

2004 USA PBX Market Review: IP Telephony Drives PBX Market Resurgence

***A TEQConsult Group White Paper
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The PBX market turnaround of 2003 that followed three years of declining shipments can be principally attributed to several factors. An improved economy and pent-up customer demand were strong contributors to PBX system market growth after the most pronounced slump of the competitive interconnect era, but it was a strong and growing interest in IP telephony that proved to be the primary motivator for increased system and station shipments. Estimated PBX station shipments for 2003 remained comfortably below the peak year of 1999, but an annual increase of almost 7% was a welcome relief for the system suppliers. Last year's solid market performance was a positive sign for the entire industry sector which had lost almost one quarter of its annual market shipments over the past three years.

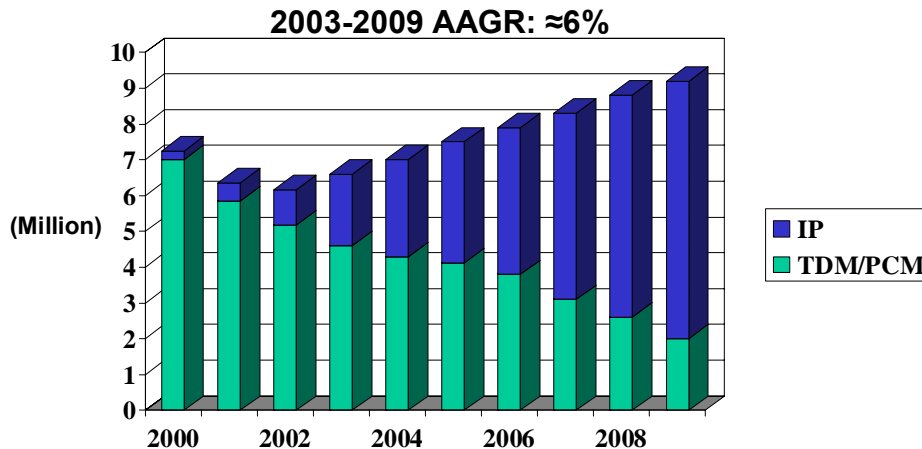
PBX market growth during 2003 was anticipated by several industry analysts, and forecast in last year's white paper. Customers delayed purchase decisions during the recessionary 2000 - 2002 time frame when information technology budgets were slashed. Many customers were also hesitant to buy a new system until a wider selection of IP-PBX models were ready and proven to be reliable. Customer horror stories about very early IP-PBX installations had circulated through the industry, sometimes scaring off all but the adventurous high risk takers. As the technology matured at an exponential pace during the past few years and customer confidence in IP telephony increased, many telecommunications managers finally made their decision to replace a large number of aged PBX systems that were no longer supported by their manufacturers and/or incapable of upgrade to the new technology platform.

Several of the major system suppliers who contributed to the extended market downturn, because of delayed IP telephony system announcements, improved their situation by finally introducing a number of new and improved IP-PBX system models during late 2002 and early 2003. This allowed customers to make less risky purchase decisions, because they were provided with more informed knowledge about their existing or new supplier's product strategy for IP telephony. Prices for IP telephones and media gateways also declined during the past year, bringing IP port prices closer to traditional circuit switched ports.

For 2003, PBX line shipments were estimated at 6.6 million stations. This total consisted of 4.6 million traditional circuit switched (analog and digital) and 2 million packet switched (IP) stations. IP station shipments doubled from the

preceding year, while circuit switched stations declined slightly more than 11%. Traditional circuit switched port shipments will continue to drop for the remainder of the decade, while increasing demand for IP peripheral equipment will easily offset the gradual demise of digital telephones to drive moderate overall market growth. Market shipments of traditional analog and digital lines will not disappear anytime soon, because many customers will continue to purchase significant numbers of add-ons to their circuit switched PBX systems, even as new IP station equipment is installed. The PBX market forecast based on line station shipments (TDM/PCM and IP) for the remainder of the decade is illustrated in the following diagram:

USA PBX TDM vs IP Station Shipments (Estimates & Forecasts)



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One of the problems encountered by market research analysts when sizing the PBX market and estimating system and station line shipments is determining what defines a PBX system as opposed to a KTS/Hybrid, and which system shipments fall within each product category. Outside of the North American market system vendors traditionally report all premises-based communications system shipments as PBXs, but the very large diverse nature of the domestic USA market begs for product segmentation, if only for analysts to have more research data to market and sell. Although KTS/Hybrids have traditionally been installed at customer locations with port requirements less than 40 stations, many new small IP-PBXs are being purchased to replace an installed KTS/Hybrid. Some of these systems were designed to allow customers to retain key system-like operational capabilities while enjoying benefits usually found in larger system offerings. The market shipment and forecast data presented in this article is

based on systems primarily designed for PBX-only operations, with the recognition that this is a conservative approach to the issue. Although many systems shipped to the small systems market (40 stations or less) may be classified in either category, the data cited in this article assumes few of these systems to be classified as true PBXs based on how customers perceive of and operate the system. A more liberal interpretation of these small system shipments may increase the total PBX market data results by as much as 5%, but have little affect on market leader positioning.

Why IP Telephony Was Delayed before Take-Off

Any PBX system with integrated IP telephony capabilities can be classified as an IP-PBX, regardless of the number of equipped IP port interfaces. Most of the 26,000 PBX systems shipped last year in the USA would be classified as IP-PBXs, because they were capable of supporting integrated IP ports (station equipment and/or trunk circuits), LAN/WAN-based control signaling links, or IP-based intramachine trunks for remote port cabinets. Just as the natural evolution of analog, electromechanical PBXs was toward digital, computer-controlled systems during the 1970s and early 1980s, integration of IP telephony technology is today's logical evolutionary step for enterprise voice communications systems during the flowering of the Internet age. PBXs with integrated IP telephony capabilities are no longer a novelty, but are the industry's standard platform for enterprise voice communications.

