



Utilities' contribution to national fiber development

How utilities and telecom operators can cooperate to accelerate fiber deployment

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Arthur D Little

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Executive summary

As the race for building fiber infrastructure accelerates globally, utilities (especially electrical utilities) are increasingly seen as new credible players. In the most convincing cases, utilities step in and play a complementary role in national fiber development. Engagement of utilities in fiber development can result in a win-win situation for national agencies, the utilities themselves and telecom operators. From one side, utilities can exploit some advantages in fiber development, leading to accelerated fiber deployment and less spending of national funds on network expansion. The utilities themselves stand to benefit through the diversification of their revenues and enhancement of their core businesses. From the other side, telecom operators benefit from the ability to reach hitherto unprofitable customers. In this article, we detail how utilities position themselves for national fiber development, and how they can be engaged.

1. The ultra-broadband demand-supply balance remains an unsolved equation

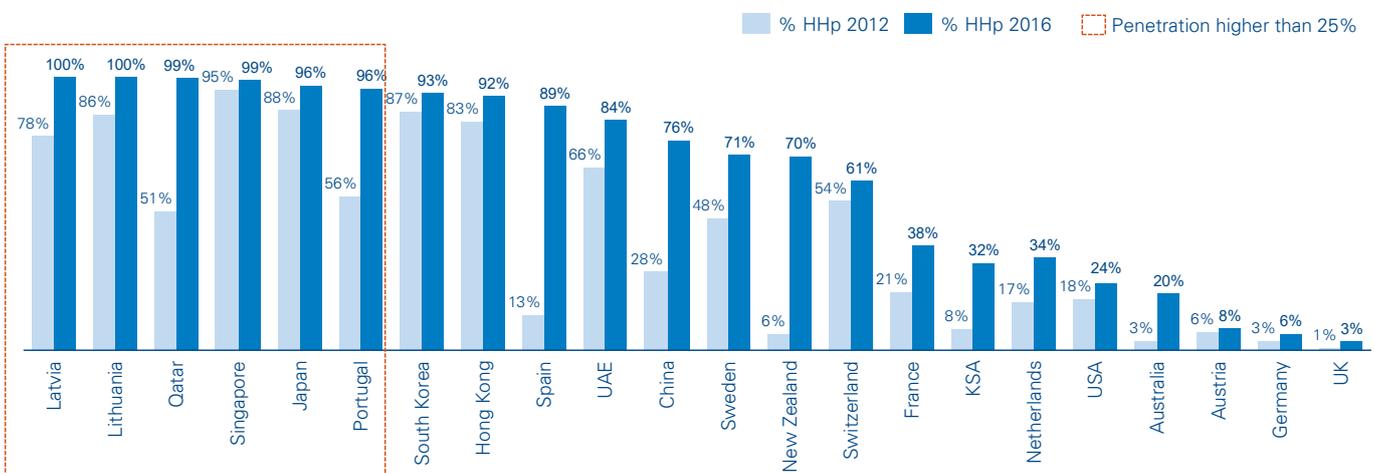
Globally, the race for fiber infrastructure has been accelerating in the recent past. The number of countries that achieved 95 percent fiber-to-the-home (FTTH) coverage increased from 1 in 2012 to 6 in 2016. Similarly, the number of countries that achieved higher than 50 percent coverage has increased from 10 in 2012 to 14 in 2016.

The growth is driven by commercial purposes (the business case for fiber is sound), as well as national development agendas, which consider ultra-high-speed broadband a critical enabler of economic growth. Several countries globally have plans to increase the coverage targets for high-speed fiber broadband.

Countries seriously willing to deploy FTTH now (e.g., Qatar, New Zealand and Sweden) can achieve full coverage in less than 10 years. In markets where fiber deployment started earlier (e.g., European markets such as the UK and Germany), the expected time frames rise to 15 to 20 years due to operators' network strategies, competitive dynamics and regulatory uncertainties.

Nevertheless, despite demand and push from national entities, only 11 countries in the world have achieved fiber penetration¹ equal to or higher than 25 percent.

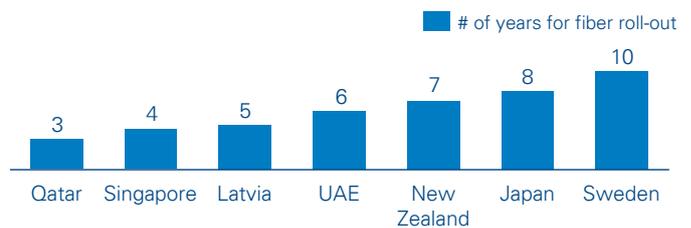
Figure 1: Households passed, 2012 vs. 2016e



HHp – House holds passed HHC – House holds connected
 Source: Euromonitor, IDATE World FTTx market June 2016, Arthur D. Little analysis

