



A New Way

The Business Case for the Open Services Exchange Model

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Abstract

Traditional telecom business models and infrastructures are no longer economically efficient in delivering contemporary IP-based Internet services required by residential and business customers, as well as by communities seeking economical stimulation, growth, and wealth. New business models, such as the Open Services Exchange Model, deliver superior financial results and present an attractive investment opportunity.

Development of IP technology, the popularity of Ethernet technology, and the growth of Fiber to the Home (FTTH) deployments created an environment in which a direct fiber connection provides a cost-effective and virtually unlimited bandwidth to the home or business. Although these technology trends made ultra-high-bandwidth delivery affordable, they did not minimize the high investment and risk associated with mass deployment of such networks, nor did they address the issue of shrinking average revenue per user (ARPU) and increasing operating expenses (OpEx).

The Open Services Exchange Model, packed with Cisco® IP technology and Cisco Capital® offerings, delivers an extremely attractive opportunity that minimizes the investment barriers of entry and risk, while addressing the shrinking ARPU and increasing OpEx challenge.

This white paper discusses the thinking behind the development of the Open Services Exchange Model as well as the financial efficiency of the model for both investors and Cisco alike.

Introduction

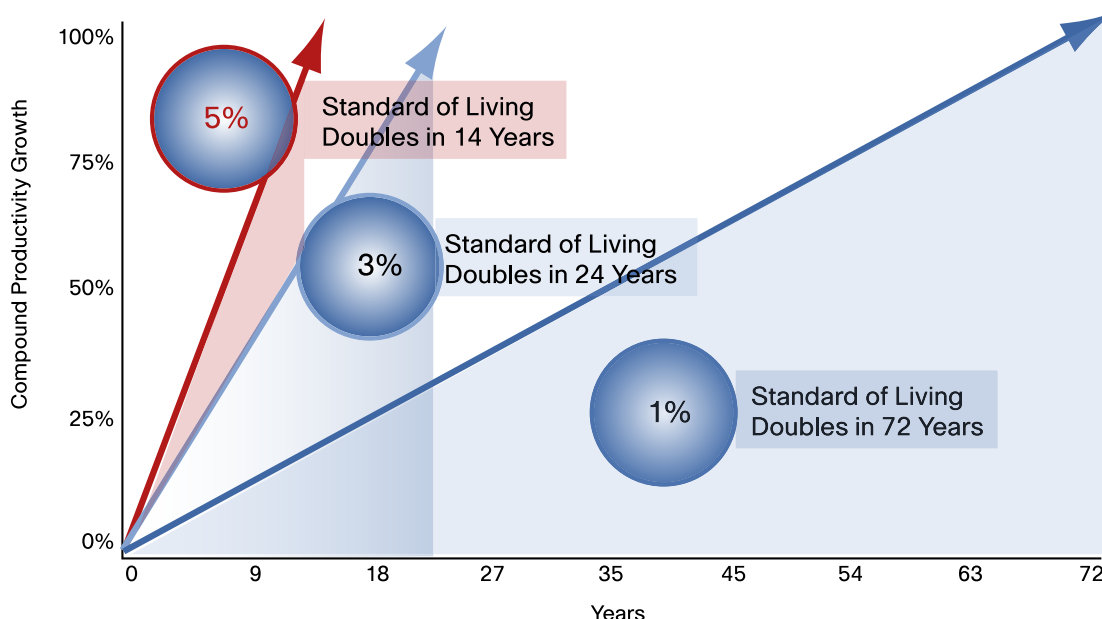
“While global business may be mobile, communities are not. Communities everywhere have the same goal: to be a place where people can raise their children and give those young people enough economic opportunity to allow them to stay and raise children of their own.”

—Intelligent Community Forum, <http://www.intelligentcommunity.org/>

History has proven that effective use of technology improves productivity. If a country can improve its productivity by 5 percent a year, it can double its standard of living in just 14 years (see Figure 1). Although this may be challenging, an annual 3 percent productivity improvement will result in a doubling in under a generation. Most emerging countries recognize that their ability to compete is directly tied to how they harness the power of information and communication technologies (ICT) to connect citizens and businesses and government and thereby strengthen their economical competitiveness. Developing countries see an opportunity to advance beyond developed markets by investing in new infrastructures rather than upgrading their current (underdeveloped) installed base and legacy networks, which commonly constrain more mature economies.

Fiber to the x (FTTx) deployments represent an exciting investment opportunity. However, the financial justification of FTTx deployments must take into account the short- or medium-term as well as long-term service provider considerations and align these internal issues with the market behavior and national conditions.