The integration of voice and data communications networks makes sense from both a financial and operational perspective, if it is technically feasible. Voice and data communications among station users using the same digital transmission signaling protocol over the same physical network infrastructure has been the dream of the major communications system suppliers for several decades. Nortel Networks, back in the days when it was known as Northern Telecom, unveiled its Digital World concept more than 25 years ago at about the same time NEC came up with its Computers & Communications (C&C) slogan. The first digital PBXs were fully capable of supporting most customer data communications applications during the 1970s when desktop modems operated at very slow transmission rates compared to current data transfer capabilities, but continuing advances in computer technology created demand for far greater bandwidth transmission resources than voice systems were capable of supporting by the early 1980s. The introduction of Ethernet-based LANs changed the landscape for support of distributed computer-based applications, and left PBX systems in the dust as an integrated voice/data communications solution.

Integration of PBXs and LANs did not start seven years ago when Selsius Systems was the first to announce an Ethernet-based PBX system. Several so-called "Next Generation" PBXs with integrated LAN capabilities were unveiled by

new market competitors in the early 1980s, such as the Ztel PNX and the CXC Rose. Although these systems made a big market splash they soon disappeared for a variety of reasons, not the least were unreliable operation and poor performance. Even traditional PBX system suppliers never got the integration of LAN technology quite right, e.g. Northern Telecom's ill-fated Meridian DV-1 and SL-1 Packet Transport Equipment (PTE) offerings. The Intecom LANMark option (a modified version of an Ethernet Bridge) worked somewhat better, but didn't capture the fancy of data communications managers who were looking at more advanced networking solutions by the late 1980s. When Intecom introduced its more advanced Intelan option during the early 1990s it was too little, too late.

Attempts to kluge traditional circuit switched PBXs and packet switched LAN technology were not successful until Selsius Systems abandoned a circuit switched technology platform entirely, and utilized an all-LAN packet switching infrastructure to support both call control and voice communications transmission signaling among the call telephony server and all peripheral endpoints.

Admittedly, the early releases of the Selsius Systems product were clearly not ready to replace full featured, highly reliable circuit switched PBXs, and neither was the first release of another late 1990s packet switched voice communications product, the Ethernet Layer 2-based NBX system. Although these systems were clearly not a threat to the traditional PBX system at the time, market interest in the new design platform sounded a wake-up call for the established system suppliers to accelerate their own IP-PBX R&D efforts. The wake-up call turned into an ear-splitting alarm in October, 1998, when Cisco Systems announced its intention to acquire Selsius Systems from Intecom. Somewhat coincidentally less than six months later 3Com announced it was acquiring NBX Systems. With Cisco and 3Com entering the PBX arena the rules of the game were quickly changing for the old-line supplier as data communications players were attempting to have a major say about the future market direction.

Although several of the traditional PBX system suppliers announced IP telephony upgrades for their circuit switched systems within a year of the Cisco Systems' acquisition of Selsius Systems, commercial availability of the new options were delayed past original target dates. Cisco Systems saw a large market window to take advantage of its competitors' laggard development activities to position itself as the new IP-PBX market pacesetter. The early IP-PBX offerings from several major PBX suppliers did not generate strong customer interest, and most early installations were not great successes. In fact, the first announced IP telephony systems from Avaya (still part of Lucent Technologies at the time), Siemens, NEC, and Nortel Networks were eventually manufacturer discontinued or never launched. Mitel Networks and Alcatel also introduced IP-PBX models, but both suppliers radically changed their core architecture designs within a year or two.

It became necessary for the traditional PBX suppliers to perform a major overhaul of their system designs and develop a second generation of IP-PBX solutions to effectively compete against Cisco Systems (which itself had totally redesigned its own Selsius Systems solution), before the mass market was ready to accept their offerings as viable replacements for the large installed base of circuit switched systems. The current line-up of IP-PBX models from the traditional system suppliers have not only caught up to the Cisco offering, but in many regards have passed it. Most of the major PBX vendors currently have a diversified portfolio of IP telephony offerings ranging from IP-enabled to converged to client/server designs across several line size market segments.

IP Telephony Market Saturation

Most IP station shipment forecasts published at the beginning of the decade have proven to be more optimistic than the actual sales data. Some forecasters assumed that customers would readily abandon their installed equipment and migrate to the new technology, although it was still relatively unproven and available product was limited. The boldest forecasts stated that IP station shipments would likely reach parity with circuit switched stations by 2004 or earlier. The market forecasts presented in previous editions of this white paper article predicted that IP shipments would not overtake circuit switched endpoints until mid-decade, i.e., sometime during 2005. This early forecast is looking to be quite accurate based on current IP station buying trends. The high exponential growth rate of IP stations is beginning to decelerate to something more linear, but continued saturation will result in annual IP station totals of more than three of every four total PBX station shipments by this decade's end. At this future time non-IP shipments will be evenly divided between analog and digital endpoints (for the first time since the late 1980s).

There are several reasons why IP station shipments are strongly increasing across most vertical market sectors and line sizes:

1. The rapid maturing of IP telephony technology
2. Increased product availability from the leading PBX system competitors
3. Declining IP telephone and media gateway prices
4. Greater customer acceptance of the evolving technology, and recognition of its performance benefits
5. More widespread installation of LAN/WAN infrastructures capable of supporting IP telephony QoS requirements
6. Undiminished marketing and promotion of IP telephony by suppliers, distributors, and the industry media

In regard to the last point, customers have been bombarded by marketing and promotional material touting the financial, technical, and performance benefits of IP telephony for the past several years. Voice industry conferences, such as VoiceCon (of which I am an active participant), have been adding more and more

IP telephony seminar sessions to the agenda until it appears to be almost exclusively IP-focused. It is a topic of great interest to the attendees, and one they need to know more about for future purchase decisions. Besides print advertisements, television viewers have been subjected to commercials pushing IP telephony, such as Avaya's campaign featuring Wayne Brady (whose talk show was recently cancelled), and subliminally targeted by Cisco Systems through product placement of their 7960 IP telephone in seemingly almost every television show, from Las Vegas to The West Wing. It's little wonder IP-PBXs have finally arrived after a five year take-off period.

