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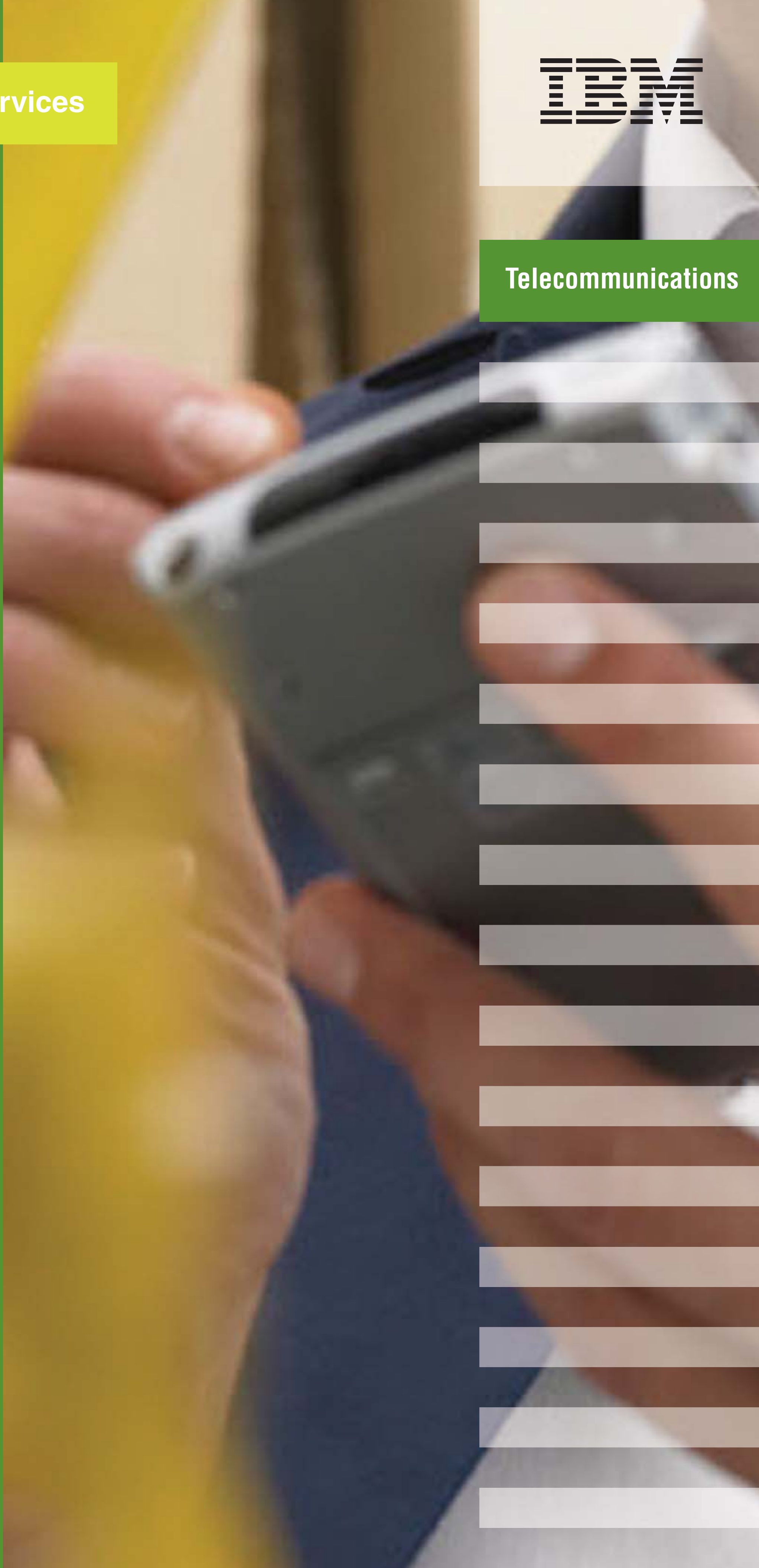

Telecommunications

Services over IP

Delivering new value through next-generation networks

IBM Institute for Business Value

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Executive summary

The communications industry is facing unparalleled changes which are breaking down traditional industry boundaries. Providers from different technologies and backgrounds all focus on the same future – *integrated* service offerings for next-generation customers. Telecom service providers (SPs) are challenged as never before to defend market share and grow new revenues.

On the one hand, peaking broadband penetration and customer demand for multimedia services and content provide new revenue opportunities. At the same time, intensifying competition from existing industry players and new market entrants, including rejuvenated cable MSOs, ISPs and consumer brands, bring renewed demands for innovation. Increasingly discerning customers expect a seamless, multichannel experience, irrespective of technology. At a time of rapid technology change, these factors add to existing pressures on telecom infrastructures and market expectations for growth.

IP technology is the catalyst for change. To telecom SPs, IP brings unprecedented changes beyond what is considered an ongoing evolution, in particular to the network: Network convergence brings together previously parallel networks (cellular, fixed, enterprise) onto a single IP-based infrastructure. Service convergence enables integrated service propositions (e.g., "triple" and "quadruple" plays[1]). Network convergence links with service convergence to enable virtually "anytime, anywhere, anyhow" service delivery. Such changes present major challenges and demand renewed SP attention to their network strategies.

SPs operating traditional CS networks are increasingly constrained to deliver against the convergence vision and extract additional value from their legacy environments. Parallel, service-specific networks, based on proprietary technologies, are typically difficult to integrate and inflexible in terms of what services they can deliver and how. Many proprietary technologies are also nearing the end of their lives and are costly to maintain, affecting network performance and the economics of service delivery. Finally, the emergence of multiple new access technologies and devices sparks demands for service and technology interoperability, requiring an IP-based network infrastructure.