Figure 1. National Productivity Drives Standard of Living



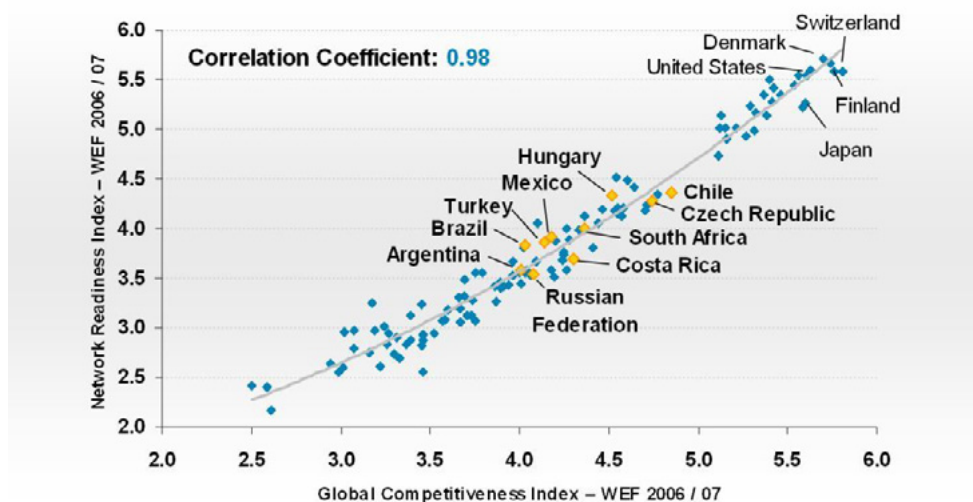
Source: Net impact study, adopted by Cisco IBSG, 2007

Once industry and government objectives are aligned, the financial justification for symmetrical broadband deployment becomes attractive for both investors and society.

Although it is clear that competitiveness drives economic growth, we need to take a closer look into what influences competitiveness.

The World Economic Forum (WEF) measures several factors that drive a nation's competitiveness. As broadband communications and networking are key components of ICT, we can plot the Global Competitiveness Index (GCI) and Network Readiness Index (NRI) on the same chart to see the correlation between the two.

Figure 2. Global Competitiveness and Network Readiness Influence Economic Growth

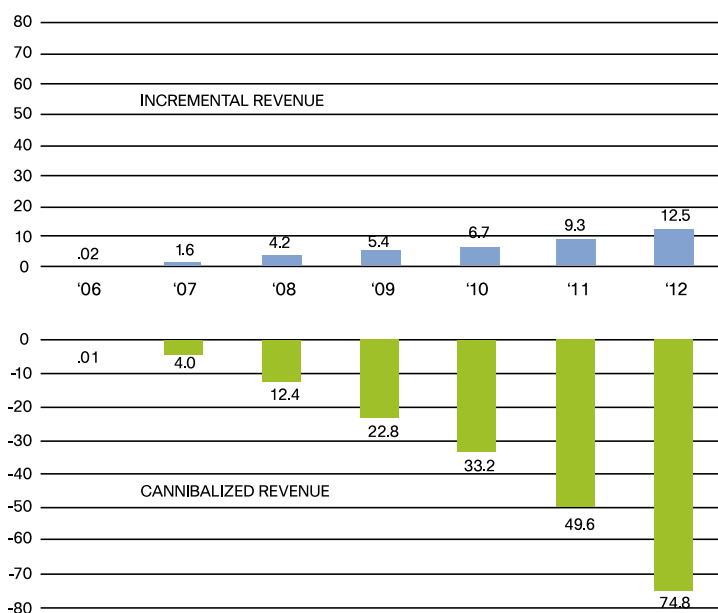


Source: World Economic Forum, INSEAD, 2006

Figure 2 shows that network readiness or availability of broadband, service provider market competitiveness and innovation, as well as other factors are critical to a nation's competitiveness and successful participation in an increasingly global economy.

However, current telecom business models are stretched in trying to achieve these objectives. Investment in maintaining and updating legacy networks to provide contemporary services is challenging for both incumbents and challengers alike, which means that many organizations do not find increased competition, innovation, and true broadband desirable. By way of illustration, let us consider the international voice market. This is the most profitable service for all incumbents in developing countries and typically accounts for 10-20 percent of revenues and 30-50 percent of profits. Most of these international calls are made by businesses and wealthy households. It is precisely these customers who are able to afford broadband. And once they have broadband, there is nothing to stop them from downloading a voice over IP (VoIP) application from Google or Skype. Then, overnight, all international calls revenue and profits are gone. Painful indeed. This issue was eloquently described in *The Economist* last year in an article titled "How the Internet Killed the Phone Business."

