

# Network Technologies of the Future - A Sneak Preview

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## **1.0 Introduction**

The growth that the data communication industries see now is tremendous. At the time the web began to weave itself, no companies expected to see this happen. Many interesting factors changed the way companies invest in communication companies forever. The development of US Telecom Act four years back, the increase in the computing and web usages in corporate for better analysis and performance tracking and ease of services offered to the residential sectors initially drove this market.

In this document, we take a sneak preview of the current trends in network computing, the growth of data technology over the past 2 years and how the technology improved. The growing need of closer interaction among the leading technology players and tighter relation between technology industry and ISPs is also examined.

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## **2.0 Internet Growth in the Last 5 Years**

Five years back in early 1995, speculation sparked controversy whether broadband high speed access at home is ever technically feasible. Market analysis showed that there are limited number of online customers taking advantage of services. Number of users using e-mail and usenet and

connecting to local service providers were limited to about 28% of the overall internet users. But the change was unprecedented in all directions. Not only did the number of users seeking web based services grow, but there were more service providers, web services etc. as shown in the statistics in later pages.

This was just the start of the data revolution. Big companies quickly realized the potential for provision of better services to residential and corporate sectors. Customers can not only check e-mail and collect information from the web but also use the web to pay household bills or to request newer services. Corporate view it as significant reduction in inter-lab calls over an international private network, for instance.

At the same time there has been shift in focus from software and computing to what consumers saw it as media of convenience. There was a clearer division of services provided by web sites and those that help build the technology service. Clearly, the shift was changing very rapidly to 'media-like' usage. Much like the early home television revolution. However, Internet Technology has caught up business and individuals atleast 50 times faster.

A comparison of various parameters related to internet explosion and web usage statistics collected from various market research firms is presented at the end of this article.

## **Communication Technology and Trends**

This section recapitulates some of the break through achievements and milestones in network technologies and network computing in the recent past. Convergence of data and voice is of special media interest and will be analyzed in below sections.

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### **3.0 Voice-Data Convergence & VoIP**

#### **3.1 Introduction**

Early 1999. Not a single week goes without talk on convergence of voice and data networks and provision of unified services over data network. Recent technical expo by Computer Telephony demonstrated corporate interests in the advancement of technology. CT Expo involved technical speech from leading network solution providers like Nortel and Lucent. Discussion can be roughly divided into three sectors: Corporate network up gradation towards convergence, Unification and closer business-to-business interaction among players & customers and Tuning the technology itself for providing better quality of services.

For ISPs, the need to leap into an unknown territory is not merely sufficient but required due to the enormous competition among service providers. Even more than an year ago, local voice service

providers were concerned about retaining customers who required faster and flexible data oriented access. Data oriented services had become a necessity than convenience. Companies like GTE not only realized the importance of services but believed in providing unified voice-data services. After an year now, with close to 1 million customers country-wide, GTE now is able to demonstrate that technology achievement for a range of unified communication services. These services include integrated voice/data services over IP technology, personal mobility, multimedia call management, unified messaging (voice/e-mail/fax) and also broadband interactive applications.

*[ Ref: TechWeb Archives; tele.com; Reseller News; GTE.com; Pulver Report; Computer Telephony Report Feb 1999 ]*

### **3.2 Early Deployment - Technology Play**

IP service-oriented technology such as VoIP became more accessible and usable by late 1998. More internet calls were being placed and existing long-distance charges were challenged to about 1/5 of the cost. Companies like Net2Phone partnered with many local data service providers to deploy call gateways to provide IP switching, IP based PSTN, billing, account tracking and authentication over a local IP network.

Merging of traditional switching technologies using PSTN using ISDN and host of other serial faster protocol support over IP gateways started to happen.

While the revolution of high density began, so did the flexibility to deal with underlying computing platform. About mid of last year, very high speed modem concentrators and RAS adaptors are available which can be as compact as a PCI card running Windows software interfacing with range of analog technologies such as V90, Flex56K to 2 channel 64K BRI connectivity or ISDN PRI on a T1/E1 link. These powerful yet compact technology partially moved the intelligence and processing power from local exchanges to desktops capable of performing routing and a host of other unified communication services. To give a rough estimate, one of the market research predicts that the overall open-systems data convergence and RAS market will reach \$750 million by 2002.