1 Defined as Households connected (HHC) over Households served (HHs). Source: FTTH council

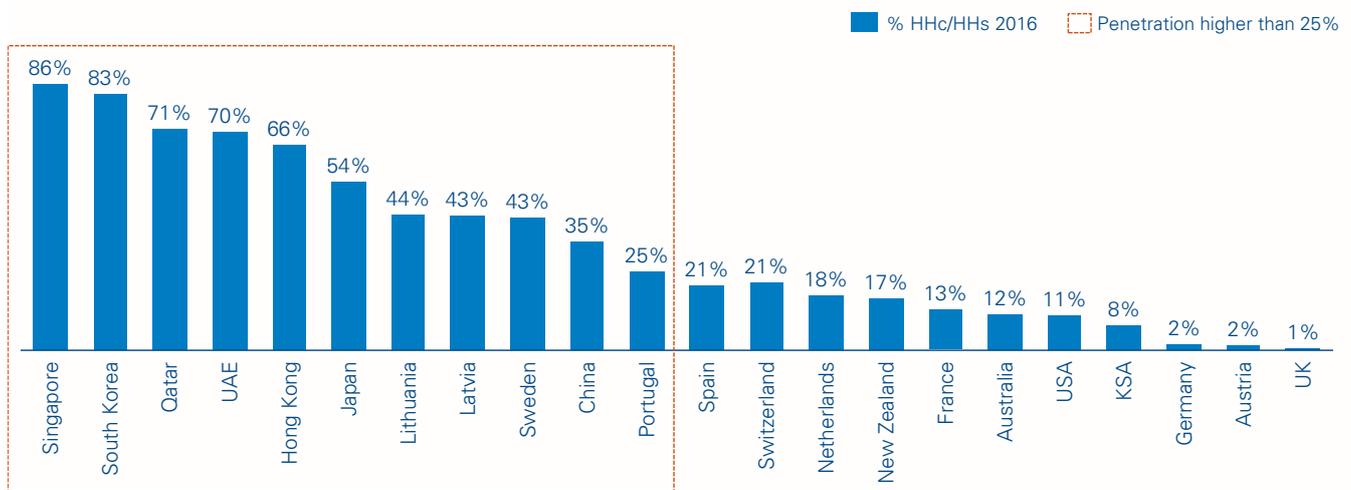
Figure 2: Time taken to deploy nationwide fiber



Note: New Zealand expected roll-out from 2013 to 2019, Sweden started in 2006, and expected to reach 80% coverage by 2017
 Note: Duration calculated as the time taken to roll-out fiber from 20% to 80% of HHs
 Source: Arthur D. Little analysis

So far, the reasons for slow fiber deployment vary by country, but – generally speaking – can be explained by the fact that user application requirements in terms of bandwidth and latency have remained moderate, leading to low take-up rates. These requirements could be satisfied more competitively with alternative technologies such as DSL later augmented with vectoring, bonding, etc., or even 4G/4G+ mobile broadband, which are less investment intensive and hence more suitable for areas that are not highly populated or digitalized. However, more recently the demand for 1Gbps products is increasing, and assumed to be 10 percent of fixed-broadband market demand.

Figure 3: Households connected, 2016e

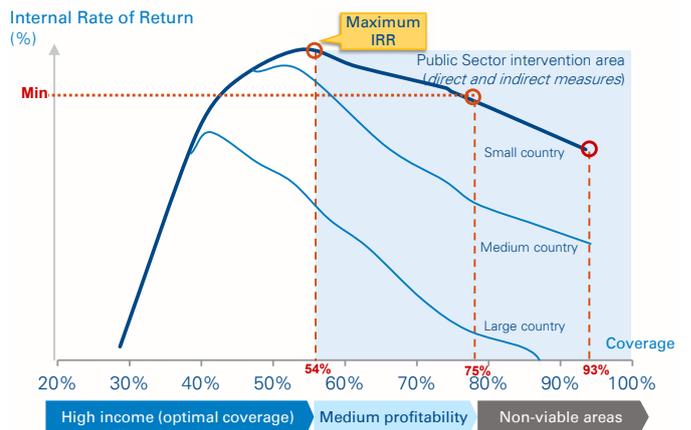


HHp – House holds passed HHc – House holds connected
 Source: Euromonitor, IDATE World FTTx market June 2016, Arthur D. Little analysis

To further exacerbate this situation, operational and regulatory risks generally offset the strongest willingness to invest, as obtaining permits and rights of way from regions or municipalities can turn into a nightmare. This is especially true when operators plan to adopt vertically integrated models in which the retail exploitation of the built fiber asset is exclusive to the infrastructure owner.

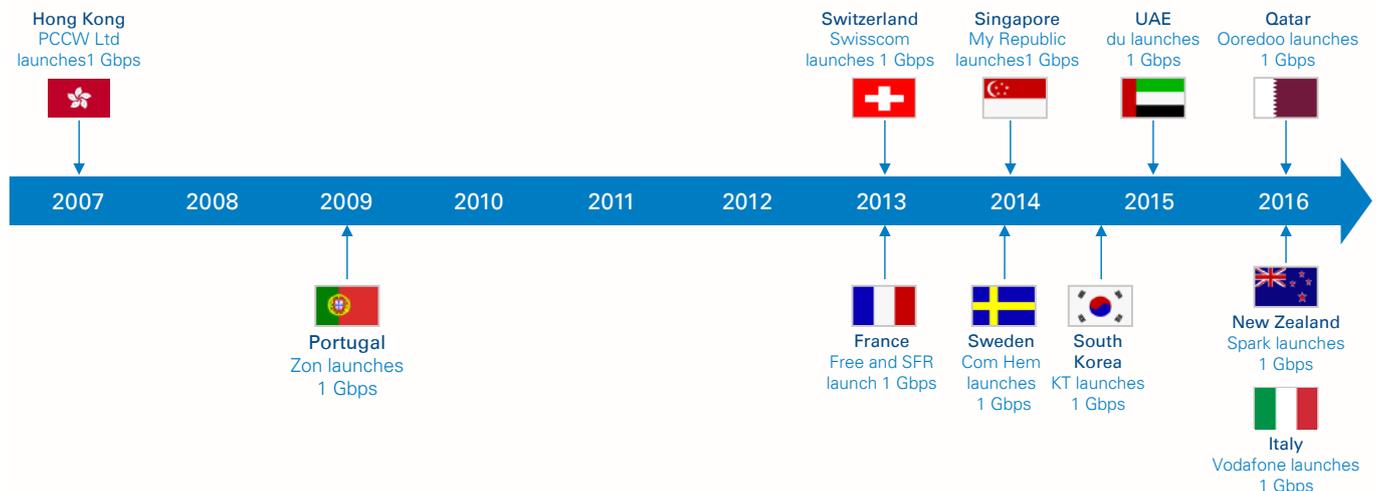
As a result, national broadband plans suffer from structural voids, as few rational investors are ready to commit to covering more than 50 percent of their countries without public support, be it direct (financial subsidy) or indirect (demand subsidy and regulatory certainty).

