

The uncaptured value of FTTH networks

ABSTRACT
Network evaluation is tricky but essential business for anyone considering network deployment. The network value for an operator consists of the potential accumulated revenue stream, typically in the form of monthly subscription from users. It is common knowledge (and a matter of simple maths), that the deployment costs can hardly be covered by revenues at current subscription fees, and this – combined with the unwillingness of end users to pay more for more bandwidth – explains the still low penetration of FTTH in most markets. In this paper we argue that the value of an FTTH infrastructure goes well beyond the revenue stream from traditional services provided by operators today, but this is unaccounted for by the traditional business model based on a vertically integrated operator. We call this unaccounted part, the “uncaptured values of FTTH”, and we point out that these should be taken into account in order to define a sustainable business model.

Keywords: FTTH, broadband access, open networks, business models.

1. INTRODUCTION

Building a ubiquitous information and communication society connected over high speed broadband networks is a widely shared goal among both developed and developing countries. Nonetheless, deployment of broadband network, especially fibre networks, is lagging far behind in many regions.

[1], [2]. A commonly held opinion is that FTTH networks are and should be built by telecommunication companies, especially the

traditional incumbents. The fact that this is not happening is generally explained by current demand for telecom services (even including triple play offers) being insufficient to cover the huge investments per end user required to deploy fibre to each home. It is rightfully argued that the end user will not be ready to pay more for more bandwidth whether this is delivered by copper, wireless, or fibre.

The conclusion is that average revenue per user (ARPU) will not increase if fibre is offered, and therefore there is no business case for the deployment of FTTH, especially considering that the infrastructure cost of existing access solutions, mainly copper, has long been amortised. This reasoning, however, misses two very important factors.

The first is that an infrastructure with a bandwidth potential thousand times higher than what possible with copper will in the long run inevitably bring new products and services, and consequently new revenue sources. Secondly, the quality improvement in current services will bring about benefits that – albeit escaping the ARPU calculation – should be counted as total revenue. We refer to these benefits as the uncaptured values of FTTH. In this paper, we analyse the uncaptured values of FTTH deployment, and identify their key beneficiaries.

2. GENERAL CONCEPTS

The traditional telecom business model is a vertically integrated one, in which the telecom operator provides the physical infrastructure (the passive network), runs the active equipment to establish connectivity on it, and sells services on the network. This made sense while the com-

munications services were limited to telephony, radio, and television, which justified dedicated infrastructures, each optimised to transmit information carried by a specific physical signal, and with inherently different traffic patterns.

Today, however, the amount of available services is booming: from well established ones such as telephony, web access, emailing and television to rapidly growing ones such as video conferencing, video and music streaming and sharing, online gaming, cloud computing; to new and emerging ones such as 3D TV, e-health, etc. For all these services information is stored and transmitted digitally, and it is increasingly delivered using the IP protocol over a converged network. In such a situation it is convenient to conceptually separate the roles of the service provider (SP) and the network operator.

Moreover, due to the different technical and economic nature of the different parts of the network, further role separation can be pursued. A fibre access network broadly consists of a passive fibre infrastructure (implying right-of-way acquisition, trenching, cable duct laying, local-office premises), and active equipment (transmission equipment, routers and switches, control and management servers, etc.). The passive infrastructure is roughly characterised by high CAPEX, low OPEX, low economies of scale, and is highly local, hard to duplicate and inherently subject to regulation. The active equipment is characterised by high OPEX, economies of scale, and is subject to limited regulation. These factors justify a further role separation between a physical infrastructure provider (PIP), which owns and maintains the passive infrastructure (this could be real estate

