

Study On

Local Open Access Networks

For

Communities and Municipalities



Acknowledgement and Disclaimer

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Preface

The Information and Communication Technologies (ICT) sector is an increasingly dynamic and competitive sector, fundamentally relevant to the World Bank Group development agenda.ⁱ

Access to the internet is becoming a prerequisite for improving any country's economic and social welfare, since it provides a conduit to enable open and accessible government, enhance business competitiveness, and improve the quality of their citizens' lives, through improved delivery of services, such as health and education. The Organization of Economic Cooperation and Development (OECD) countries, in many instances, have not only achieved ubiquitous access to basic internet services, but are also succeeding in achieving high penetration rates for broadband access, which in turn facilitates more complex and effective services provision and delivery models. Developing countries, on the other hand, struggle to provide any form of access, even in major conurbations, and rural / remote areas are almost devoid of affordable access, which further contributes to the widening of the digital and therefore economic divide. Many developing countries have tried to tackle this issue 'top-down' through regulation, policy and encouraging the private sector to invest in such areas and regions, which are deemed to be less commercially viable, but even through this active government participation, broadband coverage has remained stubbornly low. In fact, according to ITU, "there are currently 800,000 villages worldwide that lack access to even basic telephone service. Overall, some 1 billion people are unconnected and thus marginalized from the benefits ICTs can offer".ⁱⁱ

This Study is therefore a first-of-its-kind attempt to provide a systematic review of a special type of Access initiative, that of localized broadband. These initiatives, often deployed by individual champions in communities and municipalities, may potentially provide a partial alternative

‘bottom-up’ approach. Several of successful such successful projects are identified, which suggest that the donor community and national policy makers should at least consider encouraging local engagement, as a means of complementing national strategy. This Study is therefore primarily aimed at local policy makers and identifies some of the basic building blocks one should consider when developing such local initiatives. It is also aimed at donors considering sub national lending and municipal development.

Since this groundswell of local activity has yet to become a global trend, several challenges were faced during the preparation of this Study. These challenges included:

- Extrapolating lessons learned from developed country examples and applying them to a developing country context
- Analyzing data from a relatively small set of developing country examples
- Identifying potential challenges, which a bottom-up approach may meet in terms of national policy, regulation, and stance by the incumbent service provider
- Identifying potential options for local project leaders in areas such as public private partnerships (PPPs), technologies, costing,
- Identifying the effectiveness of localized broadband projects and specifically, the outcomes and impact such localized broadband networks might have

Given the above challenges, the conclusions of the Study are preliminary and part of a work in progress.

The Study will be available in .pdf form (<https://infodev.oplan.org>), repurposed into a web enabled searchable document, enhanced with the inclusion of 24 summary case studies from around the world and supplemented with on-line references and secondary sources. A web-based questionnaire will also enable the addition of further case studies and training material will be made available for local events. The indicative value-chain of the project is represented in Figure 1.

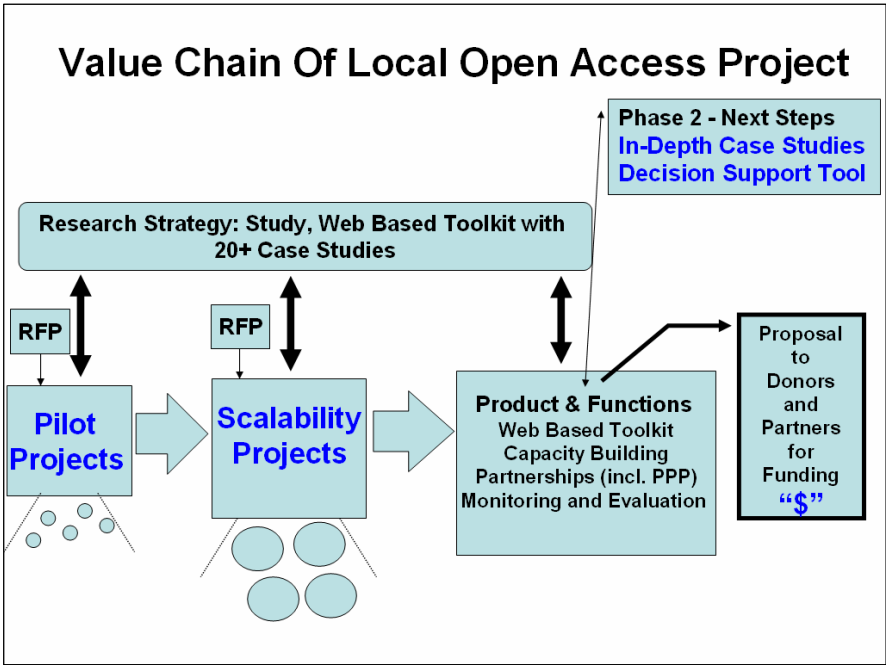


Figure1. Indicative Value-chain of infoDev’s Local Open Access Networks Project

At a later date, the web-platform will include further in-depth case studies, which will specifically analyze elements, such as costing and socio-economic outcomes and impact. Future pilot and scalability projects are also planned to further enhance this ‘Toolkit’ of knowledge components thus, assuming continuous updating, transforming the Study into a comprehensive program capable of providing decision support for local and municipal leaders, which in turn will help them deliver social and economic benefit.

