals. The backbone will be able to handle traffic at 10 Gigabytes per second at peak, with complete redundancy at every layer to ensure reliability. This is one of the nation's most powerful and flexible IP backbones.

Ireland said the "killer app" is business services powered by Voice Over IP. SBC

currently offers CPE-based Voice Over IP and will roll out a network-based solution this summer. SBC is exploring "soft switch" applications that will allow it to provide these Voice Over IP services completely from within our network. Soft switch services would enable customers to take advantage of a fully-integrated, full-featured voice network that runs through their LAN – so they don't have to purchase or maintain PBX CPE.

Promoting Development of Fiber-to-the Premises Technologies

Broadband Passive Optical Networking (BPON) dramatically reduces the cost of bringing fiber to our residential and smaller business customers. It includes a coupler about the size of a pack of gum that requires no power and no enclosures.

It is the fundamental technology behind FTTP – Fiber to the Premises. These connections can offer virtually limitless bandwidth to businesses and consumers, enabling broadband solutions on a grander scale – everything from ultra high speed Internet access to high-quality videoconferencing and HDTV-quality television.

SBC has deployed FTTP in the Mission Bay development in the San Francisco Bay area as our first application for consumers. Deployment of FTTP is a long-term proposition for SBC and would likely begin in newly-built subdivisions like Mission Bay.

If regulatory roadblocks are removed, as expected by the FCC Triennial review, SBC will begin looking seriously at expanding its FTTP plans. As a first step, SBC joined Verizon and BellSouth recently in announcing a set of common technical requirements based on established standards that will enable suppliers to begin cost-effectively producing FTTP network equipment.

Expanding DSL Availability

SBC is the nation's leader in DSL subscribers, and no provider – DSL or cable – has a broader footprint. SBC can deliver DSL to 32 million customer locations today – 66% of our customer locations. To support this, SBC has created fast-packet metropolitan networks creating more fiber "drop-off" points which broaden DSL availability in our communities. SBC also recently announced a new $90 million initiative to expand DSL broadband service to many new communities.

Ireland said that although SBC is spending far less than it once did on capital investments, its network continues to improve and expand thanks to a new network deployment strategy.

"In order to optimize our resources, we've adopted a just-in-time approach to network improvements," Ireland said.

"We're adopting new technologies in a way that allows us to stay just ahead of customers' needs. That allows us to manage costs prudently."

"There is no doubt – it's challenging to work within the capital constraints we've been under in recent years," Ireland said. "But SBC is proving that you can manage costs in new, highly effective ways, and still invest for future growth – building a world-class network for tomorrow."

"Be the change you want to see in the world."
Mahatma Gandhi

SBC Renames Research and Development Group

SBC Communications Inc. recently announced its research and development arm has been renamed SBC Laboratories. The division, formerly named SBC Technology Resources, Inc. (TRI), will continue its focus on applied research – the development of next-generation products and services that can immediately benefit customers.

"Our new name better articulates what the mission of this organization has been for more than 15 years," said Keith Cambron, president and CEO of SBC Laboratories. "Simply put, our goal is to use leading-edge technology to create real solutions that can make a positive impact on how our customers communicate."

SBC Laboratories is the lead research and development entity in the creation of wireless and wireline solutions for SBC Communications Inc. and Cingular Wireless. The division is organized around four key technology areas: Broadband Internet, Wireless Systems, Network Services, and Enterprise IT.

The organization's current research focuses on several technologies that have the potential to dramatically enhance communications capabilities for businesses and consumers for years to come, including voice over Internet protocol (VoIP), wireless fidelity (Wi-Fi), fiber-optic technologies, and network and Internet security. SBC Laboratories also will play a primary role in the evaluation and development of Fiber to the Premises (FTTP) technology in the coming months, as SBC Communications and other communications companies initiate an RFP process for recently announced common technical specifications.

SBC, BellSouth & Verizon Adopt A Common Technical Requirement for Fiber to the Premises

Anticipated FCC broadband ruling is next major step on path to new networks with nearly limitless bandwidth for Internet, voice and innovative video applications

Three of the nation's largest telecommunications service providers – SBC Communications, BellSouth and Verizon – have adopted a set of common technical requirements based on established industry standards and specifications for a technology known as fiber to the premises (FTTP). These advanced fiber-optic systems can be used to connect homes and businesses to telecom networks.

This announcement is a major step in paving the way for deployment of next-generation broadband networks that offer nearly limitless bandwidth for home and business Internet, voice and innovative new video services. FTTP, whether to the curb or to the building, will provide an ideal platform to support a number of emerging and evolving applications, such as interactive gaming, photo sharing, PC backup and telecommuting, along with video conferencing, premises surveillance, and other novel video services, which could be delivered on demand and in high-definition.

The use of common technical requirements, based on existing technical standards, will enable equipment manufacturers to more cost-effectively develop and build FTTP equipment for BellSouth, SBC Communications, Verizon, and other service providers. It positions the industry for economic deployment of fiber-optics much closer to homes and businesses, enabling these communications customers to see faster rollout of powerful broadband services. In addition, the new technology will offer enhanced overall network reliability and service quality.

The three service providers have issued a letter to telecom equipment manufacturers, alerting them that the providers will soon be seeking proposals for equipment based on the common requirements. BellSouth, SBC, and Verizon will independently finalize their FTTP deployment plans for 2004 and beyond, based on the evaluation of these proposals, ongoing internal studies, and on the resolution of related regulatory issues.

Upcoming rulings from the FCC could settle some of the uncertainty regarding new technologies such as FTTP and clear the path for companies to deploy new and powerful networks. For example, the FCC is expected to soon issue its final order under its Triennial Review of network interconnection regulations. That ruling, the first of several anticipated, is expected to

include provisions that more clearly set forth the FCC's policy regarding new network technologies like FTTP, including the extent to which unbundling and pricing regulations such as those imposed on traditional copper technologies will apply on a nationwide basis. The FCC also has additional proceedings underway to address other potential regulatory hurdles to deployment of these new technologies.