To position themselves for leadership in the converging communications world, SPs around the world need to follow the example of today's industry leaders and build a transformation path to next-generation networks and service delivery capabilities, based on:

- An IP/MPLS-based core network strategy for revenue and cost optimization
- Open standard technologies and platforms for cost efficiency, flexibility and interoperability
- Reusable, COTS solution components for lower infrastructure costs
- A service creation environment to drive and support a large ecosystem of applications and thus revenue generation capabilities
- A common, standards-based service delivery platform that can be easily integrated with existing and third-party assets for multimedia service delivery.

The urgency of migration will vary by operator type and competitive pressures in local markets. However, transition to all-IP networks is underway. How individual SPs respond to the reality of IP will create the foundations of the industry of tomorrow and determine winners and losers.

The glossary on pages 14 and 15 provides a description of abbreviated terms and acronyms used throughout this paper.

Meeting the challenge while seizing the opportunity

Responding to the growth challenge

Telecom providers around the world face tremendous pressures to sustain core revenues. Fixed-line voice is being "squeezed" by substitution of broadband (cable and DSL), mobile and IP. According to Forrester Research, mobile's popularity among European consumers continues to grow at the expense of fixed-line telecom services. About a quarter of mobile users have switched at least a portion of their fixed-line use to mobile. More intend to follow: six percent of mobile users plan to cancel their fixed connections in the future.[2] And with reinvigorated cable companies invading traditional telecom territory with VoIP "pure plays" and digital phone roll-outs, the assault on the fixed voice business is more acute than ever. Industry analysts Frost & Sullivan expect that, by 2009, there will be nearly 20 million VoIP subscribers in the United States alone.[3]

Meanwhile, increasing operating expenses are further eroding margins and overall growth. With network and network development costs typically accounting for more than 35 percent of fixed-line operating costs, telecom SPs are under pressure to reduce their network-related expenses to sustain margins.[4]

In mobile, while some markets still have opportunities to grow voice usage (MoUs) and revenues, the double-digit revenue growth and healthy profit margins once enjoyed have been lost to market saturation, intensifying competition and low-ARPU net additions in emerging markets. According to Ovum, global mobile voice revenue growth of 23.1 percent from 1999-2003 will decline to 8.0 percent from 2004-2009.[5] To compensate, mobile operators have looked to FMS to boost top-line growth. However, in some markets, the scope for further substitution is starting to slow.

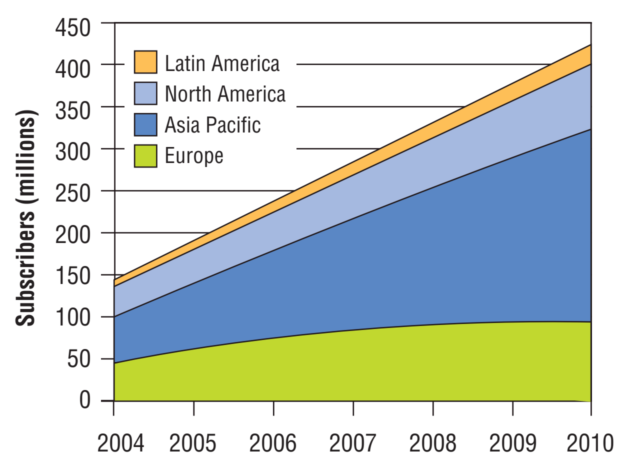
Moreover, mobile operators cannot be complacent about VoIP. With fixed-line players increasingly offering IP-based telephony, they are able to compete more effectively on price, potentially threatening mobile voice – including lucrative international roaming – revenues. In addition, although commercial deployment of mobile VoIP (e.g. VoWLAN) may be immature, mobile SPs need to consider the potential risk to future voice revenues against new, potential service opportunities enabled by IP-based wireless networks (e.g. WLAN, WiMax) and advanced devices. In the short term, pervasive IM and e-mail may start to make highly profitable SMS look like an expensive alternative, impacting data revenues. Although accelerating 3G adoption brings renewed hope, new emerging technologies such as HSDPA offer double/triple download speeds, enabling TV streaming. Finally, with the increasing importance of content, SPs may be braced for a revenue battle with content providers, making the future growth path for mobile far from clear.

Seizing the convergence opportunity

As growth moderates, the convergence opportunity is increasingly important as a source of new revenues.

The global broadband market is forecast to pass 190 million subscribers in 2005, growing to over 430 million subscribers in 2010[6] (see Figure 1), and customers are increasingly demanding multimedia services and content, such as digital music, IM, TV/VOD, games and customized content.

Figure 1. Worldwide broadband subscriber forecast, 2004-2010.



Source: Informa Telecoms & Media. "Future Broadband Markets, Worldwide Forecasts by Technology and Network to 2010." August 2005. http://www.informatm.com/bsdv3

Magnet Networks leads service innovation with Cirpack/IBM solution

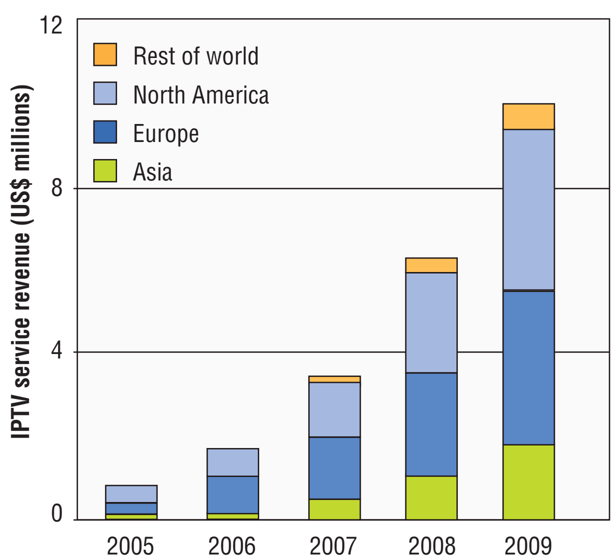
Magnet Networks, the Irish digital life style service provider, has recently brought to market a comprehensive range of high-quality communications and entertainment services, including IP telephony, multichannel digital TV, VOD and extremely fast broadband Internet, delivered to subscribers through a single fiber-optic cable, leveraging CIRPACK's MultiNode Carrier-Class Gateway based on the IBM eServer™ xSeries®.[7]

SBC out to capture "digital lifestyle"

In November 2005, SBC announced the success of a two-month field trial and its plans for rolling out IPTV, VOD, high-speed Internet access and other features in late 2005 or early 2006. The company has described the move as "not just a race to capture the digital house, but the digital lifestyle."[9] IBM was selected to develop an SDP that will collect and aggregate transactions from the billing, customer relationship management, ordering and billing systems.[10]

According to Multimedia Research Group Inc., global IPTV service revenues are likely to hit US$880 million in 2005, growing to $9.9 billion in 2009, an 83 percent CAGR.[8] Europe and North America are generating the majority of this revenue (see Figure 2).