*[ Ref: dgii.com; net2phone.com; Pulver Report; TechWeb Archives, Sep 1999 ]*

### **3.3 Market misgivings**

At around the same time, convergence technology did not create a seamless opinion among leading players during the past six months. Some took high stake by leaping into optimization and better service provision in packet networks while voice service providers played a safer role by upgrading existing setup and protocol stacks. Companies like Harris & Jeffries, RadiSys leveraged the existing SS7-based network to provide IP-like services. Other players like Cisco forged into the convergence technology by providing a single unified chassis supporting four components: Convergence server, IP call processor, IP gateways and IP telephone sets. The question remained not only in the service providers mind as to how good the quality of voice services are going to be. With high speed internal LAN, corporate networks still experienced atleast about 1-2 second delay

(circuit-switched have range in few ten msec delay or lesser) not to mention of the reliability of connection. Emerging codec standards in the H323 family of protocols and the recent SIP+ only added performance overhead. Differing standards only added to non-inter operability and inflexibility to the call servers among various products.

Leading players had the onus not only to prove their critical existence in the market but also the convince and entice more customers to jump into business with them. By March 1999, 70% of corporate IT managers surveyed are not yet comfortable or do not have plans to move to VoIP based product due to variety of reasons. While financially supported companies took steps to deploy separate networks and services systems for data and voice, others did not have in their agenda until few years down the line. Most of the problems seem to be due to the lack of robustness in the system, lesser QoS, and no diagnostic tools to support the system. Others were concerned about scalability of the system in the enterprise-wide network.

*[ Ref: cisco.com; techweb.com, Sep 1999 ]*

### **3.4 ISP and Advanced Services**

ISP bear more responsibility in ultimately furnishing services to the customers. Technical evaluation and going for the right equipment and technology is often not the only criteria for success. To survive the competition with other similar ISPs, there is a need for ISPs to deploy it in the right time in the right technology as well as good customer service.

During the first quarter of 1999, ISP market is undertaking atleast three different activities: Provision of normal voice and data access to customers, provision of value-added services to potential customers and involving in technology players to integrate these two activities internally. Analyzing and collecting data about the ISP backbone network helps to prepare the next step to provide value added services (VoIP), for instance. Technology players are cooperating in effort to cope with ISPs requirements. Cisco Avvici's call manager 8000 providing multiple functions such as IP gateways, call processor, and voice sets are one example. Another Swedish company introduced DS300 call gateway using TSDM technology to bring QoS of VoIP networks match that of circuit-switched.

*[TechWeb News Archive; reseller news]*

### **3.5 Conclusion**

During the recent years, several companies are experimenting with VoIP in their local LANs before they completely go for a single voice/data network. Several leading ISPs such as AT&T, MCI and Level3 have come forward to offer the convergence services for enterprise networks. QoS and delay reduction in the VoIP networks are yet to be addressed seriously though they had undergone several improvements.

Nonetheless, corporate managers are excited about the flexibility the service offers and significant

cost reduction. Unified messaging of email, fax and voice mails attract small and midsize business due to its flexibility.

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#### **4.0 Web Statistics**

1995:

- Estimated number of people who can use interactive services on the Internet: 13.5 million
- Cost of access, per minute, to Internet Services at Cybersmith: 17.5 cents
- Estimated number of USENET sites, worldwide: 260,000
- Number of Web pages indexed by the Lycos Internet catalog: 3.6 million

1996:

- Number of people over 16 in US and Canada with access to the Internet: 37 million
- Number of Internet service providers, worldwide: over 1400
- Number of business listings of Web sites in the Commercial Sites Index: 15,379
- Number of Internet Service Providers, worldwide (July, 1996): 3,054
- As of April, 1996, number of domains in .COM: 316,271
- Percentage increase in Internet traffic, per month, estimated by MCI: 30

1997:

- Estimated number of adult Americans who use the Web daily: 9 million
- Number of occurrences of the word "the" in documents indexed by Alta Vista: 432,118,690
- Approximate number of new domain name registrations, per month: 85,000
- Estimated total Internet advertising revenues in 1996: \$266.9 million
- Number of Americans who consider the Internet "indispensable," in millions: 20
- Approximate number of page views at Yahoo, in millions per day: 38

1998:

- Average number of dial-up customers for U.S. Internet service providers: 3,450
- Percentage growth rate, per month, in Internet access revenues (October, 1997): 24.9
- Estimated number of web pages, as of April, 1998, in millions: 320
- Percent increase in the number of registered domains from 1997 to 1999: 118
- Amount spent on advertising on the Internet in 1998, in billions of dollars: 1.9
- Estimated number of Internet users, worldwide, at the end of 1998: 147,800,000