FTTP will enable service providers to deliver nearly unlimited bandwidth and a full range of applications directly to residential and business customers. FTTP can accommodate next-generation applications such as ultra high-speed Internet access and networking, multiple voice lines and innovative, even high definition video applications.

"Fiber to the premises could be the most fundamental and important enhancement in telecom communications services since wireless networks were built," said Matt Davis, director of Broadband Access Technologies at the Yankee Group. "With these common technology requirements, and the expected resulting manufacturing economies, widespread FTTP deployment has the potential to spur new telecom investment, stimulate competition across the spectrum of communications and entertainment services, and enable innovative, bandwidth-hungry applications for consumers."

"BellSouth has always been a leader in the deployment of fiber deep within its network, resulting in almost one million households passed by the end of 2003," said Bill Smith, chief product development and technology officer, BellSouth. "This new platform, along with favorable regulatory actions, could allow BellSouth to offer additional advantages to our customers, and we plan to work quickly to select and deploy products that will ensure the most cost-effective network design."

"This development could set the foundation for the network of the next century, coupled with the core high-speed voice and data networks in place today. Given a supportive regulatory environment, we can begin to build a network that will profoundly change the way Americans communicate," said Ross Ireland, chief technology officer, SBC Communications.

"As we deploy it, fiber to the premises will be a watershed advancement for Verizon and our consumer and business customers," said Mark A. Wegleitner, Verizon's chief technology officer. "This technology is not only capable of providing the services we are familiar with today, but it also opens the door for communications, information and entertainment services previously unimagined."

Helpful Hints For Consultants & Vendors

When using the SBC Vendor/Consultant Service Center (VCSC):

1. Always get the name of the person you're speaking with.
2. If you're placing an order, write down the order number & promised Due Date.
3. When calling back to inquire about that order, have all the pertinent information, i.e., new phone numbers, address, customer name, BTN products etc.
4. If you need to speak to a supervisor, thank the rep and ask for a manager. If none are available, request a callback within 2 hours. If you can't wait, call your liaison manager to get assistance or a faster resolution.

Our commitment is to take care of each client as if they are the only one. We're dedicated to making sure managers are timely in their response to escalations. We will ensure your customers are satisfied when they've completed business with the VCSC.

In an effort to make placing and issuing orders a smoother process, we've developed standardized forms for our consultants/vendors. These forms will ensure you get the information needed from the customer prior to us receiving the orders for processing. This will surely cut down on our discrepancies and customer irritation at having to answer additional questions regarding an order that they assume has already been placed. As we all know, when orders are faxed, they sometimes lose quality; using our standardized computer generated forms will make it easier to read the information on these forms. The Consultants/Vendors receiving UPDATE will get copies of these forms as inserts.

Thanks very much. We look forward to helping you and your clients.

Missy Marzett
Sales Manager
Vendor/Consultant Service Center
& Customer Sales Support Center

"American Idol" Final Voting Brings 100 Million More Calls Than Usual

More than 260 million calls were processed by SBC's networks during "American Idol" voting on May 20 – 100 million calls more than a typical 3-hour period of weeknight calling (a 62% increase).

Jerry Hinek, SBC

Spyware

What is Spyware?

Spyware is software that sends information from your computer to some other computer on the Internet, normally without your knowledge. The information may be anything that the spyware originator wants and can get. It might be a history of your key strokes or the websites you have visited. It could be other files from your computer. It's a backdoor around any security you have for your computer. Spyware is dangerous because it takes without asking.

Most likely you do have spyware running on your computer; most likely you don't know it's there. Some spyware may be an unknown feature of software you have agreed to load. Some, but not all, free utilities on the Internet contain spyware. The author of the software does not publicize that it will send information from your computer to another.

Some spyware can be part of a malicious computer virus or worm. You might click on a link in an E-mail that does some amusing thing on the screen. While it does that, the program also installs software on your computer that you don't know about and don't want.

Is Spyware Malicious?

It's not necessarily malicious, but there are risks for you. First of all spyware is not designed to benefit you; it's designed to take from you. It benefits the originator. Most people would probably not be too upset with information going to a reputable company that will use it only for statistics and not for identification. Pollsters gather information over the phone and through the mails because people are willing to share personal information. If the information can not be tracked back to anyone personally it's not usually seen as a violation of privacy.

However spyware comes with no guarantees for your privacy. It's not like someone calling you on the phone and asking if you have 15 minutes to answer a few questions. Spyware may track the passwords you enter on the screen to access your bank accounts or the credit card information you enter on an online order form.

Since spyware is a secret or unknown feature to software, it may install bugs or incompatibilities onto your computer that will disrupt its operation. No one will support you or take care of any problems the code causes you. At the very least adding spyware to other software can be very unethical.

Spyware is often difficult to remove from a computer, and not just because you don't know it's there. Spyware authors use every means they can to protect the code they've written from discovery or removal. People have taken steps to remove it only to find it running again after a re-boot.

Why Spyware?

The simple answer is that spyware can be profitable for the originators. There is compensation for the personal info collected.

Think about television. The industry can set advertising rates because a lot of people are willing to tell a pollster some personal information and what shows they watch. Information about you is valuable.

Have you ever heard that adage that half of all advertising dollars is wasted; the trick is in knowing which half? Advertising has traditionally been a buckshot process. If you place an ad in a newspaper or on television, a lot of people will be exposed to your ad who are not likely to buy your product.

Spyware can collect more specific information on you and your likes and dislikes so that advertisers can target you with ads you are more likely to respond to. Companies such as Doubleclick.com use web page "cookies" to track the web pages you visit and to infer your interests. As you go from web page to webpage you see banner ads and popup ads, often supplied by doubleclick.com, that they think will appeal to you. Doubleclick.com does not have to know your name or location; it assigns you an ID and then tracks your interests.

This example may or may not be unsettling to you. Remember that you don't know who is collecting information that spyware collects about you, nor do you know what they will do with it.

What Can We Do about Spyware?