Executive Summary

At the 2005 World Summit on the Information Society in Tunis the International Telecommunication Union (ITU) estimated that around 800,000 communities or more than one billion people worldwide, still lacked connection by telephone line, the Internet or access to any other modern communications technology.ⁱⁱⁱ

This Study On Local Open Access Networks For Communities and Municipalities is primarily aimed at leaders and local policy makers in these underserved communities, who are faced with the complex and daunting task of facilitating and delivering to citizens, businesses and government the benefits accrued from accessing the internet. It also serves as a useful source for donors and development agencies, who may wish to understand the dynamics of emerging markets, when considering the provision of grants and loans specifically for local communications projects. National policy and regulation, as tools of ‘public interest’, should also, of course, be scrutinized to identify if alternative approaches can at least complement, if not challenge, current strategies to bridge this digital divide. Furthermore incumbents’ views on, commercial viability of networks in rural and remote regions, local public sector engagement and attitudes towards potential competition, should also be part of the debate, as if resolved, these issues would further reduce the enormity of this challenge.

This Study attempts to identify one possible methodology, which is complementary to national policy and to many incumbents current stance, when trying to reach rural and remote communities. It not only examines the feasibility of communities simply getting connected to the

internet, but also analyzes the opportunity to ‘leapfrog’ to broadband services through Public Private Partnerships (PPPs) and community engagement.

As a potential solution, the Study specifically considers the provision of *local open access networks*, which have certain key features:

- They have in most instances *true broadband capacity*. This capacity is likely to be constrained only by the physical capability of the digital hardware / software that is deployed, rather than by some artificially imposed business model.
- They serve a *local geographic community* ranging from a street or business park or housing block right up to an entire village, town or city. Such networks do not encroach upon the trunk and international networks of the conventional telecoms sector, nor do they subsume local area networks within homes and office buildings.
- These networks are, in one sense, a *public utility for the information society*. They are intended to be used by any party located within the community it serves - public and private, business and residential.
- They are *operated on an open basis*. These networks are owned and controlled independently of any service or content which runs over it. This affords anyone connected to the network to take or provide content or service from or to anyone they choose. They facilitate market entry by removing the high fixed costs associated with the need for each competitor to deploy its own infrastructure.
- Finally, the key feature of the legal structure of these local open access networks is that they have a *corporate governance culture and structure* that places emphasis on serving the ‘common good’.

An initial view of these *local open access networks* reveals that although there is a growing groundswell, which is not just restricted to Europe and North America, it is as yet, a trend which is in its infancy in developing countries. Developing country case studies from which one might extrapolate are therefore relatively few, but do exist in countries such as India, South Africa, Ghana, Brazil, Poland and Nepal.

A fundamental issue to emerge from the work underpinning the Study relates to the applicability of developed world experience and lessons learned, to the developing world. The conclusion here is that the relevance of successful experience in one context to another has little to do with the GDP rating of the country. Rather, it is to do with a number of critical factors, which are discussed fully in the ensuing chapters. These include local community commitment and vision, population density, literacy levels, technological limitations, incumbent telecommunications carrier behavior, and economics. Indeed, some of the *local open access networks* in the developing world afford useful templates for more developed contexts, in that they are more technically advanced than many commonly cited as exemplars from the developed world. Where there are developing country projects, these are also at a relatively early stage of implementation and therefore the business cases have not yet accumulated to the point where there is a reliable critical mass of evidence.

Furthermore, permutations of technologies, topology and public private partnership (PPP) options, place additional constraints on the ability to provide guidance on trends from this already relatively small data-set. As elaborated in the Preface section, the analysis presented in this Study, will however continue to be extended in several ways. One approach will be to

encourage private sector contributions to sections such as technologies and various forms of PPPs. The public sector will also be engaged to ensure case material, including detailed costing and economic impact, is kept up-to-date and accumulated to a point, where there is sufficient material to provide a decision support mechanism, capable of extracting information on several dimensions.

Although this is only an initial snapshot of the current market, the Study does provide individual and localized evidence in developing countries, on issues such as economic impact, project phasing and costing. It also draws on developed country examples, which can, where appropriate, provide guidance on technologies, applications, processes and options for public private partnerships in developing countries. These developed country examples have also only recently emerged from a period of experimentation, changing regulation and legislation and therefore, understandably in some cases, ambivalence by local government and incumbents. Within developed countries, there are further differences, which add to the complexity of the picture. For example, most, but not all of the initial local access networks in the U.S. were deployed by municipal utilities and were *closed systems*, with the local utility providing a range of telecommunications services directly to the public and often in competition with the local operators. It is estimated that over 90% are operating using a monopoly public utility model, where services are provided directly to the customer and where there is no competitive access to the network.

Lobbying on behalf of incumbent operators, state legislation restricting the entry of municipalities into retail provisioning of telecommunications services and the experience that has recently emerged from countries such as Sweden, have generated further interest in *open*

access networks, as an alternative to the existing closed access model. The European examples of open access networks can be attributed in part to local champions, government policy, at both the national level and to changes in guidelines and modalities recently introduced by the European Commission. Indeed, this is the approach that has been taken in the establishment of new Fiber-To-The-Home (FTTH) initiatives in Utah (including UTOPIA and iProvo) and those operating in Washington State (Zipp Fiber Network in Grant County).

