STATE AID, OPEN ACCESS AND MARKET SIZE: TWO CASES OF FTTH NETWORK IMPLEMENTATION IN DUTCH MUNICIPALITIES[1]

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Abstract

The discussion on the EU regulatory framework of 2003 in particular on emerging markets provides for a new dynamic approach towards investment in next generation broadband infrastructure in municipalities. By using the criterion of non-replicable assets, FTTH networks in local municipalities can be characterized as a new infrastructure which is aimed at providing new services which should be exempted from ex ante regulation. However, to justify public investment in these networks in particular in “black areas” their compatibility with Article 87 of the EC Treaty has to be guaranteed. In this context, the paper uses the examples of two FTTH networks in local communities in the Netherlands to show that (different) open access agreements are vital but not sufficient to guarantee service competition. We show that for small networks public investment in the start up phase of the network is required to facilitate a multiple supplier environment.

Keywords

EU Regulatory Framework, State Aid, FTTH Networks in Municipalities, Active Costing, The Netherlands

1. INTRODUCTION

In Europe public intervention to facilitate Fiber-to-the-Home (FTTH) networks in local communities has struck the right balance between using the existing regulatory framework while at the same complying with European competition law. There seems to be some leeway for the implementation of these networks from the regulatory point of view as important assumptions of the 2003 Regulatory Framework of the European Union (EU) are currently under review. The assumptions that competition will emerge in all parts of the telecommunication value chain and will diffuse advanced telecommunication services without intervention have been challenged on two grounds: First, the notion of “emerging markets” as defined in the EU recommendation on relevant product and service markets[2] does not seem

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[2] European Commission’s Recommendation on relevant product and service markets (C(2003) 497).

sufficient to account for the growth of next generation networks (NGN) (Baake, Kamecke, & Wey, 2005). Second, as the scope of the current definition of "universal service obligations"[3] does include narrowband[4], it does not refer to emerging broadband services (Hencsey, Reymond, Riedl, Sanatmato, & Westerhof, 2005). From the competition policy point of view, the options of policy makers to invest in these networks are more limited as public intervention should not be considered as a case of State Aid, i.e. within the scope of Article 87(1) EC.

In order to characterize options for public intervention to foster these networks, the key economic issue has been to assess the extent to which the emerging broadband infrastructure has been characterized by non-replicable assets, i.e. assets used by the first mover that a new entrant does not intend to replicate. Early research on municipal networks in the United States has proposed that FTTH networks have natural monopoly characteristics (Banerjee & Sirbu, 2005), but replicability of these networks is refined to fiber local loops in urban and suburban areas (Lewin & Williamson, 2005). To verify these results in a European context, the first question is to find out which markets produce services using assets which are not replicable (and which do not). The second question is if there are functionally equivalent assets which are commercially viable and can deliver comparable services to end users (Lewin & Williamson, 2005). The third question is to find out whether open access specifications can provide an appropriate measure in case of non-replicable assets that is compatible with Article 87(1) EC.

Within different areas in the Netherlands, a variety of FTTH networks have recently been developed even if they do not qualify as regions with less developed infrastructure. According to rules of the EU on State Aid, there are three options for public involvement in such regions: a) as an investor that invests similar to a private party ("market investor principle"); b) if the (local) government invests in the passive infrastructure and opens access up to all interested private parties on non-discriminatory terms and c) as the (local) government intends to deliver services as part of general economic interest (Hencsey, Reymond, Riedl, Sanatmato, & Westerhof, 2005). Some experience has been built up in the Netherlands using the first and second option. As in the case of the Amsterdam city net, the market investor principle has been followed as it seemed the most transparent option for public involvement. Currently the discussion on cases like Nuenen "Ons Net" has been focussed on vertical integrated operators providing infrastructure and services. However, different open access scenarios that allow a rapid take off of the network and provide incentives for service providers have not been analyzed yet.

In the following, we first characterize the relevant European legislation in the area of FTTH networks of local communities (see section 2). We then develop the case for non-replicable assets for FTTH networks by discussing the international experience and theoretical developments in the area and show how different open access scenarios can be considered as a measure in line within EU competition law (see section 3). Then we discuss our empirical findings with respect to replicability of assets of FTTH networks and open access scenarios by using empirical data (section 4). We summarize our findings and propose some strategy and regulatory conclusions in the final section of this paper (section 5).

[3] Directive of the European Parliament and of the Council of 7 March 2002 on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive), OJ L 108 of 24.4.2002

[4] However, there has been some discussion on this issue. The current technical definition of universal service obligation is, however, a narrowband connection capable of supporting voice and data communications at a speed sufficient to access the Internet; typically at or equal to 56kbit/s.

2. LEGISLATIVE FRAMEWORK ON MUNICIPAL FTTH NETWORKS IN EUROPE

2.1. The Discussion on the EU Regulatory Framework of 2003

With the overhaul of the EU regulatory framework starting in 1999 with the publication of the Communications Review by the European Commission, a discussion started aimed at redefining the balance between incentives to build new networks and to access existing ones. As a result, a package of directives was introduced that represent the New Regulatory Framework of the EU. Within this framework, the Directive (2002/19/EC) on Access and Interconnection was aimed at discussing the conditions under which regulatory intervention should occur to the presence of some form of market dominance. It also provided room for ex-ante regulation in markets (like for broadband access) that have "transitional problems" as a result of technological developments.

These markets that were (expected to be) unable to generate effective competition and therefore subject to some sort of sector-specific regulation were further specified in European Commission's Recommendation on relevant product and service markets.[5] In order to characterize these markets (and services), the Recommendation specified three criteria all of which have to be satisfied:

1. They should be characterized by "high and non-transitory" structural or legal barriers to entry.
2. There should be no tendency towards effective competition within a certain time horizon.
3. The market failure persisting in these markets (and services) cannot be addressed based only on the application of competition law.

Interestingly the Recommendation explicitly referred to the dynamic character of markets and required an assessment of a tendency towards competition (Baake, Kamecke, & Wey, 2005).

Within the discussion on how emerging markets should be delimited and exempted from regulatory intervention, the concept of 'non-replicable assets' has been put forward. The issue here is whether or not a non-replicable facility represents a high non-transitory entry barrier into such market and impedes access for competitors to downstream markets (Lewin & Williamson, 2005). Given the existence of non-replicable assets in a network, a new entrant will have no incentives to move up the "latter of investment"[6] (Cave, 2006) and invest in these assets as they attract ex-ante regulation and posing the risk of being shared with competitors .

Current criteria for regulatory intervention within the EU regulatory framework are that only if an operator has significant market power (SMP) in a given market and in the relevant downstream markets, the regulatory agency should regulate the market. In addition, the operator should have spare capacity available and the facility to which access is being mandated should not be replicable. Within the review of regulatory framework of 2003, proposals have been put forward to exclude markets from ex ante regulation in which new infrastructure provides new form of services and that are not characterized by non-replicable assets. These markets should only be exposed to European competition law.

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[5] (C(2003) 497)

[6] The "latter of investment" characterizes a recent approach in telecommunications regulation in which competitors are encouraged progressively to make investments in network assets which are less and less easily replicable.

2.2. Options for public involvement under EU Competition Law

Within competition law of the European Union, Article 87 of the EC Treaty characterizes relevant legislation with respect to State Aid. Article 87 focuses on state subsidies that distort competition in the common market. As Article 87 is under discussion to provide 'less and better aid' (Kroes), there are important repercussions for public intervention in broadband markets. Currently there are three options for public involvement in these markets: a) as an investor that invests similar to a private party ("market investor principle"); b) if the (local) government invests in the passive infrastructure and opens access up to all interested private parties on non-discriminatory terms and c) as the (local) government intends to deliver services as part of general economic interest (Hencsey, Reymond, Riedl, Sanatmato, & Westerhof, 2005). These different options provide new opportunities for public involvement in so-called "'black areas", areas characterized by high demand that supports a competitive supply.[7] The Green Paper on Services of General Economic Interest (SGEI)[8] has been central in defining the balance between common service obligations and economic efficiency arguments with respect to investment in new telecommunication infrastructure. A number of local broadband initiatives by municipalities have recently been approved by the European Commission, however, only a few have been implemented as a compensation for a service of general economic interest.

Six projects in the United Kingdom and one in Spain were approved as State Aid compatible with Article 87(3)(c)[9] of the EC Treaty. Regarding the two French projects in the department of Pyrénées-Atlantiques and the region of Limousin, the European Commission decided that they did not constitute State Aid. The European Commission did not oppose to the qualification of this public intervention as a compensation for a service of General Economic Interest (SGEI) made by the French Authorities in their notification.

In three of the approved projects[10] public funding was granted for the deployment of infrastructure, while in the other six[11] the subsidies are given to telecommunications operators for the provision of retail services to end-users (either residential, businesses or public authorities)[12] (See Appendix B).