I think the first thing to do is to be aware that people you don't know, and people you are never likely to meet, want to know about you. You should have some idea how much your privacy is worth to you. And you should be on guard against people who take for free that which you value.

If you reveal what TV shows you watch, that contributes to all the free television you get to see. Hopefully that pushes the balance towards the success of the shows that you like to watch. You can read the New York Times on the web, but they ask you to register your personal information for the free news. So you get something for your personal information. You don't even have to tell the truth.

If you are tricked into downloading a "free" software utility that contains spyware, the transaction is not so clean and you may have more reason to be on guard. The "free" utility may not be that useful to you, but the collection of your information may go on for a long time undiscovered.

There are software names that will seek and destroy spyware for you. Unfortunately even some of that anti-spyware software has been found to contain spyware. One reviewer commented that after his testing of several spyware products, he had eliminated spyware from his system, but began seeing more popup ads for computer security products.

Search on Yahoo! Look for reviews of anti-spyware software and choose a package that seems to do what you want. Be careful.

Pay attention if your computer frequently seems to access the network when you're only writing a document or playing solitaire. Notice signs that spyware may be active.

Think about the value of your personal information. You expect to get something for your professional information, you should also get something in exchange for any personal information you give up.

Jerry Hinek is a Senior Business Security Manager for SBC Services. He earned an MBA in Information Management and is a Certified Information Systems Security Professional.

SBC RENAMES R&D GROUP

In addition, SBC Laboratories is leading a collaborative effort to develop new security technologies to further protect critical telecommunications networks from security vulnerabilities. Late last year, the organization established the Internet Assurance and Security Center (IASC) to research new security concepts in cooperation with major telecommunications providers and academic groups.

In past years, SBC's research organization has played a key role in development and commercialization of technologies that shape consumer and business communications today, including broadband services and wireless communications. In fact, one of SBC Laboratories milestone contributions includes the development and deployment of packet technologies – a foundational building block in Internet transport for the exchange of traffic between Internet carriers.

Founded in 1988, SBC Laboratories has research facilities in Austin, TX and Pleasanton, CA. The division's executive team consists of leading scientists and experts in their field.

For more information on SBC Laboratories, visit their Internet site at www.labs.sbc.com.

UPDATE

Nancy Grover, SBC

Internet Worms

Attacking thousands of computers manually is a huge task for any person. If a malicious individual managed to take over five computers a day, it would take them five and a half years to compromise 10,000 systems.

To increase their efficiency, attackers have been making use of Internet worms for many years. Worms automate the process of compromising systems, and have caused the greatest, widespread damage of any other computer attack technique. Internet worms are automated attack tools that spread using computers and networks. A worm takes over one computer, and uses it to scan for and attack other vulnerable systems. When those systems fall under the worm's control, the speed of the attack increases as the worm jumps from victim system to victim system in search of additional prey. Using this process, worms propagate across a network on an exponential basis.

The difference between a worm and a virus

The major difference between a worm and virus is the level of human intervention required to make it spread.

Viruses are computer programs designed to propagate themselves from one file to another on a single computer. Human intervention is required to spread the virus. When an unsuspecting user receives infected files, disks or email, they can spread the virus to their own computer or to others while copying files to and from file servers.

Worms may require a human for the initial infection, but do not require any further human intervention to spread. Because a worm is programmed to copy itself over a network from one computer to another, it can proliferate much more rapidly than a virus.

History of Internet worms attacks

Worms were first developed as legitimate programs in 1982. The researchers at the Xerox Park research center in Palo Alto, CA., developed and experimented with worms hoping they could provide the means to efficiently spread software across a network. The programmers realized even then, that the main difficulty with worms was the inability to control their power and the danger of their self-replication process. As history has taught us, this problem has made the worm a tempting tool for anyone with malicious intent.

Why Worm-based Attacks?

Given the relative secrecy of a good manual hack, and the press that most worms generate, this is a good question to ask. Aside from the fact that a handful of hackers do enjoy their 15 minutes of fame, there are two main reasons worm intrusions exist, and will continue to be the main motivation for these types of attacks.

Relative ease: Worms can be automated. Even though there is a good deal of work involved in writing the worm program, it does not need to be monitored and can continue to operate even while the developer is away.

Penetration ability: Worms attack with such speed and aggressiveness that they can create a surprise attack, making it possible to penetrate some of the more complex networks.

How Worms Attack

Although computer worms attempt to exploit flaws within either the software or hardware design, the method of propagation has evolved over the years. Prior to 2001, most worms used e-mail as their primary method of distribution. Since then, newer broadcast techniques are being used. These methods include targeted peer-to-peer (P2P) networks as well as the use of UDP ports as a way of spreading.

Worms are programmed to spread quickly, gaining speed as more and more systems become infected. Some worms select random IP addresses to scan for victims, instead of the more efficient method of targeting victims in highly populated IP address ranges, but that could soon change.

Most of the worms seen in the past have exploited a single vulnerability in a system and then moved on to new victims. Newer worms attack computers in multiple ways, using identified security holes found in a large number of network-based applications. The newer worms are capable of exploiting five, ten, twenty, or even more vulnerabilities. With more vulnerabilities to exploit, these worms can spread faster and more successfully. Even if a system has been patched against some vulnerabilities, the newer worms will still be able to take a system over by exploiting other, unpatched security holes.

Some of the more infamous worm attacks include:

Morris (1988) – This worm is named after its creator and releaser, Robert Morris, Jr. This worm is still considered one of the most damaging worms ever unleashed on the Internet. At the time the worm was set free, Morris was a graduate student in computer science at Cornell University. Morris programmed the worm to propagate using four methods of attack. Though these attacks only affected DEC's VAX and Sun Microsystems' Sun 3 systems, they proved devastating to the more homogenous Internet of 1988.

Sendmail – a utility program that handles the routing and delivering computer mail. The worm exploited a "debug" feature of sendmail that allowed a remote operator to send executable programs. After issuing the debug command, Morris gave orders to copy itself, causing a distributed denial of service attack. (DoS)

Fingerd – a utility program that allows users to obtain information about other users, such as a user's full name or telephone extension. A hole in the program allowed the worm to identify and propagate to distant machines.