This complex mix of incumbent pressure, disruptive technologies, changing legislation, and engagement at a community level are common in varying degrees across the entire spectrum of GDP, thus contributing to the view that developing countries can learn from developed countries experience, as they emerge from this phase of uncertainty and uncoordinated experimentation.

The appropriateness of these developed country case studies can be further highlighted by examining dimensions such as:

- The perception of fiber being a typically western economy *technology* is offset by the fact that 70% of the cost of deployment, being in digging and laying fiber is substantially less in developing countries due to lower labor costs.
- Advanced *applications* perceived to be within reach of only high GDP countries, such as city-wide public safety video surveillance, automating utility meter reading, and e-learning are evolving in developing countries, and in some cases in advance of their ‘western’ counterparts.
- *Funding* sources commonly available to the developed country community are partly being matched in developing communities, by an astute use of Public Private Partnerships (PPP) arrangements.

- *Affordability* of internet access, invariably within the reach of most western citizens is being offset in developing countries by recent reductions in technology costs such as Wireless and Voice over Internet Protocol (VoIP), government programs to increase ubiquity and crucially, local commitment and vision.

Nowhere is this truer, than in Knysna in South Africa, where Voice over IP (VoIP) was rolled out in January 2006, and Pirai Municipality in Brazil, where a feasibility study is underway for rolling out IPTV (Internet Protocol Television) in the near term over its hybrid fiber and wireless network.

What is key to this Study and at the heart of this emerging groundswell is a group of champions using a suite of disruptive technologies. They are driven by the desire to bring their communities into the 21st century, to deliver access to the internet, where they perceive national policy and incumbents have sometimes failed, and to improve the lives of citizens in their community.

Since this phenomenon of local open access networks is at an early stage of adoption a degree of caution should apply. However attention should also be drawn to the achievements to date specifically of examples such as the Municipality of Knysna in South Africa which will save over US\$700,000 over the next 5 years on inter-branch voice telecommunications alone and the cost of voice communications in the area has been reduced by more than 50% overall, through the introduction of prepaid mobile Voice over Internet Protocol (VoIP) in January 2006.

Rooiwal just outside the Municipality of Tshwane, also in South Africa, is successfully scaling-up its Broadband over Powerline (BPL) pilot project to a city wide network. All the homes in

Rooiwal receive on average between 4 and 8 Mbps data services including video-streaming, closed circuit television with security cameras, automated meter reading, complete with demand side management facilities, telephony and corporate local area network services. As part of this scaling-up strategy, the municipality of Tshwane is also developing Project 424 that will connect 424 schools in the area to libraries and universities through the BPL network.

There is an animated debate in progress on the topic of municipal broadband. On one hand, the case for such local broadband networks is made on some or all of the following five rationales.

(i) Broadband is an appropriate extension of other utility services; (ii) Broadband generates additional revenues for communities and allows for a more efficient operation of already existing municipal networks; (iii) The municipality enters into public private partnerships in the belief that the private sector is not serving the markets; (iv) Broadband can be an economic stimulus for economic growth and competitiveness of the region and (v) Municipalities are more oriented towards consumer or social welfare than the private sector.

On the other hand, particularly in the U.S. and Europe, there are counter arguments for such local broadband networks in that (i) Municipal interventions are likely to result in market distortions; (ii) From a financial perspective, municipal broadband networks have fallen short of projections and result in sizeable subsidies; (iii) Municipal broadband networks can undercut national competitive policies and (iv) It is private sector competitive markets not public sector intervention that leads to increased consumer benefits in pricing, innovation and service. ^{iv}

Despite this highly polarized debate and a variety of technology, organizational and policy experimentation, it is forecast that more than US\$500 million will be invested to enable wireless broadband networks for some 300 communities in the U.S. in 2006. In addition to government applications, the municipal broadband market is projected to yield US \$200 million in annual public service revenues by 2008. It is further estimated that municipal broadband networks, many of which will be open access, will help bridge the digital divide by driving global broadband subscribers to 327 million by 2008, from 151 million at the end of 2004.^v

Should this trend continue in the U.S. and Europe and with issues such as regulation (local governments being restricted to enter the retail market), legislation (where there are some 20 states^{vi} that have either passed or introduced legislation that either prohibits Municipal Governments from deploying local access networks or puts significant impediments in the way) and typical incumbents' responses (sweating assets of the legacy network) common to both developing and developed countries, we may very well therefore see this move from closed and incumbent operated to open and public private partnership models begin to percolate into lower economy countries, where arguably citizens needs for affordable high quality Internet services are the greatest.

At the heart of the debate there is however an overall consensus that any government sponsored intervention in deploying commercial communication infrastructure is only justifiable if there is a clear and defined failure of the private sector. Given the paramount importance of broadband access, one of the lessons learned from this on-going debate in the U.S. for developing countries, relates to the need to evolve robust mechanisms to assess the competitive landscape and create

an enabling environment that allows private sector led investments through innovative public policies at the state and local levels.