Figure 3. Voice over IP: Great for Customers, a Threat for Incumbents



Source: Cisco IBSG analysis based on an Emerging Markets incumbent, August 2006

The chart in Figure 3 illustrates the impact of VoIP on the revenue streams of a typical wire line incumbent. We can clearly see the deflationary impact of a service that the customer wants. Moreover, it is not just the incumbent who suffers the pain. There are broader considerations for the country. For many emerging countries, the international accounting rate system for international voice calls provides a valuable source of foreign currency, which runs into many millions of dollars. With broadband and VoIP, this source can also disappear overnight. In the long run, the impact of these technologies is inevitable, and incumbents are responding by transforming themselves to next-generation service providers.

The liberalization of telecommunications markets around the world has delivered many customer benefits in terms of lower prices and better quality services. The incumbent operators, however, may feel that they are getting all of the pain and none of the gain from this liberalization. They will see many new technologies as being deflationary, and they will feel like their world is being transformed. Unbalanced tariffs (that is, when the retail prices of providing services do not reflect the underlying costs of providing those services) is at the heart of the issue. This was a painful issue before, but the advent of broadband and VoIP providers has compounded the issue many times over. To

respond to this transformation, over time all incumbents will need to get in shape and evaluate their next-generation network (NGN) plans. This approach, however, is not to be taken by companies who lack resources. Big investments are needed, and the environment is far from certain. Unclear revenue streams, new low-cost access technologies, new business models, and regulatory uncertainties all add to the pain. This transformation was tough enough for the incumbents in the developed countries, but it is going to be doubly tough for incumbents in developing countries because this transformation is happening at a much faster rate than anticipated.

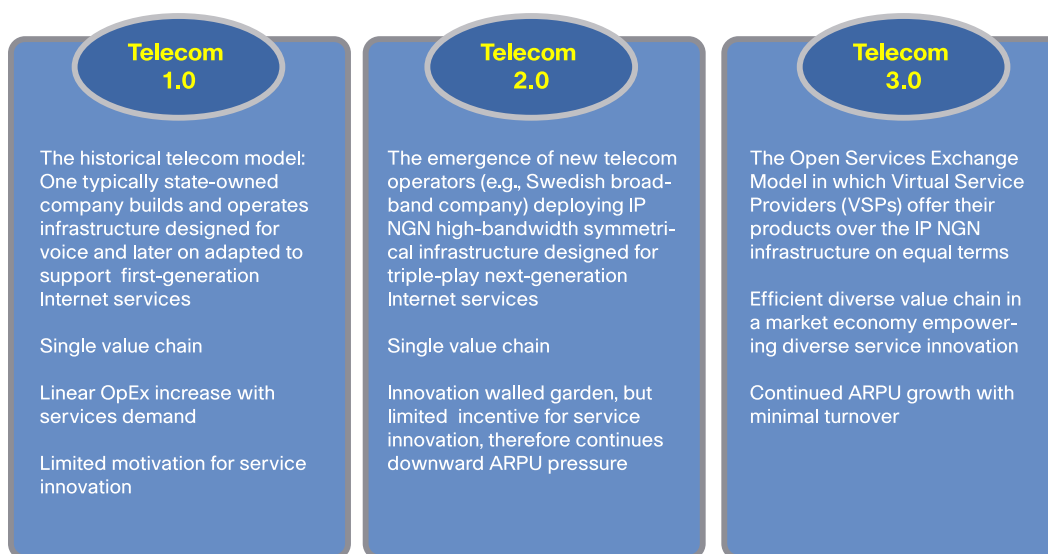
But is there a better way? ..

Open Services Exchange Model (OSEM)

It has been 133 years since the invention of the telephone in 1876 by Alexander Graham Bell. The first business model for the industry (Telecom 1.0) was the monopoly model, which was the only possible model given the original telecommunications technology. Voice was the only service possible on the original network technology, and because it was a switched network, there was no distinction between passive and active network. Therefore, a single-value chain monopoly was the only possible industry structure. Historically, monopolies were normally discouraged by governments in favor of competitive industry structures, but the telecommunications industry was an exception. The enormous strategic importance of having a well-developed ubiquitous telecom network overrode any concerns about monopoly, and governments not only allowed, but actively encouraged, invested in, and protected the monopoly operating model.

The second model (Telecom 2.0) started to emerge approximately 20 years ago with the introduction of IP technology and became more established in the late 1990s with successful examples such as the Swedish Broadband Company and FastWeb in Italy. The main philosophy of these companies focused around building new network infrastructure that is designed from the outset for efficiently delivering new IP-based services such as high-speed Internet access, VoIP, as well as IP-based video. Although the design of these new networks embraced a fiber-based, high-speed symmetrical bandwidth approach, the companies tried to mimic the single-value chain monopoly structure. In this “walled garden” approach, the telecom 2.0 players were engaged in building networks (passive and active infrastructures), producing services (Internet, voice, and video: triple play), selling these services, and supporting all the layers of the operations. The approach was very successful initially; however, over time, the limited service innovation incentives (“walled garden” approach), and the reduced but still high OpEx resulting from the do-it-all approach, paved the way for a new approach.