Passwords – Morris tried different methods to guess user passwords. Once access was gained through a correct password, it could pretend to be a legitimate user and by exercising that user's privileges gain access to other machines. Despite the advent of strong authentication mechanisms, poorly chosen passwords remain the primary scheme used for authentication and authorization.

Trusted hosts – trusted host features provide users with convenient access to each other's resources, and is used on local networks where users utilize services provided by many different computers. By using these features, Morris spread quickly within local networks once the initial computer had been compromised. The trust relationships present in 1988 were extensive, and their abuse allowed for efficient spread of the worm. Unfortunately, a number of the vulnerabilities abused by the Morris Worm continue to exist today.

Code Red (2001) – The Code Red worm was launched on July 19, 2001, and made big news with its rapid spread. The worm infected more than 250,000 systems worldwide in less than nine hours. Code Red exploited a security hole in Microsoft Internet Information Server (IIS), and once it had compromised a server, it scanned for other vulnerable servers and infected them as well. Code Red then generated threads to simultaneously scan and randomly select IP addresses for additional attacks. The primary damage caused by the worm was consuming network bandwidth and system processing cycles. Code Red had the potential to steal and/or destroying data.

Additionally, on the 20th of every month, the worm is programmed to stop infecting all other machines and to begin its next plan of attack. It launches a DoS attack against www.whitehouse.gov from the 20th to the 28th of each month, and then goes dormant following the 28th.

Nimda (2001) – The most successful multi-exploit worm seen so far is Nimda. Launched just one week after the September 11, 2001 terrorist attacks, Nimda spread quickly using several known Windows security vulnerabilities, and provided the world with a glimpse of the malicious worms to come. Nimda spread voraciously, and exploited over a dozen problems commonly found in the Windows environments, including Internet Explorer, IIS Web Server, Outlook, and Windows file sharing.

Nimda traveled through infected web pages. It copied itself to shared disk drives on business Intranets, and appended itself to JavaScript web pages, which when viewed, downloaded the worm to a user's computer.

Slammer (2003) – In January 2003, SQL Slammer hit, disabling much of South Korea's Internet access, as well as over 13,000 Automated Teller Machines in North America. Though Slammer infected only one-fifth of the hosts/servers that Code Red did, the rate of infection was 18 times faster. Slammer took only 10 minutes to spread worldwide and infect 90% of all vulnerable hosts, whereas the Code Red required about 14 hours. Within 2 days, Slammer affected over 200,000 computers in North America and between 400,000 and 700,000 worldwide, causing approximately one billion dollars in lost productivity.

SQL Slammer exploited Microsoft's SQL Server, a service that uses UDP instead of TCP. Unlike TCP, UDP does not use a three-way handshake. When a message is sent no reply or acknowledgment is necessary to complete the connection. Because of this characteristic, and its small size, this worm was able to move across the network quickly and voraciously.

The coming Super Worms

Much of the code for creating super worms is already available, scattered around the Internet. It is only a matter of time before someone collects the pieces, assembles them, and unleashes a super worm.

The super worms of the near future will more than likely spread highly malicious attack tools concealed within the worm itself. Some worms will spread denial of service attacks against a particular victim, or steal data by searching systems for files marked Secret or Proprietary, destroying and deleting sensitive information. Some could act as logic bombs causing systems to crash, disabling large numbers of machines all within a specific timeframe.

Some of the Super Worms we can except to see in the future include:

Multi-Exploit Worms – Older worms usually attacked only one type of operating system,

requiring system administrators to deploy patches to a single type of system for defense. In the near future, super worms will exploit multiple operating system types and exploits in a single worm attack, making the patching process much more cumbersome.

Warhol/Flash Worms – This worm will Pre-scan large portions of the Internet, looking for vulnerable systems. The worm will not necessarily take over those systems; it will just record the addresses of the vulnerable machines. The worm will then load itself onto the first system on the list, then spread itself to the others in a matter of minutes, achieving total domination.

Worms containing payload – So far, worms have focused on spreading, not conquering. They cause problems by consuming resources associated with spreading, issues with network utilization and computer processing power. In the future, worms will have a much more insidious purpose. They could search hard drives and steal sensitive data, steal financial information and email it to an adversary, or plant Trojan Horse backdoors for remote control of a system or systems.

Polymorphic Worms – So far, worms have done a poor job of evading detection. Some e-mail worms alter their subject line allowing them to evade spam filters. Soon, we'll see worms that dynamically change themselves. Each segment of the worm will have the same function, but will have an entirely different code base making detecting and isolating the worm very difficult.

Metamorphic Worms – Beyond altering their form, these worms will change their functionality entirely. The worm will contain encrypted payloads. Once a given event occurs (time duration, infection rate, or other trigger), the worm will morph, launching the hidden functionality, such as a backdoor, information stealing, denial of service, etc. If the worm itself is detected during the initial spread, its true purpose will continue to be concealed.

Zero-day Exploits – Newer worms will likely break into systems using so-called zero-day exploits, named because they are attacking brand new vulnerabilities, identified to the public for exactly zero days. When a worm spreads using a zero-day exploit, no patches will be available and more time will be required to comprehend how the worm is spreading. The first time the exploit code is used in these worms will be when they compromise thousands or even millions of systems.

How can you protect yourself against an Internet worm?

There are, of course, some obvious defenses. Harden your systems and stay

current with security patches. Defend your systems at the host level, not just the perimeter, and consider installing intrusion detection systems and response devices. Avoid allowing unnecessary incoming UDP traffic. And most importantly, follow corporate security policies, and educate naïve users against the dangers of sharing disks and email attachments.

This of course is nothing more than a repeat of the same-old strategy, which is the core of any good security system. While these suggestions will help defend a site or system against worm intrusions, remember that no network is 100% secure from a worm or virus attack. Network security continues to evolve, and what is considered a best practice today may not work in the network of tomorrow.