IP telephony is the natural evolutionary step for digital communications, and is entering the mainstream PBX market after several bumpy years. Early marketing efforts centered on cost savings benefits attributed to: reduced long distance service expenses and/or station moves; a converged cabling system for voice and data communications; lower equipment prices, because hardware and software would conform to published industry standards, such as Session Initiated Protocol (SIP). Many customers were quick to realize that cost savings were not guaranteed, and that back-end savings could easily be off-set by the significant upfront capital expenditures necessary to make their LAN/WAN compliant to voice QoS standards while maintaining high security levels. Another early ingredient of the IP-PBX marketing formula was the promise of new applications created by and/or facilitated by IP telephony. Until very recently these new applications were mostly a well kept secret, because the vendors themselves had little clue what they were talking about.

For most customers the true and guaranteed benefit of IP telephony technology incorporated into PBX system design has proven to be increased flexibility in the choice of the system architecture configurations, and an enhanced degree of redundancy and resiliency. Traditional PBX systems based solely on a circuit switched technology platform had numerous single points of failure, because of two inherent design conditions: major common control elements were centralized and there was a single, fixed control signaling transmission path for each unique station user port between the port circuit interface card and desktop telephone instrument. An IP-PBX system that utilizes a packet switched transmission signaling infrastructure can reduce the number of single points of failure, because of the highly distributed LAN/WAN infrastructure it can use to connect common control and peripheral elements. Redundant common control elements, such as active (primary) and standby (secondary) call telephony servers, can be geographically distributed from each other, and each IP endpoint can typically register with multiple gatekeepers (usually an embedded call telephony server function). In addition, voice communications signals between two IP endpoints can be transmitted via multiple transmission paths across the LAN and multiple media gateway devices can be programmed for shared access by an IP station or WAN trunk termination.

There are three distinct categories of IP-PBX system design: IP-enabled; converged; and client/server. These categories were defined in last year's white paper, and a highly detailed discussion of each can be found in my textbook ***PBX Systems for IP Telephony*** (McGraw-Hill Professional Publications). The majority of customers who install a new IP-PBX system are likely to be best served by a converged solution, because most installations are a mix of TDM/PCM and IP endpoints (noting that even customers who install a significant number of desktop IP telephones require a sizable number of non-IP ports for PSTN access and analog communications equipment, such as fax terminals and modems).

Converged systems are typically based on a combination of traditional voice-centric circuit switched hardware elements (port carriers and interface cards) and data-centric packet switched network elements (servers and clients). Converged IP-PBX models that replace a PBX's traditional embedded common control complex with a LAN-connected call telephony server can provide enhanced call processing redundancy and performance, and support direct control signaling links to IP peripherals without intermediary port circuit cards, while using highly reliable circuit switched hardware to support non-IP peripherals. A converged, or client/server, design with geographically distributed call telephony servers configured in either active/standby or load sharing mode can significantly raise the system's resiliency in case of isolated server failure or a disconnected call control signaling link due to LAN/WAN failure. (See my article in ***Business Communications Review*** September 2003, "*Realities of IP-PBXs*," for a more detailed discussion of IP-PBX system design benefits)

As of today, there have not been many new customer communications applications that are unique to an IP-PBX system. Information services accessed through an intelligent display-based IP telephone with browser-like capabilities stands out as one of the truly new benefits (see my article in ***Business Communications Review*** December 2003, "IP Telephony Desktop Productivity," for an overview of the option), but several existing applications are greatly facilitated by IP telephony technology, including: Unified Communications (presence, conferencing, and collaboration); multimedia messaging; teleworking; and mobility. Station user presence and instant messaging applications are not new, but are more easily supported and enhanced using a SIP-based platform. Likewise, teleworking is neither a new nor recent application, but ubiquitous access to the Internet by a variety of devices provides access to a centralized PBX system offers a less costly and simpler solution for station users located outside the normal office environs. Wireless premises solutions, too, benefit from IP telephony, because the widespread deployment of WLANs supports 802.11 handsets and PDA softphones (See my upcoming article in ***Business Communications Review***, February 2003, "Beyond the Wired Desktop Telephone," for more information about IP-based mobile client options)

Focus on Unified Communications

The term “Unified Communications” has been kicked about for a few years by several vendors. It is used to describe a collection of emerging enterprise communications applications designed to improve desktop worker productivity, facilitate interactions among co-workers, and reduce communications expenses by optimizing real-time contact management operations. Some of the specific application solutions falling under the Unified Communications umbrella are presence management, conferencing & collaboration services, and instant messaging. Although each of the three can be used independently of the others, they are best implemented when working in conjunction with each other, especially when SIP is used as the underlying communications protocol.

Presence management enables real-time communications without time and/or space constraints. It allows station users to transmit or receive mission-critical voice, data, and text information through a variety of means and user interface devices. Presence management software can be programmed and accessed from a desktop PC client and remote communications devices via a web browser, WAP-enabled cellular telephone handset, or wireless PDA. Station users are able to create a call handling and coverage profile for call screening operations that either allow incoming calls to their desktop or route them to: other enterprise desktops; off-premises extensions; voice message mailboxes; or mobile communications devices, such as cell phones and wireless PDAs. Of prime importance the application also allows station users to check the availability status of intended called parties prior to call placement, and provides an indication of how best to contact the individual at a specific time based on the stored user profile record. Station users can be assigned to defined groups to receive preferential call screening status. In effect, each system subscriber has the ability to implement and operate their own customized contact center that is comparable in capabilities and results to a large, formalized operation, but on a personal micro-level.

The benefits of presence management are achieved through both station user productivity gains and/or cost savings. Worker collaboration and workflow operations are benefited with the bonus of reducing undesired distractions during a busy work day. Station user mobility is enhanced both in and out of the work environment for the calling and called parties. The PC telephony aspect of the application includes time saving functions such as screen-based directory look-up and one-click dialing/feature access while minimizing operation errors, such as misdials. A significant advantage of the PC telephony implementation is that presence management works in association with any type of desktop telephone instrument - analog, digital, or IP – or mobile communications device. Customers with legacy telephone equipment do not have to replace their equipment with newer, more expensive models to take advantage of presence management benefits.

Presence management enables station users to more effectively schedule and implement conference calls between two or more system subscribers. Today's advanced conferencing solutions are not limited to audio-only communications, but includes web conferencing capabilities that allow the real-time exchange and sharing of text and presentation materials among the participants. Presence management contact features are useful for organizing and establishing a multi-party conference, and the supplemental conferencing software includes elements that specifically support the conference's audio and web components.

