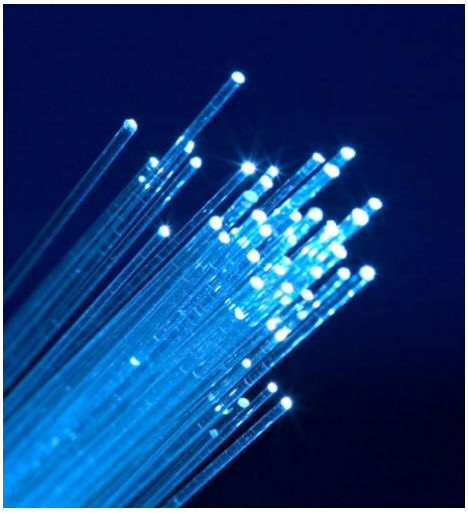
Creating a Fiber Future



White paper

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Creating a Fiber Future

Telecommunications Practice

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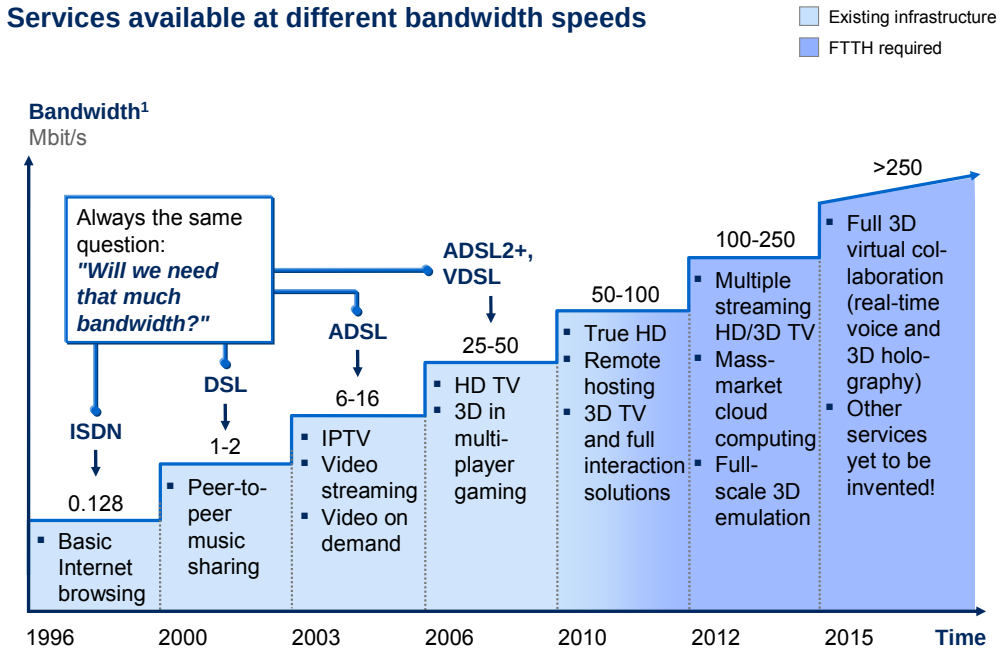
A whirlwind of consumer, technological, and public policy trends is blowing through the fixed-line telecommunications industry. In most countries, the debate is heating up over the need to upgrade the existing copper access infrastructures that have remained, to a large extent, unchanged over the last century – and some are taking action. At the center of this debate is the rollout of fiber and the role it will play in next-generation access infrastructure. The following white paper discusses why the time for fiber has come, what the financial and supply model challenges to deploy these networks in Europe are, and finally what the implementation challenges will be and how operators can address them.

FIBER SERVICES AND ECONOMIC BENEFITS

Since the Internet has become mainstream, end-user bandwidth requirements have steadily increased as new applications (particularly video) have taken advantage of broadband networks. In fact, available bandwidth has always been used up in the past. Given new services on the horizon, this trend will likely continue in the future. We are, however, soon getting to a point where xDSL techniques will reach a limit as to how much bandwidth can be extracted out of current fixed access networks. These still mostly comprise copper-based twisted pair lines running to each house. The essential constraint is that a large percentage of European homes is connected with copper loops of 1 km or more. Due to this loop length, the bandwidth is technically constrained to about 25 to 50 Mbps. Reaching higher speeds requires replacing copper with fiber.

