

IBM Institute for Business Value

Telco 2015

Five telling years, four future scenarios



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By *Ekow Nelson and Rob van den Dam*

Despite the run-up in mobile revenues over the last few years, communications revenue growth is beginning to falter as voice markets in developing countries saturate. While the global digital renaissance has yielded pockets of success and opportunity for telecom providers, content and connectivity revenues have not offset the declines. How will the industry evolve over the next five years? Will provider strategies be proactive or protective? Our research suggests four plausible scenarios and the events that would signal their unfolding. More important, we outline the characteristics of companies most likely to succeed in each of these possible futures.

The telecommunications industry has experienced more change in the last decade than in its entire history. In 1999, only 15 percent of the world's population had access to a telephone; by 2009, nearly 70 percent had mobile phones. In addition to this phenomenal growth in mobile communications, the past decade also brought steep declines in public switched telephone network (PSTN) voice revenues, an explosion of over-the-top (OTT) communication services and global industry consolidation (see page 27 for a glossary of common telecommunications terms and abbreviations). There were even ground-breaking decisions by some Telcos to outsource functions as core to their business as their physical networks.

Fueled by rapid growth in developing countries, mobile communications have propped up the industry's top line. But now with these markets saturating, communications revenue growth is stalling. Expected content and connectivity-related revenues have not risen quickly enough to compensate. Although increases in mobile Internet usage offer a glimmer of hope – along with a host of operational challenges – the telecom industry faces some serious questions: Where will future growth come from? How will the industry evolve?

IBM research suggests that the outcomes for several important industry trends are highly predictable.¹ Conversely, we have identified 13 significant variables from a larger pool of unknowns that will also have significant impact on the industry. The outcomes of the 13 variables are far from certain and fall into two main categories: potential areas of growth and the competitive structure of the industry. Mapping the extremes of the possible outcomes related to these uncertainties reveals four contrasting scenarios depicting what the industry could look like five years from now.

Four future scenarios

Survivor Consolidation: Reduced consumer spending leads to revenue stagnation or decline. Service providers in developed markets have not significantly changed their voice communications/closed-connectivity service portfolio and have not expanded horizontally or into new verticals. Investors' loss of confidence in the sector produces a cash crisis and elicits industry consolidation.

Market Shakeout: Under a prolonged economic downturn or a weak and inconsistent recovery, investors force providers to disaggregate assets into separate businesses with different return profiles. Retail brands emerge to collect and package services from disaggregated units. The market is further fragmented by government, municipality and alternative providers (e.g., local housing associations or utilities) that extend ultra-fast broadband to gray areas, while private infrastructure investments are limited to densely populated areas. Service providers look for growth through horizontal expansion and premium connectivity services sold to application and content providers, as well as businesses and consumers.

Clash of Giants: Providers consolidate, cooperate and create alliances to compete with OTT players and device/network manufacturers that are extending their communication footprints. Mega-carriers expand their markets through selective verticals (e.g., smart electricity grids and e-health) for which they provide packaged end-to-end connectivity solutions. Telcos develop a portfolio of premium network services and better-integrated digital content capabilities to deliver new experiences.

Generative Bazaar: Barriers between OTT and network providers blur as regulation, technology and competition drive open access. Infrastructure providers integrate horizontally to form a limited number of network co-operatives that provide pervasive, affordable and unrestricted open connectivity to any person, device or object, including a rapidly expanding class of innovative, asset-light service providers.

Our modeling of the four scenarios suggests Generative Bazaar as the most attractive outcome in terms of revenue, profitability and cash flow projections, followed by Clash of Giants. Survivor Consolidation and Market Shakeout are clearly less attractive scenarios, both of which imply a contracting and challenged industry. If the current growth model, based on an ever-expanding customer base, persists, the industry is likely to experience flat or declining revenues. In such a case, Survivor Consolidation or Market Shakeout would be the most plausible outcomes.

To return to strong growth, the telecom industry needs to act collectively to create the conditions necessary for the more dynamic and profitable scenarios of Clash of Giants or Generative Bazaar. They can begin to accomplish this through greater global industry cooperation on common capabilities and platforms to improve competitiveness with global OTT providers. The role of service providers can be enhanced in adjacent vertical markets, enabling new business models in health, smart grids, transport, retail, banking and more. Further growth can be achieved through pervasive, open connectivity for any person, object and a multitude of connected devices by stimulating third-party innovation and leveraging customer and network insights to deliver new experiences that help to accelerate the evolving digital economy.

As growth and revenues from traditional services stall and data and content struggle to compensate for declines, the industry faces a range of uncertainties and must prepare for a number of alternative scenarios.

More change in the last 10 years than the previous 100

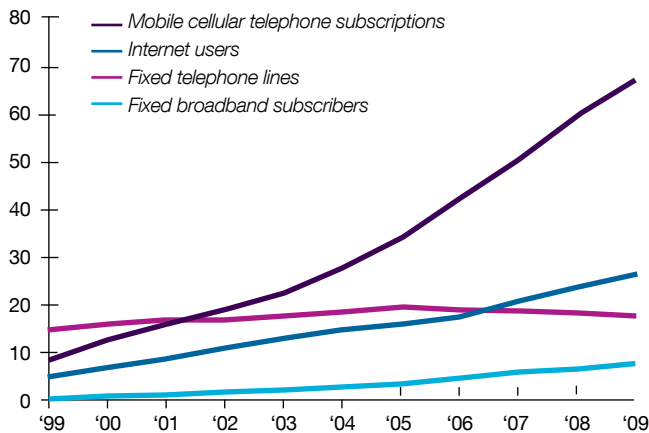
The way in which the world communicates has changed more in the last decade than in all previous history. In this section, we explore the following critical changes and challenges:

- The mobile migration
- The changing face of communication
- The challenge to monetize content
- The decoupling of traffic and revenue
- The flight from the network.

The mobile migration

In 1999, more than a century after its invention, less than one in six people in the world had access to a telephone of any kind. By 2009, *mobile* telephony was accessible for seven out of ten people worldwide (see Figure 1).²

per 100 inhabitants



Source: International Telecommunications Union (ITU) ICT Statistics Database, <http://www.itu.int/ITU-D/ict/eye/Indicators/Indicators.aspx>. (2009 figures are estimated); "The world in 2009: ICT Facts and Figures," ITU Geneva 2009, http://www.itu.int/ITU-D/ict/material/Telecom09_flyer.pdf

Figure 1: Mobile cellular telephony has exhibited strong growth over the past decade.

During the same period, fixed telephony (PSTN) lines and voice revenues continued their long-term decline in advanced markets where the volume of mobile telephony voice minutes increased at the expense of fixed telephony. In 2008, for example, outgoing fixed voice traffic in the EU-5 markets – France, Germany, Italy, Spain and the United Kingdom – amounted to 560 billion minutes or 53 percent of total minutes of use (MOU), down from 645 billion minutes and 72 percent MOU in 2003.³ In 2010, mobile is expected for the first time to carry more outgoing voice traffic than fixed telephony.⁴

After a decade of meteoric increases, global mobile growth has begun to stall. In 2008, revenue growth fell below double-digits for the first time.⁵ In some advanced countries, overall mobile revenues are expected to decline for the first time during 2009-2010.⁶ Average revenue per user (ARPU) has actually been declining for some time. For example, ARPU for Italian telecommunications companies declined from almost €30 per month in 2004 to just over €20 per month in 2008.⁷

Over the decade, emerging markets demonstrated their ability to make profits from low ARPU users, as telephony was for the first time extended to many new consumers. In 2008, average EBITDA (earnings before interest tax, depreciation and amortization) levels for the mobile telecom industry in South Asia ranged from 45-65 percent, with ARPU levels below US\$5.⁸ This was driven, in part, by significant increases in MOU and innovative cost-management models. From Q2 2008 to Q4 2009, for example, Bharti Airtel roughly doubled the total volume of traffic on its network, from over 64 billion minutes per quarter to 130 billion minutes.⁹

Emerging market expansion has also begun to falter. From 2005-2009, revenue growth from telecom services declined 14 percent in the Middle East and Africa, 11 percent in Latin America, 8 percent in Brazil, Russia, India and China (BRIC), 4 percent in North America and 1 percent in Europe (excluding Russia).¹⁰

The changing face of communication

Over the past decade, Internet access and connectivity shifted from dial-up to broadband. Higher data speeds through Digital Subscriber Line (DSL), cable modem and fiber access technologies enable users to communicate in more innovative ways. Today, communications are fragmented across online services (VoIP, peer-to-peer, social networking, e-mail, instant messaging, blogs, forums, wikis and more) and telecom services (fixed and mobile voice, SMS, MMS). While non-traditional communication services in advanced markets have grown overall, outgoing call minutes from traditional telecoms have remained relatively flat. In France, for example, the volume of call minutes across fixed and mobile will increase by only 9 percent from 2005 to 2010 – from nearly 190 billion minutes to 207 billion. However, OTT communications over the same period, including VoIP, peer-to-peer and instant messaging, will increase by 211 percent, from 303 billion to 942 billion minutes.¹¹ A challenge for the industry is to devise a way to better monetize this massive growth in over-the-top services.

The challenge to monetize content

Revenues from digital content services, such as Internet Protocol TV (IPTV) and mobile content (mobile video, mobile music, wireless games and mobile advertising) have not yet compensated for the decline in traditional services. Our analysis shows that IPTV generated close to US\$4 billion in 2008 revenues, representing only 0.5 percent of total mobile

revenues, 1 percent of fixed telecom revenues and 1.5 percent of broadband revenues. Our most optimistic view forecasts IPTV revenues at US\$17 billion and 6 percent of the pay-television market in 2012.

In emerging markets, adoption of mobile messaging-based applications that leverage two-way/premium SMS is growing, as well as Unstructured Supplementary Service Data (USSD), to deliver public information and advisory services to rural communities. These applications also allow mobile payments and money transfer services. They can also provide basic banking services in countries where such services are relatively under-developed or unavailable.