Figure 5: Return profile for fiber investments



Source: Arthur D. Little analysis

Figure 4: Launch of 1 Gbps offers, timeline



Source: Publicly available information, company websites, IDATE World FTTx market June 2016, Arthur D. Little analysis

2. Several utilities are contributing to national fiber development

As alternative network providers, utilities are well positioned to play a complementary role in national fiber development. We have seen several utilities around the world stepping in and trying to fill the gaps left by telecom players.

Utilities have more reasons to be confident now, as the current business context seems more favorable to these initiatives, compared to the bust of the original tide of alternative players in early 2000:

- Rising demand for ultra-broadband among consumers, especially in light of newer applications such as 4k, 8k, VR and AR;

- The accepted role of fiber companies or wholesale-only players in the competitive arena;
- Higher availability of public funding or government-led infrastructure initiatives;
- Incumbents mainly focused on the most lucrative areas;
- Fiber specialization offering better risk/reward balance;
- Significant unrealized value of the left-over ducting and pole capacity among many utilities.

Figure 6: FiberCos set up by Electricity Utilities

| | US | Ireland | Norway | Italy | New Zealand | Basel, Switzerland | Bavaria, Germany | Denmark |
|------------------|--|---|--|---|---|---|---|--|
| Utility |  |  | 36-utility partnership |  |  |  |  | 14-utility partnership |
| Fiber Venture | EPB Fiber | SIRO | Altibox | Open Fiber | Northpower Fiber | IWB Net | M-Net | WAOO |
| Trigger for FTTx | <ul style="list-style-type: none"> ■ Business diversification ■ Public funding | <ul style="list-style-type: none"> ■ Market opportunity ■ National policy | <ul style="list-style-type: none"> ■ Business diversification | <ul style="list-style-type: none"> ■ National policy ■ Public funding | <ul style="list-style-type: none"> ■ National policy ■ Public funding | <ul style="list-style-type: none"> ■ National policy ■ Market opportunity | <ul style="list-style-type: none"> ■ Business diversification | <ul style="list-style-type: none"> ■ Business diversification |
| Business model | <ul style="list-style-type: none"> ■ Retail | <ul style="list-style-type: none"> ■ Wholesale | <ul style="list-style-type: none"> ■ Retail | <ul style="list-style-type: none"> ■ Wholesale | <ul style="list-style-type: none"> ■ Wholesale | <ul style="list-style-type: none"> ■ Wholesale ■ Retail (B2B) | <ul style="list-style-type: none"> ■ Retail ■ Wholesale | <ul style="list-style-type: none"> ■ Retail |

Source: Arthur D. Little analysis

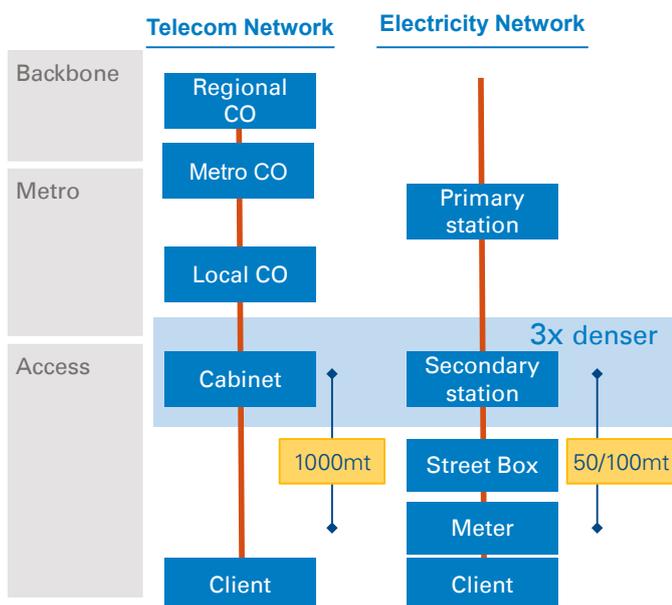
3. Utilities have inherent advantages

As alternative network providers, utilities have some inherent advantages in rolling out fiber networks, with some overrated and others underestimated.

1. Scope to lower the build cost, but be aware

The infrastructure deployed by a utility to offer its core electrical services is very similar to the fiber network architecture. In particular, the hierarchy of an electrical network follows the same hierarchy as that of an FTTH network, but is much denser (up to three times). Therefore, the fiber network can theoretically reuse the electrical infrastructure while optimizing its path to avoid redundant and unnecessary infrastructure deployment, thereby lowering the overall cost of fiber network deployment.