What does the future hold?

As the level of attack ingenuity on networks continues to evolve, the level of knowledge required to carry out these attacks has been minimized. It has become increasingly easy to distribute and launch a worm and can now be accomplished by virtually anyone, including hackers and disgruntled employees alike.

Malicious worms continue to develop quickly with increased ability to spread and cause damage, with newer worms operating more viciously and efficiently than ever before. Every two to six months, someone unleashes a new worm with an extra twist designed to defeat our present defenses. While such attacks are definitely a cause for concern, they certainly will not be the end of the world. Worms are simply part of the price we pay for the convenience of a permissive Internet.

Nancy Grover, Regional Manager, Information Security, SBC Corporate Information Security, is responsible for the company's critical systems, including the core network and the Network Operating Centers. She is a Certified Information Systems Security Professional.

SBC Techs Part of Amber Alert

SBC has implemented an internal technology system and process to notify the company's 6,000 California technicians with Amber Alerts to assist in search efforts that aid the safe return of abducted children. When an Amber Alert is received, an alphanumeric page is sent to all Technicians simultaneously via the company's alpha-paging network providing them with details. The tech can then notify 9-1-1 if they see something that looks suspicious. SBC California joins other SBC states, such as Connecticut, Texas and Oklahoma in rolling out an Amber Plan initiative.

Jagdish Kohli, Ph.D.

Healthcare Info Aggregation and Storage

Advances in medical instrumentation, computer and information technologies have created a new paradigm in the delivery of healthcare services. These evolving technologies have the capability to track the state of a person's health via healthcare information aggregation. This aggregated information presents an integrated picture of a patient's health to the attending physician resulting in improved quality of healthcare. The amount of healthcare information generated for all members of the society is considered voluminous. Information storage and retrieval technologies continue to advance to manage thousands of terabyte of online medical information.

In this article we explore the following topics:

◆ Healthcare Information Overview
◆ Network Information Repository
◆ Healthcare Information Storage
◆ The Future

Healthcare Information Overview

Our bodies are complex biological systems undergoing change with time. Monitoring information about changes is important to assess the state of our health. Many instruments such as blood pressure meters, blood glucose meters, heart rate meters etc. generate useful medical information quickly. The composition of our blood says a lot about the state of our health. Laboratory based blood analysis generates valuable medical information. Periodic check-ups are important to track the state of our health and early detection of any disease. Disease progression in the body happens over a period of time and early detection allows a cost-effective and timely treatment with improved quality of healthcare.

In today's environment our medical records are fragmented and stored in different locations using multiple storage media. Many dentists and eye doctors store medical records in paper files and storage cabinets. Some physicians have started to use computers and store patient records in floppy disks or compact disks. Many patients store their personal medical records in paper notebooks. Some patients visit homeopaths and naturopaths who keep records in paper files.

A physician can do a much better job in treating a patient if he/she has access to all of the patient's aggregated health information from a single unified database. This is an extremely important aspect of our evolving healthcare delivery system.

The availability of online healthcare information will satisfy the growing information needs of many primary and secondary healthcare stakeholders. The doctor and the patient have an intimate therapeutic relationship that is so vital for the well-being of the patient. In addition to the doctor and patient as primary stakeholders, an administrator such as health insurer has primary stakes in the cost of treatment.

Ongoing capture and analysis of healthcare information is important to improve the health of patients. There are many secondary stakeholders in our complex healthcare industry. Some of these stakeholders and how the healthcare information is used are shown in Table 1.

Table 1: Secondary Stakeholders & Usage of Healthcare Information

Secondary Stakeholders	Healthcare Information Usage
Clinical laboratory	– To process and analyze patient's specimen
	– To report results of analysis to patient's primary care physician
	– To maintain record of results of analysis
	– To bill patient, primary care physician, or health insurance company for services provided
Pharmacy benefits manager	– To process claim for medications provided to patient by local pharmacy
	– To monitor prescription and suggest generic substitutes to patient's physician
	– To perform utilization review of patient's physician
Consulting physician	– To assess patient's medical needs
	– To document patient's medical needs for continuity of care
	– To develop an appropriate treatment plan
	– To prescribe diagnostic tests, order treatment, etc.
	– To work with patient to ensure success of treatment plan
	– To work with primary care physician as necessary to provide treatment
	– To maintain ongoing record of services provided to patient
	– To bill either patient or health insurance company for services provided to patient
State bureau of vital statistics	– To record birth of patient's baby in state registry
	– To initiate an immunization record
Accrediting organizations	– To review local hospital's operations
	– To recommend improvement in operations based on review of patient records
	– To accredit local hospital for meeting both operational and quality standards
Employer	– To request claims data on employees
	– To review claims data to identify ways to reduce claims
	– To adjust benefits package based on review of data
Medical Information Bureau (MIB)	– To retain health information on individuals requesting life insurance
	– To provide health information on individuals applying for insurance from MIB members, to reduce fraud
Attorney	– To request data demonstrating adherence to standard of practice
	– To analyze data demonstrating adherence to standard of practice
State public health and family physician	– To perform metabolic screening on newborns through blood tests
State agency collecting hospital discharge data	– To analyze health services utilization and hospital cost and effectiveness of health care delivery

Network Information Repository

A single institution or a group of hospitals can create a single medical information repository for all its members. This cradle-to-grave repository has following features:

- The repository can be duplicated at a remote network location to protect medical information against natural disasters.

- The information can be updated on an ongoing basis.

- The medical information can be staged for active patients for quick access and retrieval.

- The information can be protected by appropriate deployment of fire wall technologies.

- The healthcare information can be secured by creating "information zones" with selected information access privileges for primary and secondary stakeholders.

- Grandparents, parents and children medical histories can all be linked to identify transfer of any damaged genes from one generation to the next.

When a patient moves from one healthcare plan to another plan or provider his/her information can be easily transferred to another database. This also suggests a uniform set of national standards in the coding and storage of healthcare information.