The decoupling of traffic and revenue

One of the brightest spots in the industry toward the end of the decade was the phenomenal growth of mobile broadband, facilitated by the rollout of High Speed Packet Access (HSPA) networks. This growth helped mitigate declines in overall revenues in 2009, particularly in Europe and North America. Driven in part by the increased penetration of smartphone devices like the 3G Apple iPhone, High Speed Downlink Packet Access (HSDPA)-enabled USB keys or dongles for laptops/Netbooks, and other mobile Internet devices (MIDs), mobile broadband growth is paving the way for a second wave of fixed-mobile substitution, but this time in data connectivity services.

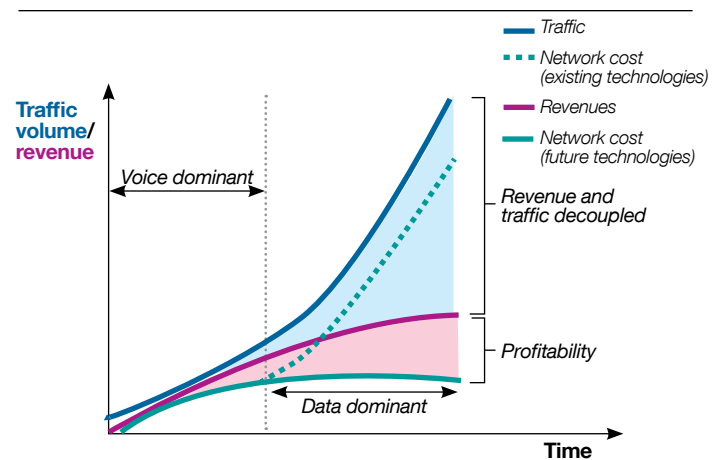
Much of the growth in overall communication volumes has come from OTT innovations, but providers are struggling to monetize these using traditional models.

Aggressive pricing and attractive packages, including “all-you-can-eat” bundles and simple pre-pay (or pay-as-you-go) options – generally unavailable with fixed broadband – have helped accelerate consumer adoption and increase mobile broadband traffic.

The dramatic increase in application stores, following the success of Apple’s App Store, has reinvigorated the market for mobile applications. Just 18 months after its launch in July 2008, the number of App Store applications had surpassed 100,000 – with more than 3 billion downloads.¹² At an average price per application of around US\$2.50, the App Store model is far from a significant source of revenue. But it is a powerful complement to drive Apple’s hardware revenues.¹³

Overall, global mobile data traffic has more than doubled since 2008.¹⁴ With future growth forecast at 130 percent year-to-year, capacity on current 3G networks is likely to be exhausted by 2013, increasing pressure on providers for additional investment in radio access and backhaul networks.

Furthermore, with flat tariffs, costs no longer match revenues for delivering an ever-increasing amount of data over a network designed to support narrowband voice and light-weight download, Web browsing and e-mail. Essentially, revenue and traffic volumes are disconnected as telecom becomes more data/connectivity-centric. While the boom in demand for mobile broadband is welcome for an industry looking for new sources of growth, based on the current revenue model of “all-you-can-eat” data plans, it is unsustainable long-term. Historically, traffic and revenue tracked along the same path. In the past ten years, however, they have diverged. The disassociation of these two is at the heart of the Telco revenue model challenge (see Figure 2).



Source: Nokia-Siemens; IBM Institute for Business Value analysis.

Figure 2: Revenue and traffic are disassociated in an increasingly data-dominant world.

The flight from the network

As part of the effort to reduce capital costs, many telecom providers are turning to network outsourcing and infrastructure sharing, which are becoming mainstream even among Tier-1 providers such as Vodafone. In early 2009, Vodafone UK signed a seven-year agreement for Ericsson to take over the maintenance and operational support of its second- and third-generation radio access networks.¹⁵ France Telecom Orange has outsourced the management of its networks in the United Kingdom and Spain to Nokia Siemens Networks.¹⁶ Indeed the number of outsourcing deals in the industry rose from six in 2004 to nearly 90 in 2008.¹⁷

After the unprecedented change that has swept through and across the telecommunications industry in recent years, what evolution will transpire over the next five years?

Scenario envisioning for telecommunications

Traditional approaches to predicting the future based on prefabricated world visions of economic and geopolitical trends are unsuitable for an industry changing as quickly as telecommunications, the evolution of which has taken many unprecedented turns over the past decade. Given the ongoing uncertainties, a scenario-envisioning approach – one that enables industry executives to assess alternative contrasting futures for the industry that are distinctly different from the present – is more appropriate. Our scenario envisioning consists of an analysis of the following:

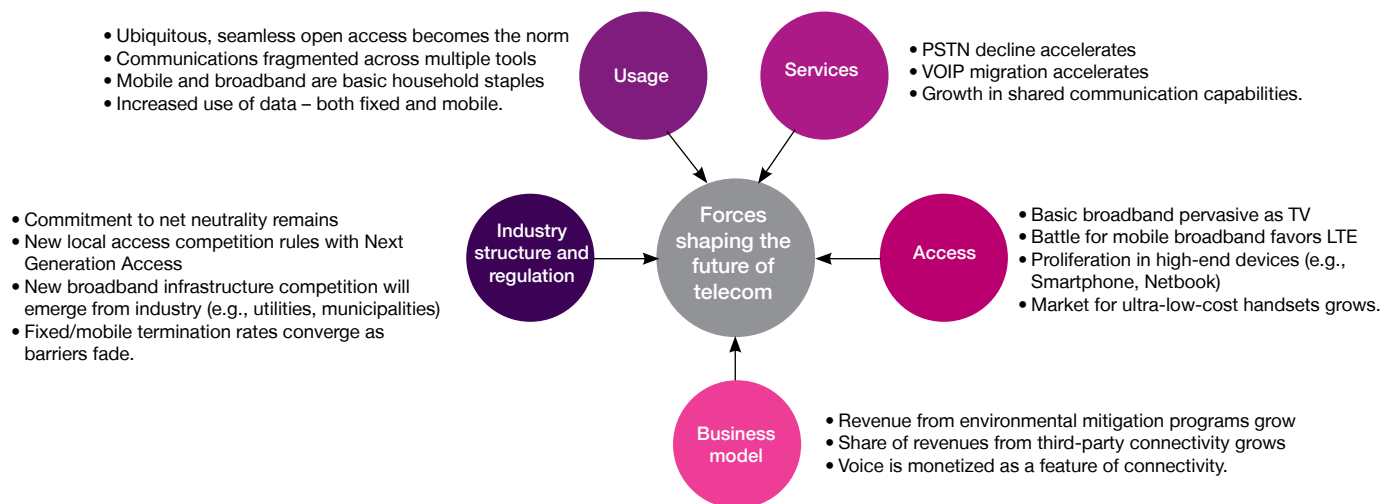
- Forces driving telecommunications through 2015
- Critical (uncertain) variables – nascent technology, possible consumer responses to offerings not yet invented, potential regulatory structure and possible competitive initiatives
- Scenario realization triggers – economic, technology, regulatory, market
- Scenario revenue and profitability outlooks.

Forces driving telecommunications through 2015

There are a number of forces and underlying trends in the evolution of the communications industry for which there is a high degree of consensus about their certainty (see Figure 3). These provide a common backdrop for future scenario envisioning. We've grouped these forces and trends into five categories:

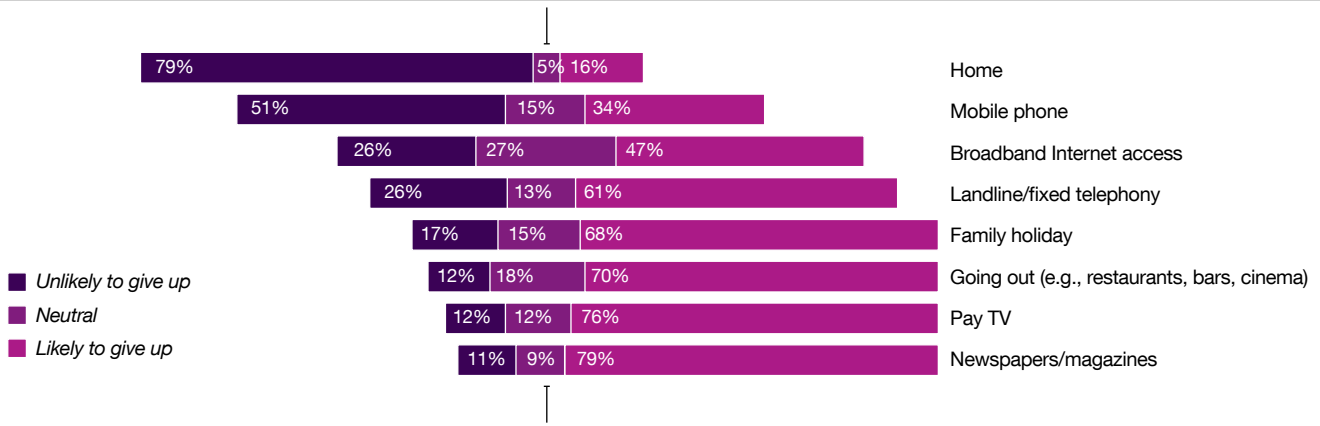
1. *Usage* – changes to user consumption patterns
2. *Services* – changes in services composition
3. *Access* – device and network access technology evolution
4. *Business model* – future revenue structure and sources
5. *Industry structure and regulation* – future of industry structure and regulation.

Usage – Mobile and broadband have emerged as key staples, and consumers are unwilling to make drastic changes in their use of communication and connectivity services, even in a time of economic uncertainty. Asked what they are least likely to give up if the economy worsened, after their homes, respondents listed their mobile phones and broadband Internet access. The items ranked considerably ahead of family holidays, PayTV and going out (see Figure 4).



Source: IBM Institute for Business Value and IDATE analysis.

Figure 3: A number of forces are shaping the future of the telecommunications industry.