Figure 7: Telecom Network vs. Electricity Network



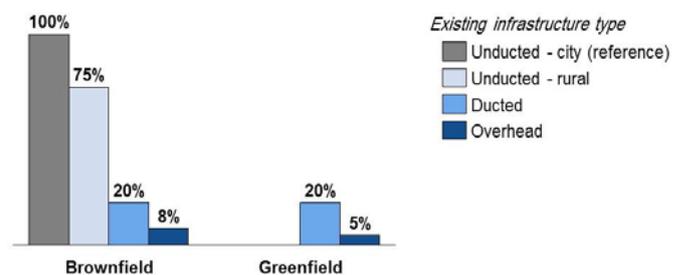
Source: Arthur D. Little analysis

Utilities could lower the cost of fiber network deployment through the reuse of spare infrastructure, depending on the area to be covered and the existing infrastructure of the utility.

The effective savings highly depend on the areas to be covered, which could be largely classified as greenfield versus brownfield, while the electricity infrastructure could be classified as underground versus overhead.

However, in the absence of suitable infrastructure, the cost savings will be minimal, as infrastructure reuse is limited.

Figure 8: Comparison of civil costs incurred to deploy fiber on existing infrastructure, per meter of deployment



Source: Arthur D. Little analysis

Greenfield areas

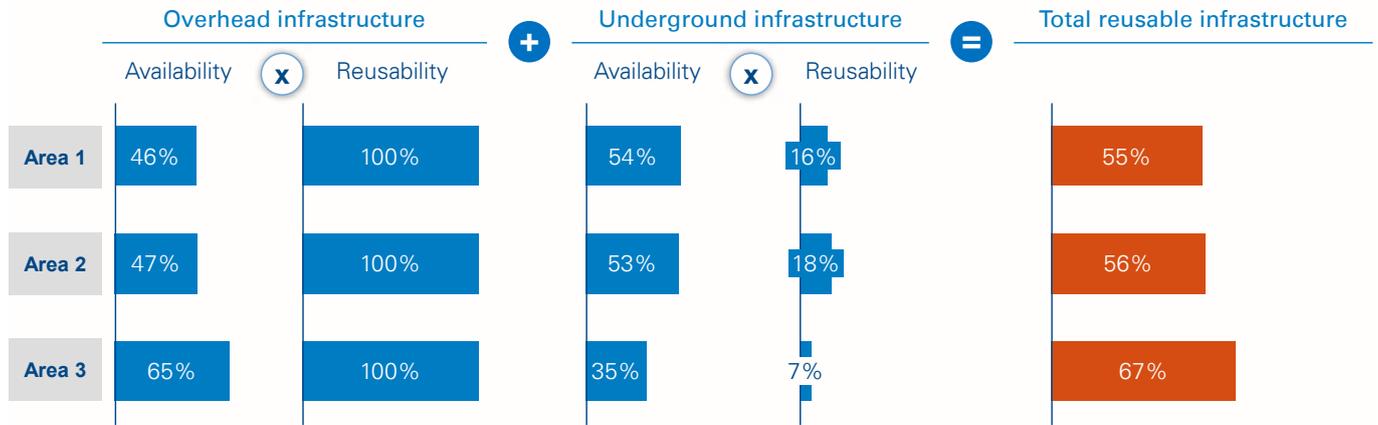
Greenfield areas are those where the utility has not established electrical feeder networks, but plans to do so in the future (this can be a large part of the new fiber deployment in many fast growing countries, such as Middle East). Utilities can achieve significant cost savings in these areas compared to new deployment by telecom operators. Civil works form nearly 60 percent of the total cost of a new network deployment. Utilities deploying electrical networks to reach new developments dig trenches, lay ducts or install poles to provide electrical services. The same infrastructure can be used for deploying a fiber network simultaneously – resulting in 80–90 percent savings on the civil costs, when compared to new telecom deployments by third parties.

Brownfield areas

Brownfield areas are built-up places where electrical feeders already exist to the customer premises. The ability of utilities to lower the cost of fiber deployment in brownfield areas largely depends on the nature of existing infrastructure. Potential elements that can be reused by electrical utilities in brownfield areas include ducts, poles, transmission towers, overhead cables, and substations for colocation of fiber equipment.

In areas with existing overhead electrical networks or ducted underground networks, the cost reduction achieved for fiber deployment is close to those in greenfield areas. This is because it requires limited additional work, such as deploying fiber on

Figure 9: Synergies by reusing electrical network announced by ENEL (Italy)



Source: Enel presentation to the Italian Senate of the Republic

existing poles below electrical lines or installing fiber in sub-ducts within existing ducts.

In this respect, Open Fiber (Italy) announced the possibility of achieving a cost advantage through Enel’s existing power infrastructure, providing the equivalent of duct access for total reusability of ca. 55–67 percent, which has been estimated to reduce build cost by approximately 25 percent.

Similarly, Altibox (Norway) is said to enjoy significant cost advantage over Telenor, with average build cost estimated at approximately €2,500 per home (vs €3,400 for Telenor).

However, our experience is that such synergies are more complicated to achieve on the ground:

- Reusability of an electrical network must be proven, and initial estimates may lead to effective synergies less than 20 percent;
- Aerial infrastructures have high potential for reuse, but they may be associated with sparsely populated areas where wireless solutions may fit better anyway;
- Beyond reusability, lower-cost figures may be achieved by adopting innovative business practices, such as 50 or 60 percent sign-up requirements in new areas, or asking customers to dig their own trenches (inverting the concept from “last mile” to “first mile”).