Figure 4. Telecom Industry Evolution



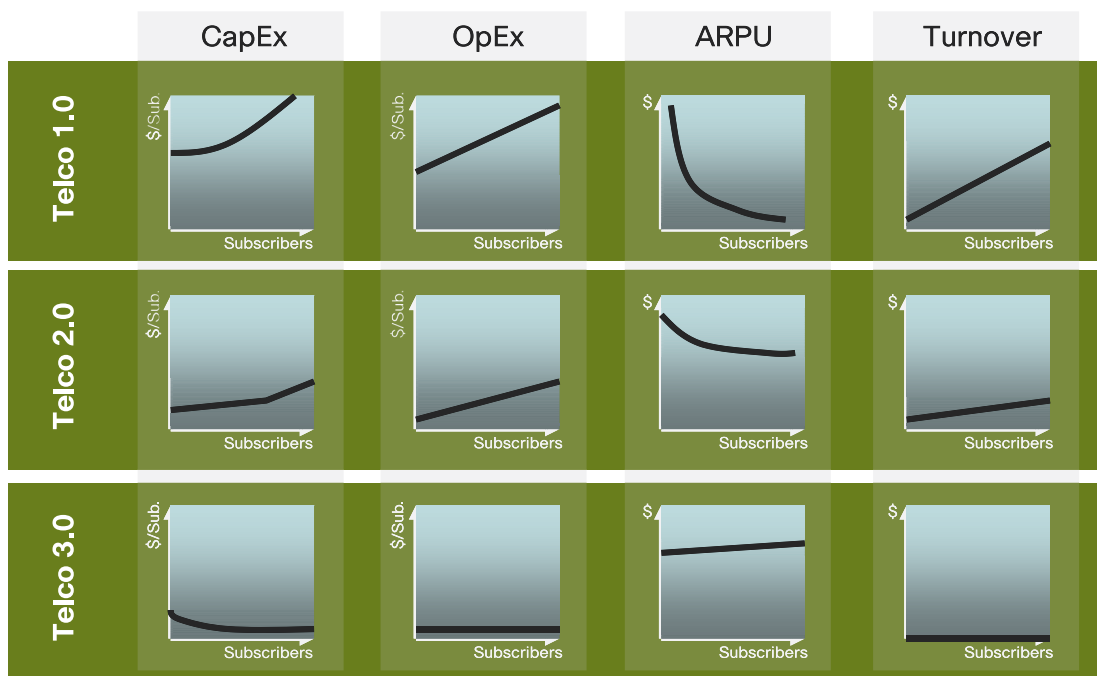
Source: Cisco Systems

It became clear that only an open market economy at the services layer has a chance of success in attracting service innovation and OpEx/capital expenses (CapEx) efficiencies. The new telecom 3.0 model initially emerged when cities, regions, and countries began to realize how important a thriving broadband economy is to their competitiveness. These entities encouraged the build-outs of modern infrastructures that are necessary stimulate their economies. In this way, the different layers of the solution were operated by different operators, with typically the municipality providing the dark fiber layer on a cost basis but with a long-term vision (so payback is calculated based on long-term overall efficiencies for the municipality). An equal access network layer is operated by a different entity over which service providers can sell their services in equal terms. The innovation here is financial engineering; separating the passive network from the active network allows the entire network to be financed more efficiently. By recognizing the different risk characteristics of these two network layers (passive = long-term, low risk; active = 3-5 year life cycle, technology and operational risk).

Over time, the model has changed so that it is equally efficient for commercial investors. Figure 4 summarizes the three phases of the telecom industry evolution.

To understand the attractiveness of the Telecom 3.0 Open Services Exchange Model, we must compare the typical financial behavior of the three telecom generations in light of current challenges and requirements posed by today's (and tomorrow's) consumer needs and expectations. Figure 5 shows the differences.

Figure 5. Typical Financial Behavior in Light of Current Networking Needs; Telecom 1.0, 2.0, and 3.0



Source: Cisco Systems

Such typical CapEx behavior shows that Telecom 1.0 companies experience almost linear per subscriber CapEx growth with growth in their subscriber base as they struggle to adapt their existing network infrastructures to the new services requirements. The Telecom 2.0 operator has a much better per-subscriber CapEx behavior because per-subscriber CapEx are lower with the subscriber base as companies take advantage of their IP NGN infrastructure. However, CapEx are still growing with the growth of customer base because companies incur service production costs. The Telecom 3.0 OSEM has the best of all CapEx behavior because CapEx expenses are lowering with the customer base growth to a minimal level because various infrastructure costs and service production costs are incurred by other players.