Figure 2. Global IPTV service revenue forecast, 2005-2009.



Source: Multimedia Research Group, Inc. "IP TV Global Forecast – 2005 to 2009." September 2005.

IPTV services enable telecom companies to compete with rejuvenated cable providers and start-ups, while generating new revenues. However, aggressive competition is leading to intense price pressures, putting telecom returns on investment at risk unless they can significantly reduce their cost base.

Differentiated triple/quadruple play bundles around the world are beginning to earn higher ARPUs and reduce churn. Korea Telecom has led the way with its state-of-the-art "Digital Home" package that offers multimedia/telecom services over its seamlessly integrated fixed/mobile networks.[11] FastWeb in Italy has generated some of the highest annual residential ARPUs in the world – more than US$1000 – by offering both telephony and video services.[12] In the United States, SBC Communications is jumping on the "quad play" bandwagon with its plans for a full IP network, incorporating fixed and mobile voice, high-speed data, TV and video services.

As convergence breaks down traditional industry barriers, Sprint in the United States is teaming up with four cable TV companies – Comcast, Time Warner, Cox and Advance/Newhouse Communications – to launch a US$200-million joint venture to create a quadruple play of voice, video, Internet and wireless services.[13]

In the enterprise market, IP is opening up major new VoIP-based opportunities. Forrester Research predicts that by 2015, 95 percent of enterprise voice calls will be VoIP-based.[14] However, the fastest growing VoIP market is "hosted IP voice" or "IP Centrex" which is expected to expand from about US$60 million in 2004 to more than US$7.6 *billion* by 2010, representing a CAGR of 282 percent.[15] By that time, VoIP technologies are expected to be handling 45 percent of the total voice-telephony market.[16]

FMC is another significant new opportunity area in the consumer and enterprise markets: Pyramid Research expects FMC revenues to reach US$80 billion in 2009, or 6 percent of total communications spend worldwide.[17] With original WLAN/WiFi offerings aimed at providing ubiquitous broadband access – now largely a commodity – SPs aim to use FMC to defend their share of voice minutes and drive new service revenues from target customers. For example, in mid-2005, BT Group in the United Kingdom launched its FMC service offering called "Fusion" – a cellular handset using Bluetooth technology to switch seamlessly from the cellular network outside the home to a fixed-line service through a broadband DSL hub in the home, all billed to the end user as one service.[18]

However, telecom companies are challenged to match the innovative service propositions of powerful cable giants, ISPs and consumer brands, such as AOL, Yahoo, MSN and Google. For example, Google is offering "Google Talk" (IM and VoIP service) along with video streaming of prime-time TV.[19] To compete, telecom companies need to improve their understanding of evolving user needs, and match these with the "right" services and content targeted at specific market segments at the "right" price. Soon, next-generation services, based on presence management (information about a user's online status), will mix realtime multimedia components with legacy services within one "call," enabled by IMS, an IP-based architecture framework enabling multimedia and converged service delivery (see section entitled "Delivering next-generation services"). Among these services are push-to-talk/message and other "push-to" services; combinational (voice/picture) and location-based services; group chat; and online, multiplayer games. IMS-based enterprise services include IP-based VPN, IP Centrex/hosted PBX, or IP Centrex combined with Web-based conferencing and messaging services. Ultimately, we anticipate that all services will become NGN- or NGN-IP/MPLS-enabled.

Mastering the infrastructure challenge

Turning out content-rich services is operationally complex, requiring integrated infrastructure and converged multimedia service delivery capabilities. However, most carriers today operate distinct CS and packet-switched (data) service networks, based on different, proprietary protocols, which are often difficult to integrate, inflexible in terms of service delivery and costly to maintain, dragging down earnings. With aggressive competition and increasing consumer choice, the ability to bring new offerings to market quickly is a critical competitive differentiator. Finally, legacy infrastructures typically have no means to address increasing user fatigue of today's fragmented communications experience, involving multiple services, devices, technologies and user names/passwords.

With competition heating up, leading SPs have begun the shift from legacy environments to NGNs. While traditional wireline capital expenses are forecast to grow at 3 percent CAGR between 2002 and 2007, global spending on IP infrastructure is forecast to grow at 12 percent CAGR during the same time period.[20] We expect the migration to IP networks to intensify over the next three to five years with the urgency of migration varying by operator type and local competitive pressures.

