
Convergence and Next Generation Network: Why Today's Telecom Engineer Must Master The Skill Set of IP Networking and Data Communication Technology

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The changes that are taking place within the legacy PSTN network, is considerably rapid. For over 100 years, copper has been used as the transmission medium in the local loop to connect each home and building to the telecommunication network. Today, copper is increasingly being replaced by fibre in the local loop while packet-based technology using the Internet Protocol (IP) is replacing existing circuit-based switching technology.

Convergence in network technologies, services & applications, and in terminal equipment forms the basis of change in innovative offers and new business models in the communication sector. The utilisation of the term "convergence" represents the shift from the traditional "vertical silos" architecture, i.e., a situation in which different services were provided through separate networks (mobile, fixed, IP/data) to a situation in which communication services will be accessed and used seamlessly across different networks and provided over multiple platforms in an interactive way. The growing role of the Internet in the economy and society has enhanced the process of convergence and its rate of change.

What is convergence?

The path towards convergence is led mainly by the increasing digitization of content, the shift towards IP-based networks, the diffusion of high-speed broadband access, and the availability of multi-media communication and computing devices. Convergence is taking place at these different levels:

- Network convergence: driven by the shift towards IP-based broadband networks. It includes fixed-mobile convergence and "three-screen convergence" i.e., mobile devices, television, and computer.
- Service convergence: stemming from network convergence and innovative handsets, which allows the access to web-based applications, and the provision of traditional and new value-added services from multiple devices.
- Industry/market convergence: brings together industries such as information technology, telecommunication, and media; formerly operating in separate market shares.
- Device convergence: today most devices include a microprocessor, screen, storage, input device, and some form of network connection. Increasingly, they provide multiple communication functions and applications.
- Converged user experience: unique interface between end-users and telecommunications, new media, and computer technologies.

Thanks to the digitization of content, the emergence of IP, and the adoption of high-speed broadband, today, the distinct communication networks and services are converging into one network. Traditional PSTN services such as voice and data are increasingly delivered over IP

networks and the development of new platforms is facilitating the provision of converged services. These converged services are appearing in markets as "triple" or "quadruple" play-offers, which provide data, television, and fixed/mobile voice services.

What is NGN?

Although there are significant amount of works being carried out in the NGN standardisation forums, there is still yet to be a complete agreement on the definition of "NGN". The term is generally used to depict the shift to higher network speeds using broadband, the migration from the PSTN to an IP-network, and a greater integration of services on a single network. From a technical point of view, NGN is defined by the International Telecommunication Union (ITU) as a:

"packet-based network that is able to provide services including telecommunication services and able to make use of multiple broadband QoS-enabled transport technologies; in which service-related functions are independent from underlying transport-related technologies."

NGN can also be defined as "broadband-managed IP networks" that includes next generation "core" networks, which evolve towards a converged IP infrastructure capable of carrying a multitude of services such as voice/video/data services and next generation "access" networks, i.e., the development of high-speed local loop networks that will guarantee the delivery of innovative services.

The shift in the migration of legacy circuit-switched PSTN network to an all-IP NGN networks is already taking place within different network operators in different countries. IP-based convergence solutions embraced by the network operators may also increasingly support IP Multimedia Subsystem (IMS) to enable fixed-mobile convergence. Compounding to the factor of this network migration is the increasing competitive pressure on mobile carriers coming from the IP world. Thanks to the availability of dual-use devices and Wi-Fi hotspots, service providers such as Skype, Google, YouTube, et al., are now able to offer a host of new services for mobile users in a very short period of time.

Why the telecom engineer must learn and master IP networking technology?

A telecom engineer working in the old days of legacy PSTN network needs to master many diverse knowledge and competency over his career such as circuit-switched technology, SS7 or ISDN signalling, frame relay or ISDN for data services, analogue cable TV, etc. However, with the global trend of network operators migrating towards convergence and next-generation network, which is built on a converged high-speed broadband and all-IP network infrastructure, IP networking becomes the foundation to the entire spectrum of communication services such as "triple" or "quadruple" play. Everything such as voice, video, and images are digitized into bits of information and these packet-sized data are transported and delivered from the core network right to the user-terminal equipment using a common Internet Protocol (IP) platform. Hence, it is important for a fresh or even an experienced telecom engineer working on current and next generation communication network, to have a strong knowledge of Internet Protocol (IP) and the practical skill competency. IP networking or data communication knowledge is no longer limited to the

community of computer, data networking, or information technology engineers – it dominates the communication world today.

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