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[7] The Commission of the EU makes a distinction between 'black areas' with high demand supporting competitive supply, 'grey areas' in which the network is controlled by a single operator refusing access to its basic infrastructure and 'white areas' with no broadband provision at all.

[8] (COM(2003)270 final)

[9] According to Article 87 (3)(c), aid granted by a Member State or through State resource may be considered to be compatible with the common market when the aim of the aid is to facilitate the development of certain economic activities or of certain economic areas, where such aid does not adversely affect trading conditions to an extent contrary to the common interest.

[10] Atlas; Pyrénées-Atlantiques; Limousin

[11] Regional Innovative Broadband Support in Wales; Broadband for SMEs in Lincolnshire; Broadband in remote and rural areas in Spain; Broadband Business Fund; Broadband in Scotland remote and rural areas;

[12] All projects are in underserved areas, either because scarcely populated or because characterized by difficult topography. The infrastructure projects consist of the construction of a technologically neutral open access network, comprising only passive infrastructure. The infrastructure operators will lease capacity to service providers on a transparent and nondiscriminatory manner. They will not be allowed to provide services to final users. The infrastructure is built in areas where no other infrastructure exists or where the existing one is not opened on appropriate commercial, technical and legal terms. In the projects dealing with provision of services to end-users, the public investment to the projects will only be provided to the extent necessary to attain the objective of stimulating the use of broadband services within rural and remote areas. In all cases the selection of the preferred bidder is done through a public tender procedure. Appropriate pricing of the services is considered particularly important in all cases. Broadband services will be offered at conditions and prices consistent with those currently provided by providers in other more densely populated areas in the same country. All projects were approved in line with the eEurope strategy to make broadband largely available within the EU, recognizing the need for public intervention to Cumbria extend as rapidly as possible the coverage of undeserved areas.

In general, the discussion on the EU regulatory framework of 2003 in particular on emerging markets provides for a new dynamic approach towards investment in next generation broadband infrastructure. By using the criterion of non-replicable assets, FTTH networks in local municipalities can be characterized as a new infrastructure which is aimed at providing new services which should be exempted from ex ante regulation. However, to justify public investment in these networks in particular in 'black areas" their compatibility with Article 87 of the EC Treaty has to be guaranteed. Currently the option to consider these networks in framework of SGEI has rarely been used.

3. TECHNO-ECONOMIC DEFINITIONS OF OPEN ACCESS TO FTTH NETWORKS IN MUNICIPALITIES

Within the European Union, broadband has grown rapidly and the penetration rate reached in 2005 11.5 percent of the EU population (almost 53 million lines), up from 7.3 percent in 2004 (EC, 2005). However, in comparison with the United States and South Asian countries Europe is lagging in the diffusion of broadband. This provides a justification for the European Commission to consider investment in broadband infrastructure as a priority and within the objectives of the Lisbon Agenda.

In the Netherlands, a forerunner in broadband diffusion in Europe, the discussion has been focused on the issue whether or not broadband markets are characterized by market failure (CPB, 2005). However, the discussion has failed to address the qualitative difference between the technical and economic characteristics of next (compared to current) generation broadband technologies, which requires a dynamic approach towards examining the potential of FTTH networks and in particular the high sunk costs associated with the growth of FTTH networks (see section 3.1).

In order to identify whether integration between different network and service functions in FTTH networks is warranted, the analysis has to focus then on which layers of the network are characterized by significant economies of scale which might represent non-replicable bottleneck assets. As there is some agreement that FTTH networks represent at the physical network layer significant economies of scale, the question is whether the size of the network matters in providing for service competition at the upper layers of the network (see section 3.2).

In order to compensate for the existence of non-replicable bottleneck assets, current regulatory approaches are aimed at imposing open access obligations. These approaches, however, insufficiently account for FTTH networks in local municipalities. As a result, a large variety of open access scenarios have emerged which represent different options for new service providers.

3.1. FTTH Networks within the Context of Next Generation Networks (NGN)

In the discussion on next generation broadband infrastructure, a number of definitions have been put forward.[13] Within the framework of the ITU Recommendation Y.2001 a number of technologies and architectures can be used to deploy next generation broadband infrastructure

[13] There is no commonly used definition by the European Commission even if there has been some discussion on the minimum transmission speed to be included. Therefore we refer to definition provided by the International Telecommunication Union in its Recommendation Y.2001 "a packet-based network able to provide services including Telecommunication Services and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies." The Recommendation has been rather vague with respect to the transmission speed and services provided.

(wired or wireless). To characterize the new quality of next generation networks (NGN), we refer to "next generation" as infrastructure that is able to provide triple play services and supports symmetrical data rates in excess of 10 Mbps per household.[14]

The distinction between "next generation" infrastructure and current generation of services provided by local cable television or telephone companies is crucial as these companies (still) offer broadband data at rates that are typically significantly below 10Mbps and do not (generally) support triple play services. Even if we currently observe that these carriers intend to upgrade their networks to provide these services and capacities.[15]

Fiber optic cables are considered as a critical component in next generation infrastructure. Even if fiber optic cables are difficult and costly to install, after installation they are long-lived. As local fiber facilities can provide very high transmission rates, but require high and largely fixed/sunk costs, multiple service providers might opt for shared access to local fiber facilities to take advantage of these facilities. The key question for these providers is whether (or not) fiber optic cable will have natural monopoly characteristics, and/or facilities-based competition at the retail level will remain unsustainable (Lehr, Sirbu, & Gillett, 2004).

The basic architectures of FTTH networks (point-to-point, active star and passive star) differ according to technical characteristics like the amount of deployed fiber, the extent of sharing of network resources between users, the complexity of open access and required investment. In a point-to-point (also "Home Run") architecture, a separate fiber is deployed from the point of presence (or central office) to each of the subscribers. This requires most fiber connections compared to other FTTH architectures, and one OLT (Optical Line Termination) port per subscriber. No sharing takes place in the access network beyond the point of presence (POP). A point-to-point architecture has the highest possible capacity in the access network. In an active star architecture, the amount of fiber is reduced by placing a remote node with a shared feeder fiber between the subscribers and the POP. The remote node has routing equipment which aggregates traffic from subscribers onto the feeder loop. This presents a bottleneck in capacity, the available capacity for all subscribers behind one node is limited by the capacity of the feeder loop. In a passive star or Passive Optical Network (PON), the remote node as used in the Active Star architecture does not have any powered equipment. A passive splitter sends the signal from the feeder loop to each of up to 32 subscribers. In this architecture, the entire access network is shared between the subscribers, indicating a capacity bottleneck.

The architectures impose also different investment requirements on infrastructure and service providers. For example, a point-to-point network concentrates all equipment at the point of presence, which reduces operational cost compared to distributed equipment. Furthermore, the aggregation of active components can lead to a lower investment in active equipment. An active star architecture is considered to be more cost-effective to build than a point-to-point architecture because of the reduction in fiber connections and lower number of OLT (optical line termination) ports in the POP. In reality however, construction plans for point-to-point and active star networks in a particular area tend to follow similar paths, the only reduction in fiber is at the feeder loop. Most installation cost is in trenching and not in the cost of fiber itself[16]. An active star network adds the cost of placing and equipping remote nodes. In practice, how much an active star architecture reduces investment cost (if at all) depends on the situation. Operational costs in an active star network are higher compared to a point-to-point network because the active equipment is placed at numerous nodes at different

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[14] We follow in our definition Lehr, et al (2004).

[15] For example, Versatel, a telecommunication company, is since 2005 providing triple play services at ADSL 2/+ at 20 Mbps. Other companies like BBNed followed rather quickly with similar packages.

[16] No aerial deployments exist in the Netherlands, all telecommunications infrastructures are buried.

locations. The PON network uses the same amount of fiber as an active star network, which is less than a point-to-point network, but also eliminates the use of active components at numerous locations which results in lower operating costs than an active star network. However, the sharing in the access network poses a capacity bottleneck and open access may prove to be more difficult. All current FTTH networks in the Netherlands are based upon the point-to-point architecture, in other parts of the world (including the US and Asia, PON networks are used as well).

The use of point-to-point fiber also eliminates the need for active outside-plant equipment. This is a large advantage in terms of network maintenance and operating costs, in contrast to an active star network. The same could be said for a PON network, but a point-to-point network is technologically superior since no sharing takes place. This makes open access exploitation of the network simpler, and provides a higher capacity network.

3.2. FTTH Networks as Replicable Assets

In order to examine the extent to which FTTH networks are based on non-replicable bottleneck facilities, and/or facilities-based competition at the retail level will remain unsustainable we first have to examine whether or not fiber optic local loops represent non-replicable bottleneck assets. In general, it has been proposed that fiber optic loops can only be characterized as non-replicable assets (i.e. if used by a first mover in a way that a new entrant would not intend to replicate them) in cases where telecom or CATV companies are not able to provide a similar range of services to consumers (Lewin & Williamson, 2005). In the Netherlands with a nation-wide high penetration rate of telephony and CATV services (EC, 2005) this currently seems not to be the case as most households have a fixed telephone and cable connection. It can be assumed that ADSL and cable-providers are broadly focused on the same large exchanges, therefore many subscribers have access to three independent infrastructures up to the exchange (ignoring local loop unbundling) (Cave, 2006).