EXHIBIT 1

Services available at different bandwidth speeds



1 Downlink bandwidth supported by respective technologies, respective uplink speeds are considered accordingly

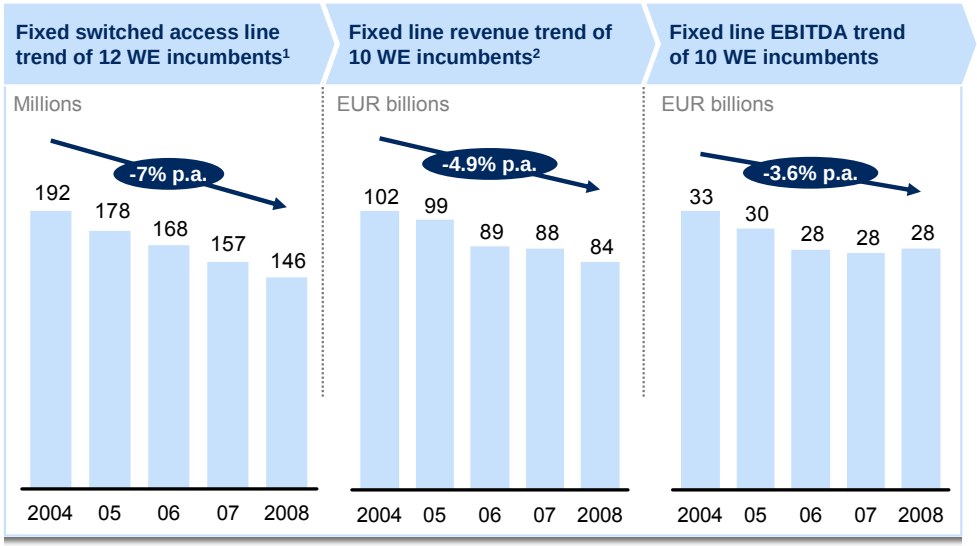
SOURCE: McKinsey

With the rise and concurrent usage of different services such as HD video, cloud-computing-based applications and remote storage, end-user requirements will soon surpass 50 Mbps or more. This will create a bottleneck in the copper access network that can only be resolved with an upgrade to fiber-based access technologies. The urgency to start upgrading is high, as it is estimated that a large-scale (nationwide) upgrade may take a decade or more to complete. As a comparison, the move from analog to digital telephony switching took about 10 to 20 years in most European countries.

The upgrade to fiber access networks may also be critical for the health of the fixed-line industry in Europe. Over the past 5 years, about 50 million households in Western Europe have “switched off” their fixed-line service. This has led to an average 4.9 and 3.6 percent decline in revenue and EBITDA margins respectively for incumbent fixed-line operators between 2004 and 2008 (Exhibit 2). Unless something is done now, further profit erosion will only make it more difficult for the industry to financially support an upgrade to fiber networks.

EXHIBIT 2

Number of access lines, revenues and EBIDTA margins for fixed line industry incumbents in EU12, 2004-2008



1 Domestic fixed lines for major European incumbents
2 Domestic fixed business of major European incumbents

SOURCE: McKinsey and Company

Finally, high-speed broadband networks based on fiber can yield broader socio-economic benefits. Fiber networks enable a range of innovative value-added services to be delivered straight to the end user, and improving and enriching their quality of life by connecting them to the world at high speed. For instance, people can better interact with government by using their personal government avatar that will advise them on how to complete their taxes or simply help them run errands in an efficient way. High-speed fiber networks can also bring improvements in the environment by allowing real-time intelligent traffic planning and simulation. Leveraging fiber broadband, transmitting large medical photographic records that consume very large bandwidth capacity can be done in a matter of seconds facilitating medical treatment of patients.

Deploying fiber infrastructure can significantly boost a country's competitive position, something that policymakers have noted. In developing economies, the rationale behind such investment is that it should attract multinationals and outsourcing businesses along with the accompanying direct foreign investment. In more advanced countries, the economic argument is that fiber can improve productivity, and its deployment offers "shovel-ready" infrastructure-building opportunities for governments seeking to stimulate growth. Research shows that