Hence, if this emerging groundswell does indeed turn into a worldwide trend, there are important implications for the various stakeholders engaged in economic growth and telecoms. These can be summarized as follows:

- *Local / Municipal government leaders:* Through the mechanism of Public Private Partnerships, local open access networks can potentially accelerate citizen, business and government access to the internet. There are however several hurdles including local engagement, regulation, business case development, financing and choice of technology to overcome.
- *Community opinion formers:* Engagement of community leaders involved in local services such as schools, health-care, religion, and police are critical to the success of local open access networks.
- *National policy makers:* Acknowledging and embracing a bottom-up approach might require reformulation of telecoms policies and harmonizing such developments with the related sector regulation. It is critical to develop robust mechanisms for assessing the competitive landscape and promote an enabling environment for private sector investments through incentives.
- *Donors and the international community:* There are several success stories emerging from the seemingly chaotic developments of the past few years and an approach of encouraging and financing pilots and scalability projects may reap substantial economic and social benefit.

The conclusions of this Study are as follows:

1. The main driver for the development of these local open access networks, in both developing and developed countries, is the fundamental belief in the importance of ubiquitous and affordable broadband access to the economic and social development of the community.
2. The involvement of local governments, communities and other groups in the deployment of these networks is being driven by the view that the incumbent service providers are not responding to the needs of the local community and in the absence of that commitment, new local networks will be deployed that can better respond to that need.
3. Although sparse, where municipal deployments are occurring in developing economies, as witnessed particularly from the experiences of cities in South Africa, such as Knysna, Cape Town, Johannesburg and Tshwane, they are as sophisticated in the use of technologies and business models as those for similar cities in developed economies.
4. Increasingly, the standard business model for these municipal local access networks being adopted around the world, is one based on local governments supporting the deployment of a common infrastructure, through public private partnerships allowing for wholesale, if not full open access to all service providers. In the words of Executive Mayor Dr. Ms. Joy Cole, Knysna, Western Cape Province, South Africa, the first city in Africa to roll out a city-wide ubiquitous open wireless network through a public private partnership, *"We believe in not only moving with the times, but more so, to set the pace for things to come - hence this initiative. We firmly believe that this town can only grow and achieve success if we create an environment where we all grow together and have access to technology through which we can have information to grow business, empower ourselves and ultimately become proud citizens of Knysna with one vision"*.

This Study is divided into 8 Chapters.

Chapter 1 focuses on the development of local open access networks describing basic characteristics and the trends that are being observed throughout the world in the deployment of these networks by governments and community based organizations.

Chapter 2 provides an overview of the rationale and drivers for the deployment of an increasing number of local open access networks in municipalities and regions.

Chapter 3 analyzes more detailed information on studies that have demonstrated the economic impact of broadband deployment at the national, regional and local level and the role of local open access networks. It also deals with the impact of broadband deployment and adoption on the issues of social benefit and inclusion.

Chapter 4 elaborates on the process for developing local open access networks. This includes from the initial concept to full implementation.

Chapter 5 examines the financial issues and the business models used in the deployment and operation of local access networks, both by governments and community based organizations.

Chapter 6 reviews the impact that government policies, regulation and legislation have on the deployment of local open access networks.

Chapter 7 presents an overview of the six major technologies that are used to provide high-speed access to the Internet, namely Optical Fiber, Wireless, Broadband Over Powerline (BPL), Digital Subscriber Line (DSL), Cable Modem and Satellite.

Chapter 8 draws on extensive experience in deploying local open access networks to provide a road map to assist community based organizations and local authorities through the process of rolling out such networks.

Chapter 1: Background and Introduction

Chapter 1 focuses on the development of local open access networks describing the basic characteristics and the trends that are being observed throughout the world in the deployment of these networks by governments, community based organizations and others.

1.1 BACKGROUND

The emerging development of local open access networks in one form or another around the world suggests that, as of mid 2006, this is an important topic of universal relevance. There is every reason to believe that the relevance of these networks is going to increase substantially over the coming months and years.

There are different dimensions to local open access networks and what they mean to different individuals, as exemplified by the following:

- The Akwapim Community Wireless Network is an open architecture mesh network that has seven nodes. This network has coverage of 45 square kilometers, and offers internet connectivity to schools and community centers across six villages in the mountainous region of Ghana. It plans to roll out VoIP services soon.
- Starting as a small pilot project in 2002, the Wireless Nepal community network, is today offering a reliable, always-on connection, with throughputs equaling 64/64Kbps. Although not broadband this is an example of an open access wireless network initially constrained by the network equipment available. This wireless network is today scaling up its operations across Myagdi, Kaski, and Parbat districts in north-west Nepal. It plans to offer VoIP services soon.
- The municipality of Pirai in the Rio de Janeiro state of Brazil has rolled out a hybrid fiber and wireless network with 52 broadband nodes that connects all local government offices and 20

public schools and libraries. A private company with majority municipal ownership has been formed to commercialize services.