The NGN environment

From CS to IP technology

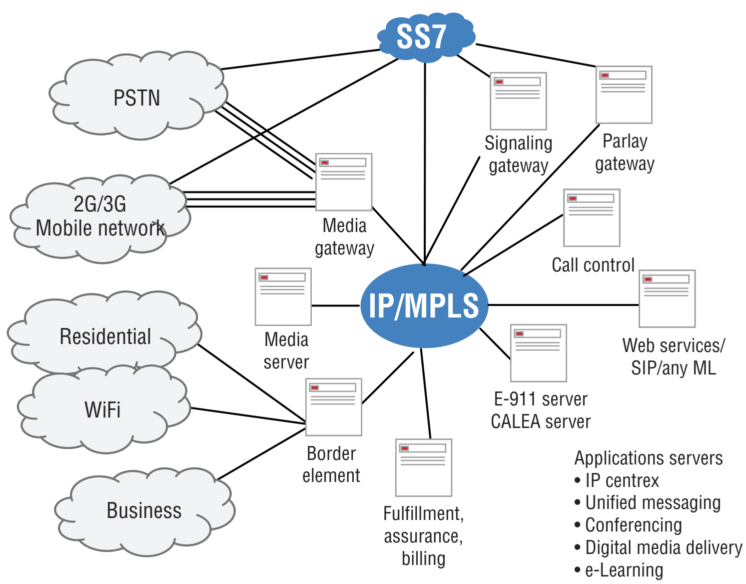
NGN is a general term used to describe networks characterized by the use of IP, fiber optics and software-based platforms for service delivery. One of the most dominant trends in the evolution of the IP-based NGN is the move from CS to IP technology, which helps reduce the cost of delivering existing services and enhances SP capabilities to deliver new, integrated services more rapidly. IP-based NGNs use quality of service technology to support all types of customer traffic – voice, data and video – on a single, common network, "marrying" different networks within one ubiquitous platform or "single piece of wire." The term NGN refers to the network core (IP/MPLS in Figure 3) and the interface of the core with the local access ("last mile") part of the network (the "network edge").

In the IP environment, SPs can increase network efficiency using optimized IP transport and coding solutions. By reducing overall capacity requirements and other cost factors, SPs help reduce the expense and inefficiencies of isolated legacy networks supporting different service types. Freed from proprietary constraints by open standards-based IP networks, SPs can shop for the technologies they need instead of building proprietary solutions, or counting on one legacy vendor to supply them, providing significant scope for cost reductions.

A key theme in the evolution of the NGN is convergence:

- Convergence of multiple, parallel networks onto a single, IP-based infrastructure
- Convergence of the telecom network with the IT operating environment
- Convergence of service offerings (VoIP, FMC, triple/quadruple play)
- Network and service convergence designed to enable "anytime, anywhere, anyhow" service delivery; network convergence is the enabler – the means by which network operators facilitate better access to converged, value-added services and applications across different forms of IP connections and devices (see Figure 3).

Figure 3. The key themes in the evolution of the network.



Convergence of multiple service networks

Source: IBM Corporation.

The benefits of network convergence stem from SPs' ability to:

- Deliver current and new value-added services more effectively at reduced cost
- Provide seamless user access to services/content irrespective of broadband connection and device
- Reduce cost and enhance flexibility.

Other key themes in the NGN include replacing:

- Technology "stove pipes" with horizontal network layers
- Time-division multiplexed, narrowband transmission with open, broadband, carrier-grade IP services
- Expensive proprietary hardware and operating systems with open software-based computing platforms, operating systems and interfaces
- Monolithic applications with offerings from hundreds of competitive firms – applications, middleware, operating systems and other technologies
- Many small, distributed elements with fewer, more centralized servers
- Closed standards taking 15-25 years to evolve with open standards advancing with timescales closer to five to ten years.

New sources of value

With the shift from proprietary, commoditizing hardware to IP- and software-based platforms, SP value shifts from enabling voice traffic to delivering software-based services and supporting infrastructure to global operations on common IT hardware and software platforms. This environment enables SPs to:

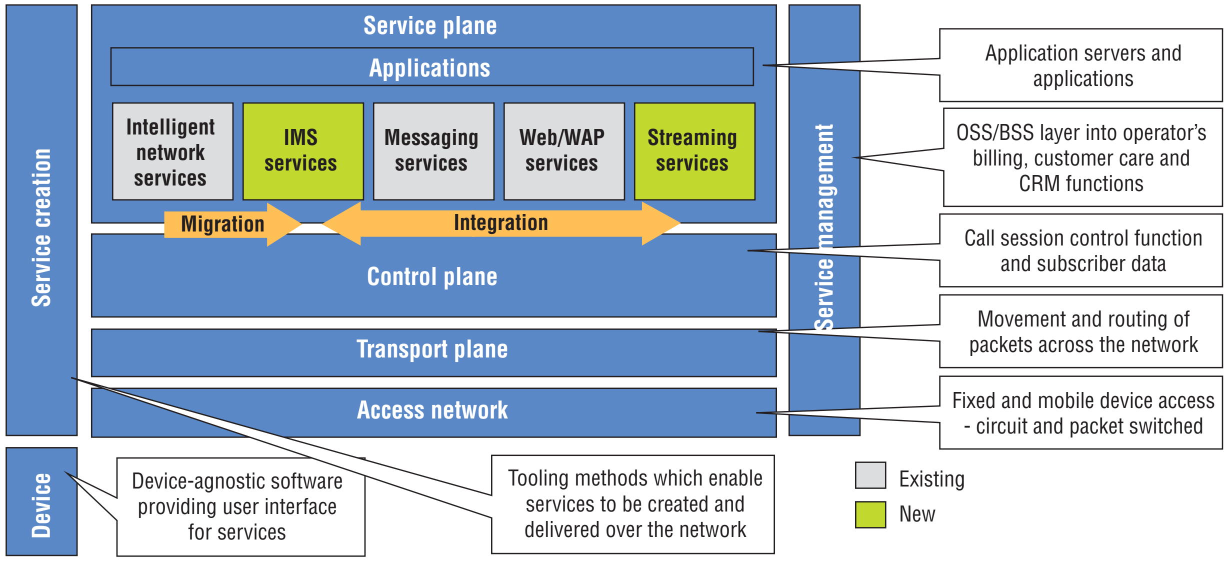
- Employ common Internet protocols such as HTTP, SSL, SIP, XML, Web services
- Move to open operating systems, such as Linux®
- Reduce capital expenses through COTS solutions that can often be developed and deployed for less than the cost of bringing legacy network equipment up to speed
- Build an environment for the creation of new services and service packages, based on multiple "basic services" or capabilities, using industry standard tools and technologies
- Build portfolios around hundreds of horizontally integrated services and supporting infrastructures at potentially lower costs
- Migrate to open, integrated business models enabling SPs to draw on the capabilities of a wider ecosystem, and leverage the competitiveness of multiple software vendors, opening the way to major savings and flexibility in service delivery.