Scheduling of conferences can be facilitated if the solution is integrated with personal calendar software, such as Microsoft Outlook. A web/audio conference reduces face-to-face meeting requirements, and can greatly enhance collaboration among internal workers, clients, suppliers, and other external parties with potentially significant cost savings. It reduces travel time and expenses, and can easily be implemented using a customer's existing communications system infrastructure, unlike a full motion video conference requiring far greater transmission bandwidth resources.

Another form of real-time communications enabled by presence management is instant messaging. Instant messaging is rapidly becoming an alternative to voice calls for communicating with someone in real-time. Ironically, this IP-based communications solution first gained popularity as an ISP application. AOL or MSN customers, particularly teenagers, used instant messaging to "talk" using a keyboard interface instead of a telephone handset. Effective use of instant messaging in the business world is greatly enhanced when station user's have knowledge of station user availability provided by a presence management software solution. A fully featured instant messaging solution will include contact lists and the option to send emails when parties are not available. An invaluable feature is the ability to convert an active instant messaging event into a telephone call with minimal caller effort. Instant messaging is available to station users via their desktop client or a variety of mobile communications devices.

Many of leading PBX system suppliers are now marketing a variety of Unified Communications offerings to their customers. Nortel Networks' MCS 5200 was an early offering originally designed for the common carrier market, but is equally effective as an enterprise customer solution when packaged at the MCS 5100. For several years Avaya has been promoting a variety of Unified Communications options, and is planning to announce some major SIP-based enhancements to their portfolio early this year. Siemens and Microsoft collaborated on the highly advanced OpenScape solution based on the latter's Real Time Communications (RTC) Server platform. Even Inter-Tel, a PBX supplier not previously known for advanced applications offerings, markets its own self-developed Unified Communicator and Conferencing/Instant Messaging options behind its Axxess IP-PBX system. Unified Communications (particularly presence, collaboration, and messaging) is on track to be the hot customer application of during the second half of this decade, like ACD-based contact centers were during the early 1990s.

Competitive Landscape

Last year's white paper predicted that Cisco Systems would retain its IP telephony leadership position through 2003, although Avaya and Nortel Networks would continue to be the dominant overall PBX market leaders in the USA. It was also stated that Cisco's competitors were beginning to catch up in IP station shipments, and that its days as IP-PBX market leader were numbered. The results are now in, and the predictions have been proven correct. Based on various market research studies, including TEQConsult Group's own primary research, 2003 estimates indicate that Cisco's IP station shipments continued to eclipse all competitors, but there are strong trend line indications that Avaya is likely to assume the IP station shipment crown this year. For total market shipments, Avaya and Nortel continued to outpace the competition by a very comfortable margin.

Although Cisco has done an amazing job moving from the back of the pack to the front grouping of competitors in less than five years, system suppliers such as Avaya and Nortel Networks have the inherent advantage of a very large installed customer base in the USA: Avaya has approximately 15 million installed PBX stations; Nortel has about 12.5 million. Each supplier has been aggressively telling their customers to migrate aging circuit switched systems to upgraded or new IP-PBX design platforms. Avaya and Nortel also have the advantage of sizable KTS/Hybrid installed bases, including many customers who may replace their existing small systems with a standalone IP-PBX model or IP remote shelf behind a centralized system.

For a year or two, Cisco was essentially the only game in town for customers looking to play with large system IP-PBX technology, because most of the traditional PBX system suppliers were late getting their acts together. As mentioned earlier, many of their first generation IP-PBX solutions were poorly conceived IP-enabled designs with numerous hardware and software problems that customers wisely passed on. Last year marked the first time most of the entrenched PBX market leaders (Avaya, Nortel Networks, NEC, and Mitel Networks) had a full calendar year to market and sell IP telephony solutions that could effectively compete with Cisco. Major IP-PBX system enhancement during 2003 from the remaining name competitors (Siemens, Alcatel, EADS, and Ericsson) will result in even more choices for customers this year, and diminish the unique IP-PBX market position Cisco held during the early part of this decade.

Almost all of the leading global PBX system suppliers compete in the USA market, but with varying degrees of success. Avaya has the home field advantage, and continues to hold onto the number one position. Nortel Networks may call Canada its home market, but the USA has long been its largest market,

and remains a strong number two behind Avaya. Each of these system suppliers enjoy a PBX market share comfortably above 20% (based on total station shipments). Siemens (Germany) may be in a tight race with Avaya and Nortel Networks for the title of global CPE market leader, but has had difficulty keeping up on this side of the Atlantic. Siemens is part of a group that also includes Cisco (USA), NEC (Japan) and Mitel Networks (Canada) who are bunched together in the second tier platform below Avaya and Nortel Networks. Cisco's reported shipment figures indicate that they have passed Siemens for third place in the USA market. Siemens is clinging to fourth place just ahead of NEC, with Mitel not very far behind. Cisco's market share is estimated at about 12%; Siemens and NEC are each at 9%; Mitel is slightly below 8%.

Two homegrown suppliers (Inter-Tel and 3Com) and a few international competitors (Alcatel, Ericsson, and EADS Telecom) constitute the next grouping with market shares between 1.5% and 4%. Inter-Tel (4%) and 3Com (2%) are an unlikely pairing, because the former has been around more than 30 years with very strong roots in the traditional KTS/Hybrid and small PBX markets and the latter is a relative newcomer struggling to escape its established market niche. Both competitors are looking to go up market by placing greater focus on larger systems equipped with advanced applications. 3Com's newest IP-PBX product model may be much larger in port capacity than Inter-Tel's offering, but far behind in optional application solutions, particularly Unified Communications and call contact center. It must be noted that PBX market share estimates for both these suppliers discount some of their system shipments that TEQConsult Group classifies in the KTS/Hybrid category

