Fiber networks: Faster payback means Better Connected

Enterprises are going digital, which is opening up a range of opportunities for operators to provide cloud services. However, only optical fiber networks can meet network requirements. What is the best strategy for minimizing costs and maximizing returns?

By Ryan Ding

Over the history of mankind, water, transport, and energy have played decisive roles in advancing our levels of productivity. These resources have been called the lifeblood and sinews of the economy. In the 21th century, ICT technologies are once again dramatically raising the productivity of our economic systems. Robust ICT networks are like a country's nervous system. In concert with our blood and sinews, they can unleash tremendous economic and social value. According to research by the International Telecommunication Union (ITU), when broadband penetration increases by 10 percentage points, GDP rises 1.3 percent, employment rises by 2 to 3 percent, productivity increases 5 to 10 percent, and innovation rockets 15-fold. At the same time, greenhouse gas emissions actually fall by 5 percent. To date, 151 countries have developed national broadband plans to enhance their ICT infrastructure. They aim to attract more investment from telecom operators by offering supportive policies, funds, and tax incentives.

Fiber is a good business and a long-term strategy

As more operators enter the market, competition in mobile broadband services has become more intense. In Thailand, for example, mobile broadband penetration was more than 120 percent in 2016. AIS, a Thai mobile operator, has now entered the home broadband market where penetration is even lower. AIS has created bundles that include optical fiber

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broadband and TV services, which has increased its average revenue per user (ARPU) and cut customer churn. According to Huawei's research, between 2010 and 2016 more than 50 mobile operators worldwide invested in fixed networks and provided fixed-mobile convergence (FMC) services.

In the enterprise market, the rapid growth in cloud services is creating new business for operators as more devices connect to cloud. Unlike traditional voice and Internet services, cloud services require ultra-large bandwidth, ultra-low latency, and highly reliable and stable connections. These requirements can only be satisfied with optical fiber networks. To develop both the home broadband and the enterprise ICT markets, operators have started to make strategic, long-term investment in fiber networks. For example, between 2015 and 2016, China Mobile procured 90 million kilometers of fiber strand and is rapidly expanding its home and business broadband services.

However, it's clear that fiber broadband development is far from ideal at a global level. Global broadband coverage is limited, average bandwidth is low, service take-up is low; meanwhile the cost of laying fiber connections remains disproportionately high. According to ITU, only 52 percent of global households have access to broadband, and 70

percent of connections are slower than 10 Mbps. Huawei has found that the cost of laying FTTH connections is over US$1,000 per household in one-third of global regions, and service take-up among connected households stands at just 15 percent. This means that payback periods for fiber network investments are much too long. Take one South African operator as an example. In a project laying fiber to a neighborhood of 2,000 households, the cost of delivering each FTTH connection was US$1,500. Fifteen percent of households actually subscribed to the services, which generated an ARPU of US$80 per month. This meant that the payback period for that operator's FTTH investment was more than 8 years. These problems of high costs and low take-up are a major barrier to the expansion of fiber broadband networks. They are a key issue for operators to address.

Cutting costs shortens the payback period

I. Government programs are increasing penetration and driving the digital society

The rollout of a fiber network is a major construction project for a city, and they are costly. For governments hoping to raise levels of broadband penetration,

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fiscal assistance and supportive policies for operator buildout are vital.

For example, in Europe, Germany's Federal Ministry of Transport and Digital Infrastructure launched its gigabit network strategy in early 2017. By 2025, over €100 billion will have been invested in creating a high-performance national network. This high investment will enable Germany to achieve its goal of connecting every house to broadband with a speed of at least 50 Mbps by 2018. In China, a policy of faster broadband for lower prices was adopted as early as 2013. To encourage the rollout of fiber networks, the Chinese Ministry of Housing and Urban-Rural Development ruled that all new-build homes must have FTTH connections. As of 2017, there are now 240 million households with FTTH in China, representing 80 percent of home broadband users.