2. Faster deployment through privileged rights of way

Utilities can ease several constraints related to rights of way and civil works, as they have access to public areas, even in well-developed parts of cities. On the other hand, without privileged access and optimized procedures, the process to obtain right-of-way licenses could take two to four months in certain countries and municipalities. In areas where construction standards are

not defined, telecom operators could take two to three years to enter new developments.

Electricity and water utilities are the first service providers to reach new developments and, in most cases, dig trenches and lay ducts or install poles to provide their own services. By deploying fiber on the same infrastructure, utilities can ensure that fiber connectivity is available in homes even before the houses are occupied.

Utilities typically have well-defined processes for coordinating with various public agencies and private owners to obtain rights of way. This helps them reduce unexpected delays and interruptions in rolling out the fiber network. They also have access to the manholes or poles in their existing infrastructure, which helps them interconnect or extend networks from different points in cities.

On the contrary, utilities also face their own challenges. Examples include generally overloaded and lengthy internal processes, as well as developing safety procedures with electrically competent contractors for installing fiber networks with minimum interruption of core electrical services – especially in brownfield areas with overhead deployments.

3. Availability to play as neutral telecom wholesale players

In many of the recently launched initiatives, utilities deploying fiber networks prefer to operate as neutral wholesale providers for passive (GPON) or active (bitstream) services. This enables all telecom service providers to focus on retail operations, while limiting their upfront investments in fiber deployment.

Such competitive plays are quite unique, though it is the norm in Sweden, as it prevents fiber infrastructure duplication while creating a level playing field in areas where single telecom

operators may struggle to achieve the minimum take-up rate to make the infrastructure investment viable.

Regulators generally mandate this neutral competitive positioning. This is the case in Europe, wherever the infrastructure player, be it a utility or a telecom infrastructure operator, enjoys support from public funding. Several utilities have started offering not only passive services, but also active wholesale or bitstream access, thereby enabling ISPs to offer services to customers.

As an example, Northpower and Ultrafast Fiber in New Zealand have implemented the active wholesale model, and now have more than forty-five service providers on their networks, offering various services such as voice, broadband, TV and home security. Open Fiber in Italy seems to be following the same approach.

Finally, utilities are exempt from the typical cannibalization dilemma suffered by telecom operators with extensive legacy fixed networks (e.g., copper). In such cases, utilities act as accelerators for national broadband plans, even exercising positive competitive pressure on telecom incumbents.

Eventually, utilities can help to extend the reach of telecom operators to areas that were previously considered commercially unfeasible.

4. Attitude towards long-term investments

Investing in infrastructure is quite different from investing in a vertically integrated retail business. This applies to telecom businesses as well.

Access network fiber, with an open access model, is a quasi-monopolistic infrastructure; we rarely find overlapping fiber infrastructure around the world. As a consequence, utilities might be ready to accept payback time frames of more than seven years, provided that clarity and stability of regulation will be in place.

This will especially hold true in areas of market failure where telecom operators are typically reluctant to invest.

4. Utilities have a variety of reasons to diversify into fiber business

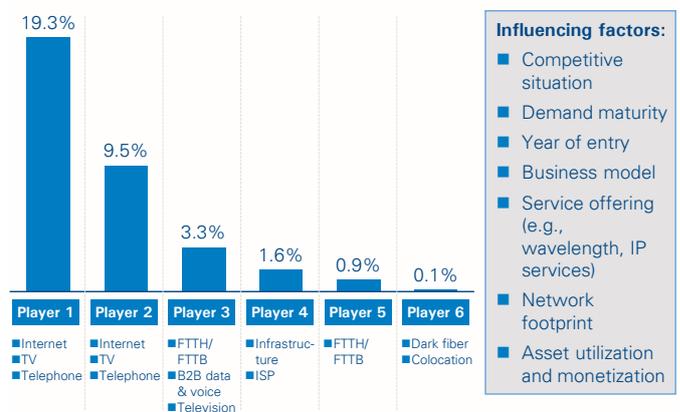
Reasons utilities diversify into fiber business largely vary by country. Sometimes there are prominent and contingent reasons, while more often, the overall decision is driven by a combination of factors, such as electrical business stagnation, soundness of the business opportunity itself, smart-grid upgrade, political call, and/or contingent availability of public funding.

First and foremost, fiber development gives utilities an opportunity to diversify their revenues.

As seen from mature markets, a utility could make up to 20 percent of its revenues from fiber business, depending on the chosen business model. Retail business models are richer in revenue contribution, but not necessarily in profits.