- The city governments of Philadelphia (U.S.) and Knysna (South Africa) have set-up city-wide ubiquitous wireless networks to overcome their socio-economic divide and increase their competitiveness through strategic partnerships with local private sector internet service providers (ISP) – Earthlink and UniNet South Africa.
- The state government of Andhra Pradesh invited private-sector bids for a broadband infrastructure project, contributed about 14% of the project equity, and provided free right-of-way permissions to the selected consortium. Similarly, the state government of Rajasthan in India has contracted with Motorola to become the first in India to deploy a state-wide wireless broadband grid.
- On.Net, a Macedonian Internet Service Provider was selected by USAID to build and own a wireless mesh technology network for the entire country of Macedonia. On.net has launched a first wireless broadband network covering 500 schools.
- Philippine Long Distance Telephone (PLDT) has leapfrogged the wired internet and has started to offer cost-effective broadband wireless internet service for individual subscribers and small and medium enterprises, with a target to double its broadband subscriber base in 2006.

Any attempt to therefore define local open access networks into different typologies would result in several classifications. On the basis of spatial considerations, such networks could be rural, suburban, and urban. On the basis of financing, such networks could be community networks, municipal owned networks, or public-private partnerships. Furthermore public-private

partnerships could be classified as management contracts, concessions, build operate own, joint ventures etc. On the basis of broadband access technologies, networks can be further classified as a wireline, wireless, power-line or satellite based. If one specifies by the clients served by each network, they could be defined as operating at either the retail segment, or the wholesale segment, or both.

Using a services offered definition, such networks can also be classified as offering triple play (voice, video, broadband internet) or quad play (voice, video, media and mobility). Given these numerous dimensions, the first step towards understanding local open access networks one must elaborate on their fundamental characteristics.

1.2 CHARACTERISTICS OF LOCAL OPEN ACCESS NETWORKS

These new open networks are ‘end user’, rather than ‘network’ or ‘operator’ centric. They are about people - linking men, women and children; commercial and non-commercial organizations; public and private institutions, within the context of their physical communities. They are about deploying advanced digital technologies to support and enhance the work, life and play of those communities and the individuals that comprise them. They are about increasing and easing connectivity and communications within and between communities that reflects the natural behavior and inclinations of the individuals that comprise those communities. The strong commitment and entrepreneurship of the individuals driving these projects is a key element of their success. One simply needs to engage with individuals in communities such as Nuenen (The Netherlands), Djursland (Denmark), Akwapim (Ghana), Pirai (Brazil) or Knysna (South Africa) to appreciate how these principles are being applied.

What is also clear is that local open access networks are not simply about doing conventional telecoms things in a new way or by someone else. Nor is it simply an issue of ownership and control, being in the hands of parties other than existing telecoms operators. These networks are, both shaping and being shaped by creative, innovative and adventurous end-users and the institutions – both public and private – that seek to serve them. The immediate global relevance of this open access network development comes from the fact that some of the core and access technologies, particularly Internet Protocol (IP) over wireline, wireless, and powerline are disruptive technologies and do not fit easily into any progressive upgrade of or evolution from existing local telecom or cable access infrastructure and the business models underpinning them. So in examining the case studies from around the world, what are some of the typical defining characteristics of these local open access networks?

First, local open access networks have in most cases *true broadband capacity*. This capacity is likely to be constrained only by the physical capability of the digital hardware / software that is deployed, rather than by some artificially imposed business model. These new technologies will deliver a capacity that is a significant improvement on anything that can be provided by existing

copper-based local telecoms networks - where they exist. As with the silicon chip, ‘Moore’s Law’ will massively impact the price-performance relationship of these technologies, with more capacity for less currency being the trend in future.

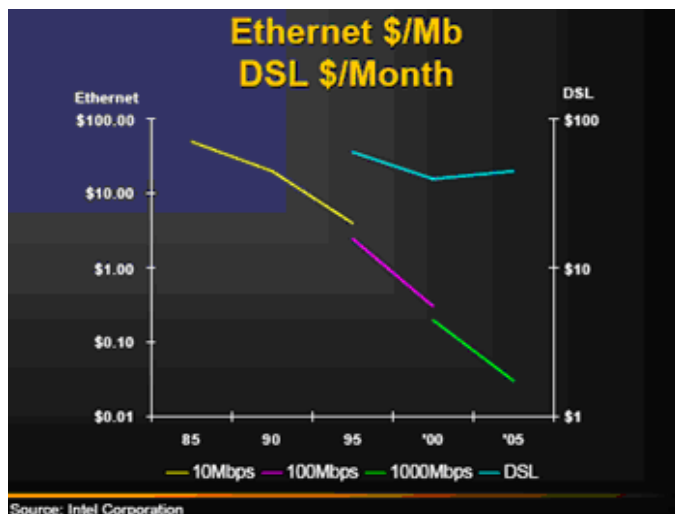


Figure 1.1 Example of new technologies versus copper based networks

Second, local open access networks serve a *local geographic community* ranging from a street or business park or housing block right up to a village, an entire town, city, a municipality, or even a region. They do not encroach upon the trunk and international networks of the conventional telecoms sector nor do they subsume local area networks, within homes and office buildings – they are confined to linking the ‘physical points of presence’ in a community. Global connectivity beyond the community will continue to be provided by the Internet, access to which would be via one or more competing third-party service. Likewise, the local area network within a home or office will remain totally independent.

