

2010

Broadband City

A Roadmap for Local
Government Executives

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Preface

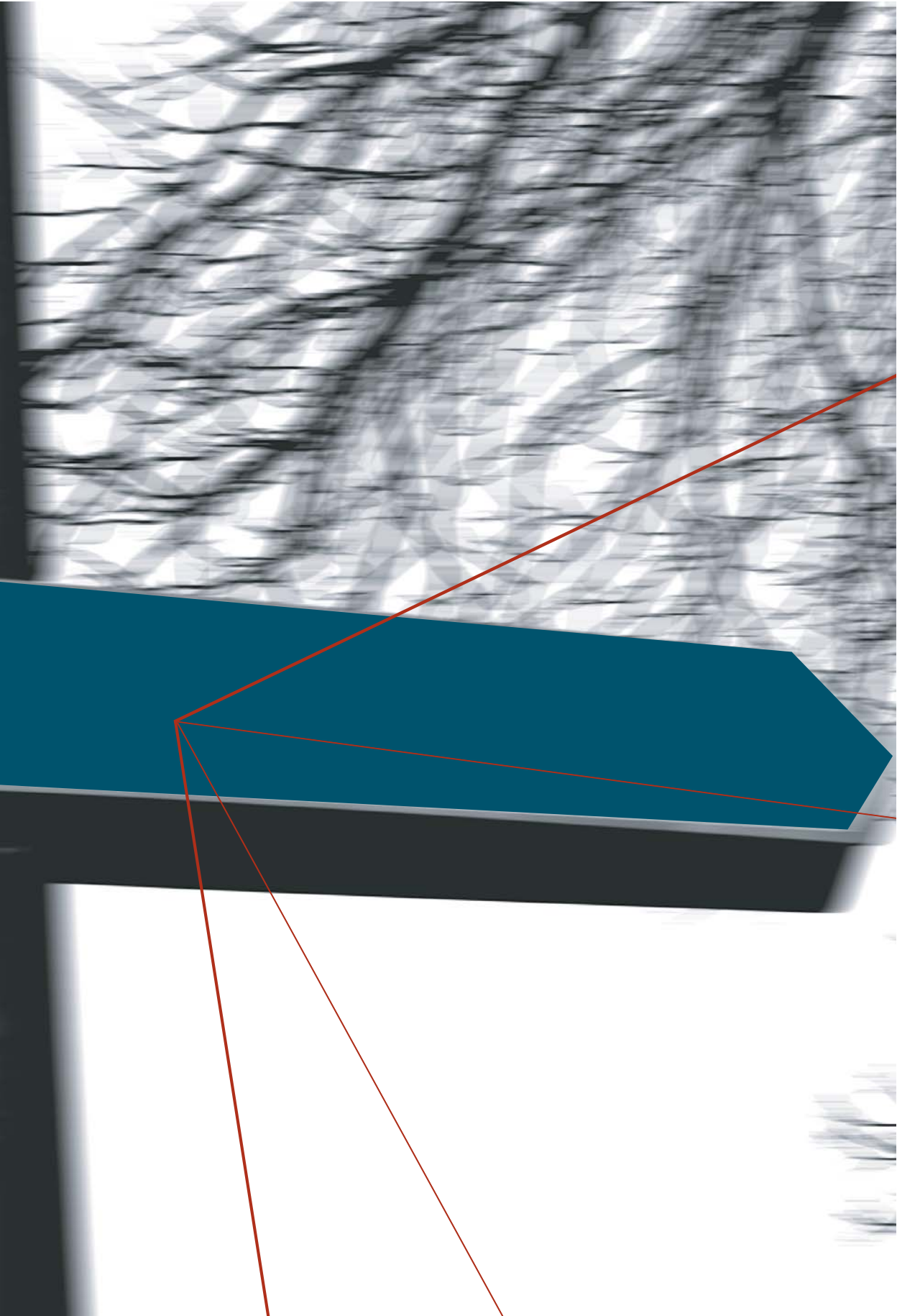
Local governments have been at the frontline in dealing with the heightened expectations created by the Internet. Citizens today expect to be able to access public services in ways that are convenient to them and without having to fill in multiple forms or visit a series of different offices. They also expect these improved services to be delivered without any increase in taxes.

Cities and regions have risen to this challenge by developing e-services and by re-engineering their internal processes. But local governments are now starting to go beyond this and create a new kind of public sector in which they work together with other layers of government, with other public sector organizations and with the private sector in new, more integrated ways. All of this requires network connectivity, so local government is inevitably confronted with the issue of how it can speed up the development of broadband infrastructure and ensure that public sector organizations, businesses and citizens have access to affordable high bandwidth connectivity.