The OpEx behavior also favors the Telecom 3.0 OSEM. Although in both Telecom 1.0 and Telecom 2.0, OpEx is growing with the growth of the installed base, in the Telecom 3.0 OSEM, OpEx is not sensitive to the growth of the subscriber base because OpEx-intensive activities such as service production, support, and maintenance, as well as depreciation, are done by others.

ARPU growth in the Telecom 3.0 OSEM is a direct result of the innovation stimulation aspect that comes with symmetrical bandwidth design. This arrangement encourages competition between Virtual Service Providers (VSPs) as well as reduces the barriers of entry, allowing new ideas and services to be sourced by multiple players competing for wallet share. In contrast, the old telecom models do not encourage such competition, and, therefore, companies do not enjoy the innovation that comes with competition. The result is reduced ARPU as these companies lose business to new players such as “over the top” (OTT) service providers.

A recent proof of this phenomenon has been demonstrated by the financial results released by City Telecom (H.K.) Limited (HKEX: 1137.HK / NASDAQ: CTEL) for 1H FY09 (6M to 28 Feb 2009), an Open Services Exchange Operator (OSEO) in Hong Kong and second largest player in the market. The results are:

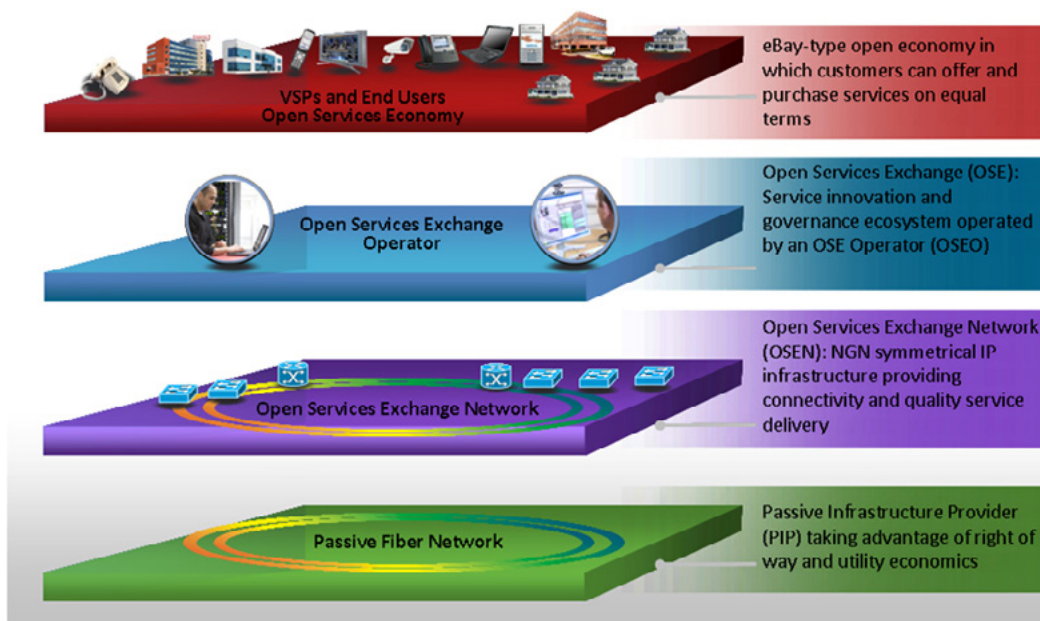
- Net profit up 57.5% YoY to HK\$75.3 mn.
- Net additions for triple play of 71,000 to 872,000 subscriptions, for six months to 28 February 2009.
- ARPU for broadband up 10.7% YoY to HK\$196/month.

Although user turnover between ISPs is the simplest in the OSEM (can be done online by the end user), subscribers tend to move between VSPs (for various reasons) but stay within the Open Services Exchange environment. This again is counter to the Telecom 1.0 and 2.0 trend of losing customers to alternative providers (e.g., Skype).

Open Services Exchange Model's Components

Modern implementation of the OSEM includes several layers, with each layer playing a unique role. The key benefit of this operating model concept is that the role of each layer is unique and very simple, which allows for economics of scale as well as specialization, which, in turn, results in lower costs and higher efficiencies. The revenues are shared between the layers, and as such, there is no cross-subsidization. Incentives simply are aligned to motivate each layer to fulfill its function without consideration of possible external conflicts in the most efficient way.

Figure 6. Open Services Exchange Model



In its most popular form, the OSEM consists of four layers (as shown in Figure 6): the Passive Infrastructure Provider (PIP), the Open Services Exchange Network (OSEN), the Open Services Exchange (OSE), and the Open Services Economy.