The high population density in Dutch municipalities allows point-to-point fiber to be deployed efficiently. Since the trenches to lay fiber have to be dug anyway, and the amount of trenching is similar in all network architectures, the incremental costs of the extra fiber required for a point-to-point architecture as opposed to a star architecture are small.

3.3. Techno-Economic Definition of Open Access for FTTH Networks in Municipalities

Currently, access to the last-mile has been characterized as a technical *and* economic bottleneck. Technically, copper and twisted-pair cable have constrains on bandwidth and on services transmitted even if the limits on transmission speed are further and further pushed upwards providing options for (light versions of) triple play services. With further upgrading, "next generation" networks are no longer considered as a technical bottleneck as they should support a whole range of (new) service bundles. These networks can, however, still comprise an economic bottleneck, if there are no or a limited number of facilities-based alternative access networks. A bottleneck facility provides an essential input for production of some service or good as there which there is no economically (or technically) viable alternative source of supply. Promoting open access has been related to the incentive of regulatory agencies to increase competition in markets characterized by the use of a bottleneck facility.

Based on open access, multiple downstream competitors can share a bottleneck facility which might provide a critical input for the services these firms intend to supply. Mostly, a firm that also competes in downstream markets owns the bottleneck facility. Open access is aimed at protecting competition and end-users in downstream markets from potential abuse of the market power arising from the monopolization of the essential facilities. Access to a bottleneck facility should be (1) non-discriminatory; and (2) priced at economic cost. This provides a guarantee in cases in which the bottleneck provider would compete downstream, i.e. the provider should be unable to realize a significant competitive advantage due its ownership of the bottleneck facility. There have been a wide variety of regulatory options for enforcing or promoting open access.[17]

The terms and conditions for how open access is provided has important implications for the industry structure that may arise. There are different ways how open access can technically be provided and at which “layers” of the network architecture. The discussion on the emerging industry and market structure for FTTH networks has been focused on whether parts of these networks represent non-replicable bottleneck assets (de Fontenay, Liebenau, & Savin, 2005, Lewin & Williamson, 2005). Initial studies have found that an optimal long-term industry structure in FTTH is based on one common infrastructure supplier which has natural monopoly characteristics and in which the provision of the network and services should not be based on vertical integration (Banerjee & Sirbu, 2005). If vertical integration is not required for the network operator to recover its costs and a viable competitive market structure for services should emerge, a split between the provision of network and services (“wholesale-retail split”) is needed (Banerjee & Sirbu, 2005). However, there are questions with respect to the incentives that different (open) access “scenarios” might represent for new service providers to enter these new emerging markets.

The provision of (open) access at different layers of the networks represents distinctive incentives for new service providers. If access is provided at the lowest ‘layer’, municipalities only supply conduit and collocation facilities in a way that new competitors have to lay their own fiber cables and supply own electronics. Even if this scenario allows the service provider the highest degree of flexibility, it also is the most costly scenario. Therefore it might decrease the number of alternative service suppliers at these firms might find it uneconomical to compete.

At a higher layer, a community could opt for open access at the "physical layer".[18] Still this would allow alternative service providers to operate with a high degree of flexibility as the community could, for example, deploy dark fiber and lease fiber strands to competitive providers. In general, the community would provide the physical infrastructure, but would leave the active elements and other higher-level service provisioning decisions to the providers that could lease these facilities. Unbundling at this layer would reduce the level of capital investment for new providers, and especially sunk capital investment and therefore reduce barriers to entry in the market. Based on unbundling at this layer, the community would assume responsibility for the longest-lived elements of the local access network: the physical outside plant structures and fiber cable facilities. Alternative providers, in contrast,

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[17] Key elements include at least the following characteristics: a) Regulation of price for wholesale access: The absence of regulated wholesale prices will enable bottleneck provider to price at monopoly levels, or provide access at a price level that would make wholesale access uneconomic for the alternative provider (e.g., to foreclose entry into a market where the bottleneck provider also competes). There are a number of options for price regulation ranging from traditional rate of return regulation to price cap to cost based pricing. The regulation may be direct as in the form of traditional utility rate setting cases, or indirect, as in regulatory approval of negotiated access agreements; b) Defining the terms and conditions for the provision of access: Here the different forms of wholesale access are characterized. At this level in particular regarding layering, the choice of how access is provided is critical in influencing the industry structure and the choice of technology that is used to provide broadband infrastructure, c) Restriction on the line of business: Here the intention of the regulator is to limit the range of activities that the wholesale provider of the bottleneck facilities may provide (Lehr, Sirbu, & Gillett, 2004).

[18] Unbundling at this layer can also occur at the optical layer. Optical layer unbundling is consistent with Passive Optical Network (PON) designs. Wholesale services at the optical layer can be found in long haul markets, but have yet to be seen in the access market. In local and long-haul transport markets, there are already active markets for dark fiber.

would select the active elements of the network that are subject to much more rapid economic depreciation (Lehr, Sirbu, & Gillett, 2004).

In this case, the municipality should assume important business functions as a communications facilities provider like for the installation and maintenance of the fiber network and outside structures or conduits. Furthermore, the design and implementation of the layer 1 physical network has important technical implications for how higher services are provided and require service providers to make substantial complementary facilities-investments in order to deliver services. The higher are these investments that are potentially sunk or co-specialized, the fewer the number of service providers that are likely to be supported in the market (Lehr, Sirbu, & Gillett, 2004).

With open access at the Data Link layer (layer 2) the infrastructure provider deploys both the fiber and the link layer active elements at either end. Service providers are offered a basic network service which they can use as a platform for delivering a bundle of retail-level services. This can be accomplished using a variety of architectures.[19] Open access can also be provided at the network layer (layer 3) in a variety of ways.[20]

4. THE ECONOMICS OF FIBER-TO-THE-HOME NETWORKS: SOME EVIDENCE FROM THE NETHERLANDS

In the following, we compare two scenarios for FTTH networks of local communities in the Netherlands that have been in so-called “black areas” (with a high penetration of cable and telephone connections). They differ with respect to the different open access scenario (layer 3 in Nuenen and layer 2 in “City”) and the size of the network. As we will show these differences are important to characterize possibilities for the emergence of service competition and the number of firms that might enter the service market.

4.1. Methodology

In order to undertake a techno-economic analysis of FTTH networks in local municipalities, the methodology has to take the technical characteristics of the FTTH networks (which are important to characterize different access scenarios) and their economic characteristics into account. Standard economic analysis (Gasmi, Kennet, Laffont, & Sharkey, 2002, Gasmi, Laffont, & Sharkey, 2002) has been useful but limited with respect to calculating the take-off of these networks and different scenarios for competitive supply. (For further discussion on methodology see Appendix A).

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[19] In examining the growth of municipal FTTH networks in the United States, Lehr et al (2004) found the following architectures: “If the deployed link layer is based on a packet-based architecture such as Ethernet, each service provider and its associated customers are assigned to a separate Virtual Local Area Network (VLAN). If the operator is providing a link layer service based on Asynchronous Transfer Mode (ATM), than customers are assigned separate Permanent Virtual Circuits (PVCs) which are switched to the designated service provider. This is not unlike what happens in DSL networks today when an ILEC provides DSL service on a wholesale basis to an unaffiliated ISP via an ATM interface to the ISP. While providing the electronics for lighting the fiber, the operator might also provide what is normally viewed as a Layer 1 service: point-to-point circuits, for example using Synchronous Optical Network (SONET) Add/Drop Multiplexors (ADMs)” (Lehr, Sirbu, & Gillett, 2004).

[20] For this form of access Lehr et al (2004) found the following technical possibilities: “In Hybrid Fiber-Coax (HFC) networks, the cable modem and cable modem termination system support an IP transport layer (i.e. IP Layer 3 service) over the cable. Policy based routers, or Multi-Protocol Label Switching (MPLS)-based Virtual Private Networks (VPNs) are used to separate traffic going to competing ISPs. This is the technology that allows Time Warner cable to provide wholesale service to Earthlink and United as well as to affiliates AOL and Road Runner” (Lehr, Sirbu, & Gillett, 2004).