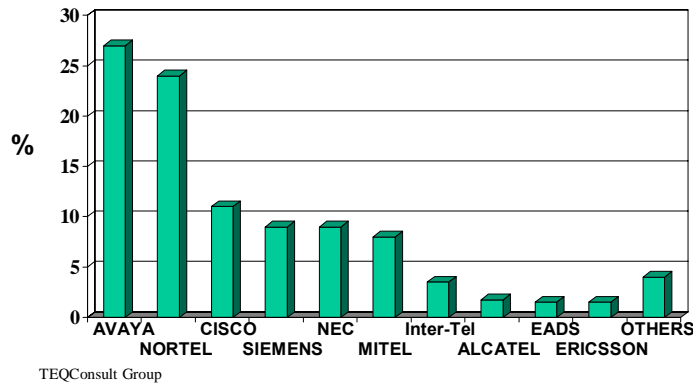
Alcatel, EADS Telecom, and Ericsson share some similarities, but there are also major differences among them. Each competitor is a leading European supplier who needs to effectively compete in the USA to maintain their global presence. Alcatel's recent re-entry into the USA market has been relatively successful, and the outlook is positive; Ericsson is a 30+ year competitor in the USA market who has been in free fall mode, but promises to get back into the game; EADS Telecom, an entity consisting to two merged suppliers, Intecom and Matra, has low name recognition despite a strong customer base. Alcatel currently has USA market momentum; EADS Telecom is in the process of recovering from an eighteen month period of relative inactivity prior to last year's reorganization and revitalization; and Ericsson needs to almost start from scratch after many years of malaise.

There are numerous other domestic PBX market competitors whose primary motivator is not jockeying for local or global market leadership, but survival. A few offer IP-enabled versions of older circuit switched systems, but most market IP-PBXs based on converged or client/server designs. These suppliers include (in no particularly order): Vertical Networks; Altigen; Shoreline; Tadiran Telecom; eOn Communications; Sphere Communications; Ping-Tel; Teltronics; ArtiSoft; and Zultys, among others. Each of these suppliers has a limited product portfolio

and much weaker distribution channels than the more established market leaders. To put things in perspective, their collective market share is less than Cisco's, and their collective financial resources pales in comparison to the datacom giant. It is difficult to imagine that the market can support more than a very few of these suppliers in the long term. A few of the 1990s start-ups have already bitten the dust (does Praxxon ring a bell?), and more are likely to follow in their wake.

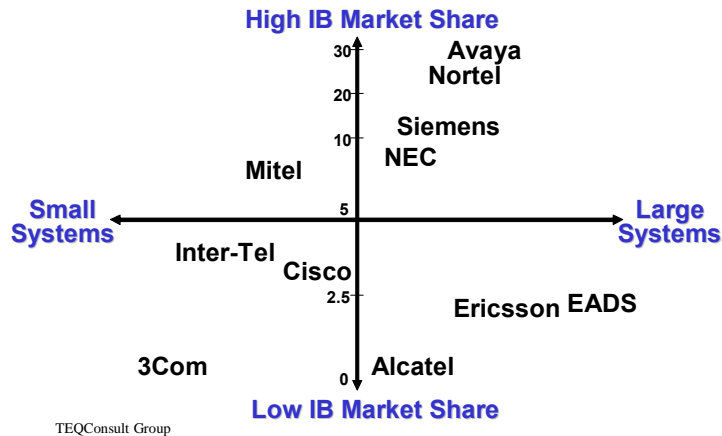
The following diagram illustrates the current PBX market shares of the leading suppliers:

2003 USA PBX Market Share Estimates
(based on total station shipments)



The following chart illustrates the relative market positioning of the leading PBX system suppliers:

USA PBX Competitor Positioning
(Primary Customer Base/Total IB Market Share)



Leading Competitors 2003 Report Card

Avaya

Significant PBX Product Announcements: Two new “models” were added to their IP-PBX family: S8500 Media Server with distributed G650 Media Gateways targeted at customers with medium/large line size requirements, and the G350 Media Gateway with an embedded G8300 Media Server blade targeted at the very small branch market (see sidebar). Two more IP telephones were added to their already large portfolio, and numerous enhancements to peripheral application solutions, e.g., Interaction Suite and Modular Messaging, strengthened the core PBX offerings.

Corporate Happenings: The most newsworthy financial announcement during 2003 was a return to profitability accompanied by an upturn in revenues; its stock price rebounded to its original IPO levels, and market confidence in the company received a big boost. Avaya’s acquisition of Expanet signaled a major change in distribution strategy, and will cause problems for several competitors who depended on the interconnect distributor for channel sales in select markets. Another major change in Avaya corporate direction was its announced relationship with Extreme Networks, because it confirmed that its own Cajun brand data communications products will slowly fade away.

Analysis and Future Outlook: Avaya’s domestic market leadership today and tomorrow may not be contested, but international sales are lagging based on earlier corporate forecast targets. The competitor’s enterprise communications portfolio is probably the strongest in the industry, but its marketing and promotional efforts appear too scattershot. It also appears that the main reason customers leave Avaya is not product-related, but due to communications problems. Avaya will likely pass Cisco as the IP-PBX market leader this year, but it needs to address its competitive positioning strategy to distance itself from Nortel Networks. Dumping the Wayne Brady television advertisements couldn’t hurt.

Nortel Networks

Significant PBX Product Announcements: Succession 3.0 included several strong enhancements to its Succession 1000 and Succession 1000M (an IP-enhanced Meridian 1) platforms, particularly survivable branch media gateways and call server redundancy. Both platforms now share common software generic and numerous hardware elements. Both offerings also interwork more closely with the renamed MCS 5100 to support converged communications applications.

Corporate Happenings: The new Nortel Networks Partner Advantage redefined its business partnerships with its resellers by creating new channel relationship architecture focused on mutual and continuous success of the supplier and distributor. Partner Advantage is focused on helping channel partners adapt to the changing marketplace, build brand equity and deliver end-to-end enterprise

network solutions and services. Internally, the Nortel Enterprise Networks executive management team experienced several major changes, including the departure of the President of Enterprise Marketing. A leaner organization may help Nortel's focus.