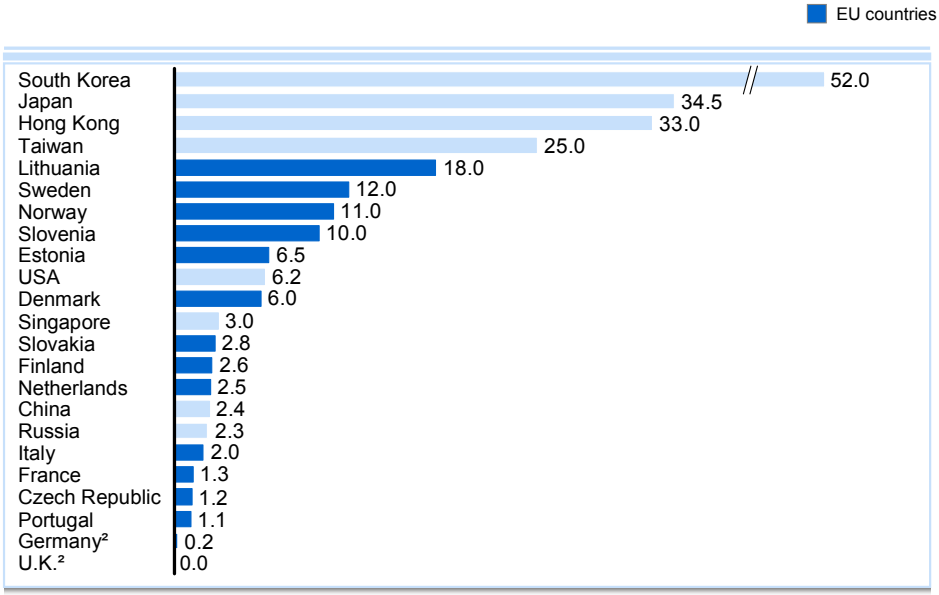
high-speed broadband infrastructure can increase GDP by 0.6 to 0.7 percent annually for every 10 percent increase in broadband penetration.

THE FINANCING CHALLENGE

The need for fiber is clear, but Europe is lagging behind the rest of the world. At the end of 2009, the number of fiber broadband subscribers totaled 44 million. Of this, only 2 million subscribers are based in Western Europe, a very low penetration compared with North America and the Asia Pacific region – although many European countries are planning to accelerate fiber penetration. Exhibit 3 shows the FTTH penetration country ranking according to the FTTH Council. Asia's most advanced markets – Japan, Hong Kong, and South Korea – enjoy fiber household penetration rates of 29, 30, and 46.5 percent respectively, while many European markets (with the exception of the Nordic countries and Slovenia) barely reach significant single digits.

EXHIBIT 3

Percentage of households subscribed to Fiber-to-the-Home/Building services, February 2010[1]



1 Figures only shows countries with > 1% FTTH/B subscriber penetration
2 France, Germany and UK penetrations were calculated separately as of Q3/2009 and December 2008 respectively

SOURCE: Global FTTH Council February 2010; IDATE, ARCEP, Pyramid research

The main hurdle in upgrading fixed access networks is financing. Achieving penetration levels in Europe (the EU-15 + the 12 newest member states) that begins to rival those in Asia will cost in the ballpark of EUR 300 billion. This

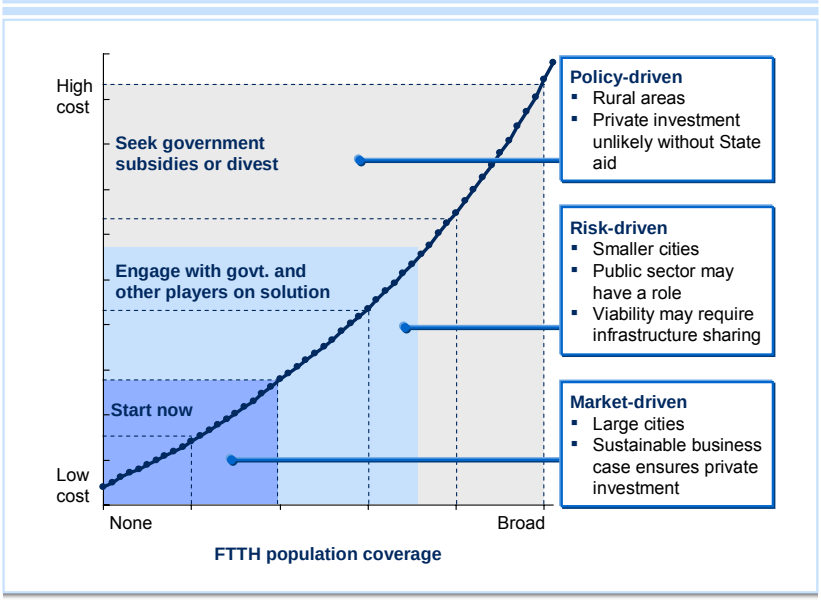
amount represents a significant stretch for the fixed-line industry. For instance, even if 100 percent of the industry free cash flow were to be invested in the fiber upgrade, it would still take 15 years to cover an investment of this scale.