The architectures of the NGN

The IP/MPLS core network forms the underpinning of the IP NGN architecture. With key architectures and standards still being defined, there are multiple sources of architecture for an NGN. However, some individual technologies are widely accepted, including IP, SIP and H.248.

Built on open standards, with COTS hardware and software, the NGN divides into three planes (see Figure 4). The transport plane manages traffic flows (movement and routing across the network) and separates traffic from the service and control planes, enabling user access to multimedia services and content and service interoperability, independent of access network or device. Applications and services (and therefore revenue generation) reside in the service plane, which supports service orchestration and application logic. Call session functions and subscriber-related information are handled by the control plane. For example, the control plane supports advanced SDPs (including IMS) and provides gateway management, selection and control. The control plane is designed to enable the convergence of technology "stove pipes," improve operating efficiency and connect the service and transport planes.

Figure 4. Next-generation network architecture



Source: IBM Corporation.

Leading European carriers such as BT and KPN, are at the forefront of the move to all-IP networks. Through the roll-out of its 21st Century Network project – expected to cost more than US$17 billion – BT aims to become the world's first multiservice, all-IP network by 2009. Annual cost reductions are forecast at US$1.7 billion.[21] Similarly, KPN is aiming to become all-IP by 2009, projecting operating expense savings of approximately US$1 billion by end of Phase 2 in 2009 – a significant proportion from a staff reduction of 45 percent.[22]

Delivering next-generation services

To drive value, the NGN needs services. One of the weaknesses of legacy environments is that end-user services and functions driving those services are vertically integrated, with parallel silos combining a particular service, its enablers, OSS/BSS and network. For each new service, vertical integration leads to extensive and costly replication of functions such as subscriber management, which is common to multiple end-user services but is typically not reused for another end-user service that requires the same function.

In the NGN, multiple services share a common set of enablers (the SDP), and common OSS/BSS. Integration and operating costs are paid once and amortized across all new services.

Enablement of a common SDP is necessary to exploit the multimedia content services opportunity fully, independent of access. SPs that do not have an SDP will likely struggle to deliver NGN services rapidly, flexibly and cost-effectively. The economics of the software industry show that when a common platform is introduced, it generates significant added value.

Sprint leverages SDP in Business Mobility Framework

To enhance its enterprise offering, Sprint is implementing an SDP as part of its new Business Mobility Framework, using IBM® WebSphere® middleware in partnership with other vendors. Sprint expects to generate US$300 million in revenue from the Framework over five years (excluding network usage costs).[23]

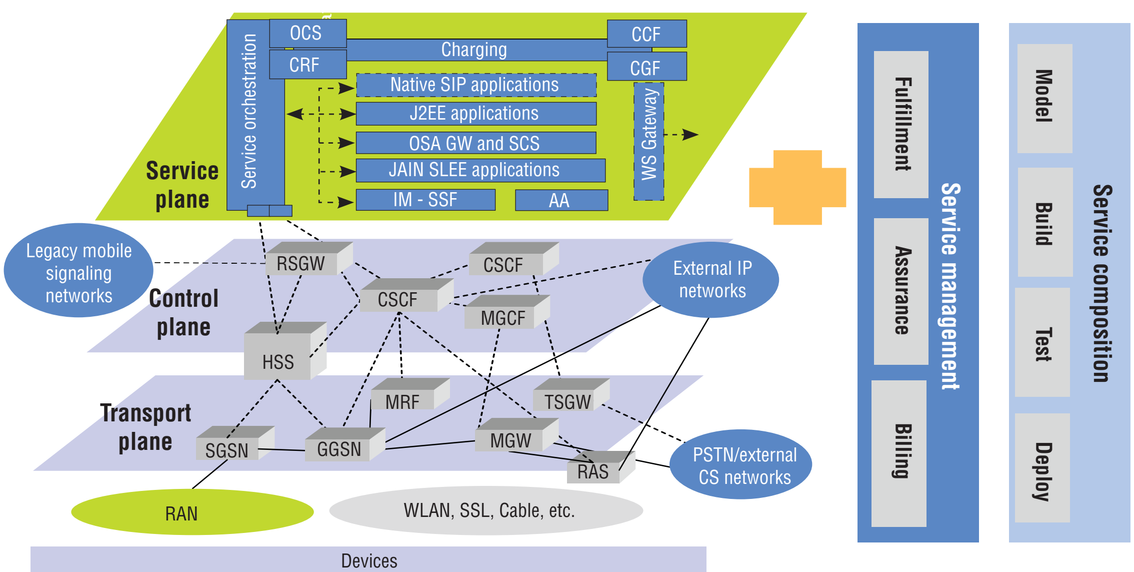
The IMS advantage

The framework of choice for multimedia and convergent service delivery is IMS. IMS is a standards-based solution defined by 3GPP and 3GPP2, as well as by organizations utilizing IETF Internet protocols, to enable IP services for mobile and fixed-line operators. IMS specifications define five planes – transport, control, service, access and enablers (Figure 5 below shows a subset view of IMS, excluding the access part of the network and the enablers). The transport plane moves the bits back and forth, and interconnects them to the legacy network; the control plane controls the session state, the subscription and service information and the selection/state of the gateways involved in the sessions. The service plane, where the application logic resides, is composed of a service-enabling plane (supporting service orchestration, charging etc.) and the applications. The access part of the network comprises the various fixed, mobile and wireless access technologies (including DSL, GSM, GPRS, WLAN, UMTS, cable). Finally, the enablers comprise the IP network, the PSTN, etc.