But local government's role is not just to provide services; traditionally, its primary responsibility has been the economic well-being of its area. Here too the advent of the Internet has changed the rules of the game. The possibility of moving vast amounts of information instantly and at little cost has given companies (and individuals) much greater flexibility in terms of where they locate. So cities and regions face more intense competition in attracting and retaining businesses. Furthermore, one of the key factors for success in that competition is the cost and availability of connectivity and services delivered over that connectivity.

Local governments cannot, therefore, avoid the issue of broadband. But it is a fast-moving technological area and, although in the past local governments played a pioneering role in the provision of traditional utilities such as electricity and water, most local authorities are no longer used to playing an entrepreneurial role. This book is intended to help fill this gap. Cisco Systems works closely with many local governments around the globe, helping them anticipate and plan for the future. Based on this experience, we have developed a practical guide to help local government executives as they seek to grasp the benefits of broadband for their area and their citizens.

Broadband infrastructures leverage a multiplicity of technology solutions in terms both of transport and of access. Technology choices definitely influence the strategic direction of broadband government programs, but this book focuses on strategic and organizational issues and does not discuss technology solutions, architectures and trends. Cisco Systems regularly publishes technology vision papers on topics such as metro ethernet, wireless, DSL or cable broadband, and these papers form a useful complement to this publication.



01.

Why Broadband Matters

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Why Broadband Matters

Cities have always competed with each other, but in a global economy that competition has intensified. Industries in one city are swept away by competitors thousands of miles away. Take Allegany County in western Maryland in the United States. Over the course of two decades it saw its traditional industries of glass, textiles and tyre-manufacturing wither away under the pressure of overseas competition. But the city of 80,000 is now thriving with an influx of new businesses. Why? One key reason was the provision of broadband connections to all businesses and homes throughout the city area.

Other cities are demonstrating that the increased mobility of businesses can be an opportunity, not just a challenge. Northern Finland, for example, may not seem the obvious place for businesses to locate in, but the city of Oulu – which is only 200 miles south of the Arctic Circle – is prospering. Its Smart Oulu initiative connects citizens, businesses and local government through a whole range of IT-driven channels. The strategy is paying off and hi-tech businesses are moving to Oulu, attracted by the forward-thinking government's initiatives.

Another way in which broadband can contribute to an area's prosperity is by boosting the population's IT literacy rate. This can benefit even geographically remote areas. For example, the Norwegian village of Modalen, which is more than one hour away from the nearest large city, was chosen as a non-urban broadband pilot by a consortium of IT companies and has had broadband connectivity (delivered to homes via radio link-up) since 2001. This has brought extra business to the village and a recent survey shows that Internet access at work, at school and at home is much higher in Modalen than in the rest of Norway and time spent online is much greater.

But local authorities are not just competing for businesses, they are also competing for people. Cities are looking to prevent (or reverse) the flight to the suburbs, while smaller towns close to large urban areas are bidding for growth by positioning themselves as more attractive places to live and work than their larger metropolitan neighbors. Cities like Almere in the Netherlands (close to Amsterdam) or Como in Italy (near Milan) are pursuing strategies, based on IT and communications, designed to lure people and businesses away from the traditional centers of economic activity.

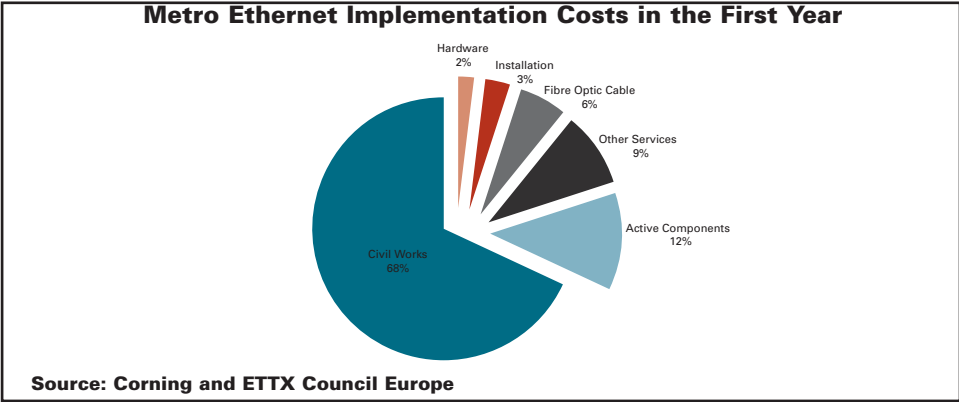
Local governments have always promoted their areas by ensuring that all citizens had access to basic services. In the past that meant utilities such as electricity, water and transport; today it means network connectivity. A robust information infrastructure helps citizens and businesses prosper in the Internet age and is instrumental in attracting the knowledge workers and technology and service industries that create today's thriving economies. Many local governments are realizing that providing this infrastructure can put their city on the map as a forward-looking, innovation-driven area.