Healthcare Information Storage

The medical information repository is a collection of data storage, database management and fast I/O (input/output) technologies tied together in a unified architecture to provide reliable access to healthcare records. The requirements for medical information storage and access are very demanding and continuous developments in Random Access Memory (RAM), magnetic disk, magnetic tape and newer storage technologies will support these requirements cost-effectively.

Main memory and magnetic disk technologies are well established and see continuous improvement in price and performance. Research continues to discover new storage technologies to manage large records such as medical images. One such active area of research is the holographic memory. Holographic memory is a promising technology for data storage because it is a true three dimensional storage system, data can be accessed an entire page at a time instead of sequentially, and there are very few moving parts

so that the limitations of mechanical motion are minimized. Holographic memory uses a photosensitive material to record interference patterns of a reference beam and a signal beam of coherent light, where the signal beam is reflected off of an object or it contains data in the form of light and dark areas. Holographic memory has an access time somewhere between main memory and magnetic disk, a data transfer rate that is an order of magnitude better than both main memory and magnetic disk, and a storage capacity that is higher than both main memory and magnetic disk. Certainly if the issues of hologram decay and interference are resolved, then holographic memory could become a part of the memory hierarchy, or take the place of magnetic disk much as magnetic disk has displaced magnetic tape for most applications.

In the memory hierarchy, holographic memory lies somewhere between RAM and magnetic storage in terms of data transfer rates, storage capacity, and data access times. Table 2: shows the comparison of access time, data transfer rates (readout), and storage capacity (storage density) for three types of memory; holographic, RAM, and magnetic disk.

Table 2: Comparison of Storage Media Characteristics

Storage Medium	Access Time	Data Transfer Rate	Storage Capacity
Holographic Memory	2.4 s	10 GB/s	400 Mbits/cm2
Main Memory (RAM)	10 – 40 ns	5 MB/s	4.0 Mbits/cm2
Magnetic Disk	8.3 ms	5 – 20 MB/s	100 Mbits/cm2

Digital medical library is a collection of online databases for medical education and research. From patient case studies, knowledge databases can be created to study the growth and control of serious diseases. Multiple diseases in humans are other serious areas needing further research.

The Future

Memory technology advances will allow the creation of large scale healthcare information databases. Soon we will move from terabyte repositories to petabyte and multiple exabyte size storage banks. The storage capacity of these newer technologies will meet our growing information management needs. A comparison of storage by each new generation of technology is shown in Table 3.

Table 3: Information Capacity Comparison

Information Size	Capacity	Comparison
1 kilobyte (KB)	1,024 bytes	half of typewritten page
1 megabyte (MB)	1,024KB	500 typewritten pages
1 gigabyte (GB)	1024MB	500,000 typewritten pages
1 terabyte (TB)	1024GB	500,000,000 typewritten pages
1 petabyte (PB)	1024TB	insanity
1 exabyte (XB)	1024PB	insanity

Currently US population is about 300 million living souls. A sizable portion of our population has no health insurance coverage. Some of these people suffer from chronic diseases and there exists no medical information about these people. If we reach a stage where all of the people can be brought into the "information based healthcare service delivery paradigm", a large scale repository can easily store all of our medical records. If each of the 300 million people gets 10MB storage for medical information, the total size of this medical data repository would be 3000 terabytes or 3 petabyte.

The road to information based healthcare service delivery has many challenges. Healthcare education and awareness programs should be established highlighting that our medical health is even more important than our financial health. A collaborated effort between healthcare industry, academia, political leadership and associated non-profit groups can lead us to an information based healthcare delivery social policy.

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Mark Fei

Food For Thought: Unintended Consequences

People that are responsible for setting policies within corporations need to not only be knowledgeable in their areas of responsibility but also need to make sure that they're talking with other policy setters at their company. I recently encountered an example of a large, well known, publicly traded company that is setting policies that are most certainly going to undermine their performance even though they're not yet aware of it. Let me explain.

Much has been written, in these pages and elsewhere, about the need for effective security measures for today's networks. We are all aware of the importance of firewalls, up to date anti-virus software, and the need to control what employees should, and should not, do with their PCs. It is also the case that the last three years have taught a hard lesson (or provided a sharp reminder) about the ongoing need for careful cost control and how important it is to keep one's eye on the bottom line.

These two things ought not to be in conflict but when the left hand doesn't know what the right hand is doing unintended consequences can, and do, occur.

Here's the situation:

Part One: The company has, for several years, purchased Palm Pilots for those employees that needed them. Employees were, of course, permitted to synchronize their (company owned) Palm Pilot with their (company owned) PC. However, in keeping with the idea of maintaining a secure environment they were not allowed to add any non-authorized applications or data to their Palm Pilots or to their PCs. OK – a bit restrictive perhaps (what, I can't put a photo of my kids on the device?), but somewhat understandable given the very real threats of viruses, hackers, etc.

Part Two: recently, a senior executive made a decision that in these lean times the company will no longer be paying for any personal information managers, be they digital (Palm Pilots) or paper (DayTimer, FiloFax, etc.) If any employee needs and wants a calendar, or name and address book, or any other such device, they are certainly welcome to spend their own money but the company will not be reimbursing for this. This too is not a crazy policy; many companies do not pay for these items.

Here's where the problem starts. If an employee has an existing (company owned) Palm Pilot they are welcome to continue using it and synchronizing it with Outlook running on their desktop. But what happens if (when) that Palm Pilot fails? Will the company replace it? No-that's part of the new financial policy. Can the employee go out and buy a replacement Palm Pilot with their own money? Certainly. Can they then synchronize their new Palm Pilot with their desktop? Nope-that would violate the IT security guidelines which state that no non-company owned assets can be connected to any computer or network. Those of you that use PDAs will almost certainly agree that their utility would be greatly diminished if they could never be synchronized.