Originally defined by 3GPP as an application-enabling technology for mobile Internet, IMS is now generally accepted as the future convergence platform for fixed as well as mobile carriers; no major alternative architecture exists, even though alternative "point solutions" are available. In a recent survey of the telecommunications industry by IDC, all respondents indicated an interest in IMS, with most listing a timeline for deployment. With the overall market still in its infancy, leading SPs are not expected to begin commercial IMS deployments until 2006, with spending ramp-up not likely until 2008. Worldwide IMS revenues are expected to grow to US$14.1 billion by 2010, with Western Europe driving adoption.[24] The bulk of revenues are expected to come from the service plane.

Figure 5. IMS is defined by standards 3GPP and 3GPP2 and by organizations utilizing IETF internet protocols.

Access and IMS Control plane agnostic



Source: IBM Corporation.

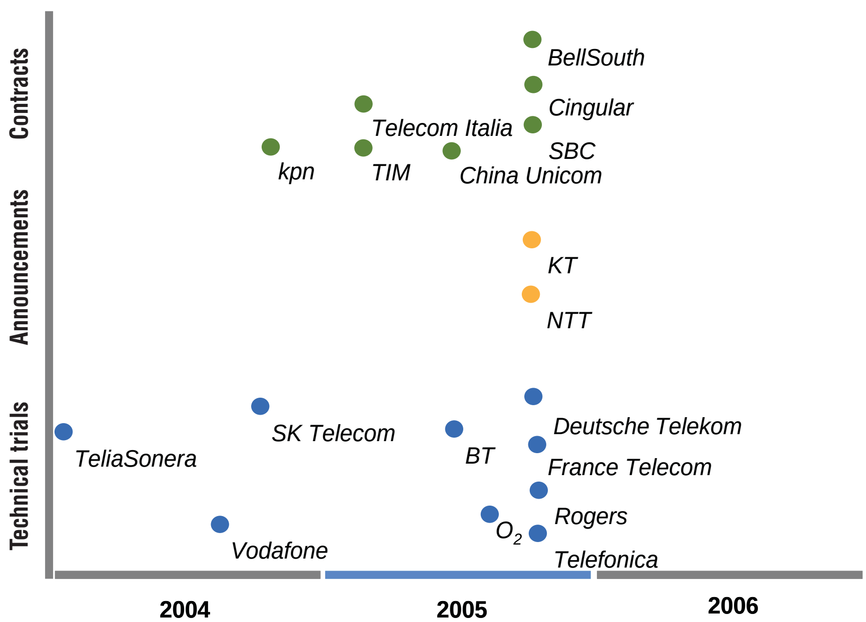
IMS supports multiple services and access types and is designed to enable interoperability of IP services and applications, and service interoperability between subscribers. IMS is distinct from but complementary to the NGN and any existing SDPs. Unlike NGN, IMS is specifically optimized for SIP and multimedia applications.

Benefits of IMS

From an operator perspective – mobile or fixed – IMS delivers a framework and common capabilities to enable converged and multimedia services to meet user demands for personalized services and content. New, attractive services and service bundles typically improve ARPU and customer stickiness (loyalty), reducing churn. The ability to roll out services rapidly and flexibly fights back competitors. As a single, horizontal infrastructure for fixed and mobile platforms, IMS can potentially enable significant cost savings.

To the end user, life is not about technology but what the user wants and how well services fulfill those needs. IMS allows the simultaneous use of realtime voice and data with non-realtime data, based on presence management, including push-to-x, combinational and VoIP-based services, in virtually any setting (e.g., stationary, in motion) and to suit individual preferences and allow multiuser activities (e.g., collaborative working or multiplayer games). IMS also enables an intuitive, integrated user interface and consistency of service across technologies and devices, helping meet user demands for a simplified, improved experience.

Figure 6. IMS contracts, announcements and trials – leading service providers.



Source: IBM Corporation analysis, operator announcements.

Mapping your transformation

Consensus is beginning to emerge about how the evolution to NGN will happen, even as the industry debate continues on the detailed architecture of the NGN and the best deployment schedules (especially for replacing legacy networks and OSS). Transition to NGNs affects seven key areas:

- The access network
- The core network
- The service plane
- The control plane
- Systems
- New services
- The device.

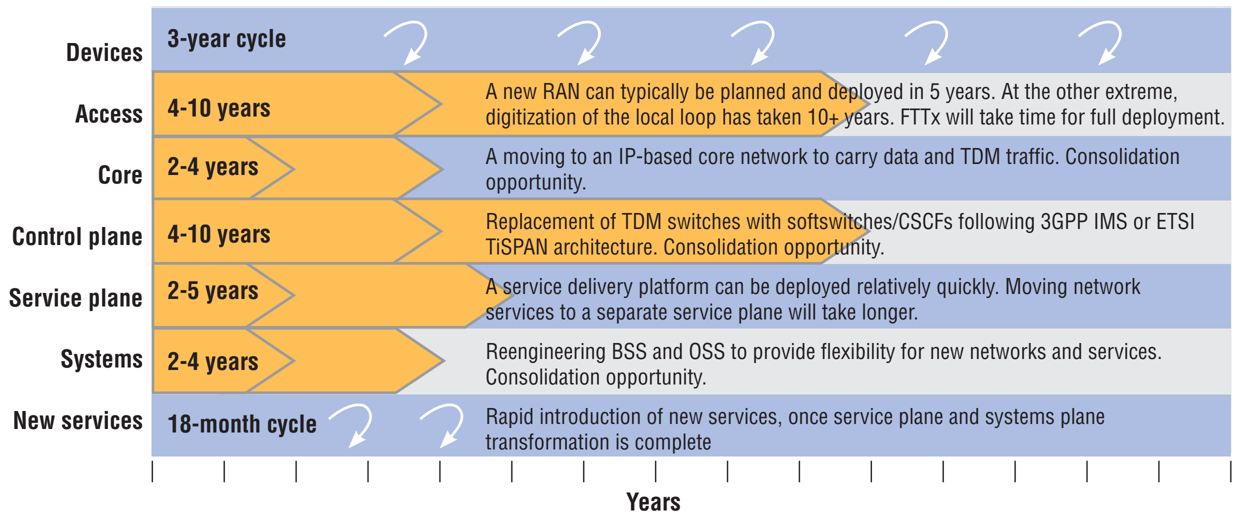
Each SP's NGN migration path will depend on its strategic and commercial objectives, unique network technology, maturity and depreciation schedules. However, there are dependencies between the seven areas which lead to some obvious staging of the different steps. These principles apply to both fixed and mobile networks, with more areas of similarity than difference.