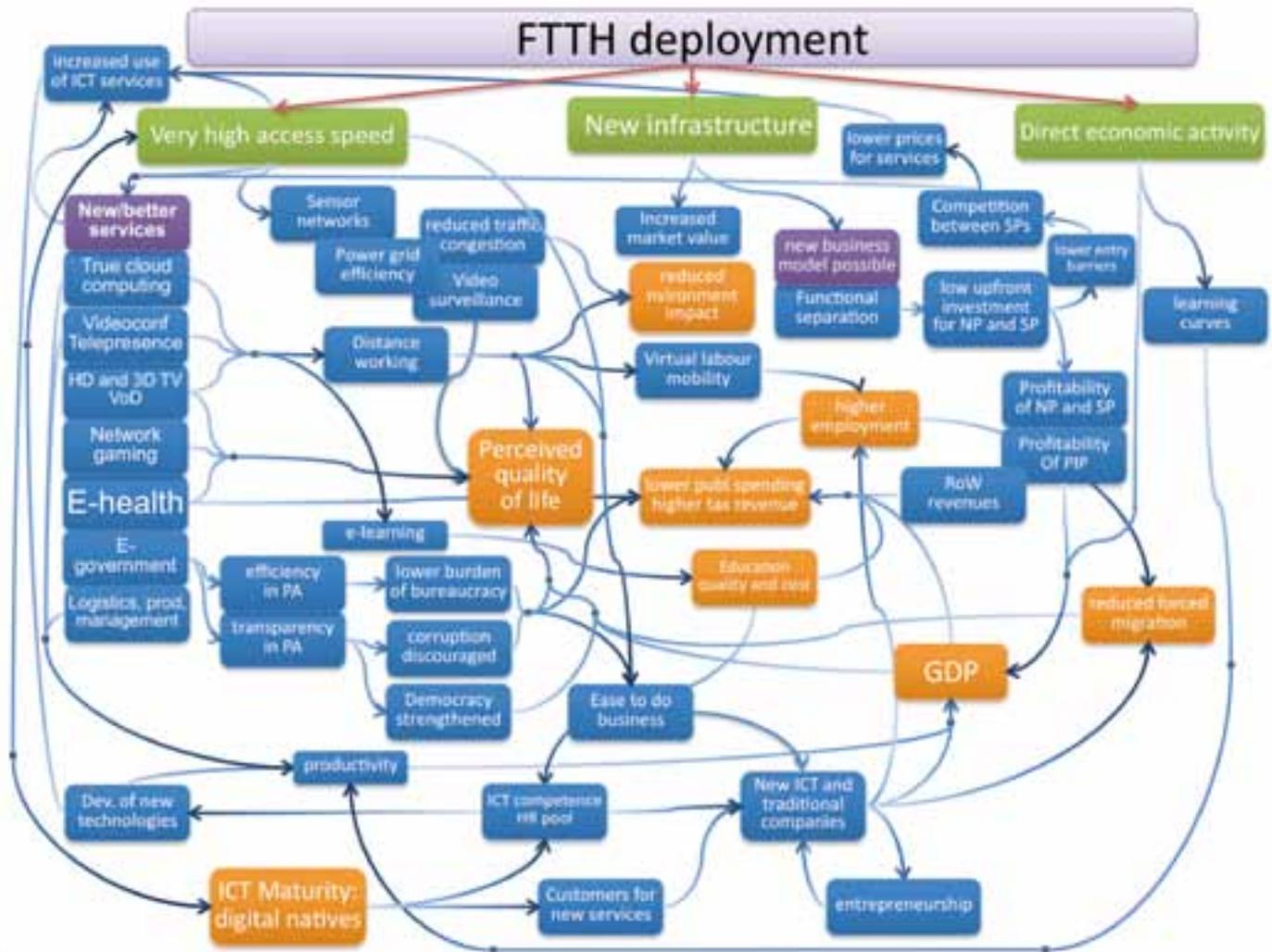


Figure 1
Direct, indirect, and induced effects of FTTH deployment

companies, municipalities, utilities, or traditional operators); and the network provider (NP), which operates (and typically owns) the active equipment (e.g. incumbent operators, new independent operators, broadband companies). Depending on which roles different market actors take up, different business models will arise [3].

3. EFFECTS OF FTTH DEPLOYMENT

The benefits related to FTTH deployment can be roughly divided into direct, indirect and induced benefits.

Many of these benefits are dependent on and related to each other, sometimes in a circular fashion. In this section we identify different effects starting from the direct ones and describing how this lead to medium- and long-term (indirect) effects on the FTTH market as well as the changes induced on the economy and the society.

Figure 1 can work as a useful illustration of the different effects, and their mutual dependencies.

Direct effects – The direct effects of FTTH

deployment are (i) significantly higher access speeds, (ii) the availability of a new, future-proof infrastructure, and (iii) the direct economic activity generated by the network deployment (civil works, fibre cables and active equipment). These are benefits available immediately during or at completion of the deployment.

Indirect effects – Higher access speed in turn allows for new and/or better-quality services as mentioned in the introduction, and typically leads to a higher use of these services [4], [5]. It is worthwhile to comment that some of these services (especially video-based ones, and others not yet envisaged) will only work on fibre connections. Many others will also work over traditional broadband connections, but may end up saturating the available bandwidth rapidly when more than one of them are provided simultaneously. Moreover, bandwidthhungry services will in general be more reliable and offer better quality over a fibre connection.