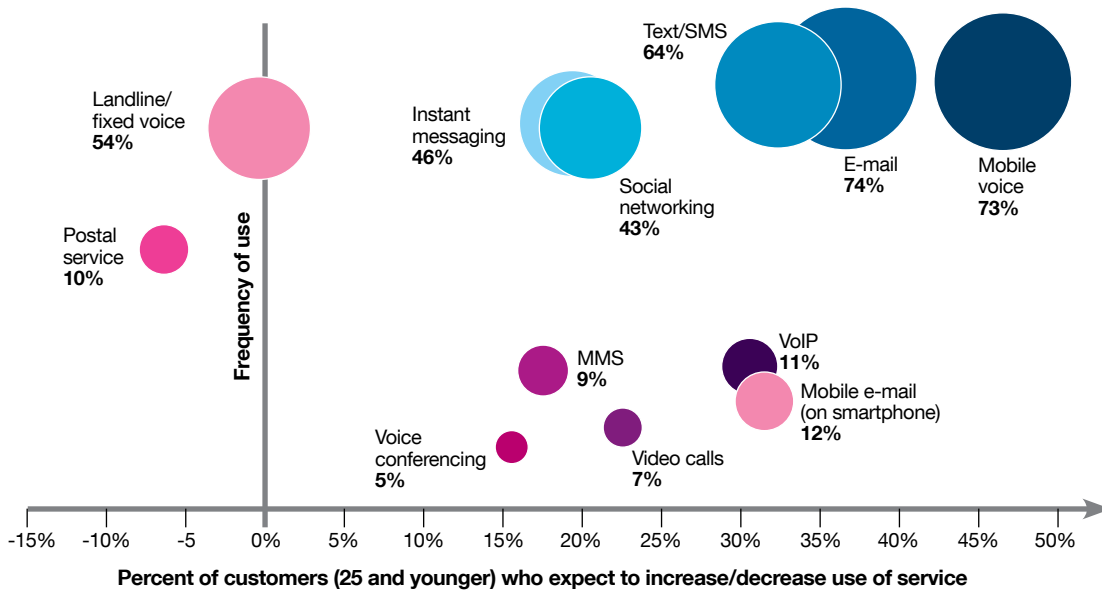


Source: IBM Institute for Business Value Global Telecom Consumer Survey, 2009; N= 7722.

Figure 4: After their homes, consumers are least likely to give up mobile phones and broadband Internet access.

Furthermore, while many consumers will make adjustments in their use of communication services to control costs, only 23 percent of consumers expected an economic downturn to significantly impact their use of such services.

Over the next five years, driven in large part by younger consumers, communications will be fragmented across a number of tools, from fixed and mobile voice and text messaging, to online alternatives, including e-mail, VoIP, instant messaging and social networking (see Figure 5).

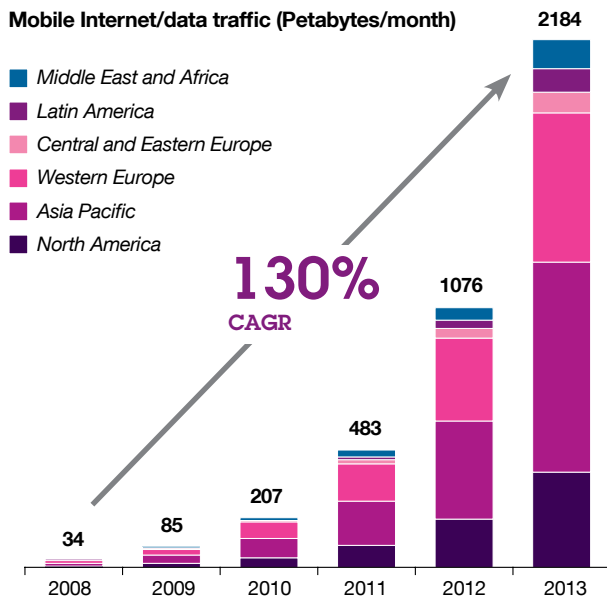


Note: Size of bubble: Percent of respondents who expect to use service every day.
 Source: IBM Institute for Business Value Global Telecom Consumer Survey, 2009; N= 7722.

Figure 5: OTT communication services are challenging Telco-controlled services, especially for people age 25 and under.

Between 2008 and 2013, Internet data traffic is expected to quintuple, largely as a result of significant increases in the consumption of Internet video.¹⁸ While in 2008 file sharing accounted for the majority of Internet traffic at 56 percent, this will decline to 31 percent by 2013, with Internet video replacing it as the largest contributor to online traffic at 46 percent.¹⁹

However, the largest growth area by far will be mobile broadband, with a forecast CAGR of 130 percent from 2008 to 2013 as the penetration and use of Smartphones, MIDs, Netbooks and tablet devices increase (see Figure 6).



Source: Cisco Visual Networking Index, June 2009, http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-481360.pdf; IDATE, IBM institute for Business Value analysis.

Figure 6: Use of video and other data services will grow as Internet data and mobile broadband consumption soar.

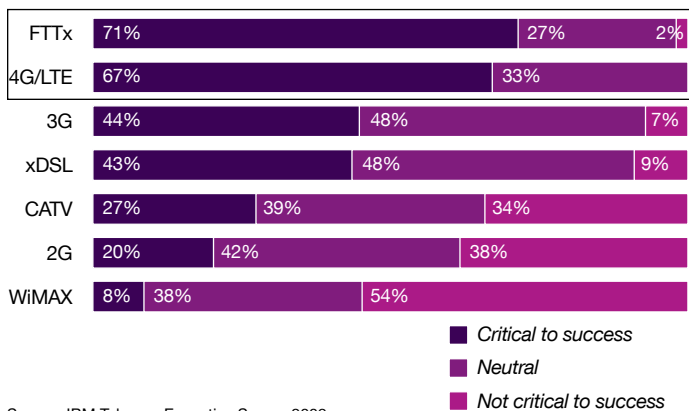
Services – Overall, PSTN circuit-switched lines will continue to decline, although some emerging countries may notice short-term growth in fixed lines as they “catch up” with the rest of the world. Increasingly, VoIP will replace fixed-voice access lines in mature economies. Further, as penetration of mobile VoIP accelerates, the proportion of provider-managed mobile VoIP will also increase. A previously skeptical industry will overcome fears of cannibalization and will begin to transition from outright prohibition, through models imposing surcharges and, finally, on to formal partnerships with over-the-top providers like Skype. Mass migration to mobile VoIP, however, is unlikely until HSPA and Long-Term Evolution (LTE) networks are deployed more widely to address known limitations around usability, availability and quality of service.

Shared capability services that enable interoperability across fragmented communication tools will become standard as several industry initiatives become a reality, like GSMA’s Rich Communications Suite (RCS) and GoogleVoice, which enables users to link all their phones together into one central communications network.

Access – With forecasts of nearly 800 million fixed broadband subscribers and over one billion mobile broadband subscribers by 2015, basic broadband will be available to most households around the world, and levels of penetration will be similar to television in advanced markets.²⁰

The race for mobile broadband appears to have been decided in favor of LTE – one of two broadband access technologies telecom providers identified as critical to invest in over the next five to ten years (see Figure 7). In December 2009, Nordic carrier TeliaSonera deployed what it claims are the world’s first two commercial LTE networks, offering maximum throughput

Critical access technologies for telecom providers 2010 - 2015



Source: IBM Telecom Executive Survey 2009.

Figure 7: The race for mobile broadband appears to have been decided in favor of LTE.

speeds of 20-80 Mbps.²¹ A number of major providers, including Verizon, KPN, NTT Docomo, AT&T, France Telecom/Orange, Telstra, Vodafone, Telus and Rogers, have announced early commercial deployment plans for LTE. Global subscribers are expected to reach nearly 400 million by 2015.²²

Business model – Over the forecast period, fixed voice communications will increasingly be monetized largely as features of broader connectivity packages, rather than as standalone services. Providers will seek new revenues by providing open wholesale interfaces to drive innovation on their networks. As environmental sensitivities progress, the “green” practices of telecom providers will become sources of revenues as they help companies in other industries reduce their CO₂ emissions through new services such as mobile virtual private networks, video and teleconferencing capabilities and machine-to-machine communications.

Industry structure and regulation – Increasingly, the source of new infrastructure competition will be external: from government, municipality, local housing associations and utility companies. In France, a law passed in 2004 allows local authorities to act as telecom providers, and around half of the €2.1 billion invested in backhaul networks in sparsely populated areas since then has come from public financing.²³ All across Europe, municipalities – and even housing associations – are investing in local access networks. By December 2009, nearly 60 percent of FTTH/B projects across Europe were being led by municipalities, utilities or housing associations, with incumbent and alternative telecom providers accounting for the rest.²⁴ For example, the city of Amsterdam, in partnership with two private investors and five housing associations, has invested €18 million in building a fiber-to-the-home broadband access network to initially connect nearly 40,000 households.²⁵

In developed markets, both mobile and fixed termination rates will continue to decrease. The EU’s long-term vision is to reduce mobile termination rates (MTR) in member states to levels comparable to fixed termination. At the same time, the boundaries defined by access (i.e., fixed, mobile, cable, Internet) will fade as an increasing number of players offer a combination of products.

Existing remedies for enforcing local access competition will be replaced with the deployment of next generation access (NGA).

The race for mobile broadband appears to have been decided in favor of LTE.

Critical (uncertain) variables

In addition to the trends we've outlined, a number of potentially high-impact variables exist with outcomes that are, as yet, uncertain. From these, we have selected 13 whose contrasting outcomes signal distinctly different scenarios for the future. These variables are placed in context with the industry trends previously described:

Usage:

- *The future of voice:* Will voice communication volumes continue to decline, substituted by asynchronous and/or online data communications (e.g., SMS, social networking, instant messaging, IP voice), or will drastic price cuts, superior convenience, and new voice usage applications (e.g., human-to-machine voice communications, high-definition voice) trigger a voice "rebirth?"
- *OTT versus network-optimized content:* How will the battle be waged with over-the-top providers? Can telecom providers deliver and monetize unrivalled user experiences through network-optimized features (e.g., multi-sensorial, 3-D, immersive reality) to derive value alongside over-the-top (OTT) providers?
- *Siloed versus unified communications:* Will consumers finally make the leap to embrace unified communications across fixed, mobile and online, or will shared capabilities across stand-alone fragmented communication tools be a sufficient trade-off between simplicity and freedom of choice?