Analysis and Future Outlook: Nortel's Enterprise Networks is once again a significant entity within the corporate structure, and actually benefited from ill-fated corporate forays into the optical fiber, Internet, and data communications arenas. The competitor has slightly rebounded during the past year from near collapse two years ago, but still depends heavily on the weak carrier services market for most of its revenues. The IP-PBX product portfolio may be much improved compared to two years ago, but the Succession 1000M retains more than a few of the architecture weaknesses inherent in its core Meridian 1 foundation and the Succession 1000 suffers from some redundancy and port capacity issues. Nortel currently has a weak IP telephone portfolio, and needs to roll out several of the new planned models very quickly. Overall, Nortel's loyal customer base coupled with a strong migration strategy, and an extensive distribution network should keep them highly competitive in the domestic market, but the competition is fierce and the Meridian 1 installed base is a large target.

Siemens

Significant PBX Product Announcements: HiPath 4000 Version 2 was major leap forward, because it supports peer-to-peer IP switching between endpoints without the circuit switched connections needed in the earlier product release (see sidebar). Other important HiPath 4000 V2 capabilities include support of HiPath 3000 Access Point equipment for distributed communications requirements, resilient media gateway options, and local processor survivability options. The new optiPoint 410 IP telephone family and the associated interactive browser display module option allows Siemens to more effectively compete against suppliers who had more rounded complete desktop portfolios.

Corporate Happenings: The Siemens Enterprise Networks (EN) group is part of the company's larger Information Communications Network (ICN) organization (which includes network carrier services equipment), until recently the corporation's only money-losing operation. The picture recently changed when ICN turned profitable after a long downturn, and EN results were strong despite a weak European market for enterprise voice communications systems.

Domestically Siemens' share of the high end PBX market dipped, because of HiPath 4000 Version 1 IP telephony weaknesses, but sales of its small/medium enterprise HiPath 3000 were up. Through its Siemens One initiative the competitor hopes to leverage its vast corporate resources and strengths in other product markets, such as power systems, transportation, and medical equipment, to better position itself in the growing market for integrated infrastructures to support information technology and communications services.

Analysis and Future Outlook: Siemens EN' strong Euro-centric focus has hurt their USA market position. IP telephony in Europe may be at least two years behind our domestic market, but the HiPath 4000 V2 delay has probably cost

Siemens at least one or two USA market share points. A similar situation occurred in the late 1990s when IBM/Rolm was late with its ISDN PRI option. It is important for the central planners in Munich to understand that the reputation Siemens enjoys in Europe does not translate overseas, and that a more aggressive marketing and sales effort is needed to combat several competitors who are their equal in terms of size and product portfolio. Siemens should be a stronger competitor this coming year in the IP-PBX market, but only if they are able to capitalize on their recent product upgrades and services strengths.

Cisco Systems

Significant PBX Product Announcements: Cisco Systems announced Cisco® CallManager Express, a Cisco IOS® Software-based product providing call-processing services, and Cisco Unity™ Express, a voice-mail and automated-attendant offering. Both products are integrated into Cisco access routers and provide a simple, easy-to-deploy IP Communications solution for businesses with 100 employees or fewer. It is intended to replace the ICS 7750 as Cisco's primary small systems market solution. Cisco also introduced several new IP telephones, including a low price entry model (7902G), two single line models with displays (7905G and 7912G), a high end, color display browser model (7970G), and an 802.11 wireless handset (7920). Other AVVID system enhancements included Cisco IP Communicator, a software-based application that delivers enhanced telephony support through personal computers, and Cisco Security Agent, an offering that aggregates multiple security functionality, combining host intrusion prevention, distributed firewall, malicious mobile code protection, operating system integrity assurance, and audit log consolidation all within a single agent package.

Corporate Happenings: Cisco revenues were flat last year, reflecting the state of the information technology industry, but the company generated more than \$5 billion in cash from operations. The company is cash rich, and remains the standard bearer for the data communications market. By all counts, Cisco's entry into the enterprise voice communications has been successful, as they have shipped more IP stations (closing in on the 3 million mark at time of this writing) than any global competitor while establishing the ground rules of the IP telephony market space. Although Cisco's shipments have been strong, word on the street is that resellers have voiced complaints about their margins, because large discounts must be applied to AVVID solutions to be competitive against an increasing number of IP-PBX solutions. On a more positive note Cisco has been expanding its enterprise voice systems marketing and support staff, and aggregated its many voice offerings under the new Voice Technology Group (VTG).

Analysis and Future Outlook: Cisco has done amazingly well in the IP-PBX market, maybe better than anyone expected, but the traditional voice system competitors appear ready to mount a major offensive. The CallManager generic software solution has some major feature gaps, especially in the areas of attendant operations and private voice networking. CallManager is weaker than

almost all of the traditional PBX suppliers' generic software offerings. And even though no one has done more to promote IP telephones than Cisco, its higher priced instruments have some basic design flaws, such as too few programmable feature/line keys and an over-dependence on softkeys for basic feature access. Cisco has often managed to overcome its product deficits by bypassing knowledgeable voice managers, and focusing on its sales/marketing efforts at data managers who know little about PBX systems. Public relations took a hit when Merrill Lynch announced it was taking out its Cisco solution for an Avaya IP-PBX and a large contract in Alaska was cancelled, because the system failed to satisfy some performance tests. Cisco will continue to be a very strong competitor in the IP telephony systems market space, but its market leadership position is highly likely to be usurped by at least one or two of the traditional PBX suppliers within the next year.

NEC

Significant PBX Product Announcements: NEC's major IP-PBX announcements came in 2002 (see BCR April 2002), so last year was relatively quiet. Three new IP telephone models with integrated web browser functionality designed to work behind the NEAX IPS and IPX product families were released: 240G, 320G, and 320C. The NEAX IPS-DMR was introduced as a remote survivable IP-based PIM for distributed networking requirements behind a centralized NEAX 2000 IPS. NEC also introduced the Electra Elite IPK, an IP-KTS/Hybrid system that could intelligently network as a remote branch to larger NEAX 2000/2400 systems using the new K-CCIS Networking software solution.