4.2. The Case of the FTTH Network in Nuenen

In the Netherlands, the first large-scale community-wide rollout of a FTTH network has taken place in Nuenen, a region close to Eindhoven that can be characterized as a "black area", i.e. where high demand supports a competitive supply. As existing market parties (telecom and cable operators) were not interested in building a new network no existing infrastructure could be used, the new emerging services are running on a new FTTH infrastructure. The physical network structure of the FTTH network Nuenen is shown in Figure 1. It illustrates that within a vertically integrated FTTH network structure customer premises equipment (CPE) is part of the access network. This is necessary as the CPE has to work with the access router at the optical line terminal (OLT). To assure overall functionality the network operator chooses and supplied the CPE for the network.

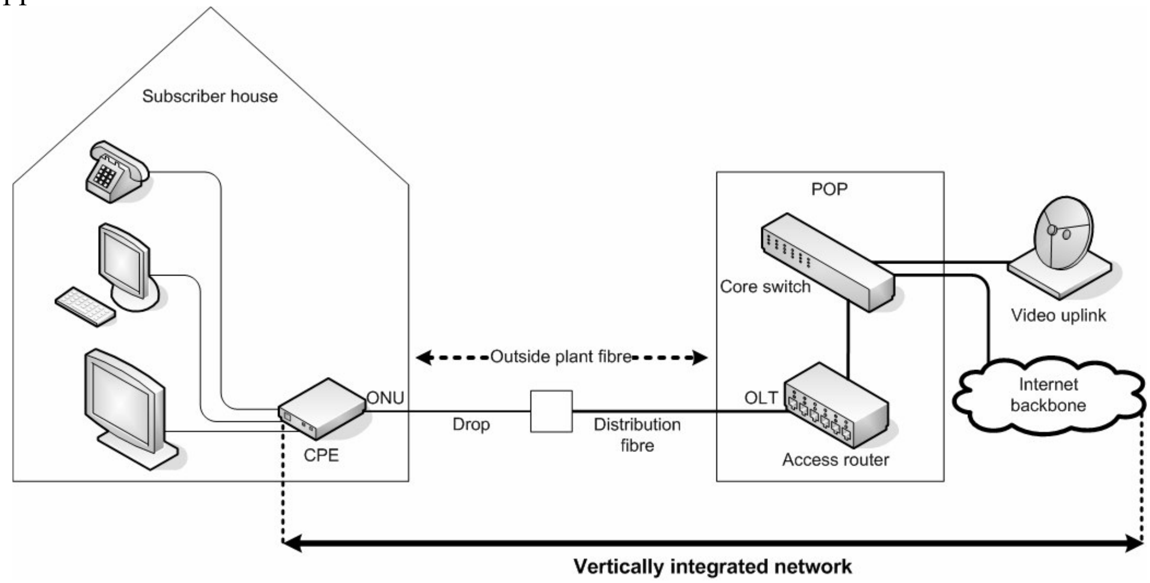

Figure 1: Physical network structure of the FTTH network ('Nuenen')

In the network, "OnsNet" functions as a network operator as well as a service provider (see Figure 2). Therefore, currently there is a case of vertical integration. In order to provide different services, the network includes its own Internet backbone and a TV broadcast headend. A requirement of the government "Kenniswijk" (Knowledge area) subsidy was that the subsidy had to target also services (and not just infrastructure). As an open network, OnsNet provides access to other service providers, but they have to arrange their own means of local interconnection with the network.

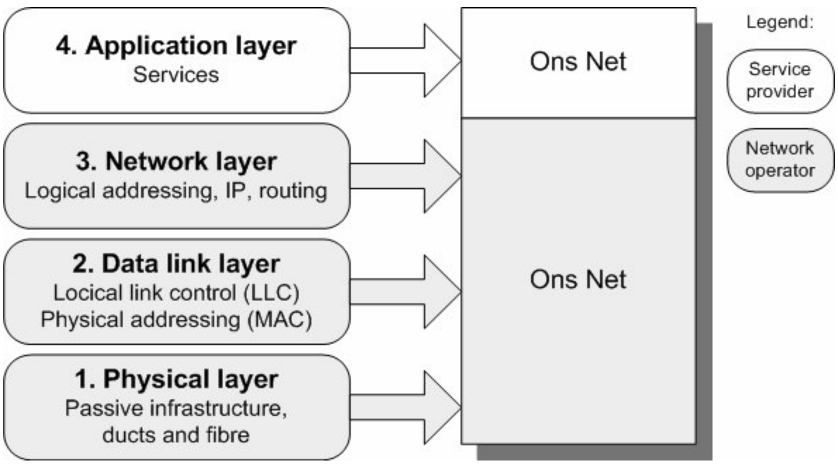

Figure 2: Network Operator Structure ('Nuenen')

The lower three shaded layers show the layers of the access network operated by the network operator "OnsNet", who is providing access to the service provider "OnsNet". As the figure shows, the network offers access to the service provider(s) at network layer 3. The decision for a layer 3 system was mainly based on the fact that this provided a complete, integrated system which could be used by "OnsNet" to offer services. As no additional equipment was needed the integrated layer 3 system was considered as a cheaper option compared to a layer 2 system.

The network is based on a double point-to-point architecture. It connects 7445 homes in the Nuenen municipality. A single POP is used to aggregate all connections, and two fibers are deployed to each connected house. On one fiber, Internet and telephony services are provided; the second fiber is used for RF TV broadcast.[21] The equipment used on the data network is an integrated layer 3 system by Swedish vendor PacketFront. The PacketFront system[22] is capable of delivering IPTV on the same fiber; however this requires set-top boxes for consumers. Due to the high cost of set-top boxes (as subscribers often own multiple television sets), the deployment of an additional fiber for normal TV broadcast was considered as a cheaper option. In addition, subscribers would then not be deterred by the inconvenience of using a set-top box instead of their normal television remote control. A set-top box is still required for video-on-demand or future digital transmissions over the RF broadcast fiber.

In a layer 3 system, the network operator has more tasks than in a layer 2 system, specifically managing the IP layer.[23] The use of an integrated system essentially reduces the service provider offering services like telephony to someone who sends bills; and service provisioning by an Internet service provider is stripped several basic tasks as well. Many tasks are now performed by the network operator, who takes on a significant amount of system management. Experience with the network so far has indicated that in a split network and services cost structure, almost all of the operational costs (apart from the costs for broadcasting rights and some servers for the Internet services) would be allocated to the network operator.

With entry conditions for service providers as described above, we characterize scale economies for the network operator and service providers in the case of the "Nuenen" network. The model assumes both network operator and service providers to be single-product firms so that the network operator provides only network access.

Due to the substantial government subsidy ("Kenniswijk" subsidy), the business case in Nuenen is quite different from a 'normal' FTTH rollout. Therefore we introduce a first distinction between 'current' (subsidized) scenario and a 'normal' (unsubsidized) scenario. In the first scenario, a subsidy of €800 per subscriber was available. In order to maximize the benefits from the subsidy, subscribers were offered for a one-year free-of-charge 10 Mbps symmetrical Internet service when they signed on, which led to a 97 percent penetration rate already within the first year. The advantage of this high penetration rate had also a downside: virtually all required active equipment to serve the entire community had to be installed. After

[21] The choice for a second fiber for analogue RTV has been based on considerations with respect to customer comfort. End-users can therefore reconnect their TV in a "plug and play" fashion

[22] The PacketFront system is optimized for municipalities (or operators) wishing to provide services themselves, while still offering the option of open access for services. The ASR 4000 series access routers have an integrated network operation system called 'BECS', which makes it an all-in-one solution.

[23] On this subject, PacketFront writes in: "Even though the IP Addresses are owned by the service provider, they are handed out (via DHCP) by systems in the Network Operators network and therefore required to be delegated to the Network Operator." And: "the technical requirements put on the service provider are reduced to providing a pool of IP addresses and specifying service parameters (Bandwidth, QoS etc). The rest of the delivery is handled by the network operators control system."

the first year when subscribers had to pay for access, penetration dropped[24] which also rendered part of the installed equipment unnecessary. To calculate the costs in the "subsidized" scenario, the real investment figures for the first year were used, since the subsidy has to be offset against high costs of pre-installed equipment. For the long-run cost calculation however we were interested in years following the first year where penetration can vary.

The active and the passive network have different payback periods. The costs for the active network are relatively high.[25] The subsidy of €800 per subscriber therefore has to be spread in our model over the active and passive network. While the amount invested in the project can be considered as a form of lump sum payment, €500 from the subsidy went into the infrastructure, and €300 into services.[26]

Network equipment has a short depreciation time; we assumed a 5-year depreciation period for active equipment. The passive network was assumed by us to have a 25-year depreciation period; interest on both was assumed to be 10 percent. Marginal revenue per subscriber (remember the service providers sell only the triple-play bundle) is (services and network) €50 per month (including VAT). In the 'normal' scenario, a network operator would not receive the subsidy but also would not pre-install all equipment. In our models we have assumed 40 percent of the variable active equipment (access routers, etc.) to be pre-installed, more is installed as higher penetration rates are achieved. Pre-installing 40 percent is a reasonable assumption because a significant penetration is required to recover large investment in the network.