Services

- *New verticals:* What is the opportunity for telecom in industry verticals such as healthcare, smart grids and financial services beyond basic connectivity? What form is this likely to take, and can Telcos beneficially enhance the vision of an increasingly instrumented, interconnected and intelligent world to create value?

- *Premium connectivity:* What is the opportunity for premium connectivity features (e.g., guaranteed low latency, security, or a more robust content delivery network)? Will increased available bandwidth to third-party solution providers reduce the need for premium features?

Access

- *Ultra-fast broadband availability:* Deployment of ultra-fast broadband networks requires high levels of investment. Taking into account their commercial viability and the regulatory environment, how much coverage can be effectively achieved over the next five to ten years?
- *Open versus closed devices:* Will providers continue to subsidize handsets, or will unlocked and open devices prevail? Will a standard open device platform emerge, or will the industry continue to support competing device platforms, including Apple, Symbian, Google Android, Windows and Palm OS.

Business model

- *User-funded versus third-party funded:* Will user-funded (subscription) revenues continue to dominate, or will Telco be able to gain significant revenues from third parties, such as advertisers, in a two-sided business model? Can providers adequately and legally monetize subscriber information (e.g., socio-demographic, presence, preferences)?
- *Service pricing models – voice and connectivity:* What will be the predominant service pricing models? Single-service metered? Monolithic bundles structured for key subscriber segments? Abundant (all-you-can-eat) pricing for connectivity and voice? Differentiated tiered pricing based on quality/speed? Will providers be able to generate premium prices for ultra-fast broadband (FTTH and LTE) compared to current broadband services?

- *Machine-to-machine (M2M)*: Will provider revenues continue to be based primarily on maintaining high ARPU across a finite number of accesses, or on ramping up M2M services based on an infinite number of connected objects?

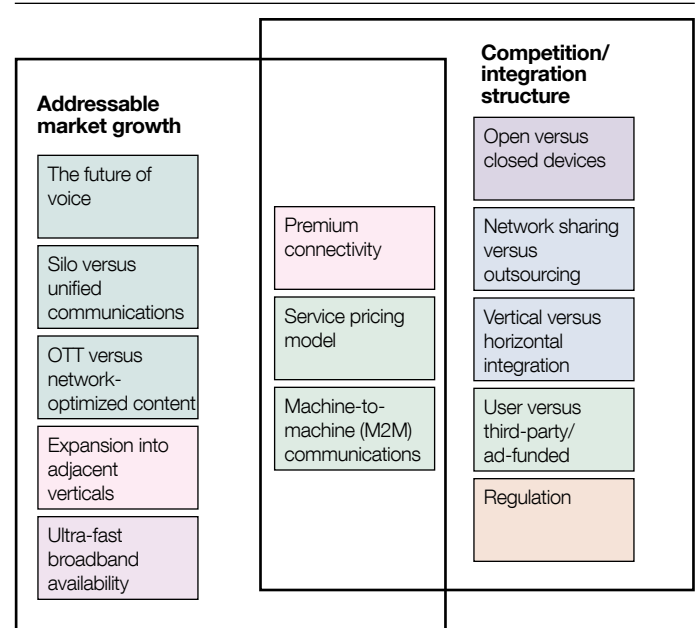
Industry structure and regulation

- *ServCo/NetCo versus vertical integration*: Will the industry be organized by separate service companies and network companies, or will vertically integrated providers prove to be the only viable model to generate sufficient shareholder value?
- *Network sharing versus outsourcing*: Will passive infrastructure sharing become the norm? Will providers go beyond passive infrastructure sharing and share the active network, too? Will network outsourcing become the norm?
- *Regulation*: What will be regulators’ goals over the next five-to-ten years, and how will they impact the industry’s business models? After two decades of liberalization of telecom markets around the world, is competition self-sustaining, making *ex-ante* provisions dispensable? Or will new networks, market consolidation and new business models require the (re-)introduction of a number of *ex-ante* remedies. What is the future of net neutrality? The industry appears divided over its long-term future. Nearly half of our respondents expect regulators to sustain the commitment to neutrality over the next five-to-ten years. But over 40 percent anticipate the commitment will be abandoned or relaxed to stimulate investment that improves customer experience/ quality of service.²⁶

Four industry scenarios for Telco 2015

These variables can be grouped into two industry dimensions – addressable market growth and competition/integration structure – as shown in Figure 8.

Addressable market growth: This covers all the variables related to future sources of revenue growth. Will there be a rebirth of the blockbuster revenue generator of voice, or is this destined to be replaced by content, broadband connectivity and new service areas in selected industry verticals? Will communications fragmentation dissipate value, or create new opportunities with increased demand for shared capabilities?



Source: IBM Institute for Business Value and IDATE analysis.

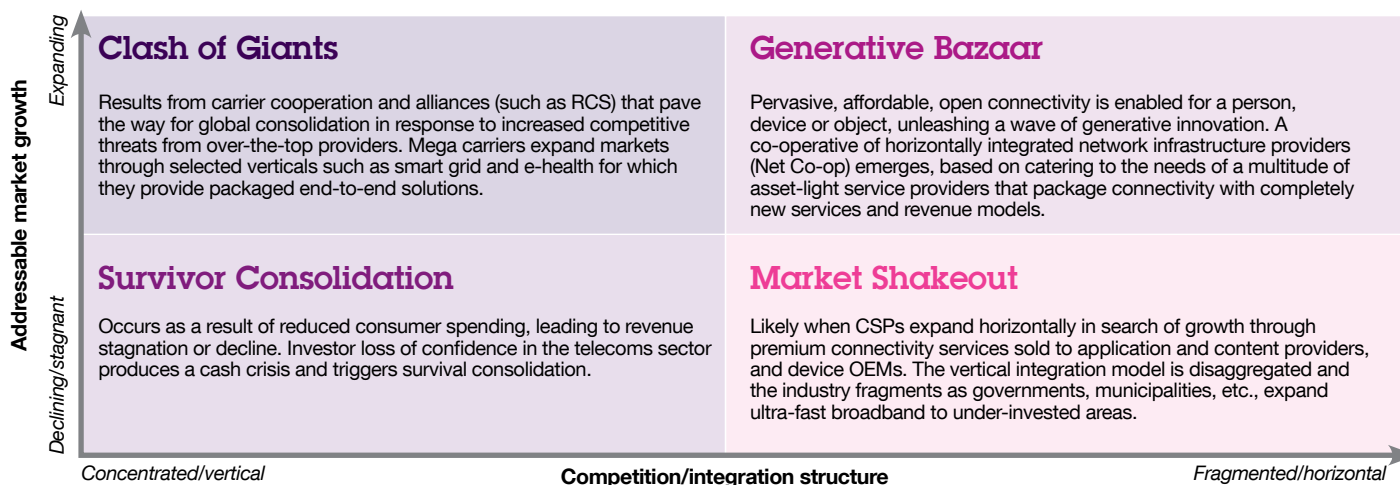
Figure 8: Variables that may shape the future of telecommunications can be grouped within two industry dimensions.

Competition/integration structure encompasses uncertainties around industry integration and open versus closed connectivity models. As regulatory change and technology developments lower entry barriers for new entrants to deliver innovative services, will the service structure be based predominantly on packaged end-to-end delivery or open access platforms with multiple service providers? Will the vertically integrated model survive as providers increasingly share infrastructure and outsource significant parts of their business, including networks, to external providers? Will demand for new service combinations impel infrastructure providers to open up their networks and enable third-party providers to leverage capabilities to deliver new experiences? Is the fragmentation of the industry – with independent national and regional providers – sustainable when the main competitive threats are expected to be from global over-the-top communications providers? How will future regulation impact industry structure and competition?

The interplay between the dimensions of addressable market growth and competition/integration structure produces four equally likely but contrasting future scenarios (see Figure 9).

It is important to note that these scenarios are potential outcomes for markets at national or regional levels and not a set of strategic choices to be made by individual telecom providers. The purpose of the scenario-envisioning process is not to rank the probability of individual scenarios or attempt to make predictions, but to provide a framework to enable executives to assess what it would be like to operate in each potential scenario and to build capabilities for success for whichever scenario prevails over the next five to ten years.

Table 1 (see page 14) describes contrasting outcomes for uncertain variables and sets out plausible consumer behaviors and industry/market dynamics for each scenario.



Source: IBM Institute for Business Value analysis.

Figure 9: Four contrasting scenarios are possible, depending upon the interplay of trends and variables.

Scenario realization triggers – economic, technology, regulatory, market

Each of the four scenarios described is triggered by a distinct combination of factors across several dimensions: economic/financial, technological/investment, regulatory/competition and marketplace/customer-related.

Survivor Consolidation is likely to be triggered by a prolonged global or local economic downturn that causes consumers to cut back spending, leading to intense price competition. Constrained access to and high cost of capital leads to reduced investment.

Alternatively, a prolonged economic downturn may invoke a different response from telecom providers, investors and governments that leads to a different outcome – the Market Shakeout. Private equity investors may acquire ailing telecom providers and break them up. A shakeout may also be triggered by increased fragmentation resulting from greater involvement and investment by governments, municipalities and infrastructure players like utilities.

Smaller or emerging providers may be compelled by circumstances to outsource more of their networks, and the industry may end up with the majority of its network infrastructure run by equipment suppliers. Telecom providers may further outsource other assets, including their business process support infrastructure, and divest others, like their retail store networks. The business of telecommunications could be driven by established retail brands with first-class sourcing, supply chain and customer management capabilities.

Each scenario is triggered by a combination of factors across several dimensions.