Third, these networks are, in one sense, a *public utility for the information society*. They are intended for use by any party located within the community it serves: public and private, business and residential. This does *not* necessarily mean that they need to be owned and operated by the public sector, but it does mean that in its legal structure and governance, whether publicly or privately funded and controlled, there are legal instruments and mechanisms to ensure that nobody within the community being served can be denied access to them. Knysna, for example, has chosen like other developed world municipalities to facilitate this by partnering, and not to own and operate the network on their own.

Fourth, and probably the most critical, they are *operated on an open basis*. That is to say, these networks are owned and controlled independently of any service or content, which runs over it. The technological driver is the Internet Protocol (IP) architecture, where ‘intelligence’ is located at the ‘edges’. This affords anyone connected to the network to take or provide content or service from or to anyone they choose. This means that anyone connected to one of these open access

networks may equally be ‘providing’ content and application services as ‘consuming’ them. It is for this reason that ‘symmetrical bandwidth’ is so important – something not always recognized in the telecom model, which in many instances is focused on the telephone network for local access. For example, in South Africa, 95% of all broadband services are provided on a capped basis that naturally limits the ability of individuals on the network to provide content to the community. However, already, 60% of all internet traffic is reckoned to be accounted for by peer-to-peer,^{vii} despite the asymmetry of the DSL local infrastructure over which most of it runs.

2005’s Most Advanced Fiber-To-The-Premise (FTTP) Network: Vasteras, Sweden

The city of Vasteras is located 100 kilometers west of Stockholm in Sweden with about 130,000 people. In 2000, the city tasked its community-owned power utility, Malarenergi, to build a local open access fiber network and provide its citizens with the benefits of next generation networking. The shared cost of infrastructure has lowered the costs to service providers and lowered the prices to end consumers. The total turnover of businesses connected to the local open access infrastructure is US\$50 million/year. Over 30,000 households (50% of all citizens) and over 2000 businesses (50% of all companies) have an FTTP connection. All schools, hospitals and public offices are covered. There are already 86 services offered over the network by over 30 service providers. Pricing options start from US\$17 for 3 Mbps to US\$47 for 100 Mbps (about what most U.S. customers pay for 1-2 megabit cable or DSL asymmetric service). The network has improved the administration of the local municipality and its service delivery to citizens including GIS-based applications. This project was awarded Broadband Properties 2005 Most Advanced FTTP Network Award.

The issue of the legal structure of these networks is also dealt with in this Study, but it is important to stress that one of the key emerging defining characteristics of these local open access networks, is that they have a *corporate governance culture and structure* that gives importance to serving the ‘common good’. Put another way, these emerging networks are structured and managed to ensure that the ‘benefit and value’ of broadband digital technologies devolve to end users to a far greater extent than is the case under the conventional business models of the current telecoms, internet service providers (ISP) or cable industries.

1.3 FACTORS DRIVING THE DEPLOYMENT OF THESE NETWORKS

The underlying imperatives of the various digital technologies themselves, are underpinning the emergence of local open access networks. Digital Internet Protocol (IP) networks do not require an operator in the same sense that former analog or digital telecoms networks did – where management of the routing of traffic was undertaken through control of the physical network infrastructure itself. This has led to an explosion of innovation at the edges and in the development of new applications and services by parties other than the network operator – all of which are seeking access to their own potential markets of willing buyers, over an open and ‘non-interfering’ infrastructure. While this is readily available in the trunk and international context, (especially for large corporate customers) this has not been true for the mass market of residential and small and medium enterprise (SME) users.

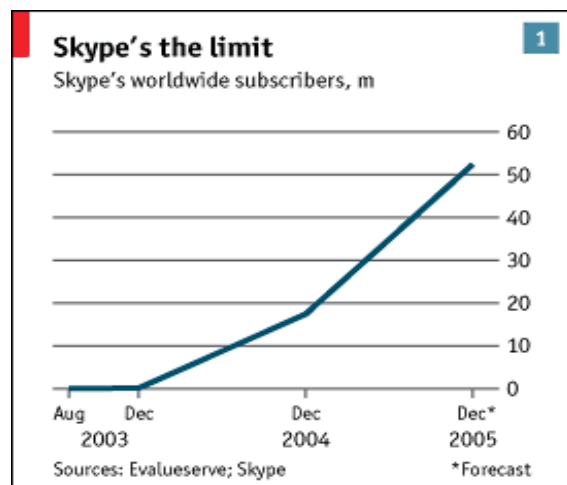


Figure 1.2 Skype as a VoIP application^{viii}

Against this background of technological imperative, there are a number of factors driving the deployment of these networks. There is no single cause, but a coalition, in varying degrees of various factors, which are proving sufficient to stimulate this development. These include the following: First, in a mature and developed market, there is an undoubted increase in what might be called ‘end-user frustration’, which is resulting from the underlying technologies that have the capability to deliver (and which many are experiencing for themselves in their office/work environment) and what are generally on offer from conventional Telco/ISP service providers. As at the time of publication, this phenomenon of consumer frustration has been partly satiated by the development of always-on DSL technologies, but frustration remains with the seeming lack of bandwidth and openness. It can be added that although this is largely confined to a technocratic sub-culture, there is nevertheless a growing amount of circumstantial evidence to suggest that this frustration is now seeping out into a wider consumer market. It is expected that this will be exacerbated, as the explosive growth in recent years (aided by tumbling prices) of high quality, low cost, digital consumer devices, such as camcorders, which further stimulates their owners to want to share or broadcast their creative output over the internet with others in their local or global community.