Corporate Happenings: NEC's PBX systems operations are part of the Corporate Networks Group (CNG), which also includes Key Systems, Wireless, ATM, Facsimile and other networking systems and equipment. CNG had a strong year in the USA during 2003: both PBX and KTS shipments both grew at a greater rate than did the total market, as did high profit margin contact center solutions. NEC's estimated domestic Customer Premises Equipment (CPE) market share of 11% for combined PBX and KTS shipments trails only Avaya (21%) and Nortel (17%). NEC's IP station sales started off weak during the first quarter, slightly less than 5% of total PBX shipments, but tripled by year's end.

Analysis and Future Outlook: NEC is the strongest Japanese-based CPE supplier in the USA, and the only one of significance in the PBX systems segment. After a slow start with the NEAX 2400 IPX first release that did not support peer-to-peer IP switching between client endpoints, NEC has since greatly strengthened its portfolio of IP telephony system offerings from small system key systems to small/medium and large PBXs, and also plans to expand it again with a very major new design platform announcement early this year. On the downside, NEC's two-tier intelligent networking platform (CCIS and the more advanced Fusion CCS option) places some inoperability limitations between the IPS and IPX platform models. A more important issue has been CNG cutbacks in marketing support for its direct and indirect sales channels. NEC is a technology-driven company that must devote more resources to

external communications and field support activities if they wish to maintain their strong market momentum. Borrowing some marketing genes from Cisco couldn't hurt.

Mitel Networks

Significant PBX Product Announcements: Mitel's very large installed base of SX-200 Light customers was provided an IP telephony migration path with the announcement of the SX-200 ICP. The new model is based on a call telephony server using a modified 3100 ICP control carrier and SX-200 port carrier equipment. The new call telephony server supports control signaling to IP endpoints (up to 96 stations per controller) via a direct LAN connection, and to circuit switched endpoints (200+ digital stations) housed in the SX-200 expansion bays over a fiber optic cabling link. The most important enhancement to the existing 3300 ICP was failover resiliency support for IP telephones in case of primary control server or signaling link failures. Mitel's agreement with Citel to develop a CITELink IP Handset Gateway for the 3300 ICP that will initially support Nortel Norstar and Meridian digital telephones, and an agreement with SpectraLink to support wireless NetLink telephones behind the SX-2000 and 3300 ICP offerings both help diversify the voice terminal portfolio that works behind the PBX supplier's large system offerings.

Corporate Happenings: Terry Mathews, the company's original co-founder and current owner, has been making a series of strategic moves to strengthen Mitel's market positioning as a prelude to a future IPO. In its home market the relationship between the systems supplier and Bell Canada has been growing stronger, particularly distribution to the small systems market, and overseas distribution agreements, such as the one signed with Damovo, are important for Mitel's long term growth. Mitel is a privately held company, and financials are not made public, but strong sales this past year of IP telephony solutions and an improved contact center and messaging applications portfolio has helped to maintain Mitel's Top 10 global leadership position within the enterprise voice communications system market.

Analysis and Future Outlook: Mitel was historically recognized as a leader in the small system PBX market segment, but a minor player in the large systems and advanced applications market segments. The current PBX product portfolio continues to show strong strength in the small/medium line size markets, but has some limitations for the higher end customers requiring thousands or tens of thousands of user stations. Multiple 3300 ICPs can be networked for large/very large enterprise communications requirements, but some customers may still prefer a single system solution. Although Mitel's ability to support advanced voice applications has improved greatly during the past few years, the company has had to work very hard to convey this message to a marketplace crowded with competitors who have more financial resources for marketing and promotional programs. Mitel's market share has remained steady despite competition from phalanx of many new suppliers, including Cisco, and its solid

position among the second grouping of USA market leaders should continue for the foreseeable future.

Inter-Tel

Review & Analysis: Inter-Tel is one of the very few interconnect system suppliers founded in the 1970s that have made it to the 21st century as an independent company not swallowed up by acquisition or merger. Although most of the early interconnect manufacturers are no longer in the business Inter-Tel appears to be thriving, and is in the process of expanding beyond its traditional small/medium line size target market for basic voice systems. Unlike most of its USA competitors Inter-Tel relies on its own direct sales/service offices for a significant percent of its revenues, and has the means to take strong control of its future through a loyal sales channel. Its IP-enabled AXXESS PBX is supplemented by several advanced application solutions, including its Unified Communicator (presence and call control) and Enterprise Messaging options . The new IP telephone family includes a high end full color all-LCD display model with embedded Windows CE and browser functionality. Inter-Tel is likely to find it difficult to compete in the higher end of the PBX market, especially against a number of firmly established competitors several times their size, but considering the company's past track record they cannot be counted out.

Alcatel

Review & Analysis: Alcatel rolled out the OmniPCX Enterprise Release 5.0 early in the year (see BCR April 2003) and later announced several enhancements with Release 5.1. The Enterprise 5.0 model was based on a Linux O/S platform for either a rack mount or LAN appliance server supporting distributed rack mount media gateway port carriers; 5.1 allowed installed base OmniPCX customers utilizing earlier generation Crystal architecture design to migrate to the new Linux O/S. Other 5.1 enhancements included improved networking support, campus-based failover resiliency, and support of cellphones as OmniPCX extensions. Alcatel continued to make good progress in the USA market, especially with Nextira One and Verizon as distribution channel partners, but will likely face stronger competition from two of its primary European competitors (Ericsson and EADS Telecom) to capture market share from the established suppliers in the next year. Without a large installed base as a captive market for add-on stations, Alcatel must continue to win customer by customer to move up the leader board and separate itself from the many other suppliers with annual market shares currently below 2%.

EADS Telecom

Review & Analysis: EADS Telecom – North America sounds like a new USA system supplier, until it is pointed out that it's the renamed Intecom organization. EADS Telecom, formerly Matra Communications, is a leading supplier to the European market, but must strongly promote itself as a viable USA player to counter the affects of Intecom's slow and gradual market decline beginning in the early 1990s. The recently announced PointSpan M6500 IP-PBX models (See BCR April 2003) will help EADS Telecom gain some much needed market share in the small/medium line size segment, something Intecom was unable to do for almost twenty years. The new M6500 platform is based on a highly modular design architecture, especially the flexible M6501 that can be installed as a standalone system, a media gateway for the PointSpan Communications Server, or an IP remote behind the larger M6550. For future USA market success EADS Telecom has several things on its "Must Do List," including: retain its blue chip customer base of large system installations; expand its IP telephone portfolio, to include a model embedded with browser-like functionality; and strengthen its indirect distribution channel to aggressively market the M6500 portfolio.