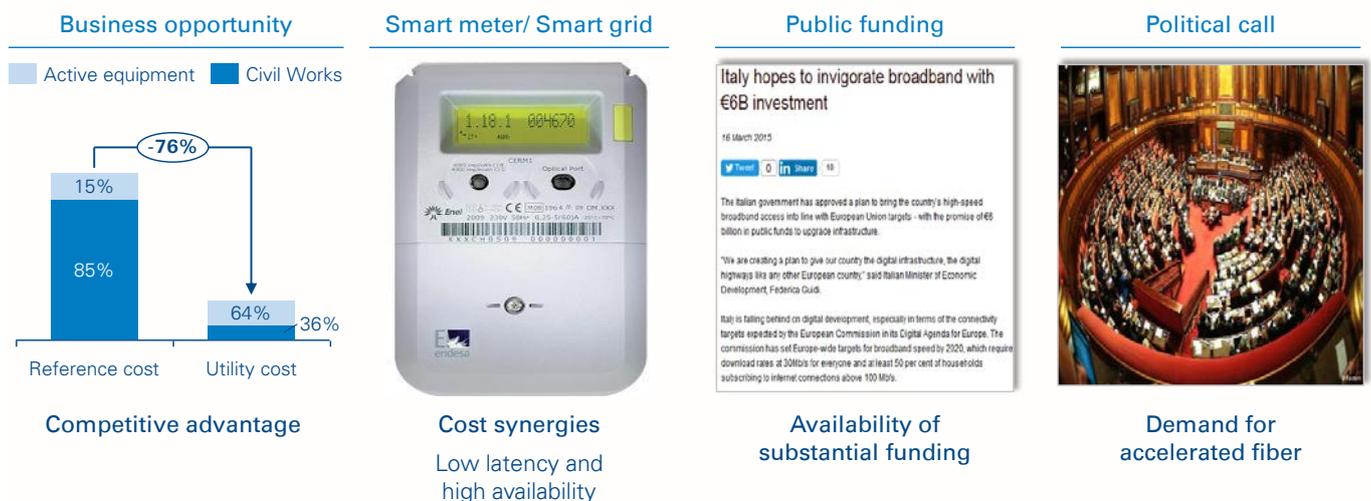
Utilities that already have fiber assets deployed on their long-haul networks (i.e., transmission networks) have generally opened them up to third-party use, but they could monetize their assets better if they deployed complementary fiber-access networks.

Figure 11: Telecom revenue as % of utility revenue¹



¹ Group revenue denotes total revenue of parent co. including utility, telecom, and other sources
Source: Arthur D. Little analysis

Figure 10: Drivers for electricity utilities to go for fiber



Source: Arthur D. Little analysis

Additionally, utilities deploy fiber to achieve independence for their internal telecom needs and benefit from the fiber infrastructure for their own internal use.

There is an increasing need for making utility networks smarter and equipped with high-bandwidth communication and more important, there is a need for very low latency and high availability, as demanded by certain internal applications such as tele-protection.

However, deploying fiber purely for internal use is not commercially feasible. Sharing the costs of deployment between internal and external purposes makes the investment

more attractive. For example, utilities in the US, Germany and Ireland have benefited from rolling out fiber, as they reserved a few fiber strands for their own internal use while counting on external monetization to recover the initial investment.

In a few markets (such as Switzerland) and cities (such as Chattanooga, Tennessee), utilities are controlled by local municipalities, and their decisions to invest into fiber are aligned with the vision to improve the standard of living in the city or to boost the local digital economy. Therefore, the utility may be rolling out fiber to improve the local quality of life and make its territory a more attractive investment destination.

5. Three business models can be adopted

Utilities engaging in fiber development have been observed to follow one of three notable business models, as listed below:

1. **Wholesale operator with telco partner**
2. **Wholesale operator, state-triggered or co-owned**
3. **Independent retail/wholesale telecom operator**

In the first case, the option to partner with telecom operators to diversify into fiber business is straightforward. The utility offers wholesale services (active or passive) to telecom operators, which provide retail services on the fiber network. Telecom partners share the initial investment risk, especially in the case of large roll-outs, by guaranteeing purchase commitments and minimum utilization of the network. Sometimes, telecom partners also bridge gaps in skills, such as network design, network deployment and geo-marketing, and gaps in telecom systems such as Operations Support System and Business Support System.

Though the utility may partner with one or more telecom operators, it typically retains the right to offer wholesale capacity to any telecom operator to augment its revenues from the deployed infrastructure. IWB is a good example of such a model. IWB and Swisscom co-invested in deploying fiber in Basel. Swisscom has committed to a long lease of a few fiber strands to offer telecom services to retail subscribers, while IWB remains free to wholesale the other fiber strands to other telecom operators or use it for its own purposes.

In the second case, the state-aid component could be in different forms – a subsidy, a zero-rate long-term loan, setting up a joint venture with the state, etc. The availability of the state aid typically mandates that the utility follows the wholesale model in order to promote service competition. An example of this business model is Oman Broadband Company (OBC), which was set up as a joint-stock company wholly owned by the Government of Oman. OBC is focused on the deployment of a broadband infrastructure, providing equal and open access to telecommunication service providers on a wholesale basis, enabling end users to efficiently leverage high-speed

fiber connectivity in Oman. OBC partners with government-run utilities and ministries, such as the Public Authority for Electricity and Water, the Ministry of Regional Municipalities and Water Resources, and Haya Water, to reduce the cost of civil works. The company has covered 23 percent of the Muscat Governorate, and aims to achieve 85 percent coverage by 2020.

Northpower Fiber and Ultrafast Fiber in New Zealand are other examples of utility-led fiber roll-outs set up with government funding to cover rural areas. In contrast, Open Fiber in Italy started as an autonomous initiative by Enel (it was initially called Enel Open Fiber), but ended up as a joint venture with Cassa Depositi e Prestiti (CDP, an Italian government fund) after the merger with Metroweb (a historical fiber company active in a few cities in Northern Italy). In our view, SIRO is another example which operates under Model 1, but also has the potential to move to Model 2 for selected areas.