Generally, with a broadband core network in place, the service plane can begin evolving to a set of application services that use open interfaces that link to the control plane and modern software technology, such as SOA and application programming interfaces for service creation. SPs can also deploy SDPs before the control plane of the network has been migrated, enabling interaction with third-party services.

Example trends in network evolution.

	NGN implementation plans	Evolutionary trends
NTT DoCoMo	Announced the migration of half of all PSTN users to IP over FTTH by 2010. Began in 2004 by migrating users to VoIP, and plans to inaugurate widespread IPv6 in the 2006-2007 timeframe. Following that, it is planning for FMC, enhanced mobility, and high-definition TV over NGN. In the future, NTT DoCoMo is aiming to introduce ubiquitous services (using sensors or tags).[25]	• Migrate in stages to an IP core network, with the IP network operating in parallel with the existing ATM-based, circuit-switched network. • Enhance the radio access network as cost-effective new technologies become available. • Expand bandwidth available to broadband subscribers.
MCI	Upgrade backbone with ultra long-haul technology. Base system on a new IP core. Enhance edges with new, multiservice switch. Migrate access to converged IP architecture. [26]	• Converge voice, corporate VPN and ISP transport networks in a single IP network. • Converge both voice and data access networks in a single IP network. • Take advantage of intelligent switches.
Vodafone	Move core network to all IP in 2010. Increase indoor quality broadband coverage from 50 to 60 percent in Europe, and from 80 to 90 percent in Japan. Launch high-speed download packet access in 2006 and upgrade to upload capability in 2007/2008. Evaluate orthogonal frequency division multiplexing and other options for future moves.[27]	• Migrate to a common IP infrastructure. • Continue evolving radio access network in step with new technologies. • Evolve the core network to IMS. • Rapidly introduce new services (e.g., push-to-talk, see-what-I-see, VoIP, online games).

Figure 7. Example network evolution roadmap.



Source: IBM Corporation.

Despite the differences in migration paths and the ongoing evolution of the network planes, several conclusions can be drawn regarding the transformation to NGN. Of key importance is the transition to a single core IP network. Once broadband is in place, this will lead to the relatively independent evolutions of the access network and devices. To design an on demand, cost-effective network, services must be access-agnostic. The systems plane should evolve toward an NGN architecture that is network plan agnostic, based on SOA principles, and supportive of NGOSS. Services must be separated from the network and able to support open interfaces with service enablers. The service plane integrates SOA principles and the IMS architecture to deliver new services rapidly. Open standards underpin the entire evolution, aiming to produce greater flexibility, economy and investment returns.

Questions of strategy

Network transformation carries a range of strategic implications for SPs and the industry at large. First, IP and convergence are forcing players to rethink their roles in the expanding telecom value chain, how they add value and with which core competencies. “Walled gardens” have given way to open standards and business models to meet customer demand for the services/content of their choice, producing an industry shift away from single, one-size-fits-all to multiple business models and industry ecosystems in which SPs must partner to create new value.

Separation of transport from service delivery and control, and the shift to software and services, are changing industry dynamics. Linkages between service delivery and control allow service innovation. Separation of transport and control from network operations improves service focus. Open standards and a shared software environment support multiple third-party interfaces.

These trends have caused the emergence of a complex mix of new network, software and IT players. In areas beyond their core competencies, SPs will increasingly leverage the skills of these players, focusing on their wider strategic supplier ecosystem. NGN equipment and service provider consortia of telecom equipment manufacturers, network equipment providers and system integrators are emerging as dominant players.

Third, to support next-generation service offerings, telecom providers need to build NGOSS and BSS capabilities. Advanced service delivery requires enhanced network and service management. Next-generation customers are also demanding a seamless, superior customer experience to move to convergence, including single sign-on, one bill, realtime charging, etc., which usually requires upgrades to telecom business support, including billing systems. In the transformed NGN environment, the value proposition of OSS and BSS is elevated from business support to business enablement.

T-Mobile Czech enhances time-to-market and service quality with open-platform solution

T-Mobile Czech sought to reduce time-to-market for new services, improve service quality to decrease churn and sharpen its competitive edge with an open platform solution from IBM. The solution leverages Micromuse's Netcool suite, resulting in easy roll-out and integration of future IP-based services, a single view of operations (end-to-end), and rapid detection and resolution of service problems.[28]

Finally, in a horizontal network environment, service providers must flatten their vertical, single product-based structures to enable horizontal service delivery to better serve customer needs and reduce IT, general operating and network costs. For instance, Telecom Italia and Telecom Italia Mobile (TIM) have announced the complete integration of their fixed and mobile assets, following the acquisition of Telecom Italia and TIM in 2004.[29] IMS, in particular, enables data center consolidation and the virtualization of network infrastructure, helping reduce costs and improve flexibility.

Higher revenues, lower costs: Proving the NGN business case

The rationale for moving to NGNs rests on capturing two major opportunities – increasing revenue and reducing costs (both capital and operating expenses). Combined, these opportunities offer very significant margin potential to companies that may have been struggling to grow their bottom line. An August 2005 article in *Dataweek* reports that IP networks may save carriers up to 38 percent in the long run.[30]

Similarly, detailed IBM business case analysis shows that IMS has the potential to generate returns on the incremental costs, with related network renewal investments generating further savings.

IMS is expected to produce revenues from IMS-enabled services from the outset, while the magnitude of revenues and costs depends on the exact service portfolio mix. Based on conservative assumptions, IBM's base-case scenarios show that for a mobile carrier with approximately 15 million customers a positive cash flow on the full IMS investment was reached early in the second year. This estimated return requires a relatively low upfront investment of US$27.5 million to get the services up and running. The analysis showed an ongoing incremental cash flow of approximately US$63.50 per IMS-enabled user per year, net of the full incremental costs and revenues.