So, this company has two policies, issued from two completely different departments that, taken individually, might make some sense. The problem is that these particular policies run right smack into one another, creating a ridiculous situation. There is another problem that ensues from this which is that this will, almost unavoidably, create "underground" behavior. People that have grown accustomed to using a Palm Pilot on a regular basis are not likely to give that convenience up, even if they have to break the rules. So, rather than fostering a more secure environment, this company is unwittingly driving its employees to introduce more risk by making them synchronize their personal PDAs "on the sly." Since they are not company-owned PDAs there's no telling what kind of applications (and potential threats) they will have loaded on those PDAs.

So, what's the answer to this conundrum? The first and obvious answer is that before executives issue proclamations about new policies they should at least attempt to make sure that they're not creating conflicts like this one. But the second and more difficult part of the answer is that all policies need to be very carefully thought-through and should not be instituted without analyzing what all the repercussions will be.

Computers – all of them, from mainframes to PDAs – are all about improving productivity. When IT policies are established that hamper individual productivity they are running contrary to this fact. Many IT security departments will establish policies that are overly restrictive (no, you cannot put a photo of your kids on your PDA) because it's simply easier. Rather than make the effort to carefully think about what employees should and should not be able to do in order to maximize both productivity and security, they just ban everything and assume that this provides the best protection. It doesn't. The folks that are paid to understand computers, networks, and their

security, also need to think about what will create an environment that is flexible and accommodating to a variety of individual needs and working styles.

Mark Fei , founder of Fei Communications Group, LLC, has been training CEOs and other leaders in the Telecom World for nearly 20 years. He provides this observation and insight. Mark Fei can be reached at www.fei-comm-group.com.

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Telecom Challenges & Solutions

The Situation
Dunn-Edwards, one of the nation's largest independent paint manufacturers and suppliers, used to rely on a complicated combination in-house and outsources solution for their network and hosting services.

The Challenge
They wanted to consolidate and streamline these services and implement a disaster recovery solution with one provider.

The Solution
After a thorough review, Dunn-Edwards chose SBC E-Services, which offered a single, simple end-to-end solution that met their needs at a competitive price.

Impressed with the technical capabilities of the SBC state-of-the-art Internet Data Center, Dunn-Edwards saw SBC E-Services could provide a simple end-to-end solution: the equipment, the SBC network and the rock solid data center solution they needed.

"It was important to have a company that was stable financially, stable in terms of where they were headed in the future," said Darlene Mitchell, Director of Information Systems & Technology for Dunn-Edwards. "SBC, based on our research, certainly is poised to continue to grow and be a stable provider for us for a long time. They have the depth in their organization to bring the right people to the table to get results!"

She knew the cost of designing and implementing an equivalent data center would have been cost prohibitive. "Based on our timeline and the expected return....we never would have been able to match the redundancy that SBC PremierSERV Data Center Hosting offers," Mitchell said.

"Dunn-Edwards can now spend less time and resources managing their network and more time focusing on their customers and growing the business," said Mike Miller, Regional Sales Director for Advanced Enterprise Solutions.

Cassandra Jessie-Johnson, SBC

DSL DATA NEWS

What's New with DSL?

In May, SBCIS introduced two new enhancements to the SBC Yahoo! DSL product suite. The SBC Yahoo! Basic Package can now be ordered with either dynamic or static IP's – providing all SBC Yahoo! DSL customers with a static IP alternative. Additionally, a dynamic IP alternative was made available for customers who need the greater bandwidth of the SBC Yahoo! Expert Plus Package. These two enhancements are available across the SBC footprint, except in the Southern New England Telephone territory.

The availability of the new speeds is contingent upon the distance the customer's premise is from the Central Office, loop length. If the SBC Yahoo! DSL service is out of a Remote Terminal (RT), the loop length limitation does not apply. The guaranteed speed is the minimum speed in the speed range selected. Actual throughput speeds will vary due to Internet congestion and other factors associated with the Network or the customers' computer. For more information on either of these two new SBC Yahoo! DSL Packages, call your Unique Services Center South Consultant Queue today at 1-866-234-4DSL (4375).

Back by popular demand! Rates at-a-glance for SBC Yahoo! DSL Internet service:

Product Name	Speed (downstream x upstream)	Loop Length	Rack Rate
SBC Yahoo! DSL Basic Package	Up to 384Kbps x 128Kbps	16K ft	$39.95/mo
SBC Yahoo! DSL Basic – S Package	Up to 384Kbps x 128Kbps	16K ft	$54.95/mo
SBC Yahoo! DSL Standard Plus Package	384Kbps – 1.5Mbps x 128Kbps	12K ft	$49.95/mo
SBC Yahoo! DSL Standard Plus – S Package	384Kbps – 1.5Mbps x 128Kbps	12K ft	$64.95/mo
SBC Yahoo! DSL Deluxe Package	768Kbps – 1.5Mbps x 256Kbps	9K ft	$59.95/mo
SBC Yahoo! DSL Deluxe – S Package	768Kbps – 1.5Mbps x 256Kbps	9K ft	$79.95/mo
SBC Yahoo! DSL Symmetric 384 – S Pku	384Kbps x 384Kbps	12.5K ft	$119.95/mo
SBC Yahoo! DSL Expert Plus Package	1.5Mbps – 6Mbps x 384Kbps	7.5K ft	$139.95/mo
SBC Yahoo! DSL Expert Plus – S Package	1.5Mbps – 6Mbps x 384Kbps	7.5K ft	$159.95/mo

On the Horizon

The enhanced SBC Yahoo! Business Portal will be available at the end of this summer, and will be tailored for business customers. The enhanced suite of products and services will enable the small businesses to leverage the power of the Internet to communicate, collaborate and grow. The SBC Yahoo! "Business Edition" Portal offerings will include SBC Yahoo! DSL and Dial-up. These offerings will include customized services, applications and capabilities, including many optimized for broadband, which will help your customers improve productivity and become more competitive.