Passive Infrastructure Provider (PIP)

The PIP's role is to provide the fiber optic passive infrastructure by leveraging existing right of way or acquiring it from the central/local government or utility companies. Successful examples are Stukab in Sweden, CityNet in Amsterdam, Västerås in Stockholm, and Axia Netmedia in France. Passive networks can be deployed on demand or predeployed for all/part of the potential subscribers in accordance with the business model most suitable for the environment. In all cases, the infrastructure must support high symmetrical bandwidth such that stimulation of services offering and innovation is maximized. Operational aspects of the passive infrastructure deployment must be streamlined also in line with the business case (e.g., work orders are automatically generated by an automated system).

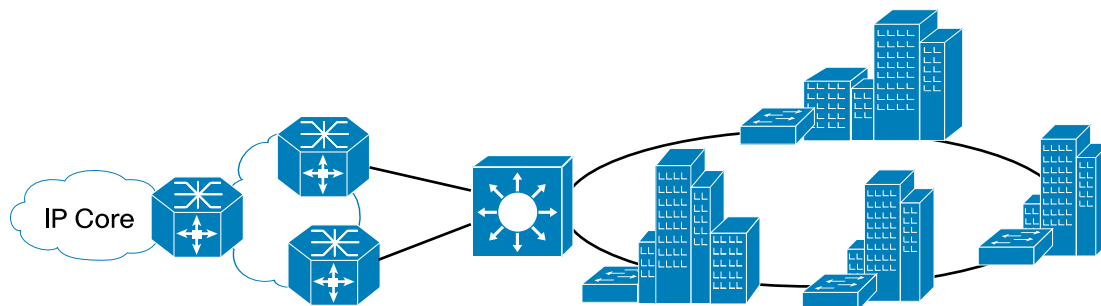
Open Services Exchange Network (OSEN)

The architecture of the Open Services Exchange Network is discussed in depth in a separate document (see Fiber to the Home Architectures, Cisco Systems); however, here we will discuss some of the high-level requirements and design considerations of the OSE Network.

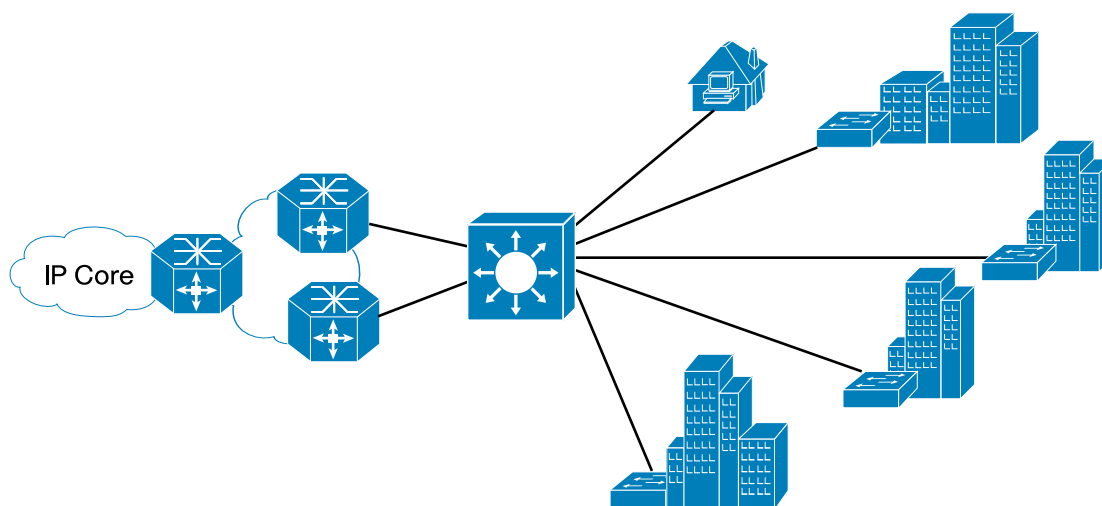
The OSE Network design must be optimized to enable the convergence of both consumer and business services across a single network. From the customer premise through the aggregation layers to the multiservice core, the network layer design should be converged (a single network for business and residential services), resilient (such that the customer experience allows the full benefits of the VSP offerings), intelligent (service optimized), and scalable (to facilitate the pay-as-you-grow model).

The requirements for rapid time to market and low cost per subscriber have led to the evolution of network architectures based on Ethernet switching. Ethernet transmission and switching have become commodities in the enterprise networking market and have led to very attractive cost, mature products, and rapid innovation cycles for all the systems involved. Initial Ethernet FTTH projects (Telecom 2.0 model) in Europe have been based on architectures where switches located in the basements of Multi-Dwelling Units (MDUs) have been interconnected by Gigabit Ethernet in a ring structure as illustrated in Figure 7.