In the third case, utilities play the role of full-fledged telecom operators. M-Net in Germany and electrical companies such as OptiLink and EPB in the US engage in wholesale and retail services. This is often the case for those utilities that decided to diversify into telecom business early, around 2000.

Though this business model helps utilities to capture a larger part of the value in the fiber broadband market, it is extremely challenging, as it demands a strong build-up of commercial and technical telecom capabilities. Further, telecom operators are not incentivized to procure wholesale services from the utility, due to the direct competition threat at retail level.

Recently, utilities taking up the role of stand-alone wholesale operators is not widely observed. (It is more the case for utilities that started this diversification process in the early 2000s). The utility may not be able to achieve extensive coverage through this model, as some areas are not feasible without state funding. Further, the utility carries the risk of upfront investments in areas where telecom operators may not be interested in offering retail services.

The retail model: EPB case (US)

The case of EPB is exemplary in showing how far diversification into telecom services can go, and the hurdles and criticism that utilities may encounter along the way.

As early as 1996, EPB decided to invest into telecoms and connect its electrical assets (e.g., substations), backed by its main shareholder, the municipality of Chattanooga, Tennessee. The project was resumed after stagnation in 2000, after the company obtained a license to offer non-electrical services and take out loans in non-electrical business.

EPB's expansion into telecom services was met with lawsuits from incumbent ISPs claiming that EPB was illegally cross-subsidizing its communications services with revenue from its electric business. EPB only decided to invest into FTTH in 2007, and gained permission to operate in 2008.

EPB Fiber was successfully launched, and the fiber networks now cover a footprint of 170,000 homes, schools and enterprises of Chattanooga. EPB Fiber is now profitable, yet highly leveraged, and advertises its products as the "nation's fastest internet" by proposing internet access ranging from 100Mbps to 10Gbps.

The case of a municipality entering the telecom space and allowing the local electrical company to compete against telecom giants such as Comcast and AT&T has raised much discussion and criticism so that plenty of literature and news can be found about this case.

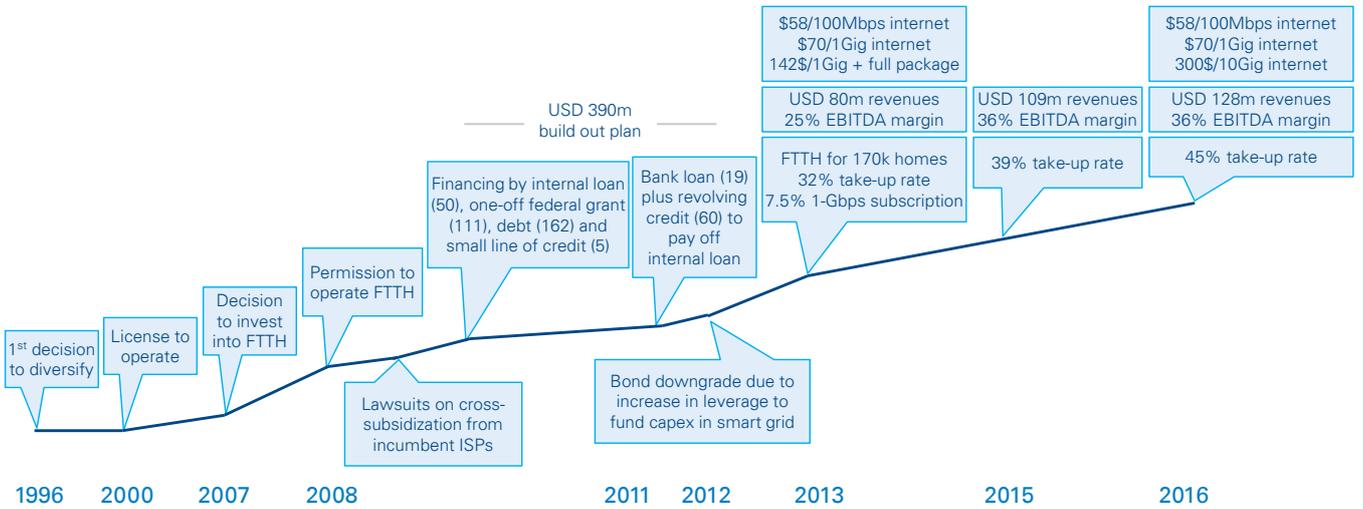
Critics of the government-backed project argue that private utilities are at an unfair disadvantage in competing against a government utility that gets extra federal funds and doesn't have to generate a profit for its owners. It is argued that Chattanooga cannot be taken as a model for other municipalities to replicate the building of fiber networks for several reasons. Firstly, this particular network arose out of the unique circumstances of access to a federal grant. Secondly, Chattanooga residents are not entirely shielded from liability stemming from the debt required to build the FTTH network. Finally, "the exclusively public nature of the Chattanooga fiber network not only contradicts the city's established preference for using PPPs to improve local economic conditions, but the high upfront and recurring costs associated with running the fiber network divert critical resources from local government priorities." (From "Chattanooga Case Study" by Charles M. Davidson.)

However, backers of EPB Fiber insist that the investment has already paid off in a smarter electric grid which generates savings and greater quality, better telecom services and more economic development in Chattanooga.

Learnings

Fully fledged telecom retail models can offer up to 20 percent revenue diversification for utilities, but ignite serious debates on fairness and the nature of such a competitive value proposition.