Clash of Giants is triggered by the determination of telecom providers to take on Internet communication providers, identified by 76 percent of telecom executives as the greatest competitive threat to their businesses over the next five to ten years – well ahead of traditional cable and content providers. In an industry essentially fragmented by geography and national regulations, the ability of Telcos to engage global OTT providers that are relatively unencumbered in their reach will require global alliances, cooperation and standardization of the kind the GSMA is leading for rich communication services (RCS), the OneAPI global applications platform and Voice over LTE (VoLTE), among others.

The GSMA's RCS initiative, for example, will enable subscribers of telecom providers to exchange rich multimedia, such as video and photos, during a call, and will facilitate shared capabilities, including a common personal address book augmented with real-time presence across providers, devices and networks.²⁷

In response to the success of mobile application stores driven by the likes of Apple, 24 of the world's largest mobile providers teamed together in February 2010 to announce an initiative to collaborate on a wholesale platform for mobile applications with a single point of entry for developers.²⁸ Forty organizations in total within the telecom industry are supporting the One Voice initiative.²⁹ Based on current open standards, this initiative defines the minimum mandatory functionality for interoperable IMS-based voice and SMS over LTE, which is needed to drive the global mobile industry toward a standard for delivering voice (and messaging) services for LTE (VoLTE).

	Survivor Consolidation	Market Shakeout
Usage	<ul style="list-style-type: none"> Communications are “siloeed” and fragmented Connectivity is personal and asymmetric, with more download than upload Passive content consumption remains strong. In emerging economies communication remains voice-centric on mobile; Internet and data usage is limited to large cities with sufficient data networks, but deployment of basic mobile data services, (e.g., mobile money, information advisory services) meets with success. 	<ul style="list-style-type: none"> Communications are “siloeed” and fragmented from a wide range of suppliers and aggregators. Consumers opt for over-the-top and user-generated content In emerging markets, mobile money paves the way for other simple data applications catering to specific local market needs.
Services	<ul style="list-style-type: none"> Services remain as today as Telcos fail to enter new industry verticals and/or expand horizontally Packaged connectivity and communications services prevail. 	<ul style="list-style-type: none"> There is greater focus on wholesale backbone business as well as Information, Communication and Technology (ICT) services Telcos expand horizontally to offer premium connectivity services that enable content/application providers to offer OTT content services with adequate quality of service (QoS) and service level agreements (SLAs) Emerging market providers focus on growing mobile data usage.
Access	<ul style="list-style-type: none"> Ultra broadband availability is limited to 10-15 percent of households, primarily in economically profitable, densely populated areas For smaller providers, active network outsourcing to NEPs and passive sharing with one another is sustained for FTTx and LTE Handset subsidies remain and telecom networks remain closed to unapproved devices, third-party providers or applications/services. 	<ul style="list-style-type: none"> Government, municipality and alternative provider (e.g., local housing associations, utilities) initiatives increase ultra-fast broadband household coverage to 20-25 percent in advanced markets Passive infrastructure sharing becomes the norm for most providers for FTTx deployment and for 2G/3G mobile infrastructure optimization Low-end, SIM-only, open devices co-exist with high-end devices, based on exclusivity periods and strategic partnerships with OEMs.
Business model	<ul style="list-style-type: none"> User-funded subscription revenues dominate and still rely upon maintaining high ARPU across limited number of accesses Retail-driven with multiple tariff packages, including metered and bundled for different segments with an emphasis on cost control Content market of limited value. Service providers absorb network costs from increased OTT content consumption or pass connectivity costs to users. 	<ul style="list-style-type: none"> Multiple tariff packages, including metered and bundled, that appeal to different segments are supplied under a variety of market brands Predominantly subscription-based but driven in part by wholesale, as devices, application and content providers leverage premium connectivity Ultra-fast broadband (FTTH and LTE) offers are priced at levels comparable to broadband connectivity, encouraging rapid migration Open access models financed by government/municipalities in gray/sparingly populated areas.
Industry structure	<ul style="list-style-type: none"> Consolidation of declining private-sector players in advanced markets; competition typically revolves around a limited number of large integrated players as fixed and mobile pure-plays disappear In emerging markets, a duopoly of mobile service providers is the norm Large mobile-centric providers from BRIC successfully gain footholds across emerging regions (e.g., Africa), replicating their low-cost models. 	<ul style="list-style-type: none"> Some Tier-2 providers divest network and assets to focus on customers and brand Multiple service provider brands emerge to package low-cost, no frills services targeted at specific consumer segments Major device manufacturers provide communications services as MVNOs in major markets A handful of NEPs manage networks for a significant percentage (more than half) of global telecom providers.
Regulation	<ul style="list-style-type: none"> As is, with ongoing uncertainty NGA investment is stifled by very restrictive regulation or uncertainty Providers reduce rollout speed and geographic coverage of NGA. 	<ul style="list-style-type: none"> Strong access obligations on infrastructure and strong net neutrality stance undermine investment incentives Local not-for profit network initiatives and governments/municipalities provide open access.

Source: IBM Institute for Business Value analysis.

Table 1: Characteristics of each of the four possible telecommunications scenarios.

	Clash of Giants	Generative Bazaar
	<ul style="list-style-type: none"> ▪ Users adopt shared capabilities (e.g., presence, contact list) and enhanced rich multimedia communication booms ▪ A significant portion of consumers purchase packaged digital content and lifestyle services (e.g., healthcare, payments, security, energy management) from providers ▪ Voice services dominate in emerging markets and extend to the remaining population at the base of the pyramid. 	<ul style="list-style-type: none"> ▪ Advanced users mix and match communication tools; most adopt open shared capabilities (e.g., presence, contact list) across voice and online communication. Enhanced, rich multi-media communication is the norm in advanced markets ▪ Usage extended to any object for personal and professional use by individuals and third parties ▪ Seamless and ubiquitous access across devices and networks.
	<ul style="list-style-type: none"> ▪ Providers gain sizeable commercial traction for packaged end-to-end solutions for strategic verticals. Some premium network-optimized entertainment services (e.g., multi-sensorial, 3-D, immersive reality) gain commercial success ▪ Shared communications capability (e.g., RCS) becomes standard feature offering. 	<ul style="list-style-type: none"> ▪ Open approach triggers new connectivity needs for OTT providers delivering industry-specific solutions (e.g., wellness and smart grid services) but no end-to-end packaged Telco "vertical" offering ▪ Premium connectivity (e.g., guaranteed low latency, security, CDN) for OTT providers ▪ Local applications that meet emerging market specificities boom ▪ HD Voice ▪ Shared communications capabilities ▪ Large-scale machine-to-machine communications.
	<ul style="list-style-type: none"> ▪ Next generation access infrastructure sharing extends coverage to 40-50 percent of households ▪ Providers enter strategic partnerships with selected device manufacturers for customized devices with support for proprietary service, network and platform features. 	<ul style="list-style-type: none"> ▪ Widespread fixed and/or mobile ultra-broadband availability, with coverage of 50 - 60 percent of households ▪ Open devices (e.g., unlocked phones, Netbooks) dominate market as providers retreat from handset subsidization ▪ Open and standardized device platforms supported by Net Co-ops and device manufacturers.
	<ul style="list-style-type: none"> ▪ Voice communication services are free for users who pay for shared capabilities ▪ Retail dominated, based on customer ownership and delivery of end-to-end targeted services and experiences based on network and customer insights ▪ New revenues from packaged end-to-end digital content and lifestyle services ▪ Emerging market providers focus on optimizing their asset utilization by growing voice revenues through more users at the base of the pyramid. 	<ul style="list-style-type: none"> ▪ Voice services continue to be paid-for on mobile, but fixed communications become an embedded feature of connectivity ▪ Wholesale-driven with premium connectivity a key feature for revenue generation. Providers are able to generate premium prices for ultra broadband (FTTx, LTE) ▪ OTTs collaborate with network providers and pay carriage fees or share revenues in return for network-optimized delivery to enhance end-user experience ▪ Providers ramp up M2M to generate low ARPU for an infinite number of connected objects ▪ Net Co-ops supply analytics to service providers for platform advertising and improved customer experience.
	<ul style="list-style-type: none"> ▪ Active global industry alliances and standards, some of which pave the way for global provider consolidation ▪ European and North American providers consolidate at regional level (e.g., two or three pan-European providers) ▪ OTT players integrate backwards and build out own fixed networks in selected geographies. Others are successful in bidding and acquiring spectrum for mobile ▪ Some emerging market providers enter mature markets. 	<ul style="list-style-type: none"> ▪ A co-operative of infrastructure providers support a myriad of asset-light service providers such as VNOs, OTTs, banks, utilities, governments, etc. ▪ Vertically integrated models replaced by horizontal model with NetCo/ServCo separation ▪ Passive infrastructure sharing, but no network outsourcing.
	<ul style="list-style-type: none"> ▪ Light-touch regulation on infrastructure to encourage infrastructure competition ▪ No endorsement by regulator of strong net neutrality positions ▪ Telcos develop a portfolio of premium services (e.g., 3-D TV) but have to carry competing OTT services. 	<ul style="list-style-type: none"> ▪ Evolution to Internet-style model with light-touch regulation for Telcos ▪ Abolition of the majority of sector-specific services regulations, creating a level playing field in services for Internet and Telco players ▪ Structural separation of access networks with wholesale open access to best-in-class services and applications from any provider ▪ Open access is the norm.

Other events that may trigger a Clash of Giants scenario include integration of OTT players into the network. Eric Schmidt, CEO of Google, announced in February 2010 that Google will be building an ultra-high speed optical network with speeds of 1 Gbps to connect up to 500,000 consumers in the United States, enabling them to download a high-definition movie in less than five minutes, or watch live 3-D video services.³⁰

Generative Bazaar is predicated on the break-up of the vertical integration model, resulting in some form of structural separation of Telcos into distinct network (NetCo) and services (ServCo) businesses. It is unlikely that there will be many competing NetCos in any one country, but rather a handful of providers that will form a co-operative (Net Co-op). This co-operative will be based on a viable funding model to support open access infrastructure (see Appendix 2 for examples of emerging net co-op models).