II. Take-up rates can be raised by identifying high-value users, targeting investment, and speeding up connections

- **Identifying high-value districts and users for targeted investment and precision marketing**

Many operators still take a broad brush approach to network expansion. But if the areas they extend

coverage into don't contain high-value customers – if residents do not have the ability or the desire to spend money on broadband services – then the process of increasing take-up rates after network expansion will be slow and painful.

To solve this problem, Huawei worked with one Chinese telecom operator to identify high-value customers. Using data from mobile services, governments, industry consultants, and other sources, we collected a multi-dimensional array of data on targeted residential complexes in one city. This included residential density, house prices, the evening locations of the operator's high-value mobile users, the age of the apartment buildings, renter versus owner occupation, apartment turnover, competitor services and customer satisfaction with those services, and current network coverage. Using Huawei's targeted investment planning tool, we mapped users onto residential areas, and ultimately identified over 3,000 high-value apartment complexes and more than a million high-value users. This enabled the operator to accurately identify its target customers, and follow through with precision marketing. The value to the operator was enormous: The success rate for telephone marketing jumped by a factor of three when it targeted the high-value customers we had identified, and in just three months it was able

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to increase the take-up rate for its FTTH services by 6 percent.

In India, Huawei helped another operator to target its FTTH investment by identifying high-value blocks. The operator had laid fiber to fewer than 60 densely-populated high-rise apartment blocks, just 2 percent of the total in the city. Fear of low take-up was holding it back from extending its services to 98 percent of households, but with only a small network, it couldn't achieve the economy of scale it needed to reduce costs, and its broadband business was struggling. Huawei's SmartCapex methodology and targeted investment planning tool enabled the operator to identify 1,200 mid-rise apartment complexes, with over 80,000 households. These complexes didn't have the same level of disposable income or user density as the high-rise complexes, but they represented great potential for future growth. Balancing the cost of rollout against the higher ARPU and increased use of base stations and fiber, the payback period on laying fiber to these users turned out to be quite short. The operator targeted the 1,200 identified complexes, and delivered competitive service packages, with the result that it quickly achieved 50 percent take-up, and in the end, recouped its entire investment in less than three years.

- **Quick delivery of services, good processes, better skills**

New entrants to the telecom market, unfamiliar with the intricacies of running fiber networks, often find themselves engaged in time-consuming, redundant labor. The complexity of number allocation, uncertainty over fiber resources, and lack of skilled staff, mean that operators struggle to roll out their services fast. And if customers have to wait to be connected, some will drift away due to a poor user experience, and take-up rates will remain stubbornly low.

Huawei's lightweight MiniOSS is designed to solve the problems of over-long processes and lack of visibility into resources. It references China's best-in-class FTTH operator business process, and links up the entire operator based on IT systems: network construction, service marketing, and service engineers. All fiber cables are efficiently recorded and the information easily shared and updated, providing accurate, usable information on 99 percent of the company's network resources. One operator in South Africa was able to bring its FTTH network online in under two months using MiniOSS, and speed up the connection of customers by 60 percent. This helped it to win and retain a high level of customer take-up in its coverage area.

In terms of employee skills, China's fast rollout of FTTH networks offers valuable experience. China

Telecom Shanghai is a case in point: It has developed a portfolio of over 40 engineering standards for use in the laying of FTTH networks, covering both outdoor and indoor scenarios. The company set up a virtual worksite and trained over 3,000 network engineers in fiber deployment and maintenance. The results were a huge increase in the speed and efficiency of FTTH deployment. In 2011, only 30 percent of new FTTH lines were successfully activated on the first attempt. By 2016, that proportion had risen to over 95 percent.

III. Collaboration cuts the total cost of FTTH deployment

- **Industry alliances: Finding partners to help roll out broadband**

In the city of Surabaya, Indonesia, the costs of fiber rollout were high because operators couldn't gain access to the rights of way they needed. In 2016, three local operators teamed up with the Ministry of Communications to form a broadband industry alliance that ultimately brought in 17 members drawn from government agencies, real estate developers, property management companies, fiber/equipment providers, content providers, and water/power infrastructure companies. The alliance enabled all participants to engage more positively in the construction of fiber networks.