The widespread availability of fibre connections and high transmission speeds is also a powerful enabler of sensor networks, driving the deployment or improvement of such services

as video surveillance, smart power grid, traffic congestion management, accident prevention through monitoring of buildings and utility infrastructure. Again, most of these services would work over existing copper infrastructure, but the aggregate bandwidth of numerous and increasingly data-intensive services will be best met by fibre access.

Finally FTTH represent a future-proof infrastructure, because the optical fibre is a transmission medium that, for its inherent physical properties, offers orders-of-magnitude higher bandwidth and lower signal loss, when compared to radio- and microwave-frequency technologies [6], [7]. Therefore, deploying FTTH represents an investment leading to higher property value. Moreover, installing a new infrastructure offers the opportunity to more easily depart from the traditional business model and to fix market failures difficult to deal with in the presence of formalised ownerships, long-term contracts and established privileges. Seizing this opportunity is to a great degree a matter for regulators and public policy makers [3].

Induced effects – The direct and indirect effects

of FTTH in turn have positive consequences in other areas than ICT. For instance services like high-quality cloud computing, video-conferencing and tele-presence have a positive impact on e-learning (with benefits on education and competence development) and distance working, which in turn reduces traffic congestion, increases virtual labour mobility, and reduces the cost of doing business. Reliable and high-quality e-health services reduce the need for expensive hospitalisation and home visits; while e-government services increase efficiency and transparency in public administration, which in turn strengthens democracy, increases transparency and decreases corruption and the burden of bureaucracy.

Widespread use of advanced ICT services brought about by FTTH increases ICT maturity of the population, which creates both new potential customers of, and new human capital for the production of new services and products. This in turn leads to the creation of new ICT companies, which in turn increases the level of entrepreneurship, favouring the creation of more companies, or the improved management of existing ones.

Also, putting in place the correct business model induces other benefits back on the ICT sector: if network and service providers are freed from the heavy upfront investments required to deploy the passive infrastructure [3], they can scale investments with the number of users served, and therefore achieve profitability in the short-medium term. This, together with the availability of end users with very high access speeds will allow the provision of bandwidth-hungry, but profitable services like HDTV, 3D TV, Video-on-Demand (VoD). Those profits will then propagate down the value chain to the NP and the PIP. At the same time, the separation of NP and SP introduces competition between SPs, which is expected to lead to lower prices for ICT services.

4. FTTH BENEFITS AND BENEFICIARIES

A key step in order to develop a business model, in which the uncaptured values of FTTH are internalised in the value chain, is to identify the key stakeholders and how they benefit from the direct, indirect and induced effects described in the section above.

Benefits for the individuals – Individuals benefit from FTTH in terms of improved perceived quality of life, both directly connected to new high-quality services at lower prices (especially entertainment and communications) but also indirectly in terms of improved individual



Reliable and high-quality e-health services reduce the need for expensive hospitalisation and home visit.

health conditions, decreased hospitalisation, smoother and more transparent interaction with public administrations, increased sense safety in traffic and security in public space (see Figure 1). Higher perceived quality of life is also determined by the opportunity to work away from the desk more flexibly, and even to choose more freely where to live and work.

Benefits for housing companies and homeowners – Better building and infrastructure monitoring and housing management systems lead to decreased housing maintenance and insurance costs. If acting as a housing company may collect revenue from the NP, as well as other operators (e.g. 3G and 4G mobile operators placing their antennas on the building roof and renting fibre to transport the aggregate traffic). Moreover, the presence of a future-proof infrastructure increases the value of property for the housing company and the homeowners.

Benefits for media and service providers, and alternative operators – The FTTH infrastructure represents an efficient distribution channel for content, at the same time reducing the need for costly distribution network of the physical support, and introducing useful direct marketing and market analysis tools.

Service providers will have access to a large number of potential customers of new bandwidth-hungry and profitable services. If functional separation is used, alternative operators can operate networks as NP, without having to face big deployment investments. They get revenue from SP, as well as other operators buying transmission capacity.

Benefits for telecommunication operators (telcos) – Telcos can benefit in different ways from FTTH, largely depending on which business role they decide to take [3]. As SP they can benefit from the availability of very high-speed connections, allowing them to sell bandwidth-hungry services with high added value for the end users, and therefore increase their take-up rate and possibly ARPU.