Figure 12: Evolution of EPB Fiber (Chattanooga, US)



Source: Arthur D. Little analysis

The wholesale model: SIRO (Ireland)

ESB is the electrical utility in Ireland, engaged in power generation, transmission and distribution. ESB has a long-distance fiber network across its high-voltage electrical footprint, established over 15 years, partly for internal use and partly to serve external customers. Further, ESB has a dark fiber network in Dublin, which hosts many data centers and large technology companies. Major cities in Ireland already had high-speed broadband. However, roll-out in regional and rural areas was limited despite the demand for high-speed broadband, due to the high cost of network roll-out.

ESB set up “SIRO,” a 50/50 joint venture with Vodafone, to roll-out and market the access fiber network in regional and rural areas of Ireland, with an investment of €450 mn. SIRO was set up with the vision of establishing the first 100 percent fiber network in Ireland, with a target of passing 450,000 premises.

The partnership limits the investment and risks for ESB, as it assures monetization of the new network via Vodafone. ESB could leverage its electric-network infrastructure for the deployment of a fiber network and monetize it by offering wholesale open access to all telecom operators. For Vodafone, the largest fixed-mobile operator in Ireland, the partnership lowered the cost of reaching customers.

SIRO started the program to launch the network in the first 50 commercially viable towns. It consciously targets regional and rural areas, where there is limited competition from telecom operators. The rural focus has led to SIRO being shortlisted by the Irish government as one of three potential network providers for two geographic areas of the country under the government’s National Broadband Plan.

A key criterion for SIRO in selecting cities for the roll-out has been the reusability of the electrical infrastructure of ESB. Roll-out is prioritized based on multiple factors, including:

- Limited competition from telecom operators
- Customer concentration: preference for areas with high densities of housing
- Reusability of electrical infrastructure, based on the cost and effort required, with preference for overhead and ducted or vaulted areas.

Due to the safety considerations for building a fiber network in the vicinity of an electrical network, SIRO leverages electrical contractors supported by telecom contractors for fiber deployment, after ensuring that they have the necessary authorization, certification and training.

SIRO offers a managed-access service to retail telecom operators, ISPs and other entities that are licensed to offer retail telecom services within Ireland. Though Vodafone acts as the anchor customer, SIRO offers services to any operator demanding wholesale service. Apart from FTTH/B access, SIRO offers multiple points of interconnection across the country and backhaul to mobile towers.

It should be noted that ESB continues to offer long-haul services and international backhaul services to carriers on its own network, independent of the SIRO business.

Learnings

SIRO is a good example of utility, telecom operators and government coming together to accelerate fiber deployment at a national level.

6. Fiber development does not come without challenges

Though there are many examples of utilities rolling out fiber successfully on their infrastructures, it does not come without challenges.

Firstly, utilities should know if conditions exist (e.g., existence of specific policies which support the development of strategic infrastructures in the country) to ensure the bankability of the project with adequate internal rates of return their overall business plan objectives and growth priorities. For example, utilities should confirm the existence of specific policies that support the development of strategic infrastructure in their countries, as well as the availability of a favorable competitive landscape (presence of cable operators with upgradeable networks can limit the opportunity for utilities).

Secondly, utilities should take into account the requirements mandated by the regulators on their core activities, in order to tap (business) synergies for both the power grid and the telco business without compromising regulatory compliance. For example, the role of fiber optics as a reliable communication infrastructure used for grid management should be clearly formulated in a mid-term network development plan and communicated with the regulator.

Thirdly, utilities should set up a business model (ownership, operation, transfer of rights to entities involved, including pricing) which complies with various regulatory requirements such as license conditions, cyber-security and tax regulations.

The business model should also enable a clear split between regulated and commercial business in terms of CAPEX and OPEX.

Utilities should build telecom capabilities in the areas of planning, design, construction, operations and maintenance. Even if the utility plans to outsource most of the activities, it should be able to develop the fiber-network architecture, identify areas for roll-out, monetize the deployed network and plan to reduce the gap between investment and revenue generation. It will also need to define the process, procedures, standards and specifications that the contractors will adhere to.

Utilities should collaborate with construction contractors to define procedures which will minimize the outages required and qualify them accordingly.

Utilities should also collaborate with telco operators and their contractors to develop operations and maintenance procedures which will allow to operate in the proximity of dangerous equipment, taking into consideration the service-level requirements of both electricity and telecom networks.

Lastly, utilities should manage regulatory constraints on the telecom side. In developing regions such as the Middle East, the deployment of fiber and monetization methods (such as wholesale and retail) are tightly regulated.

7. Arthur D. Little is the ideal partner to support both utilities and telcos

Arthur D. Little is uniquely positioned to support utilities and telecom operators in:

- Bringing diversification opportunities to the Board
- Identifying possible partners and negotiating terms and conditions of the agreement between the parties
- Assessing the reusability of assets
- Identifying business models and developing business plans for fiber development
- Identifying financing strategies in compliance with regulatory constraints
- Identifying governance models between utility and telecom units
- Developing processes, procedures, standards and specifications for fiber infrastructure deployment (both overhead and underground)
- Assisting with the definition of IT system requirements

We have extensive project experience in fiber development, and have worked for both utilities and telecom operators. We have also worked with ministries and regulators in developing their national broadband plans, gaining a holistic view of fiber development strategies across all relevant stakeholders.

Our internal experts combine extensive fiber experience with local insight and industry expertise.

Our extensive network of external experts ensures that each client will leverage the best-possible expertise, in line with the challenges and the context the company is facing.

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Utilities' contribution to national fiber development

How utilities and telecom operators can cooperate to accelerate fiber deployment

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