Ericsson

Review & Analysis: Ericsson's USA PBX market presence has shriveled during the past decade while the parent company focused its corporate resources at the wireless market. Although Ericsson remained a strong global competitor it appeared that it had given up hope in more highly competitive USA. Its MD110 system lagged the field in IP telephony capabilities, its distribution strategy to shift from direct to indirect sales was close to a disaster, and its acquisition of Touchwave (renamed WebSwitch) bared little fruit. During the past year Ericsson has begun adding more IP telephony options to its PBX, including fully integrated media gateways and more functional IP telephones, and appears ready for a comeback. The system supplier hopes that its reputation and expertise in wireless communications will help it regain lost confidence among enterprise customers who want increased mobility, and that its name recognition will open up new doors. The first thing Ericsson must do to climb back to its former position in the USA PBX market is spend more marketing dollars (a lot more dollars), because too many customers and competitors think the supplier has left the building, and is not coming back for an encore.

3Com

Review & Analysis: The data communications system supplier has established itself in the IP telephony systems market, but its NBX sales have mainly been limited to customers with line size requirements below 100 stations. Its new VCX V7000 system, best described as a hosted system solution based on its since-sold network carrier softswitch, is 3Com's best hope to play in the large systems market, but its feature and advanced application limitations compared to the

established competitors' offerings will make it very tough going. The NBX generic software package will be the basis for the V7000, but like the Cisco CallManager offering, there are too many missing features and functions to be competitive one-one-one against the Avayas and Nortels of the world. 3Com also needs a more robust IP telephone portfolio (a large display browser telephone is still missing), and stronger messaging and contact center options. The NBX offerings have met with some success at the lower end of the market spectrum replacing key telephone systems, but playing in the big leagues with the pros for large stake multi-premises customer networks is a whole different ballgame.

Rest of the Pack

The PBX market competitors analyzed above account for about 95% of the total USA market installed base, and only slightly less of its annual station line shipments. Their collective market share for systems above 100 stations is even greater. The remaining few per cent market share points are divided among many other system suppliers, a few with somewhat recognizable names.

Tadiran Telecom is a PBX system supplier who has been in the business for a few decades, but has limited visibility within the high end of the industry. Its Coral IP-enabled PBX architecture design is not highly distinctive, but has strong networking capabilities. Teltronics and eOn Communications are two more system suppliers who pre-date the IP-PBX system era. Teltronics markets the 20-20 IXP, an upgraded version of the old Harris 20-20 system, to the large systems market and the IP-centric Cypreon to the small systems segment. The eOn Communications Millenium is a traditional circuit switched system designed for the key, hybrid, and PBX market segments. Tadiran, Teltronics, and eOn are all flying below the competitive radar of the leading system suppliers, but remain in the market as lower priced alternatives to the market leaders.

Vertical Networks, Altigen, Sphere Communications, and Shoreline each entered the PBX market with the hope that customers would accept communications system based on a PC telephony desktop design instead of the more traditional multi-line feature telephone platform. Although there are cost benefits to PBX systems that don't require proprietary telephone instruments, the current market for such systems is very limited. Each of these system suppliers now market their systems with IP telephones, while attempting to carve for itself a distinctive market niche: small voice communications system with integrated VoIP router (Vertical Networks); All-in-One client/server communications system (Altigen); modular, LAN-distributed communications system (Sphere and Shoreline). Unfortunately for these 1990s start-ups several of the market leaders incorporated these same system design concepts into their own PBX offerings. This has forced Vertical, Altigen, Sphere, and Shoreline to compete primarily on

a price basis, a competitive strategy that cannot be sustained for the long run against larger suppliers with much deeper pockets.

Two more recent market entrants, PingTel and Zultys, have staked their hopes primarily on SIP. PingTel first made industry news promoting and marketing SIP telephone technology, but has expanded its portfolio to include the SIPxchange, a SIP-based client/server IP-PBX system. Zultys entered the market with its MX1200 SIP-based system, and recently announced its smaller MX250 solution. Each system leverages SIP technology to provide several advanced communications features for user desktop applications, but offer less than the rich set of station, system, contact center and networking features available in traditional PBXs. It is anticipated that most, if not all, of the SIP benefits offered by these two suppliers' solutions will soon be available with most of the flagship system offerings of the leading suppliers.

PBX Market Outlook

A resurgent economy coupled with widespread acceptance of IP telephony should help ring up continued sales growth for PBX systems this year. The longer term outlook is for steady, if unspectacular, growth for the remainder of the decade assuming a non-recessionary economy. IP station shipments will continue to inch closer to traditional TDM/PCM numbers, and more customers will begin to understand how to better leverage the performance potential of IP telephony instead of merely replacing an old technology platform with a newer one. Few customers currently comprehend the true value of IP telephones with information service capabilities, and even fewer understand the true inherent design benefits of a communications system utilizing a LAN/WAN infrastructure for control and voice transmission signaling. The benefits of IP-PBXs that were promoted a few years ago, such as major cost savings through reduced private network transmission expenses, are being replaced by ones that are more cautious and realistic. Even the system suppliers are now the first to admit that IP-PBXs will not guarantee cost savings for any particular customer.

The overcrowded competitive market arena is likely to be trimmed down some during the next year or two. As briefly alluded to earlier, venture capitalists have already shuttered a few of the early IP-PBX market start-ups, and it is not without precedent that a long term established system supplier withdraws from the market (remember Fujitsu?). It is difficult to believe that the traditional market leaders will lose significant share points to anyone, except Cisco, and that another new competitor will vault from the pack to climb up the leader board.

One observes from history every generation believes that its recently sprouted new technology will totally disrupt and replace the hold in-place technology within a very short period of time. This may be true in the world of computers and data networking, but not in the staid voice market. It was stated in this annual review of a few years ago that IP telephony is an evolutionary, not revolutionary, process. This means that the old world of circuit switched PBXs will not go quietly (and quickly) into the night, but slowly (and noisily) during the day.

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