The municipal government started to recognize the boost that home broadband connections bring to the economy, and set a hard deadline for decisions on rights-of-way applications. Real estate developers saw the added value that fiber broadband brought to their properties, and agreed to build fiber conduits into their new developments. Property management companies were able to agree conditions on benefit sharing and access to existing properties. And utility infrastructure companies gained a new revenue stream from leasing pipe/pylon access to network operators. The alliance brought about a huge 40 percent drop to the cost of

building FTTH networks in Surabaya.

The success of Surabaya's approach clearly shows how coordination and benefit sharing can dramatically reduce the costs of building out fiber networks.

- **Infrastructure coordination: 30 percent savings achieved by working with a utility**

Routing FTTH through existing electricity pylons and underground pipes is a way to work around the need to obtain rights of way and dig trenches to lay cable. Using existing infrastructure can bring savings of 30 percent or more on network buildout.

In 2014, Vodafone established SIRO, a joint venture with an Irish power company. Taking advantage of the network of electricity pylons and conduits, Vodafone has been able to roll out a fiber network at low cost. In 2018, it plans to connect 500,000 households in 51 towns and cities with an FTTH network.

There are many similar examples around the world of collaboration with electricity companies. In Kenya, when one operator laid fiber connections to a high-consumption district of low-density, expensive housing, the cost of digging its own trenches meant that the cost per connected household was more than US$2,000. In early 2017, the operator started working with a power utility, routing an overhead fiber network through its pylons to a densely-populated urban village area. This brought the cost down to just a few hundred dollars per household. Worthy of note is that the Kenyan power company realized that it was in a position to roll out fiber networks at low cost, and is now planning to enter the fiber broadband market itself. Over the next five years, it will build extensive FTTH networks.

We have seen many similar stories. In 2016, Italy's biggest power company, Enel, announced that it would invest €2.5 billion in building FTTH networks in 200 or more cities, using its existing pylon

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infrastructure. It plans to lease the networks to operators, which should be a powerful stimulant to the competition in local broadband market and broadband development.

- **Mobile base stations anchor fiber broadband: fixed/mobile synergy**

When mobile operators enter the fixed-line broadband market, Huawei recommends that they use their large network of mobile base stations as anchor points for their new fiber networks. Fiber only needs be laid over the short distance from the base station to the surrounding household. One operator in Mexico City used this approach, cross-referencing its existing base station network against fixed broadband demand. It identified 20 or so base stations to be used as fiber hubs, installed mini OLT terminals, and laid cable to customers no further than 300 meters away from the base station. Very quickly, it was able to offer fiber broadband services to adjacent business and residential buildings, and was generating revenues within two months. The total payback period was under 2.5 years – an extraordinary commercial win.

- **Using microwave solutions to deploy fixed networks shortens project time by 70 percent**

One operator in Greece faced many challenges in network deployment: too many islands, the high cost of submarine cables, and long engineering projects. With E-Band, Huawei's innovative, high-capacity microwave solution, the operator was able to offer high-speed Internet and TV services for users living on the islands without any need for submarine cables. E-Band provides bandwidth as high as 10 Gbps over a 10-kilometer microwave link, supporting fixed broadband services with five nines reliability. With Huawei's solution, the operator shortened its buildout time by 70 percent. As of the end of 2016, the operator had deployed 1,000 microwave links supporting its nationwide broadband network, and attracted 100,000 fixed network users.

Based on our analysis of global best practices, we're convinced that operators can achieve fast, cost-effective fiber buildout. They just have to use the techniques I've outlined here: differentiated service design, targeted planning, fast number allocation, infrastructure coordination, and fast network deployment. These techniques enable operators to bust the high cost/low take-up barrier that has hindered fiber rollout, and drastically shorten their payback period on fixed broadband network investments. We will continue to work with operators to explore paths to low cost and high efficiency in network buildout. Together, we can bring forward the day when 100 percent of households are connected to ultrafast broadband networks.