Another factor that is stimulating consideration and deployment of these networks is an informed and specific extension of this market frustration argument, as being articulated by local municipalities and the public sector. This is well argued by CISCO ^{ix} *“Cities have always competed with each other, but in a global economy that competition has intensified. ... Many local governments are realizing that providing this infrastructure can put their city on the map as a forward-looking, innovation-driven area.”*

Mr Grant Easton, Financial Manager, Knysna Municipality also argues on behalf of his municipality *“We would like to attract the likes of the Microsofts of this world to our humble town, by ensuring that the town offers as good, if not better access to the Global IP network, in an environment that has all the added value of pristine beauty and tranquility”*.

What is significant is that although national public policy and indeed, pan-national policy in this area is very concerned with eliminating the digital divide, at the local level there is another divide emerging, that of competition and differentiation between one community or city and the next. An important public policy issue is whether such technology driven local community digital-advantage creation is to be welcomed and fostered in this early stage of these local open access networks or whether, as it will undoubtedly be argued by some, that it should be halted, while nation or state-wide uniform policies are set in place.

1.4 DRIVERS FOR THEIR DEPLOYMENT

At this early phase of local open access network development around the world, one important factor seems to mark out the genesis of these initiatives to date. This factor is the entrepreneurial vision and commitment on the part of an individual man or woman, which not only sows the initial seed for a local open access network initiative, but also provides the willingness and determination over an extended period to make the dream a reality. This is in marked contrast to the conventional wisdom, which would suggest that the necessary and sufficient conditions for bringing about change in the telecommunications sector are carefully crafted public policy and focused regulation.

Many of the early advocates encountered during the development of this Study have conveyed a deep conviction that there is more to this than simply competing against incumbent operators or getting in on the telecoms bandwagon. They also seem to be motivated by a conviction that all is not fair in the way in which digital technologies are being deployed for the benefit of citizens at large. It is as if these individuals are saying to the communities they serve and the world at large, that maybe some of the \$1,500 billion + plus per year ^x that is being spent by the world's citizens on communications technologies, might yield greater end-user benefit if it were expended on themselves, by themselves.

This concept of user owned networks is nothing new in the context of a local area network within the confines of a home or office. What is new is the emerging idea of open access networks with strong user control if not ownership, as a means of redressing the failure of the conventional telecoms business model to deliver fair value and benefit to end-users. The Economist ^{xi} was one of the first to bring this point into the public arena in its Quarterly Technology Review in 2003. Individuals, who perceive the potential of what the Economist calls "Telecoms II", are often to be found as the driving energy behind the growing number of local open access networks. Such individuals fall into two broad categories: i) elected politicians and ii) community opinion leaders.

In the first category, there are political leaders such as Mayor John F. Street who gave birth to the high profile Wireless Philadelphia initiative aimed at making theirs the first major U.S. city to deploy a citywide wireless network. In South America, Mayor Luiz Fernando de Souza of Pirai Municipality, in the Rio De Janeiro state of Brazil, was responsible for the municipality to roll-out a hybrid fiber and wireless network. In Europe, it is local politicians such as the Mayor

of Amsterdam and particularly his Deputy Mayor, Mark van der Horst who have been leading efforts to improve the competitiveness of their City in the future through constituting Glasvezelnet Amsterdam BV. In the Western Cape Province of South Africa, the Executive Mayor Dr. Ms. Joy Cole of Knysna Municipality have Wi-Fi enabled the entire region through a public private partnership between the municipality and UniNet - a local internet service provider. In the city of Tshwane, South Africa, Father Smangaliso Mkhathshwa, Executive Mayor, has spearheaded the City of Tshwane Metropolitan Municipality's (CTMM) efforts to scale-up a successful pilot project completed in Rooiwal village to a city-wide network. Likewise, in Athens, Greece, the Municipality of Maroussi under the civic leadership of a Mayor Panayiotis Tzanikos^{xii} has plans for an advanced local open access network to serve its citizens. Although there is as yet no conclusive evidence to suggest that there is a direct ballot-box-benefit to be garnered from promoting these network developments, it is nevertheless fair to assume that these local political leaders are supporting and driving these initiatives, because they believe that it will deliver real and appreciable economic or social benefit to the community, either directly or indirectly and that this will be reflected in democratic support for them at the ballot box.