The difference between the 'current' (subsidized) and the 'normal' (unsubsidized) scenario is related to the amount of pre-installed equipment and the (government) subsidy into the network, otherwise both models do not differ. The 'normal' scenario can therefore be considered as representative for a FTTH rollout in a small local community, i.e. black (high density) area.

The long-run average cost curves for a network operator in the 'current' (subsidized) and the 'normal' (unsubsidized) scenario for the FTTH network Nuenen are shown in Figure 3.

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[24] However it still is above 80 percent.

[25] A €1000 investment in the active network has a higher annual cost than a €1000 investment in the passive network.

[26] We have used this as a proxy for dividing the subsidy into €500 for the passive, and €300 for the active network.

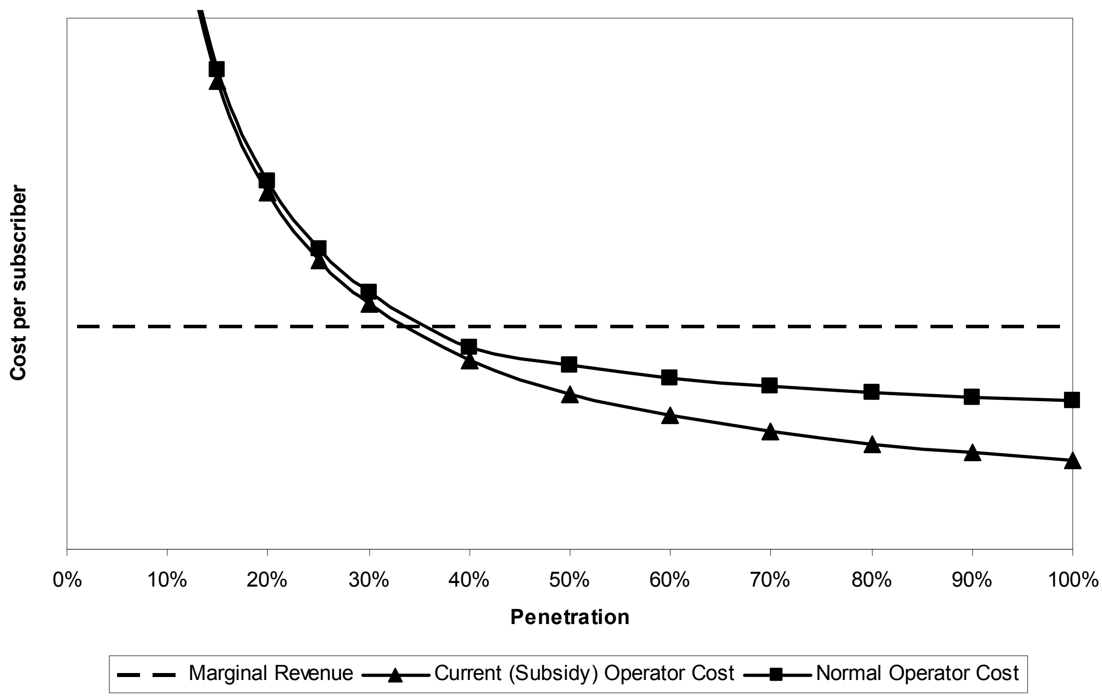

Figure 3: Long-run average cost curves for a network operator: 'Subsidized' and 'Normal' ('Nuenen')

The two curves are the long-run average costs per subscriber per month; the horizontal line is the limit on revenue per subscriber per month. The figure shows that the LRAC curve is decreasing for all possible outputs, which is a characteristic of a natural monopoly. The costs for network in the 'current' (subsidized) scenario are lower compared to the 'normal' (unsubsidized) case. The cost difference between these scenarios is growing with penetration due to increasing connections per household and the availability of active equipment (in the 'subsidized' scenario) while in the a 'normal' operator would have to build and invest more. At very low penetration ratios this cost difference is very small due to under-utilized investment in household connections and the existence of active equipment in the 'subsidized' scenario.

Service providers can connect to the FTTH network in Nuenen to offer services to consumers. Providers incur a fixed cost related to gaining access to the network, and a variable cost per subscriber related to the actual provisioning of services.

As the network is an all-in-one system that requires no investment in layer 3 equipment for service providers. While this reduces fixed costs, significant costs are incurred nonetheless in the provision of a backbone Internet connection, so scale economies do exist. Service providers are assumed to be identical and to have equal market shares for any achieved total penetration. The cost curves for service providers are therefore identical.

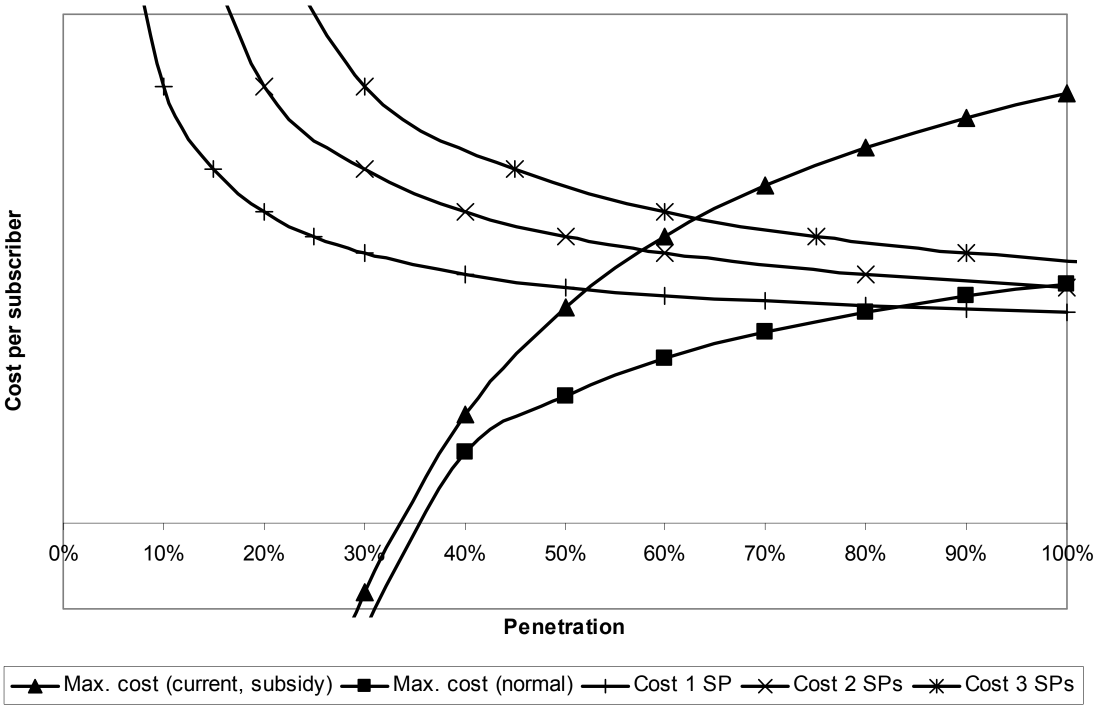

Figure 4: Competitive Entry in the 'Subsidized' and 'Normal' Scenario ('Nuenen')

For an open network with multiple service providers to be successful, the common price for the network and the services must be competitive. Under this assumption we assess possible market structure and service provider competition in the Nuenen network (see Figure 4).

For the network operator to be able to focus solely on wholesale transport and not on services, he has to be able to recover his cost plus a reasonable profit margin. Under the assumed restriction, this leaves the area between the operator's LRAC curve and the marginal profit line as the possibility space for service providers.

The maximum cost curves are therefore the difference between the marginal revenue and operator LRAC curves. Any service provider offering services on the network needs to be able to offer services below the price of the maximum cost curve. By plotting the LRAC curves for multiple providers we can assess at which achieved penetration rate sustainable competition between multiple providers is possible.

For the current ('subsidized') scenario, our analysis shows that a single service provider is able to achieve the required scale to deliver services at a competitive price at penetration rate between 50 and 55 percent. The two-provider curve is within the range 55 and 60 percent while the three-provider curve starts at maximum cost range of 60 to 70 percent penetration. These are the minimum penetration rates required for the service providers to be able to recover cost, profits are not yet incorporated (see Figure 4).

While the calculations show that the subsidized network in Nuenen could support multiple service providers, the 'normal' (unsubsidized) scenario is very different. The 'normal' investment scenario in the Nuenen network differs significantly from that of the subsidized scenario with very high first year investment in house connections and equipment. The LRAC curve for two service providers intersects with the normal maximum cost curve at 90 percent penetration, which is extremely high.

We must conclude that in a 'normal' scenario without subsidy, the network in Nuenen would not be able to function as an open network. While the network can technically offer access to multiple providers, the scale of the network is too small to support multiple service providers in sustainable competition. We suspect a minimum efficient scale exists for FTTH networks to truly function as an open network, and will test this by performing the same analysis for a larger city-wide network in the following section.