These are the highlights of the SBC Yahoo! DSL Business Edition:

◆ Personalized SBC Yahoo! DSL homepage

◆ Customized SBC Yahoo! DSL browser

◆ SBC Yahoo! Mail account with 25 MB of storage, POP access and email forwarding

◆ Ten additional SBC Yahoo! Mail accounts with 10MB of storage each

◆ SBC Yahoo! Messenger with high quality web cam capability

◆ SBC Yahoo! Photos and Briefcase with 110MB of online storage

◆ Firewall software to help shield you computer from unauthorized access

◆ Three consumer reports

◆ Unlimited nationwide dial-up internet access

◆ Choice of two premium services

SBC Yahoo! DSL Premium Services:

DSL subscribers can choose one free service from each category below:

Category A	Category B
– Games All Star Pku.	– Online storage (Photos/Briefcase) (500 MB extra)
– Online storage (Photos/Briefcase) (150 MB extra)	– Bill Pay (5 per mo.)
– ***Got Marketing* trial (DSL version)**	– Company/Finance Research Reports
– **Premium business content (sourced from hundreds of trade journals)**	– Encyclopedia Britannica Online
	– **50MB additional email storage for master**
	– **Anti-virus client and subscription to virus signature updates – protects entire PC**

Note: The bolded options are new.

Unlike other DSL (or Dial) products, SBC Yahoo! products are the only ones that include a unique set of services for small businesses at no additional cost. The enhanced SBC Yahoo! Portal will also include an upgraded fun and friendly Consumer Portal, as well as new business services and features. Look for more communication on the enhanced SBC Yahoo! Business Portal this month.

DSL as low as $29.95/mo!

SBC wants your customers to enjoy an enhanced broadband experience so we've continued to offer SBC Yahoo! DSL Internet Service at record-breaking prices. Your customers can participate for as low as $29.95/mo for a 12-month term. It's simple, the more they buy, the more they save! When customers purchase our bundles that include voice packages, SBC Yahoo! DSL, SBC Yahoo! Dial, Shared Web Hosting, Online Office, Dedicated Internet, Cingular and SBC Long Distance, they can appreciate additional discounts. Look for direct mail drops and listen for radio ads.

SBC Yahoo! DSL Pacesetters!

SBC is the top provider of DSL high-speed Internet Service in the United States. We have over 2.7 million DSL lines installed with service available to more than 32 million customer locations. To date we have nearly 1,970 Remote Terminals (RTs) with over 11,620 Distribution Areas (DAs) ready for service, in ASI West and SBC California and Nevada. For more information, to qualify your customers for SBC Yahoo! DSL Internet Service, as well as to order the service for your clients, contact the Unique Services Center South Consultant Queue at 1-866-234-4DSL (4375).

Cassandra Jessie-Johnson is Associate Director of Voice & Data Solutions, SBC Sales Operations-West.

SBC Ad Campaigns in Unusual Places

The next time you grab a cup of fancy coffee...or pump gas...or buy groceries...you might be in for a surprise. SBC ads are appearing on mobile billboards, receipts issued by parking garages, TV screens in grocery stores, at gas pumps and on the sleeves of coffee cups. Some are even projected on the side of buildings in high traffic areas.

UPDATE

SBC Data Services Directs Key Growth Efforts

To more accurately reflect its focus on the critical growth area of data, the company has changed the name of its data business unit from **SBC Enterprises** to **SBC Data Services**. The organization is responsible for **SBC Advanced Solutions, Inc.**, which provides DSL transport functions, national Frame Relay and ATM services; **SBC Internet Services**, which provides SBC Yahoo! DSL and Dial Internet Service at the retail level, as well as Dedicated Internet Access over an IP backbone (in authorized states); **SBC DataComm**, brings together our data CPE operations; **SBC E-Services**, managed hosting, data center hosting and value-added services; **SBC Long Distance**, and **SBC Telecom**, currently reporting to SBC Data Services on a dotted-line basis.

Wireline-Wireless Shared Bucket Of Minutes On One Bill

A new service, MinuteShare℠, created by SBC, BellSouth and Cingular Wireless, will enable residential customers to share a single bucket of minutes for calls made from either their SBC or BellSouth wireline and Cingular wireless phones. A market trial is underway in Texas with existing customers who have SBC local and domestic long distance service and Cingular wireless service.

Get It All With One Call

Dial 1-800-CONFERENCE® – An SBC and Conference Plus Service – For All Your Conferencing and Collaboration Services Needs

With all of today's complex technology, it's easy to get distracted from your core business. 1-800-CONFERENCE® lets you outsource conferencing coordination to conferencing experts, so you can stay focused on your strategic business objectives.

One call is all it takes to schedule and connect audio, video, and web-based conferences as well as webcasting events. You don't have to buy and maintain special bridging equipment or worry about network details. We even offer web-based conferencing that lets you distribute and collaborate on documents while you audio conference.

Operator Assisted Services – The Key to Successful High Profile Conferences

1-800-CONFERENCE® also provides continuous support for your most important, highly visible conference events with Operator Assisted Conferencing Services. Experienced operators actively manage the conference and offer assistance for queuing questioners, polling participants and exchanging information with the conference host.

Much like the way your office manager keeps the office running smoothly by tending to all of the administrative necessities, our Operator Assisted and Strategic Services Team perform this same function for your conference, enabling you to concentrate on the content and the flow of the call, without having to worry about any of the details. Operator Assisted Services:

◆ Enable your highly visible, all-important calls to run smoothly.
◆ Allow you to get the most out of your meeting with participant lists, queuing and polling features, and post-conference reporting.
◆ Provide an "insurance policy", knowing the operator is always available to assist in solving any unforeseen issues.
◆ Make you look good.

Please visit www.1800conference.com to learn more about 1-800-CONFERENCE® Services or call us at 1-800-266-3373 and select option one.

Long distance service, where applicable, will be provided by certified carriers through Conference Plus, Inc., and will be itemized separately on your bill.

1-800-CONFERENCE® is pleased to sponsor the next SBC Streaming Media Broadcast from 9am-11:30am PST, August 20, 2003. Please contact your Liaison Manager on 1-800-552-5299 for further information or register for the Broadcast by calling, 1-888-889-6010.

Toni Warbyla, Associate Director, 1-800-CONFERENCE

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Thank You for reading
UPDATE