Today these services consist almost exclusively of video-based services (HDTV, movie rental, and shortly 3D TV), but there is no reason to doubt that new profitable services will appear once large-scale ultra-high-speed access is there. As NP they can increase the attractiveness of their networks (through higher connection speeds) for end users and service providers and consequently increase take-up rate (more end users) and ARPU (more service providers per user).

Benefits for companies in general – Network equipment vendors and civil works firms, will benefit directly from massive fibre deployment, and will also climb the learning curve, therefore gaining longer-term competitive advantages over companies located farther away from the countries/regions where the deployment takes place. In the medium-term, high transmission speed and increased ICT maturity should lead to improved productivity for the activities directly related to data transmission, but also through new services and products to manage logistics, production and operation. Tele-presence will not only decrease transport, lodging and allowance costs, but also employee stress (and hence increase productivity), and possible carbon-emission cost in terms of carbon permits or carbon tax. Also, access to reliable high-speed connections can lead to the access for employers to a larger pool of qualified (and/or cheap) labour, through distance-working and outsourcing. Symmetrically, fibre-enabled high access speed leads to the extension of market areas for goods and services (think of the Indian software outsourcing industry). In the long term, companies will benefit from increased education and ICT competence and entrepreneurship. More in general, new companies or new product offerings will appear that will capitalise on the new possibilities offered by the fibre infrastructure, and its induced effects in the society (see e.g. [8], [9]).

Benefits for public administrations – The local public authorities will benefit in the short-medium term from right-of-way fees from network providers, and from revenues from NP if they act as a PIP for the municipal network. In the medium-long term, public administrations will benefit from a number of induced effects, most notably increased efficiency and cost reductions connected to e.g. e-government and e-health. This is especially crucial in the developed world, where ageing population will lead to dramatic changes in society if no measures are taken to counteract the economic consequences related to the care of the elders. Fibre will provide the very high quality access connections to allow for a major rollout of electronic health services such as distant care & treatment, equipment in the home, prolonged staying, better supervision, etc, which is probably the only way of keeping the costs at a reasonable level.

At local level, public utilities can increase the efficiency of their power grids; while distance working and increased traffic information collection and processing will reduce traffic

congestion and cost for road maintenance and upgrade. Also, fibre will increase the economic attractiveness of rural municipalities, and lead to the establishment (or the decision to stay) of more companies, which will counter emigration with positive effects in terms of social cohesion and tax revenues. At national and international level, this will determine a more efficient labour market (virtual labour mobility: jobs more easily move where the people and skills are), especially in places with traditionally low mobility like Continental Europe. Finally, all the increased economic activity described above will result in higher employment and GDP, and therefore to increased tax revenue and reduced welfare expenditures.

Benefits for society at large and the environment – Social networking leads to contacts with people not necessarily in the immediate vicinity and with the leading to cultural and social exchange. Increased ICT maturity and education are positive societal development, and e-government is believed to benefit democracy, voting transparency and legitimacy. E-health services also lead to improved general health, and a better society inclusion of disadvantaged people. Other benefits are increased safety in traffic and security in public space.

Reduced environmental impact arises from e.g. reduced traffic congestion, reduced need for physical transport and travel, and increased power grid efficiency. The lessening of “economically forced” migration from rural areas to large cities also a positive social impact in that the social fabric of regions is not disrupted.

5. CAPTURING THE UNCAPPED VALUES: TOWARDS A NEW BUSINESS MODEL

We have identified the main benefits, their beneficiaries and their mutual interactions. With this in mind, a new business model can be developed. This should include all the major beneficiaries in the value chain. As can be seen from Figure 1, ICT services the key drivers of the whole chain of positive effects, and the enablers of a rich variety of high-quality services are fibre access, and competition. The business model should therefore focus on free and fair competition between service providers, and the availability of long-term-return investments.

The open access model seems therefore an excellent starting point, because by separating the roles of PIP, NP, and SP it allows on one hand competition on the SP level, as well as consolidation of the actors operations to their core business. More crucially, the PIP functional separation leaves the large upfront

investments to actors (public administrators, investment and pension funds, etc.) that are not bound to short-term returns like telecom operators. In the coming months we will refine the open access model, taking into account the analysis presented in this article, to develop a new business model that captures the uncaptured values of FTTH. ■

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