Figure 7. Ethernet Ring Architecture



Such a structure provides excellent resilience against fiber cuts and can be built very cost effectively, but has the disadvantage of sharing a comparatively small bandwidth of 1 Gbit/s, (in relation to long-term bandwidth requirements) over each access ring, thus providing a challenge for scalability of the architecture. More recently, primarily Ethernet star architectures have been used, as shown in Figure 8.

Figure 8. Ethernet Star Architecture

Star architectures provide dedicated fibers (typically single-mode single fiber – with 100 BX or 1000 BX Ethernet transmission) from every endpoint to the point of presence (POP) where they are terminated on a switch. Endpoints can be single-family residences, apartments, or multidwelling units, where a switch in the basement would fan out to the apartments using any appropriate transmission technology (e.g., 100 BT, 100 FX, 100 BX, ...).

Open Services Exchange (OSE)

The Open Services Exchange is at the center of the model and is the “money-making machine” of the Open Service Exchange Model. Successful implementations of this layer, such as LABS2’s BRIKKS system, are based on a fully automated system that controls all aspects of the OSE operations. As shown in Figure 9, the system typically includes both a VSP interface for service creation, sales, support, etc. and an end users marketplace interface that allows end users to select the services that they are interested in: change of VSP, support, etc.

Figure 9. Open Services Exchange System Implementation by LABS2 and ViaEuropa

The OSE system also serves as a VSP service innovation incubator because it provides capabilities such as ready billing and customer care necessary for the launch of new services but not easily obtained by the smaller VSPs. VSPs can offer services nationally and even internationally by taking advantage of the symmetrical infrastructure on equal terms.

Services are created and promoted by the VSPs, and the end users select services from the VSP's offering in the OSE marketplace using the web interface. Revenues are collected by the VSPs, and the OSE system tracks all transactions and facilitates the revenue sharing (VSP, OSEO, OSEN, and PIP). VSPs must conform to the OSE rules and systems operated by the OSE Operator, creating customer choice and low OpEx. Actual deployments of the OSEM, such as operated by ViaEuropa in Scandinavia, shows a high initial take rate and constant upward trend as users turn over between VSPs but within the OSE. ARPU follows an upward trend as service innovation and competition encourage new services to replace old, while AMPU [NOTE: Need to spell out AMPU.] is high and predictable at each layer taking advantage of expertise and economies of scale.

Open Services Economy

The Open Services Economy is essentially an online marketplace in which VSPs, as sellers (of services), offer their goods to buyers, who choose the most appropriate service to meet their needs. It can be best described using the Ebay analogy in which every seller is also a potential buyer and vice versa. It is thanks to this relationship that the OSE model is so successful in stimulating the macro and micro economies. Moreover, this healthy competition and open marketplace make raising ARPUs possible, as over time, consumers choose the product that gives them the best price/performance for their needs, freeing wallet share to be spent on new innovative services and goods. The more efficient the economy becomes, the more it requires advances, in the form of efficiency-enabling services, and has the funds to buy these services.

Just like Ebay's contribution to thousands of small, medium, and large business around the world in opening the global economy opportunity, the Open Services Economy is stimulated by the globalization and scale of the opportunity now open to the VSPs in the Open Services Economy. With minimal investment and a revenue share model, VSPs can now compete globally and in an environment in which both the VSPs and the infrastructure providers (PIPs and OPSEs alike) have a common goals and agenda. The more services are sold over the infrastructure, the better it is for all parties.

Services and Bandwidth Requirements

Since the Internet has become an indispensable medium for virtually everybody in the industrialized countries, we have seen a rapid increase in the access speeds, both required by the applications and delivered by the industry and the service providers. Although initially bandwidth (bitrate) increases were justified by the requirements for Internet browsing and increasingly larger volumes of email exchanges, in the meantime more and more bandwidth-greedy content is being delivered over the Internet, and peer-to-peer applications consume the largest share of bandwidth in most broadband networks today. Peer-to-peer applications encourage users to share files, and a typical peer serves several gigabytes of files. A three-minute song usually requires 3-5 megabytes. A 10-minute movie can be hundreds of megabytes long.

A new generation of web-based service providers, offering services "over the top" (OTT), has boomed, thanks to enhanced personal communication. They have introduced new trends and have leveraged the power of the Internet, voice over IP, and TV over IP for effective communication. Just to name few of the most famous players in the consumer market:

- Skype with more than 150 million users lined up within two years
- YouTube with 120 million video streams per day; the company emerged in only nine months
- Myspace.com with 50 million visitors per month, after three years of operations.