The Net Co-op may also emerge through the deliberate intervention of national governments, as currently exemplified in Australia and Singapore, or through voluntary cooperation of infrastructure providers such as in the Netherlands (see Appendix 2, page 22). Generative Bazaar depends on widespread deployment of ultra-fast broadband and the availability of connectivity with pervasive and ubiquitous access supporting the proliferation of Smartphones, Netbooks, MIDs and large volumes of other connected devices. This would serve to accelerate the explosion of new services and applications emerging to support the increasingly digital economy and personal lifestyles.

Scenario revenue and profitability outlooks

The 2015 scenarios each have different revenue profiles and include varying levels of contributions to the overall mix from communications (voice and basic data), connectivity (broadband, legacy and enterprise) and digital media/content. We have designed a revenue and profitability model for each scenario based on assumptions of penetration and ARPU growth for fixed voice, mobile voice and data (SMS), VoIP/VoBB, fixed broadband (including dial-up), mobile Internet and broadband, machine-to-machine connectivity, IPTV and mobile content services.

In a Survivor Consolidation scenario, fixed-mobile substitution accelerates, mobile penetration slows and ARPU declines as consumers move to control spending on telecom services and/or turn to VoIP/VoBB alternatives. Despite the downturn, fixed and mobile broadband penetration increases modestly as providers offer competitive “all-you-can-eat” bundles and users opt for free OTT services. Paid content services, however, decline.

As governments and municipalities participate more actively in extending ultra-fast broadband capabilities and fixed connectivity penetration, this potentially triggers a Market Shakeout scenario. Overall ARPU declines sharply, but premium connectivity services enable OEMs and content providers to bundle content or device-centric applications with connectivity.

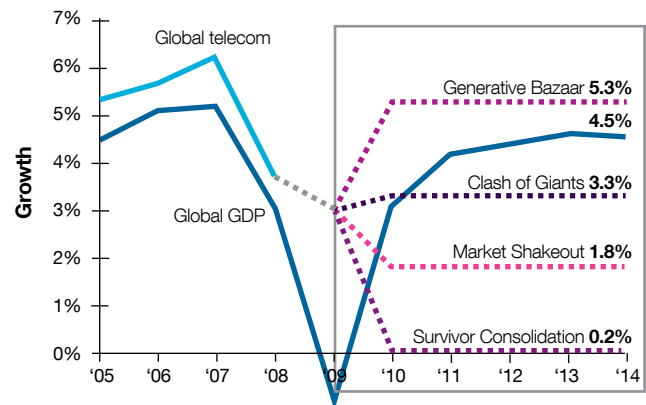
In Clash of Giants, while fixed voice penetration continues to decline, overall voice revenue erosion is contained as consumers increasingly adopt and pay for end-to-end packaged services and enhanced rich communication capabilities. Consumers come to accept network-optimized vertical industry applications and digital lifestyle services from telecom providers. Providers in emerging markets are successful in extending communications to many more people as ultra-low-cost handset penetration increases.

PSTN line losses accelerate sharply, along with significant decreases in ARPU as providers migrate consumers to managed VoIP offerings in a Generative Bazaar scenario. VoIP/VoBB use is widespread as connectivity becomes part of the fabric of society and is bundled with all broadband/connectivity packages. Users pay only for communications aggregation and shared capability services across multiple tools. Phenomenal growth in mobile broadband continues, and nearly all mobile users in advanced markets have data connectivity plans across multiple devices. In emerging markets, mobile broadband is the *de facto* Internet platform as mobile devices become the users' portable digital identity. OTT video, applications, services and digital content services boom as a result of open access infrastructure. There is also a significant ramp-up in the penetration of M2M services as low tariff packages enable profitable network connectivity of objects and sensors.

Regardless of which scenario dominates, PSTN revenues decline. Likewise, fixed and mobile connectivity/broadband revenues increase in all scenarios. Overall, the financial model suggests Generative Bazaar is potentially the most profitable, with the highest revenue and growth prospects. However, it is also the most challenging scenario because of the dramatic degree of change it will demand from the industry. Clash of Giants may, indeed, be more a plausible and natural evolution in a recovering/slower-growing economy, even if revenue and profitability potential is less than in Generative Bazaar (see Figure 10).

The most promising scenario will require a fundamental change in industry structure and result in a shift in revenue mix, with connectivity supplanting communication services as the dominant contributor.

Global GDP versus telecom growth scenarios



Source: International Monetary Fund (IMF), World Economic Outlook Database, October 2009, <http://imf.org/external/pubs/ft/weo/2009/01/weodata/index.aspx>; IBM Institute for Business Value and IDATE analysis; 2004 - 2009 growth forecasts are based on IDATE "World Telecom Service Market," 2008 Edition, January 2009, revision in July 2009; forecasts for 2010 -2015 are IBM Telecom 2015 scenario forecasts.

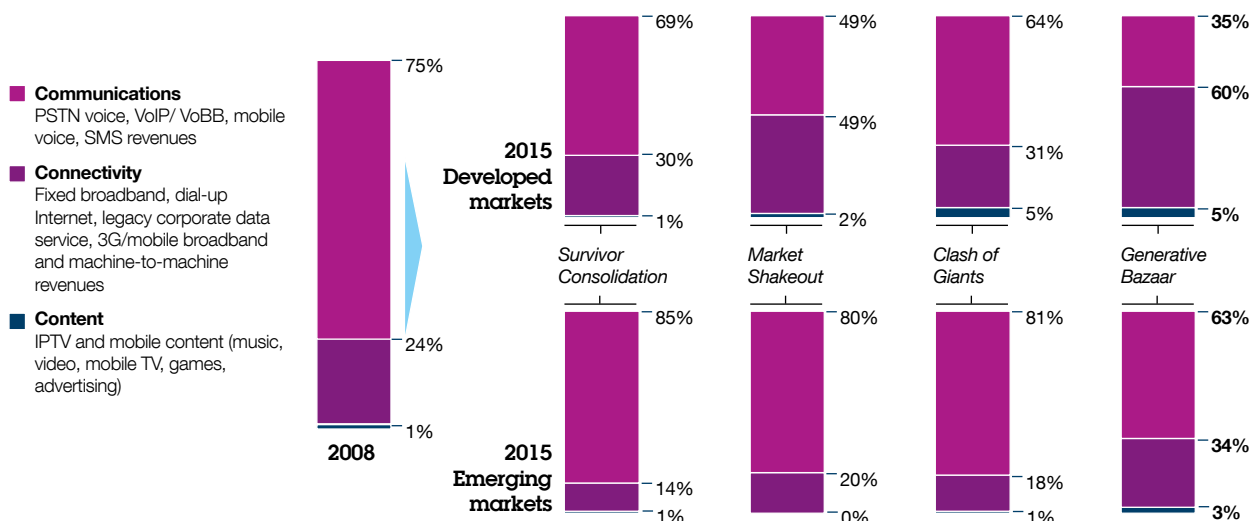
Figure 10: Generative Bazaar represents the most optimistic growth outlook.

A critical potential industry shift is the overall composition of the telecom revenue mix as the once-dominant PSTN voice business disappears and mobile revenue growth stalls. In 2008, the proportion of total industry revenue in advanced markets attributed to communications (PSTN Voice, VoIP/VoBB, Mobile Voice and SMS) was approximately 75 percent, versus 24 percent for connectivity (fixed broadband, dial-up Internet, legacy corporate data services, mobile broadband and machine-to-machine revenues) and 1 percent for content.³¹ With the growth in broadband and the slowdown of communications revenues, this split is likely to shift, with a greater share going to connectivity.

The four scenarios show contrasting revenue composition outcomes (see Figure 11). Survivor Consolidation and Clash of Giants retain the current revenue mix structure, even as their share of connectivity increases. In Market Shakeout, parity exists between communications and connectivity in the overall revenue composition. However, Generative Bazaar reflects a model that is opposite the dominant model of today. Connectivity revenue becomes most prevalent in the mix. PSTN voice declines, and fixed voice communication is offered virtually for free as a standard service in mobile and fixed broadband packages. The demand for access grows, fueled by the proliferation of smart devices, including machine-to-machine connectivity supporting growth in sensing and automated response capabilities.

Critical success attributes and imperatives

The scenarios should not be treated as strategic aspirations or choices by any specific provider. They are significantly influenced by a number of highly dynamic external factors, including government policy, regulation, technology evolution, industry dynamics and the state of the local/global economy. Collectively, industry players in specific markets or regions can shape and influence these outcomes, but the imperative is for telecom providers to focus on the attributes for success for the scenario most likely to emerge, and to begin to take action now to best position themselves for the future.



Source: IBM Institute for Business Value and IDATE analysis.

Figure 11: Although revenues shift from communications to connectivity in all four scenarios, the substitution is highest by far in the Generative Bazaar.

To be successful in a Survivor Consolidation scenario, telecom providers will have to achieve scale, reduce cost-to-serve, contain voice ARPU erosion, secure a significant proportion of the ultra-fast broadband market and increase share of high-value customers.

In a Market Shakeout scenario, successful telecom providers will be those that have clear and distinctive roles in a fragmented and horizontally integrated industry; a powerful brand/reputation; viable premium connectivity propositions for third-party application providers; agile, flexible and reconfigurable processes and infrastructure; and the ability to provide ubiquitous and cost-effective ultra-fast broadband access.

The providers likely to be successful in the Clash of Giants scenario will include those with the ability to effect collaborative inter- and intra-industry alliances; deliver innovative and differentiated network-optimized experiences based on end-to-end packages; and enhance the role of service providers in adjacent vertical markets to achieve competitive cost structures and scale.

Success in the Generative Bazaar scenario will be dependent on the provider's ability to achieve structural industry separation; a pervasive open network access infrastructure; support for third-party application/services innovation; a dynamic business design; and the ability to leverage advanced customer and network analytics.

For a more detailed view on the capabilities required to successfully achieve the attributes for each scenario, please reference Appendix 3 on page 23.