The economics of deploying fiber remain challenging for private-sector incumbents. They are the industry's main infrastructure investors due to the high deployment costs that yield returns only in high-income, high-density, or new-build areas. Moreover, the European industry is reluctant to scale up investment levels in fiber due to the uncertainty around how fiber networks will be regulated. In our experience, regulation can easily affect 30 to 40 percent of the benefits in a typical fiber upgrade business case of a telecoms player.

EXHIBIT 4

Fiber-to-the-Home investment requirements by population coverage

Cost per household



SOURCE: FTTH Council; The Wall Street Journal Europe 19 January 2010; team analysis

Additionally, the cost to roll out fiber varies significantly between dense urban areas, middle-sized cities, and sparsely populated rural areas (Exhibit 4). In high-density, high-income areas, fiber rollouts could potentially yield positive returns for a private player, although it will mostly remain a risky venture depending on the operator's ability to "fill" the infrastructure and on the stability of the regulatory environment to preserve retail and wholesale pricing. In lower-income, low-density areas on the other hand, there is very little financial incentive for a private

company to invest in fiber infrastructure. When left to market forces, this essentially means that fiber rollout will materialize in only a limited number of areas, which is what we can observe today in Europe.

This mismatch in social incentives versus private incentives appears to lie at the core of the regulatory debate and the initiatives taken to support fiber. These issues are qualitatively different from those that have dominated regulatory thinking over the past two decades. Up to now, the intent was to open up existing networks and support competitive parity. As a result, policymakers have been trying multiple approaches to bridge the perceived social versus private gap, with some initiatives working more successfully than others.

If Europe does not want to fall further behind other regions in terms of ICT readiness, policymakers and industry players in Europe will need to work together to develop and align on regulatory and supply models adequate to ensure wide-scale fiber rollout. This may include a role for public supply in smaller cities and in the least profitable rural areas. Unlike private investors, governments can justify fiber investment on the basis of wider economic benefits beyond selling telecoms subscriptions and services. These include spillover effects to productivity, job creation, and growth in other industry sectors along with societal benefits such as CO2 reduction. The French and Portuguese governments have recently announced fiber stimulus packages on the basis of these types of "fiber macro case" arguments.

In order to bring clarity into potential regulatory models, it is useful to look at other markets that seem to have succeeded in implementing large fiber rollouts. The first approach, tested in several Asian countries, consists of a public supply model coupled with some form of regulated access to the incumbent's infrastructure. The purpose is to have state-of-the-art infrastructure without compromising the level of competition in the market. The second approach – as seen in the US and Hong Kong – foregoes subsidies and allows incumbent infrastructure to remain closed (i.e., with no wholesale obligations). In most of Europe so far, private investments in fiber rollout have been limited overall as policymakers are still trying to balance out a way of ensuring competition, while getting the infrastructure rolled out (Exhibit 5).

EXHIBIT 5

Regulatory models for fiber in United States, Asia and Europe NGAN SPECIFIC

	Model		
	"Laissez-faire" (US)	"Subsidy" (Asia)	"Open-access" (Europe)
Goal	▪ Push infrastructure ▪ Guarantee financial returns	▪ Make broadband accessible for everyone	▪ Push competition
Description	▪ Favors infrastructure competition ▪ No unbundling of fiber	▪ Favors service competition ▪ Favors open-access wholesale networks	▪ High degree of network unbundling ▪ Favors fiber unbundling/open access
Funding	▪ Operators fund the fiber network	▪ Government-subsidized deployments	▪ Operators and municipalities fund the fiber network ▪ Subsidies for rural/un profitable areas only

SOURCE: McKinsey and Company

WHY EUROPE CANNOT AFFORD THE WAITING GAME

The European industry cannot afford to play "the waiting game" while governments and regulators continue maturing their approaches to fiber-based offerings and networks. McKinsey's experience is that the fiber learning curve is steep and long, as the execution challenges to overcome are manyfold. They range from lack of standardized fiber operations procedures, customer migration management, and civil works challenges to complex installation procedures. Wireline telcos need to rethink every aspect of their business and operations in order to create maximum value and successfully execute the rollout and commercialization of the new services. In other words, fiber implies a full transformation of the company. The journey involves many unknowns, as the last time anyone rolled out a large-scale fixed access network was 100 years ago.

