

Convergence of Technologies for Rapid Development

INTRODUCTION

Convergence is integration of multiple media such as voice, video, data, and other digital media into a combined data stream. This concept has brought integration of e- business, customer relationship management (CRM), Web application and multimedia broadband content, delivered on global IP (Internet Protocol) network infrastructures.

Development of Convergent Network

Public Switched Telephone Network (PSTN) has been in operation for over a century. In this system a connection is switched from the caller to the sender by selecting idle circuits from a pool and interconnecting them end-to-end. The connection is stable, exclusive to the parties, and quality is so good that an international call can hardly be distinguished from a local one.

PSTN switching involves connecting circuits together end-to-end to form an exclusive voice path from sender to the receiver for the duration of a session. For the first century of the telephones existence, circuits were all analogue, first carried on wire and then on coaxial cable and microwave radio. To increase the carrying capacity of the medium, analogue multiplex was used. Analogue multiplexing has certain drawbacks, the most important of which is noise. With increase in distance between sender and receiver, the noise level increases, and transmission loss is also cumulative. Loss can be overcome by amplifying the signal, however the noise is amplified along with the voice. Analogue circuit is also less than desirable for carrying data. In order to carry data on an analogue connection, it must be converted to a signal that fits in the voice pass band which is normally 300 Hz to 3300 Hz.

The Bell system began applying digital multiples in 1960s, but it was used for short distances until the development of fiber optics as the transmission medium. Subsequently, digital transmission replaced analogue except that the use of copper cable between the local telecom office and subscribers premises.

A digital network is beneficial for data because it can be directly applied to the transmission medium without conversion except, perhaps, the coding scheme. However the voice must be digitalized before it can be applied to a digital network.

With development of transcontinental and intercontinental fiber –optic systems, the need for higher- order multiplexing hierarchy became apparent. With the introduction of Synchronous Optical Network (SONET) standard most common bandwidths were available for telecommunication networks. Thus fiber-optic SONET backbone became a medium to transmit both voice and data through digital switches.

The Internet began in 1969 as an experiment in packet switched data networking. It evolved from its beginning as the development of a coalition of government agencies, universities, and contractors. Several events launched the Internet as we know it today. First was the decision to release the Internet and its Protocols into the public domain. The backbone was converted into an enterprise and Internet Service Providers (ISP) emerged to manage customer access to the backbone. The second event was the development of Hypertext Transfer Protocol (HTTP) which enabled the use of Web browsers. Parallel to Internet was initiated by IEEE, which launched (LAN) Local Area Network protocols. With the increase in popularity of LAN it became possible for the users to obtain information from millions of computers throughout the workplace with the help of personal computers.

Although both voice and data networks use the same fiber-optic backbone, an IP network is separate and distinct from the PSTN. IP uses different station addressing method and a signaling protocol. When voice is transmitted over a data network, it is compressed into packets and these packets are launched through a router where they are prioritized ahead of data packet. This prioritization is done because voice is transmitted in real time.

The Internet is the data equivalent of the PSTN and ISP in the Internet is the counterpart of the local telecommunication exchange. The Internet equivalent of PSTN Switching is Routing.

The protocol that makes the Internet possible is Internet Protocol (IP). IP is an open protocol that is evolving to carry telephone traffic through the use of associated protocols. The switches that link the PSTN are proprietary in every respect except their line and trunk interfaces. The merging of voice and data into a single packet-based transport network that carries both is referred as **Convergence**.

IP telephony is used for conveyance of voice, fax and related services, partially or wholly over packet-switched IP-based networks. IP telephony may also include applications that integrate/embed the transmission of voice and fax with other media such as text messages.

IP telephony, Voice over Internet Protocol (VoIP), and Internet telephony are normally used synonymously.

Functioning of Convergent Network

IP telephony is a technology that enables voice calls over IP based networks. More specifically, it is the provisioning of telephony features and applications across packet switched communication networking using IP standards and specifications. Its ultimate goal is to enable call processing to be combined with voice, data, video, and wireless applications into an integral enterprise and infrastructure that ensures the reliability, interoperability, and security of a voice network, while offering the efficiencies, mobility, and the manageability of an IP network. It removes the limitations of proprietary systems and provides increased productivity, scalability, mobility, and adaptability. Voice over IP (VoIP) is a superset of IP telephony used for transmission of voice signals over an IP-based network. VoIP has brought transmission of voice, data, and video communication into a new convergent world. A converged distributed network seamlessly integrates both circuit-switched PBXs and LAN clients/servers into a unified network.

There are variety of technologies relate to VoIP. These include the following:

- Internet protocol private branch exchange (IP PBX) and IP enabled PBX
- IP trunk connections in both the public and private networks
- Soft switches and voice over digital subscriber line (VODSL)
- IP voice over cable

Following are the most common categories of networking:

- Remote connectivity
- Local area networking (LAN)
- Internetworking
- Wide area networking (WAN)

Virtual Private Network (VPN)

A VPN is a private communication network, which tunnels through the Internet WAN backbone using IPSec/L2TP encryption, offering the appearance and functionality of a dedicated private network at a reduced price. The great advantage of these networks is that they mimic the appearance and functionality of leased services at a fraction of cost, and has resulted in the rise of Internet and IP usage for business applications in today's corporate data networking environments.

Applications

VoIP infrastructure and technology allow for easier integration of voice with other Web middleware applications, as indicated below:

- Unified messaging
- Advance call routing
- Intelligent agents
- Voice portals
- Integrated multimedia contact center
- Real time integrated enabler for vertical markets
- Voice Web
- Remote telecommunication
- Video conferencing.

Benefits of VoIP

VoIP has fundamentally changed the way communication takes place. The benefits of VoIP are;

- Cost saving
- Improvement in productivity
- Improved profits
- Improved customer services
- Increased sales
- Reduction in expenses due to maintenance of only one infrastructure
- Easy access to e-mail, Internet content via human voice from any phone, any where, at any time.
- Convergence
- Support local and remote communication

Conclusion

The current integration of Internet applications, telecommunication, and knowledge management has resulted in a new, unified approach to managing vertical market segment, such as CRM (Customer relationship management), ERP, and healthcare, e-business, e-governance, tele-education, tele-medicine, The unifying solution provides a platform that enables the integration of business operations, business management, and business intelligent capabilities.