Summary and conclusions

After a decade of unprecedented change, where the phenomenal growth of mobile telephony has given rise to an era in which anyone who wants – and can afford – telephony has it, the industry is at an inflection point as it postures itself for future growth . . . or survival. Unless the telecom industry is able to reinvent itself as it did with mobile telecommunications in the 1990s, the next few years could usher in a period of flat/declining growth as opportunities for industry growth based on increasing customer penetration gradually diminish. Continuing along this path favors the emergence of a Survivor Consolidation or Market Shakeout scenario, both of which are likely to yield very low levels of growth.

A return to strong growth requires the telecom industry to act collectively to create the necessary conditions for the emergence of the more profitable scenarios, Clash of Giants or Generative Bazaar. They can do so by focusing their strategic priorities on those capabilities required to deliver on the critical success attributes for these growth scenarios, including:

- Global industry collaboration on common capabilities, enablers and platforms to facilitate innovation and improve competitiveness with global OTT providers
- Enhancing the role of the service provider to enable new business models in adjacent vertical markets such as e-health, smart grids, transportation, retail and banking
- Pervasive and open access connectivity for any person, object and a multitude of devices, optimized to deliver large data volumes cost-effectively

- Value propositions for third-party application and asset-light service providers with a range of coarse to granular wholesale connectivity offers, open interfaces to network capabilities and services enablers, and infrastructure support for common business process services (e.g., billing, CRM), along with a viable commercial model
- Harnessing information and business insights to reduce complexity and costs and to deliver new customer experiences that enable new business models.

To be ready, providers will need to watch for the key scenario triggers we've described, understand the requirements for success in each of these contrasting environments, begin to address execution gaps and nurture critical capabilities that are common across all four scenarios. These include a cost-effective ultra-fast broadband deployment strategy, business optimization based on more advanced network and customer insights, more effective cost management and embracing a highly collaborative culture.

Appendix 1

Scenario realization: Major prerequisite economic, regulatory and market triggers for each scenario

	Economic and financial	Investment and technology	Competition and regulation	Customers and markets
Survivor Consolidation	<ul style="list-style-type: none"> ▪ Prolonged economic downturn ▪ Declining/flat revenues/margins ▪ Investor loss of confidence. 	<ul style="list-style-type: none"> ▪ Constrained access to, or increased cost of, capital ▪ Reduced/flat capex ▪ Reduced investment in service innovation and research. 	<ul style="list-style-type: none"> ▪ Increased price competition ▪ High wholesale and interconnect charges ▪ Governments foster favorable M&A climate ▪ Some under-performing providers hand back licenses. 	<ul style="list-style-type: none"> ▪ Stagnating penetration at or near current levels ▪ Inability to monetize value-added services ▪ Consumers reduce spending ▪ Consumers switch to lower cost alternatives.
Market Shakeout	<ul style="list-style-type: none"> ▪ Prolonged economic downturn ▪ Declining/flat revenues ▪ Industry EBITDA consistently performs below historic levels. 	<ul style="list-style-type: none"> ▪ Governments/municipalities increase network infrastructure investments ▪ Private sector capex constrained ▪ Private equity enters and acquires under-performers and breaks them apart. 	<ul style="list-style-type: none"> ▪ Increased network outsourcing and infrastructure sharing ▪ Voluntary/forced separation ▪ Viable B2B market for premium connectivity services emerges ▪ Telcos outsource other parts of business – e.g., support, retail, IT, etc. ▪ Governments take over infrastructure of ailing incumbents. 	<ul style="list-style-type: none"> ▪ Proliferation of brands emerge to target specific segments/services ▪ Stagnating penetration at or near current levels ▪ Consumers reduce spending ▪ Consumers switch to lower-cost alternatives.
Clash of Giants	<ul style="list-style-type: none"> ▪ Growing, vibrant global economy ▪ Increased consumer confidence and spending on communications ▪ Vertically integrated Telcos deliver superior returns and shareholder value. 	<ul style="list-style-type: none"> ▪ Unencumbered access to and lower cost of capital ▪ Increased capital expenditure ▪ Global telecom technology alliances and standardization ▪ OTTs integrate backwards into the network with their own spectrum and infrastructure ▪ Providers invest in selected verticals. 	<ul style="list-style-type: none"> ▪ Global telecom consolidation ▪ OTT provider consolidation with a small number of significant global players ▪ Some emerging market providers enter advanced markets ▪ OTT actions pose significant competitive threat to Telcos. 	<ul style="list-style-type: none"> ▪ Greater willingness of customers to purchase digital lifestyle services (e.g., energy management, e-health) from Telcos ▪ End-to-end customer experience and QoS are a key differentiator ▪ Customers expect ubiquitous, seamless access and rich multimedia communication interactions.
Generative Bazaar	<ul style="list-style-type: none"> ▪ Increased investor confidence in Telco two-sided business model ▪ Growing, vibrant global economy ▪ Increased consumer confidence and spending on communications. 	<ul style="list-style-type: none"> ▪ Unencumbered access to and lower cost of capital ▪ Increased capex ▪ Widespread deployment of ultra-fast broadband ▪ Investment in developer platforms, tools, communities. 	<ul style="list-style-type: none"> ▪ Providers devise funding model for open access infrastructure market ▪ National governments fund open infrastructure for economic growth ▪ Infrastructure to services-based competition and regulation ▪ Asset-light providers emerge to innovate on open infrastructure. 	<ul style="list-style-type: none"> ▪ Increasingly, organizations package connectivity with their own services ▪ Proliferation of MIDs Smartphones, Netbooks and connected devices ▪ Consumers demand access to services from multiple providers.

Source: IBM Institute for Business Value analysis.

Table 2: Major prerequisite economic, regulatory and market triggers for each scenario.

Appendix 2

Emerging net co-op models

Open access net co-ops

Creation of Net Co-ops, aimed at providing national or local open access network infrastructures, are already under way.

In the Netherlands, KPN has announced a plan to “roll out its next generation network based on an open access model, using a joint venture to spread the risk and separate the functions of wholesale access for providers from retail sales direct to consumers.”³² The other members of the consortium are Tele2-Versatel, BBned and Orange NL (now Online.NL).³³ KPN has memoranda of understanding in place with each company on the terms of next generation roll out and sharing of facilities.

Australia and Singapore offer an alternative government-led model. In April 2009, the Australian government launched a National Broadband Network (NBN) company – jointly

owned by the state (51 percent) and the private sector (49 percent) – in order to build and operate a fiber-to-the-home network that provides broadband to 90 percent of urban and regional towns at speeds of 100 Mbps.³⁴ Next generation wireless and satellite will be employed to cover the remaining 10 percent. NBN will operate the network on a wholesale only basis, with no role in retail services direct to consumers, and will provide rights of access to all service providers on non-discriminatory terms and conditions.

In Singapore, the government is rolling out the open access Next Generation National Broadband Network (Next Gen NBN) that will offer pervasive ultra-high speed connectivity by 2015, supporting a range of new and exciting Next Gen Services such as high-definition video conferencing, telemedicine, Grid Computing-on-Demand, security and immersive learning applications.³⁵

Appendix 3

Critical success attributes and capability implications

A-3.1 Survivor Consolidation

Critical success attributes	IBM recommendations
Achieve scale	<ul style="list-style-type: none"> ▪ Deploy standardized processes and technology platforms for rapid and seamless M&A integration ▪ Leverage dynamic infrastructures, global resources, “centers of excellence,” and standardized and automated processes for scale ▪ Institutionalize processes to identify acquisition targets, conduct due diligence and close M&A transactions.
Reduce cost-to-serve	<ul style="list-style-type: none"> ▪ Explore selective use of network outsourcing and infrastructure sharing ▪ Accelerate migration to converged/single core IP-based NGN ▪ Optimize and consolidate IT infrastructure ▪ Leverage global resources, “centers of excellence” and business process outsourcing (BPO) as necessary ▪ Simplify and automate business processes and transition to self-service.
Contain voice ARPU erosion	<ul style="list-style-type: none"> ▪ Bundle basic communication services with access/value-added services ▪ Enable access to widest range of communication tools/channels and facilitate integration of lower-cost/free alternatives with subscribed services ▪ Acquire/partner with mobile, OTT communications, fixed or broadband provider to plug capability gap in communications portfolio ▪ Leverage customer insights for cross-/up-sells.
Secure significant share of ultra-fast broadband in densely populated areas	<ul style="list-style-type: none"> ▪ Acquire/partner with incumbent local network infrastructure organizations to accelerate the deployment of ultra-fast broadband access in densely populated areas ▪ Passive infrastructure sharing, including underground ducts.
Increased share of high value customers	<ul style="list-style-type: none"> ▪ Leverage network insight into customer experience to deliver personalized experiences and services ▪ Apply social network analytics to enable automated identification of group leaders for focused retention and attraction (churn management) actions ▪ Develop end-to-end visibility of high value customers for focused retention and attraction (churn management) actions.

Appendix 3

Critical success attributes and capability implications

A-3.2 Market Shakeout

Critical success attributes	IBM recommendations
Clear and distinctive role(s) in disaggregated value chain and ability to partner externally	<ul style="list-style-type: none"> ▪ Identify strategic areas of focus in fragmented/disaggregated industry value chain aligned with core capabilities ▪ Build collaborative relationships with key external partners for open innovation ▪ Define and implement common standards, processes and platforms to support external collaboration.
Powerful brand/reputation	<ul style="list-style-type: none"> ▪ Leverage insights across the customer lifecycle to enhance the end-to-end customer experience ▪ Deliver differentiated and personalized experiences ▪ Proactively monitor and track actual experience delivered with the capability to adjust in realtime.
Viable premium connectivity propositions for third-party application providers	<ul style="list-style-type: none"> ▪ Enable open and standardized access to premium connectivity (e.g., device management, CDNs) and service enablers (e.g., presence, location) ▪ Integrate partner services/offerings with providers' retail channel and application stores ▪ Develop platforms and tools for information sharing with partners (e.g., device OEMs and application and content providers).
Agile, flexible and reconfigurable processes and infrastructure	<ul style="list-style-type: none"> ▪ Implement standardized processes based on dynamic infrastructures to optimize business flexibility ▪ Leverage global resources and "centers of excellence" to optimize capability ▪ Leverage dynamic architectures and cloud-based infrastructure to optimize costs.
Ubiquitous and cost-effective ultra-fast broadband access	<ul style="list-style-type: none"> ▪ Deploy standardized processes and technology platforms for rapid and seamless M&A integration ▪ Leverage dynamic infrastructures, global resources, "centers of excellence," and standardized and automated processes for scale ▪ Institutionalize processes to identify acquisition targets, conduct due diligence and close M&A transactions.