Wider NGN investments – such as introduction of an optical IP core, migration of subscribers from HLR to HSS, soft switching and consolidation of sites, and server and data center consolidation – provide the operator with the potential to reduce costs further, by an estimated US$5.20 per user per year.

The picture for fixed-line carriers is similar, depending on service portfolio mix and associated costs. Core network savings from introducing a VoIP core network are estimated to provide a 50 percent reduction in operating expenses from US$1.4 to US$0.72 per subscriber per year. The analysis also shows access network costs halved from US$6.6 to US$3.2 per line per year.

IMS can also yield important indirect benefits, each with its own financial rewards and of further value to the business case for NGN transformation. The anticipated benefits include:

- Enabling more rapid service delivery, reduced time-to-market and faster investment returns
- Enjoying greater flexibility in building solutions – either through internal resources, or by combining and/or modifying applications to create differentiated services
- Sharing functions across applications, leading to higher end-user loyalty
- Giving managers seamless views of customers and services, and thus, new understandings of customer preferences, habits and interests
- Simplifying provisioning architecture while also streamlining maintenance, new deployments and technical recruitment.

Capitalizing on your NGN opportunities

The fixed-line business is under attack as never before. Mobile revenue growth is slowing, as developed markets saturate and emerging market net adds come at low ARPUs. NGNs offer service providers revolutionary new capabilities to drive dramatic improvements in revenues by enabling new, advanced services across multiple media, such as rich voice applications, music, IPTV, VOD, location-based services, push-to-x, video messaging, interactive games and many others. NGNs also offer significant potential for cost cutting and capital efficiency, hence scope for margin improvements. Heightened competition is driving increased transformational capital expense, and the list of SPs embarking on the path to NGN services is growing rapidly.

By moving to open, IP-based network technologies, supported by flexible, on demand SDPs, SPs will become better equipped to respond to new opportunities quickly. The NGN environment enables SPs to link service creation and delivery to the device, thereby strengthening their abilities to customize and enhance the user experience, attract new subscribers and reduce churn. Transition to a COTS software-based environment creates potential for significant cost savings. Clearly, the NGN demands new investment and expertise. However, its foundation in advanced IT and software-based technologies opens the way for SPs to collaborate with an extended ecosystem of partners and suppliers, enhancing their responsiveness to rapidly evolving user demand. IP transformation poses challenges and requires change, but utlimately we believe that the enablement of integrated, on demand service delivery can place telecom companies at the heart of the realtime economy, enable innovation and create new value.

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Glossary of terms

AA – Automated attendant

ARPU – Average revenue per user

ATM – Asynchronous transfer mode

BSS – Business support systems

CALEA – Communications Assistance for Law Enforcement Act

CAGR – Compound annual growth rate

CCF – Charging collection function

CGF – Charging gateway function

COTS – Commercial-off-the-shelf

CSCF – Call session control function

CS – Circuit switched

CSCF – Call session control function

DSL – Digital subscriber line

E-911 – Enhanced 911 service

ETSI – European Telecommunications Standards Institute

ETSI TiSPAN – Combination of Telecommunications and Internet Protocol Harmonisation of Networks (TIPHON) and Services and Protocols for Advanced Networks (SPAN) ETSI workgroups

FMC – Fixed-mobile convergence

FMS – Fixed-mobile substitution

FTTH – Fiber-to-the-home

FTTx – Commonly used term to reference both FTTH and FTTP (fiber-to-the premises)

GGSN – Gateway GPRS support node

HLR – Home location register

HSDPA – High-speed downlink packet access (mobile telephony protocol, also called 3.5G)

HSS – Home subscriber server

HTTP – Hypertext transfer protocol

H.248 – Megaco/H.248, the Media Gateway Control Protocol, is for control of elements in a physically decomposed multimedia gateway, which enables separation of call control from media conversion. The Media Gateway Control Protocol (Megaco) is a result of joint efforts of the IETF and the ITU-T Study Group 16.

IETF – Internet engineering task force

IM – Instant messaging

IMS – IP Multimedia Subsystem

IP – Internet protocol

IP-based VPN – IP-based virtual private network

IP Centrex – Service that enables enterprises to merge voice telephony and Internet technology on a single network

IP PBX – IP Private Branch Exchange

IPTV – Internet protocol television

ISP – Internet service provider

JAIN SLEE – JAIN Service Logic Execution Environment

J2EE – Java 2 Platform Enterprise Edition

MGCF – Media gateway controller function

MGW – Media gateway

ML – Mediation Logics

MoUs – Minutes of use

MPLS – Multiprotocol label switching

MRF – Multimedia resource function

MSO – Multiple system operator

NGN – Next-generation network

NGOSS – Next-generation operations support system

OCS – Open communication server

OSS – Operations support systems

OSA GW – Open service access gateway

PSTN – Public switched telephone network

PVR – Personal video recorder

RAN – Radio access network

RAS – Remote access network

RSGW – Roaming signaling gateway

SCS – Service capability server

SDP – Service delivery platform

SGSN – Serving GPRS support node

SIP – Session initiation protocol

SMS – Short messaging service

SOA – Service-oriented architecture

SP – Service provider

SSF – Service switching function

SSL – Secure socket layer

SS7 – Signaling system 7

TDM – Time division multiplexing

TSGW – Transport signaling gateway

UMTS – Universal mobile telecommunications system

VOD – Video on demand

VoIP – Voice over IP

VoWLAN – Voice over wireless local area network

WLAN – Wireless local area network

WAP – Wireless application protocol

WiFi – Wireless fidelity

WLAN/WiFi – Wireless local area network/WiFi

WS – Web services

XML – Extensible markup language

3GPP – 3rd Generation Partnership Project

3GPP2 – 3rd Generation Partnership Project 2

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