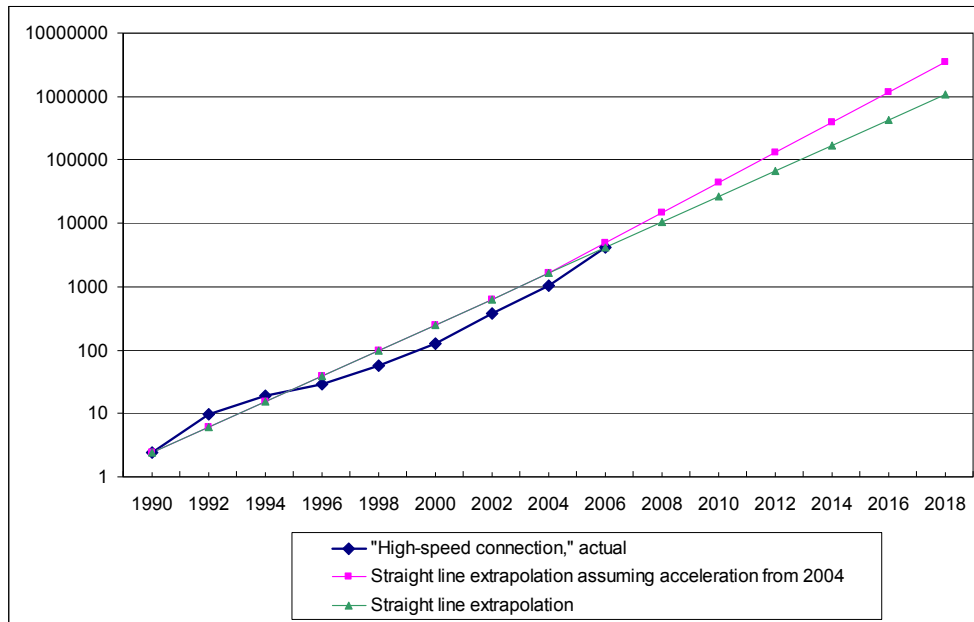
These non-facility-based service providers have dramatically contributed to "filling the pipe" and increased the demand for bandwidth, creating a social trend similar to the diffusion of the Short Message Service (SMS) within the mobile users' community. A significant step ahead in the request for higher bitrates has been the delivery of entertainment video via broadband networks, initially by some alternative service providers, but increasingly also by incumbent providers. Furthermore, the introduction of TV over IP has contributed to broadening the community of broadband consumers: typical households have more than one TV set, while PC penetration is not yet so pervasive.

This pattern of a race between application requirements and technical capabilities resembles very closely the pattern that has been observed in the PC industry. Every processor speed increase and every memory increase have quickly been absorbed by novel applications that could not even be perceived few years before. Image processing or video editing are some of the applications that required supercomputers not too long ago, but are now performed by school-age kids on their home PCs.

Nevertheless, it appears that very frequently the bitrate requirements for new broadband deployments are being justified primarily by the applications that are here today with little anticipation of things still to come.

Figure 10 shows the historical evolution of access bitrates for PC users and an extrapolation into the future. It is amazing to observe the exponential growth over the years. Although it may look daring to predict bitrates of more than 1 Gbit/s by 2018, we should keep in mind that Hong Kong Broadband Network and some other service providers are already offering 1 Gbit/s access to residential customers today, and that there are some substantial deployments of 100 Mbit/s access networks in some European countries (e.g., Denmark, Sweden, The Netherlands).

Figure 10. How Much Bandwidth Is Enough



Source: FTTH Worldwide Market & Technology Forecast, 2006-2011; Heavy Reading Report, June 2006

With just a little imagination, one can come up with examples for applications that require bitrates far above 20 Mbit/s:

- Download of large video files for editing or post-processing in an acceptable time requires bitrates far above those required for streaming (e.g., a 10 Gbyte video download over 10 minutes requires more than 130 Mbit/s without any protocol overhead).
- Joint video editing or other forms of remote collaboration on huge files requires very high bitrates to keep response times acceptable.
- Tele-presence, which includes video, voice, and applications inter-working concurrently.

There is, however, a major difference between the bitrates required for video streaming and most of the other high-speed applications. Most data applications are highly bursty in nature and require high bitrates only for a relatively small fraction of time. Therefore, many of these applications can share a reasonably large common bitrate pool in the aggregation and backbone networks, which can be highly oversubscribed. In contrast, streaming applications like broadcast video, video on demand, or voice over IP require the bitrates to be reserved for the entire duration of the application.

Depending on the precise service-level agreement between the service provider and the consumer, it may be necessary to permanently allocate the bitrate of one or more video channels for each individual subscriber in order to avoid the experience of video blocking (i.e., not enough available capacity in the network to transport the video stream).

As the holding times of entertainment video sessions are on the order of hours, rather than minutes in the case of phone calls, the blocking situation would likely persist for an unacceptably long period.



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