Appendix 3

Critical success attributes

A-3.3 Clash of Giants

Critical success attribute	IBM recommendations
Collaborative inter/intra-industry alliances	<ul style="list-style-type: none"> ▪ Adopt and implement global standards for service interoperability across fixed and mobile Internet ▪ Develop and implement global standards for application/service roaming ▪ Global collaboration in service innovation and development.
Innovative and differentiated network-optimized experiences	<ul style="list-style-type: none"> ▪ Invest in service innovations based on tightly coupled intelligent network capabilities and content services to deliver new, unrivalled experiences ▪ Speed time-to-market through greater experimentation and collaboration ▪ Leverage insights across the customer lifecycle to enhance and deliver differentiated end-to-end customer experience.
Enhanced service provider roles in vertical markets	<ul style="list-style-type: none"> ▪ Clarify role in selected verticals and develop capabilities and domain expertise through acquisition, or partner to deliver solutions ▪ Deliver customer experience consistent with service level expectations along with requisite sales support organization/infrastructure for verticals ▪ Collaborate with partners in the ecosystem in defining new and common standards for telecom-enabled vertical services (e.g., mobile payments).
Efficient and competitive cost structure	<ul style="list-style-type: none"> ▪ Unified support infrastructure for end-to-end service management across all platforms and devices ▪ Explore use of network outsourcing and infrastructure sharing as necessary ▪ Optimize and consolidate IT infrastructure ▪ Simplify and automate business processes and transition to self-service.
Achieve scale	<ul style="list-style-type: none"> ▪ Deploy standardized processes and technology platforms for rapid and seamless M&A integration ▪ Leverage dynamic infrastructures, global resources, “centers of excellence,” and standardized and automated processes for scale ▪ Institutionalize processes to identify acquisition targets, conduct due diligence and close M&A transactions.

Appendix 3

Critical success attributes and capability implications

A-3.4 Generative Bazaar

Critical success attributes	IBM recommendations
Structural separation of network and services operations	<ul style="list-style-type: none"> ▪ Negotiate appropriate point of separation to preserve the integrity of the NetCo and ServCo businesses and align skills with business outcomes. ▪ Define and implement target operating model for separation along with processes, systems and organizational design ▪ Build capability to support dynamic wholesale pricing for different levels of service.
Pervasive open network access infrastructure	<ul style="list-style-type: none"> ▪ Devise shared/co-operative funding model for open network access with risk sharing ▪ Anticipate and plan for growth in data and build/optimize network to deliver large volumes cost-effectively ▪ Secure regulatory incentives for open and non-discriminatory access.
Third-party applications/services innovation	<ul style="list-style-type: none"> ▪ Establish value proposition for third-party providers, including interfaces to network capabilities, service enablers based on open standards, access to ecosystem of partners, a commercial model and infrastructure support for common business process services, e.g., self-service, e-commerce, billing ▪ Provide test infrastructure for experimentation and stimulate developer community to ramp-up application/service innovation.
Dynamic business design	<ul style="list-style-type: none"> ▪ Enable infrastructure/processes to support connectivity of a multitude of objects, sensors, devices and applications ▪ Enable real-time data collection and analytics for dynamic decision support ▪ Leverage dynamic architectures and cloud-based infrastructures to reduce cost, and for business flexibility.
Leverage advanced customer and network analytics	<ul style="list-style-type: none"> ▪ Leverage insights into network and usage data to optimize core and access networks; reduce costs; and improve customer experience ▪ Proactively monitor, track and effect actual experience in real-time ▪ Leverage insights across the customer lifecycle to enhance and deliver differentiated end-to-end customer experience.

Glossary³⁶

2G – Short for second generation of mobile telephony systems.

2.5G – An extension of 2G systems to support packet-switched data communications.

3G – Third generation of mobile systems that supports conventional voice along with high-speed data transmission for multimedia (including video) communications over a mobile network.

3.5G – (see HSPA)

Access network – Connection of end-user premises to a service provider. It is sometimes referred to as the “local loop” or “last mile.”

ARPU (Average revenue per user) – earned from a subscriber, typically over a month.

Blog – Short for Weblog. A Weblog is a journal (or newsletter) that is frequently updated.

Broadband – “Always on” high-speed Internet access with speeds in excess of 256 Kbps.

CAGR (Compound Annual Growth Rate) – The average annual growth rate over a specified period of time.

CDN (Content Delivery Network) – A network of computers that cache data at various points in a network to enhance delivery and user experience.

CSP (Communication Service Providers) – An umbrella term used to describe both traditional providers of communication services (i.e., telecom) and alternative providers such as cable TV companies and other-the-top providers.

Dongle – Portable mobile broadband adapter connected to a laptop or PC via a USB port.

xDSL (Digital Subscriber Line) – A family of technologies capable of transforming ordinary phone lines into high-speed digital lines for Internet access. ADSL (asymmetric digital subscriber line) allows higher speeds in one direction (toward the customer) than the other. HDSL (high data rate digital subscriber line) and VDSL (very high data rate digital subscriber line) are all variants of xDSL).

FTTC (Fiber-to-the-cabinet) – Access network consisting of optical fiber from the exchange to the cabinet or node at the end of the road (in a residential area) and a traditional copper pair augmented with high-speed DSL technology (e.g., VDSL) to the customer’s premises.

FTTH (Fiber-to-the-home) – Optical fiber is extended all the way to the customer’s home.

FTTB (Fiber-to-the-building) – Similar to FTTH but building is typically a multi-dwelling unit (MDU) e.g., a block of flats.

FTTx – Variants of optical fiber access networks – e.g., FTTC, FTTH, FTTB.

GSM (Global System for Mobile Communications) – A global standard for mobile telephony.

GSMA (GSM Association) – The trade body for the world’s mobile operators.

HDTV (High-definition television) – A technology that provides viewers with better quality, high resolution pictures.

HD Voice – A technology that provides better audio quality by delivering at least twice the sound range (wideband) of a traditional (narrowband) telephone call.

HSPA (High Speed Packet Access) – Often referred to as 3.5G, this is an extension to the original 3G standard providing significantly higher data rates. HSDPA (downlink) can provide theoretical maximum downlink speeds of 14.4 Mbps. HSUPA (uplink) supports maximum uplink speeds of 5.76 Mbps.

IMS (IP Multimedia Subsystem) – Part of 3G Architecture designed to provide ubiquitous cellular access to all Internet services.

IP (Internet Protocol) – The packet data protocol used for routing and carrying messages across the Internet and similar networks.

IPTV (Internet Protocol Television) – Television and/or video signals that are delivered to subscribers or viewers using Internet Protocol (IP), the technology that is also used to access the Internet. We use the term to mean delivery over a “closed intranet”, typically operated by ISPs and local-loop unbundlers, rather than over the public Internet. IPTV services are hosted on servers placed in the exchange, which means they can be delivered with assured QoS since the ISP has more control over the network.

Local Loop – The access network connection between the customer’s premises and the local PSTN exchange, usually a loop comprised of two copper wires.

LTE (Long Term Evolution) – The next iteration of 3G mobile communications network, which optimizes the 3GPP’s (3rd Generation Partnership Project) radio access architecture to deliver mobile broadband speeds similar to those available on high-speed fixed broadband networks. It is based on a high-speed, IP-only radio interface, promising downlink peak rates of 100 Mbps, with uplink rates of 50 Mbps. It promises higher spectral efficiency than normal 3G and will benefit from much-needed new spectrum resources to support mobile data growth.

Microblogging – Short-form blogging. The term is commonly associated with the Twitter service, on which messages are no longer than 140 characters.

MMS (Multimedia Messaging Service) – The next generation of mobile messaging services, adding photos, pictures and audio to text messages.

Mobile broadband – Various types of wireless high-speed Internet access through a portable modem, telephone or other device.

Narrowband – A service or connection providing data speeds up to 128 Kbps, such as via an analog telephone line.

NEP (Network Equipment Providers) – Companies that supply communications equipment to service providers/operators.

NGN (Next Generation Networks) – Internet Protocol-based core networks that can support a variety of existing and new services, typically replacing multiple, single service legacy networks.

NGA (Next Generation Access) networks – Broadband access networks that connect the end-user to the core network capable of a bandwidth quantity and quality significantly in excess of current levels (a benchmark of 20 Mbps or more is often used).

PSTN (Public switched telephone network) – The network that manages circuit-switched fixed line telephone systems.

SIM (Subscriber Identify Module) – A SIM or SIM card is a small flat electronic chip that identifies a mobile customer and the mobile operator. A mobile phone must have a SIM card inserted before it can be used.

SIM-only – A mobile contract that is sold without a handset.

SMS (Short messaging service) – Also known as “text messaging,” this is a mechanism that facilitates the delivery of short text messages over mobile networks.

Social networking sites – A Website that allows users to join communities and interact with friends or to others that share common interests.

VoBB (Voice over Broadband) – VoIP (see separate entry) delivered over broadband networks.

VoD (Video-on-demand) – A service or technology that enables TV viewers to watch programs or films whenever they choose to, not restricted by a linear schedule.

VoIP (Voice over Internet Protocol) – Voice communications transmitted over public Internet or private IP networks.

VNO (Virtual Network Operator) – A telecom service provider that does not have allocation of spectrum or its own network and uses those of another operator to deliver services to its customers. MVNO is Mobile Virtual Network Operator.

WiMAX (Worldwide Interoperability for Microwave Access) – A wireless MAN (metropolitan area network) technology, based on the 802.16 standard. Available for both fixed and mobile data applications, the technology was approved as a 3G standard by the International Telecommunications Union (ITU) in 2007.

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