4.3. The 'City' case

In the 'City' case we use data for a FTTH network for a medium-sized city in The Netherlands. This project would pass all houses in the entire city with a fiber network, potentially a little under 37000 subscribers. This increment in scale is a step up from the small Nuenen network.[27]

The physical boundaries of the access network in a split network operator/service provider industry structure are shown in Figure 5. Equivalent to the Nuenen network, the CPE is part of the access network.[28]

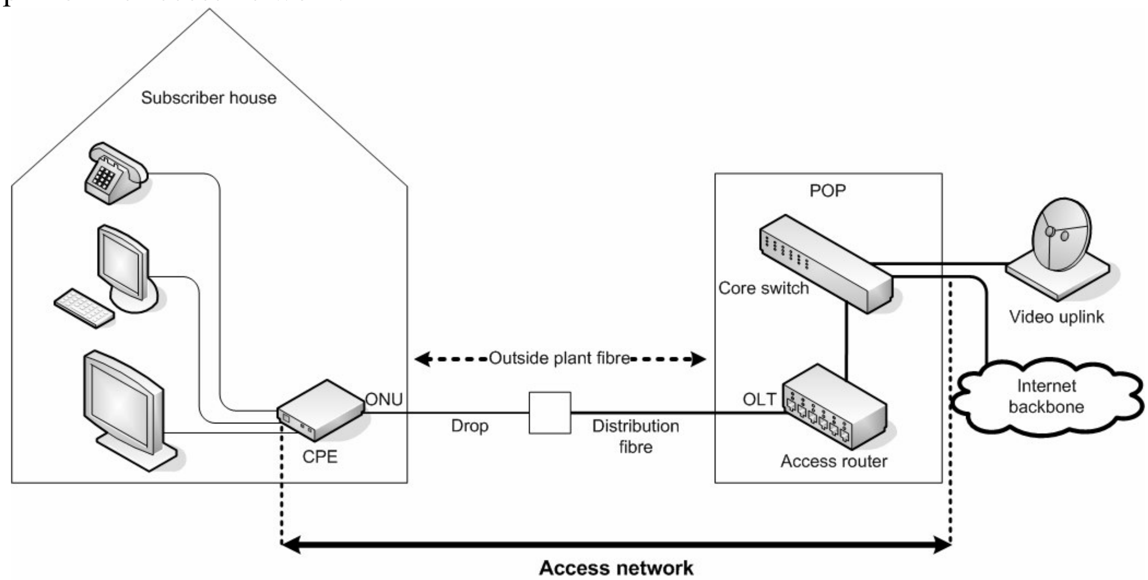

Figure 5: Split network operator/service provider ('City')

In Figure 5, the backbone Internet connection is not considered part of the access network, nor is the video headend. In this split industry structure, facilities are present the main POP of the city to make provisioning of Internet, TV or other services by service providers possible (the interconnection point). The providers themselves are responsible for bringing their signal or connection to the POP. Figure 6 shows the functional delineation in the 'City' network. The figure shows a layer 2 solution for the network operator. The network layer (layer 3) and

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[27] We expect FTTH networks to start out as small localized networks such as the Nuenen municipality, the Tongelre neighborhood in Eindhoven, or the Almere Fiber Pilot in part of the city of Almere. A network covering an entire city is a next step in the evolution towards larger (even regional) networks and a mature FTTH access market.

[28] In the future it may be preferable to exclude the CPE from the access network from the operator's point of view, and only provide a fiber termination point for an optical network unit. This would reduce cost for the operator, while offering options for service providers and consumers. In a mature equipment market with clear standards, subscribers could choose the CPE which best suits their needs: some CPEs could be simple and cheap, while others could offer more functionality at a higher price. Service providers could also choose to supply their subscribers with a CPE upon subscribing to their services. These possibilities are currently already employed in the market for ADSL equipment, which is a mature market. Consumers can go to a store and buy an ADSL CPE with more options (for instance including a wireless router or a VoIP interface) if they so desire. However, until fibre-optic access equipment has reached mass-market availability, the CPE needs to be supplied by the operator as part of the access network.

services on top of that are the responsibility of independent service providers, not affiliated with the network operator.

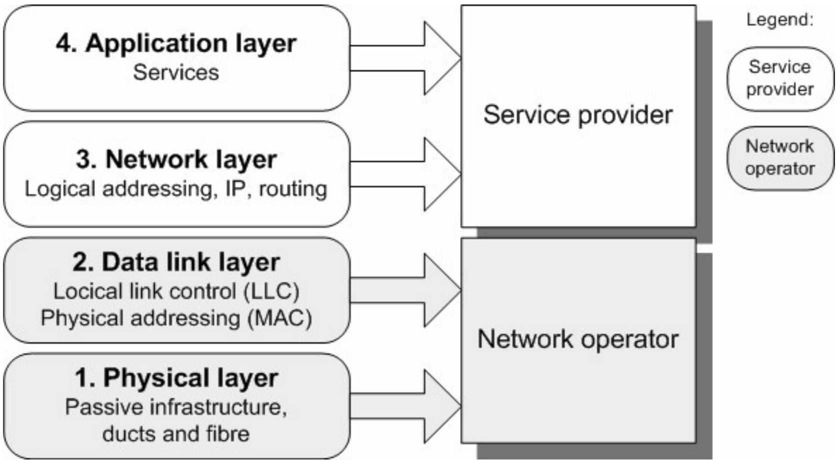

Figure 5: Network operator/service provider structure ('City')

The decision for layer 2 equipment in this network is taken from the perspective of the network operator as well as that of the service providers. The service providers have their own pool of IP addresses for which they are responsible. Should problems occur with one of the addresses (for instance spam or viruses are being distributed from one of their IP addresses), the owner of the address is responsible for taking action. If the problems are not solved timely and adequately larger problems may arise, for instance if e-mail from the entire domain or IP-range is blacklisted by other providers. This responsibility is taken on by the network operator in a layer 3 system, but many service providers may not be willing to relinquish control over their addresses.

Management of the IP layer is a significant task and becomes more complex as the open network model is more successful offering access to more providers and more different services for subscribers. While in a simple network each subscribed house may only have a single IP address (say for an Internet service). Adding additional services (such as VoIP and IPTV) will require several IP addresses per subscriber (assume one IP address for each subscribed service) which increases complexity. Furthermore in an open network with multiple service providers, they each will have their own pool of IP addresses to give out. A subscriber who takes three services, each from a different provider, is a distinct possibility but a complex task to manage for the operator. As subscribers sign on for more services and the open network is more successful, the operator is faced with an increasingly complex network operation environment which increases operational costs. Shifting these tasks to the providers therefore lowers system management costs for the operator.

The network will pass all 37000 houses in the city in a double point-to-point architecture. In the active network, layer 2 equipment from a major vendor will be used on the data fibre. The costs of construction and operation of the 'City' network will be used to evaluate the scale economies for the network operator and service providers of the City network. Only a single cost curve for the network operator will be calculated since no subsidy has to be incorporated. All concerned parties are privately owned companies. The cost curve for the operator will therefore be calculated like the 'normal' scenario in the Nuenen case: the basic infrastructure and core active equipment are fixed as well as a 40 percent pre-installment of the variable active equipment. Variable costs for the passive network are obviously fully dependent on penetration since house connections can only be made when a subscriber's address is known.

The capital requirements are the same as for the Nuenen case: a 5-year depreciation period for the active equipment and a 25-year depreciation time for the passive network. Interest on both parts of the network is calculated at 10 percent. Marginal revenue for the triple-play bundle is €50 per month (including VAT). Service provider profits are not calculated.

The long run average cost (LRAC) curve for the network operator in shown with marginal revenue for the bundle in Figure 7. The slope of the curve is similar to that of the 'normal' operator in Nuenen, however it reaches a lower per-subscriber cost at high penetration. This is caused by the larger scale of the network which allows fixed and sunk costs to be shared amongst more subscribers.