There is a second category of entrepreneurial visionaries, who are not formally part of the local political government structure. At the time of this Study, this group was far greater in number, but often operating on a smaller-scale in terms of the scope of network and with lower public profile. Good examples of such individual open access network advocates include John Atkinson, Gideon Amoah, and Boateng Ebenezer – the three member team that have developed the Akwapim North District Community Wireless Mesh Network in Ghana's Eastern Region. The Akwapim community network was established to meet the four goals of promoting a reading culture; training rural schoolchildren and teachers in the use of ICTs; empowering rural

communities by providing access to information; and using ICT to help increase direct participation in development and decision-making processes at local and national levels. Bjarke Nielsen has led the creation of an open access wireless network in the rural area of Djurslands^{xiii} in Denmark. So has Sascha Meinrath, the Project Coordinator of the open access community wireless network project in Champaign-Urbana^{xiv} Illinois, U.S. The Internet provides an excellent platform for global networking between these open access advocates, but the movement (to the extent that it can be called a movement) is locally driven and is popping up spontaneously in communities around the world rather than being driven by some centrally orchestrated global mission.

1.5 TRANSFORMATION OF THE TELECOMMUNICATIONS INDUSTRY

The vast majority of both incumbent and competing telecoms operators are strongly opposed to the emergence of local open access network initiatives. The reason for this is rooted in the fundamentals of the underpinning business model that has supported the telecoms sector for over a century and the manner in which the digital technologies of abundance effectively circumvent this business model. Nowhere is the relentless disintegration of traditional models more evident than in the threat posed by Voice over Internet Protocol (VoIP). That the world will change for telecoms operators, as a result of the possibility of digital technology enabling voice telephony to be disrupted by a software application that can be downloaded free from the internet, is self-evident. In the words of Michael Powell, former Chairman of the Federal Communications Commission (FCC) of the U.S., “I knew it was all over when I downloaded Skype.”

It is not difficult to see why the telecommunications industry should be so concerned about the development of local open access networks. Millions of individuals are employed around the world within the conventional telecommunications sector. Any rapid or sudden replacement of this local infrastructure, with modern fiber or wireless technologies operated on an open access basis, will suck traffic away from these incumbent operated networks, with negative impacts on the telecoms operators, and its negative effects on local economies.

The opposition is most visible in the U.S.,^{xv} where it is rightly pointed out that the municipal entry into telecommunications services, especially in areas where private enterprise is already serving the community, shifts the market risk from the investor to the tax-payer, thereby raising the total level of risk for all the parties. At the heart of the rhetoric at both ends of the spectrum is the reality that the telecommunications industry is in the midst of a *transformation*. This transformation has been triggered by the increasing introduction of Internet Protocol (IP) based networks and the accompanying principles of open access. Such IP based networks create competition in all layers, except passive infrastructure. It enables anyone to connect to anyone in a technology-neutral framework that encourages innovative, low-cost delivery to users. It encourages market entry from smaller, local companies and seeks to ensure that no one entity can take a position of dominant market power. It seeks to build on the characteristics of the IP network to allow devolved local solutions, rather than centralized ones. On one hand, societies will benefit greatly from a shared open access infrastructure, where various service providers can compete with relatively low entry barriers. On the other hand, there is the obvious downside, if local authorities start building such networks in competition with incumbent operators.

1.6 VALUE-PROPOSITION OF INFODEV'S PROJECT

The involvement of governments in telecommunications and the overall effects of such local open access networks in the telecommunications sector is somewhat differently shaped in emerging markets and the developing world. Although there is no immediately overt end-user demand for local open access networks development, there is a growing awareness that such deployment of digital technologies may be the only way to accelerate the closing of an otherwise ever-widening digital-divide.

The supporters of local open access networks hold the view that it is an issue of potentially pervasive impact and one of the vital keys to unlocking the golden age, which the digital technologies of today are widely regarded as having the power to deliver.^{xvi} There is, however, a century of investment in concepts and conventional wisdom, in addition to many billions of dollars in existing infrastructure, which are challenged by the underlying principles of 'openness' or 'network neutrality'. The opponents argue that the development of local open access networks is unnecessary, unwise and potentially highly destructive in terms of the economic and social consequences they could have.^{xvii}

Having said that, there is, as yet, no standard universal template or blue-print that can be followed in order to assure the successful deployment of a local open access network and there may never be such a 'common standard'. This Study takes the first step to accumulate a portfolio of templates, which have begun to emerge as a result of distilling common patterns and procedures learned from the experience of others. But, at this early stage of development, in what is a radical approach to local communications, it is still very much a matter of experimentation and progressively deriving lessons and good practice by means of openly

sharing knowledge and relevant learned experience. At the same time, considerable insight and understanding into what makes for positive public policy formulation in this area can be derived from undertaking rigorous analytical thinking –rather than simply ‘replicating’ what is happening in developed economies or from pursuing a process of public policy formulation that is primarily founded on a process of consultation with existing stakeholders.

This Study is aimed at helping those who, in an open society, are disposed to take an exploratory and positive questioning stance towards the potential development of local open access networks and their ability to serve the social, economic and private needs of local communities, villages, towns, and cities. One of the key issues is to find a formula that will encourage incumbent operators to cooperate in the creation of an open access network. However easy it may be to dismiss the telecom operators as monopolists with no desire to innovate, in reality these are companies employing many people and their failure is likely to have a major political cost for the societies involved.

If we accept that local open access networks are indeed beginning to take root and grow, the debate on how to frame government and regulatory policy needs to begin now, to see how best to nurture and accelerate their growth. The Study is a small first step in that direction to further the thinking, and initiate a real debate that focuses on how to include all the stakeholders.

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