Once the decision to upgrade to fiber is made, the fundamental transformation of a telecom operator into a fiber company can be pursued in three successive waves:

- **Wave 1: Get started with key decisions.** Managers must make a number of initial structural decisions, such as choosing the most suitable fiber network architecture, taking into account economic and regulatory implications. They

should also define the most appropriate macro-fiber strategy and investment case; work out the rollout priorities and planning; identify existing IT gaps and the required new-generation network IT architecture roadmap; and develop their construction, supply chain, and operations strategies. Finally, operators need to define the most appropriate organizational structure and governance model to develop the fiber business in parallel to the old business.

- **Wave 2: Prepare for launch.** A well-oiled and high-quality operational model for network construction, supply chain management, and installation (including field force readiness) is of the utmost importance. This wave will also entail working out and completing detailed plans for the commercial and home installation approaches, as well as the marketing communication strategy and approach.
- **Wave 3: Establish the building blocks.** This wave of the transformation will require operators to ensure the sustainability of a new fiber-focused company to fully extract the value of fiber. To do so, operators will have to focus on improving operations, minimizing cancelations, developing standard sophisticated installation processes and improving maintenance practices (ensuring remote monitoring from day one). Failing to deploy these practices can jeopardize the fiber transformation business case since FTTH operational ratios will underperform those of copper networks (when everyone is expecting the opposite). It can also harm the fiber brand image early in the game, creating a perception that fiber is complex and cumbersome. Also critical is the development of distinctive products and services that showcase the fiber network's value proposition. While fiber is a superior infrastructure for multiplay, simply offering triple play services will not render sufficient differentiation from other infrastructures; nor will it capitalize on fiber's huge potential. To tap into all that fiber has to offer and gain a real competitive advantage, operators need to look beyond multiplay toward a new horizon of services, such as next-generation TV (e.g., true HD, 3D, etc.), OTT streaming, mass-market cloud computing, and advanced home integration services.

OPEN INNOVATION ECOSYSTEMS WILL BE CRITICAL

Fiber players should aim to build their own future by fostering the development and customer acceptance of tomorrow's services and applications. The industry should promote the development of "innovation ecosystems" in telecoms – ones that align the interests of different stakeholders, such as governments, universities, application providers, and other industry sectors. In e-health, for instance,

ecosystem participants could include pharmaceutical and device manufacturers, healthcare IT providers, distributors and retailers, outpatient and home care providers, inpatient care facilities, and payors.

Telcos could leverage their infrastructure to drive ecosystems for broader service innovation in other sectors. In Asia, for example, the digital city concept is gaining credence. The aspiration: to develop a city that senses, monitors, tracks, and triggers action as needed. The result: an intelligent city based on IT that enables communication between humans and the physical spaces they occupy. In such a city, residents can access high-speed services anywhere, anytime. The concept leverages ICT infrastructure, applications, and know-how, creating a unique, central starting position for future fiber companies.

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Over the coming years, copper access networks will need to be upgraded with fiber to keep pace with steadily increasing end-user bandwidth requirements. In addition to providing higher bandwidth, fiber can be critical part of rejuvenating the value proposition of the fixed-line industry with new innovative services, and counter the secular trend of line loss and profit erosion. Fiber also can yield broader socioeconomic benefits and improve a country's growth and competitiveness – something that has captured the attention of policymakers. Yet Europe is running behind other regions with so far only 2 million fiber-based broadband subscribers versus 44 million worldwide. The challenge is one of financing. The economics of fiber are challenging for the private sector, which could only see positive benefits from their investment when rolling out fiber in affluent, densely populated, or greenfield areas. Current regulatory debate centers on this discrepancy between social and private incentives, along with the potential actions to support fiber rollout. Several models are emerging that show how the industry can work effectively with policymakers to improve the business case and obtain the broader social benefits fiber networks can offer. The industry should take a proactive stance in leading this dialog and evaluate their investments in fiber now. Failure to move in a timely manner could further erode the financial capacity of the industry, and leave Europe further behind other regions.

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