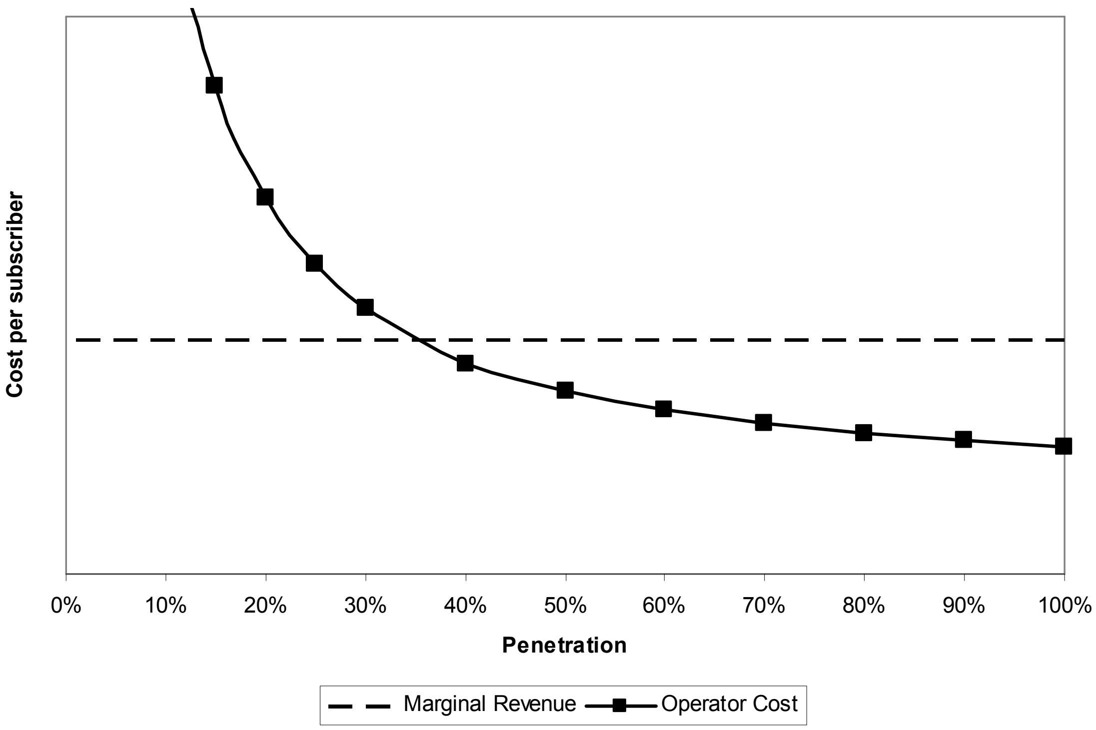

Figure 6: Long run average cost curves ('City')

Service providers who connect to the 'city' network incur higher costs than those in Nuenen. Since the network operator offers open access at network layer 2, each service provider will have to provide its own layer 3 equipment in addition to the other costs such as a video headend or Internet backbone. While a layer 2 network requires more capital investment because of the added layer 3 equipment, this provides better allocation of costs and responsibilities to specific parties in the value chain and is therefore to be preferred. The calculations will show that these added equipment costs are not a problem at sufficient scale.

The cost curves for one to three service providers are then calculated (see Figure 7). Again, service providers are assumed to be identical and to have equal market shares for a given penetration. The common price of the network and the services is critical in determining is the open network can compete with existing infrastructures. Using a marginal revenue of €50 per subscriber we assess the long-term competitive market structure of the 'City' network. Assuming the network operator charges according to his cost curve, can multiple service providers compete in this environment? The difference between the marginal revenue and the operator's cost per subscriber is the allowed cost for a service provider on this network to remain below the marginal revenue limit. The possibility space for service providers (the difference between marginal revenue and the operator cost curve) can be characterized as the maximal cost for service providers. The LRAC of the service providers needs to be lower than this maximum cost for the providers to be able to offer services in sustainable competition. The LRAC curve shows for a single service provider to cross the maximum cost curve at a range between 55 and 60 percent. Two providers can compete at a penetration range between 60 and 65 percent, and three providers between 65 and 70 percent.

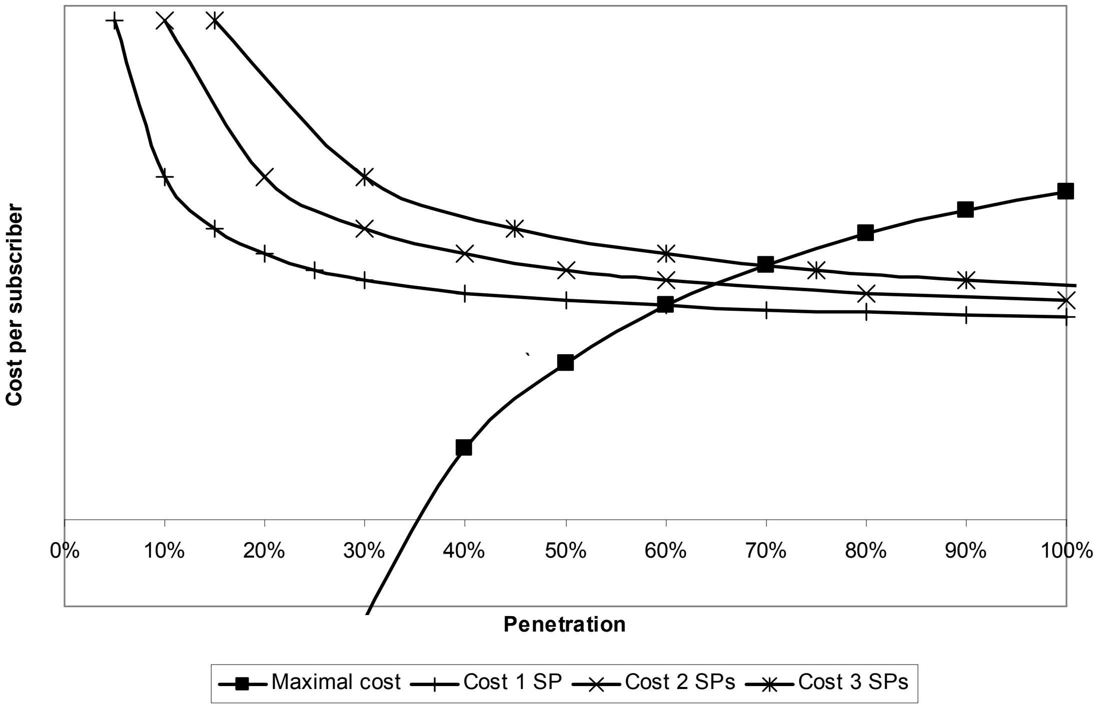

Figure 7: Competitive Entry of Different Providers ('City')

The conclusions for the 'City network are significantly different that that of the 'Nuenen' network. Whereas the 'normal' scenario in 'Nuenen' could not support multiple service providers (only at very high penetration rates), the City network can support multiple providers under normal private investment. The fact that service providers are faced with increased fixed cost to connect to a layer 2 network does not interfere with the viability of offering service on the network.

The calculations for the 'City' network support that a minimum efficient scale exists for a FTTH network to be able to operate as a truly open network. Calculating the exact minimum is problematic since building the network is a custom task in every situation. The local geography, town layout, population density, type of housing, presence of parks, highways, railroads or water, etc. influence network cost and are different in every situation.

Results from our open network cost model have shown that the 'City' network can support multiple service providers under normal private investment. At sufficient penetration, the network has sufficient scale to support multiple triple-play service providers in sustainable competition. The network operator can focus on providing wholesale access to service providers.

5 SUMMARY AND DISCUSSION

Our paper has shown that provision of open access to basic infrastructure as required by the European Commission according to Article 87 is also applicable for the FTTH networks implemented by local communities. As these networks are based at the wholesale level on non-replicable assets, the key issue is whether open access provisions will provide sufficient incentives for the growth of the user community and competition at the retail level.

We have shown that there are different ways for municipalities to foster FTTH networks by complying with European legislation (see section 2). Municipalities can act like (private) market investors, provide for open access in these networks or consider their support as part of the services in the general economic interest. As the first two routes have already been taken in the Netherlands, the third one (already utilized in other European countries) still has not been exploited yet.

In developing the case for non-replicable assets for FTTH networks, we have shown that open access scenarios can be considered as a measure in line within EU competition law (see section 3). However, the open access scenarios differ much technologically as access can be provided at distinct layers of the FTTH network. The different architectures of FTTH networks provide, in addition, more technological options to provide open access.

Finally we discussed our empirical findings in the light of the growth of two FTTH networks with a small scale ("Nuenen") and a larger scale ("City") (section 4). Our general conclusion was that without a government subsidy small-scale FTTH networks will be unable to sustain service level competition. The counterfactual evidence with respect to larger networks ("city") shows that with large network size government subsidies are not per se necessary to guarantee a multiple service environment given open access obligations.

Furthermore, we concluded that current EU and national regulation will provide for a patchwork of regulations on FTTH networks as there has been no general recommendations with respect to the involvement of local communities or the definition of open access (at which layer?). The first signs that this patchwork of regulations will find its reflection in a patchwork of FTTH networks are already visible in the Netherlands.

Our research has been limited as we were examining the growth of just two FTTH networks in the Netherlands with very specific technological and economic characteristics. Further research has to show to what extent our conclusions with respect to public intervention (in line European legislation), network size and the growth of municipal broadband initiatives can be generalized in a broader context.

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APPENDIX A: METHODOLOGY

Making explicit which costs are caused by which parts of the value chain will allow for activity based costing. In a split industry structure, correctly allocating costs to market parties is of vital importance. Where (to whom) costs are allocated will have an impact on the attractiveness of certain roles in the value chain, and will influence competition (or lack thereof) in that part of the value chain (Gasmi, Kennet, Laffont, & Sharkey, 2002, Vogelsang & Mitchell, 1997).

Modeling the business environment: Vertical vs. Open

To compare open networks with vertically integrated networks, we compare the cost structures of two single-product firms. The first firm is a vertically integrated operator who sells a bundle of triple-play services to subscribers. The second firm is a wholesale network operator who sells access to the fiber network.

The vertical business model
The 'vertical' business model models the costs and revenue of vertically integrated FTTH network. The network provider does not only operate the network, but also offers services to its subscribers. In this model, triple-play services are offered to consumers.

The costs of the network are capital expenditures (*CapEx*) from the investment in the passive and active infrastructure, and operational expenditures (*OpEx*) from maintenance and operations which have a fixed part fix and a variable part var. In addition to this, costs related to service provisioning (SP) are incurred. We will use a two-part cost structure for the service provider: a fixed part, related to the costs of gaining access to the FTTH access network (putting the services on the network), and a variable part per subscriber. The fixed part includes for instance the necessary equipment (TV headend, internet backbone) and the variable part includes for instance the per user cost of the broadcasting rights.

Capital Expenditure CapEx is split in the Investment I in the active part a and passive part *p* of the network, which are both annualized (using the function "Payment" *Pmt*) according to their respective capital requirements: the rate of return *r* and *n* years depreciation period.

The price at which services are sold to consumers forms the income of the firm. Since the network and the services are provided by the same company, this income can be used to cover the costs of the network and the services without a specific allocation between the sources of costs.

The open business model
In an open network business model, subscribers choose to take services from independent service providers. The role of the network operator is restricted to operating the FTTH network and offering access to it. Our interest in this business model is if an open FTTH

network can recover cost and if the network can sustain competition at service level. For this to happen, three necessary conditions must hold:

1. The network operator must be able to recover cost.
2. The service provider(s) must be able to recover cost.
3. The total price for the subscriber must be competitive.

The importance of the first two conditions is trivial, since no operator or service provider will invest in a loss-making network. The third condition is also required because service providers will have to compete with providers on the PSTN and cable networks. If the costs of service provisioning are such that a FTTH service provider is much more expensive than a PSTN or cable service provider, many consumers will choose a different network. Since the bandwidth of a fibre connection cannot be matched by copper networks, a premium price may be charged for high-bandwidth services, but not all services require high bandwidth and not all consumers may value a fast connection equally high. This means the costs of the network and the costs of the services both need to be reasonable. This also indicates why we can accept a monopoly position for the network operator. While a monopolist network operator could raise prices for service providers, price competition from other networks would cause subscribers to choose a different network, which would reduce the operator’s profits.

While competition is not explicitly incorporated in this model, it does exist and limits the achievable market penetration and price. Obviously, the total cost in the open network is the cost for the network operator plus the cost for (any one of) the service provider(s)

Service providers are assumed to provide fairly homogeneous products to subscribers. Services are reasonably exchangeable between providers, who compete on price, level of service, and brand. Service providers incur costs SP in the same way as the services in the vertically integrated firm: a fixed part, related to the costs of gaining access to the FTTH access network, and a variable part per subscriber.

The network operator incurs costs the same way as the network part of the vertically integrated firm, but has recover these costs with its own independent income. The network operator can choose to charge a fixed network subscription price to consumers (in addition to a charge for the service providers), or can choose to charge all costs to the service providers. In the latter case, the service providers incorporate the cost of the network in the service price for the consumer.

Charging service providers for the network cost is fairly straight-forward in a single service provider environment, but becomes less attractive when multiple service providers offer services to the same subscriber. While this would allow the operator to charge the same connection multiple times (to each of the service providers), the subscriber will not appreciate having to pay twice for a single fiber. The double network charge a subscriber would incur would drive all subscribers to choose all products from the same provider. Economies of scope already exist for service providers, since the cost of gaining access to the network occurs only once for all services. Adding a possible double network charge is undesirable from a competition point of view. Splitting the network cost of a subscriber over multiple service providers creates an accounting nightmare and a confusing environment for the subscribers. (A subscriber who currently has one service and subscribes to a second from a different provider will find the price of the first service has suddenly lowered.)

While charging the service providers for the full cost of the network is a possibility, this paper will focus on the network subscription scheme as an income source for the operator.

This is an elegant way to recover the cost of the network, and allows service providers to compete on service and price. This choice does not affect the results of the analysis. The operator's costs are the same regardless of the pricing system. Whether the income required to recover cost is paid by the service providers or by the subscribers directly is of little importance, assuming the income per user is the same.

Model parameters

The model will use quantitative data from a private investor to calculate the cost functions of the network scenarios.

Investment
The Capital Expenditures for the network operator are the annualized costs for the active and passive network. The two parts of the fibre network have very different lifetimes so the distinction is important. Each asset should be annualised according to its own specifications.

The equation for *CapEx = Pmt(r, n, I)* is based on the investment in the network I (for both parts of the network). The result is highly dependent in the capital requirements in the formula: the rate of return r and the number of payments n. The scenarios in subsequent chapters will distinguish between a public or private investment scenario for the passive network only. The active network is always exploited by a commercial party.

Network Size
Size matters. Scale economies exist within a given FTTH network (as penetration increases), but additional scale economies exist when networks become larger. Small networks will have higher average cost for maintenance and control than large networks. A distinction will be made between the small local network in Nuenen and larger networks in the future of Fiber-to-the-Home.

APPENDIX B: MUNICIPAL PROJECTS APPROVED BY THE EUROPEAN COMMISSION (APRIL 2006)

Until now, the following projects are approved by the European Commission as in line with current legislation on State Aid.
Compatible State Aid

(1) "Project Atlas" (Broadband infrastructure scheme for business parks): The project is aimed at lowering prices of broadband services for commercial users located in business parks. It will ensure the widespread availability and use of highspeed broadband services at conditions closer to those in areas with a greater density of population and businesses. This project will not require building duplicative infrastructure in these locations.
(2) "Broadband Business Fund"
(3) "Broadband in Scotland remote and rural areas" (Provision of end-to-end services)
(4) "Broadband for SMEs in Lincolnshire": Scottish Executive, East Midlands Development Agency & sub-regional Strategic partnerships and Lincolnshire County Council will provide a subsidy to a telecommunications service provider selected by a competitive tender to provide respectively: 1) mass market broadband services to businesses and citizens in remote and rural areas in Scotland, 2) broadband services to SMEs and residential users in selected counties in East Midlands, 3) advanced broadband services to SMEs in the county. The selected provider will have a mandatory requirement to provide not only retail, but also wholesale access to its network to third party service providers.

(5) Regional Innovative Broadband Support in Wales: The Regional Innovative Broadband Support scheme aims at supporting the provision of first generation broadband services to connect end-users (households and businesses), at conditions and prices similar to urban areas, in the so called "blackspot" areas of Wales. These areas are currently not served and there are no plans for coverage in the near future. The measure is part of the Broadband Wales Program, which feeds into the National Broadband Strategy of the United Kingdom.

(6) Broadband in remote and rural areas in Spain: By means of an aid scheme called Programa de extensión de la banda ancha en zones rurales y aisladas, Spain aims at supporting the provision of broadband services, at conditions and prices similar to urban areas, in certain rural and remote areas, which are currently not served and where there are no plans for coverage in the near future. The notified measure is part of the Spanish National Broadband Strategy. The measure is partly funded by structural fund and partly by resources of the Spanish central government The Spanish government envisages to cover approximately 203,000 households and businesses, at an average cost per user of € 1,000. According to the calculations of the authorities, the overall cost for achieving this coverage will be in excess of € 203m (€ 175m of which in objective 1 regions), of which most is to be borne by the selected service providers.

(7) "Cumbria Broadband" (Aggregation of demand): Under the Statutory responsibility of the North West Development Agency, a contractor would be chosen through an open tender procedure for a period of three years for the provision of broadband services through Cumbria and parts of North Lancashire. Both areas are characterised by mountainous topography and a general lack of densely populated villages.

Service of General Economic Interest

(8) "Haut débit Pyrénées-Atlantiques"

(9) "Mise en place d'une infrastructure haut débit sur le territoire de la région Limousin The two projects concern the construction and exploitation of a public, open access network on the whole department of Pyrénées Atlantiques and in the region of Limousin respectively. The network will be made available, under transparent, objective and non-discriminatory conditions, to operators wishing to provide broadband services to residential users, business and public authorities. In both notifications, the French Authorities underlined the fact that the measure fulfils the criteria allowing it to be defined as provision of public service, according to national law. In addition, the French Authorities qualified the projects as services of general economic interest (SGEI) in accordance with Art. 87 of the EC Treaty.