Local governments that anticipate and plan for these changes can look forward to stable and sustainable economic growth by increasing the area's attractiveness for citizens, academic, research and government institutions, education and health providers and businesses. Local governments which fail to take account of the fast-changing landscape may struggle to keep up with their better-prepared competitors.

But broadband is not just about economic growth; it has a key role to play in transforming local services and the way citizens and their leaders interact. High-speed connectivity makes possible more convenient, more integrated services. Indeed, it paves the way for a citizen-centric model for public services, where different parts of the public sector provide a better and more efficient service by linking up to create a networked virtual organization that brings together agencies so they can share functions and processes, with each specializing in what it does best. It also offers radical new opportunities for two-way interaction between citizens and the state, so that the broad mass of the public can be involved in public policy and in service design in a way that has never been possible in the past.

These arguments demonstrate the importance of broadband, but does the public sector really need to intervene? In view of all the exciting possibilities, why not leave it to the private sector to find the best way of delivering these new services? It is true that the private sector is investing heavily in the deployment of broadband infrastructures, but there are a number of reasons why many local governments have decided that it is worth intervening to speed up the pace of development and ensure that as many people as possible have access to the broadband network.

One issue is the scale of investment required. For example, undertaking the civil works to lay the fiber and to install the other technology necessary to create the broadband network requires an investment that is only likely to deliver a return over a period of up to twenty years, whereas a telecommunications company would typically be looking for a return over a three-to-five-year period. The problem here is the cost of the passive infrastructures (civil works and dark fiber) which in the case of fiber to the home can reach approximately 75% of the costs of the first year of implementation.



The difficulty created by the need for a high initial investment is made worse by the fact that significant returns are only likely to kick in when the full network is rolled out and the number of customers has reached a critical mass. Affordable home video telephony is a very attractive service, but people are unlikely to pay much for it until it is available throughout an area and with a reasonable level of take-up. More generally, there is a chicken and egg problem. Broadband service and content providers may be reluctant to invest until they are confident that the network will be built, while telecommunication companies may be reluctant to build the network because they are not sure that the services and content will be there to drive customer demand. A third and final difficulty that may hold back private sector investment is that the major telecommunication companies have already made large investments in the existing communication networks and may be reluctant to invest in new networks that make their past investments obsolete.

Recognizing these points, local governments often take an active role in increasing the speed of broadband deployment and in ensuring maximum coverage in their region. For example, a recent study, run by the telecommunications, Internet and media analyst group IDATE and commissioned by the Fibre-to-the-Home (FTTH) Council Europe, found that approximately 70% of the 167 existing “Fibre to the Home” programs in the EU25 countries benefited from the involvement of the local municipality or of the municipality-owned utility.

Players involved in FTTH Initiatives in Europe (June 2004)

Incumbent Operators	8	7.8%
Municipalities/Power Utilities	72	69.9%
Alternative Operators ¹	9	8.7%
Housing Companies and Others	14	13.6%

¹ FastWeb (13 Cities) and B2 (53 Cities) each treated as one operator

Source: IDATE study / ETTX Council Europe

The example of FastWeb in Milan shows what can be achieved. Using the civic infrastructure of the municipality-owned local utility company and helped by the high density of the population, FastWeb was able to build an infrastructure that now provides services to around half a million people. Through FastWeb users have a single secure connection to a range of services including:

- Free telephone calls to other FastWeb customers plus unlimited national calls for a fixed monthly fee;
- High speed Internet up to 10Mbps with a WiFi capability that enables the user to surf from anywhere in the home without additional cabling;
- Traditional TV broadcast content, pay-per-view content and video-on-demand and interactive TV applications;
- Video services such as network personal video recorders and video calls between FastWeb customers;
- Videosurveillance, hard disk storage, email, security, Virtual Private Network services, IP telephony and unified messaging for business customers.

FastWeb's experience shows the strong appetite for innovative services delivered via broadband. Based on its success in Milan, it is now expanding to other Italian cities including Rome, Turin, Como and Venice. This is the type of success that many local governments want to encourage. They recognize the role that a broadband infrastructure can play in the fortunes of their area and are keen to seize this opportunity on behalf of their citizens.



02.

The Broadband City of the Future

02.

The Broadband City of the Future

Broadband promises ultra-fast, high bandwidth connections, delivering a captivating array of services from a whole range of providers. The collaborative possibilities that connectivity offers have already changed many aspects of our lives, but the promise of broadband ubiquity is not simply more information or more forms of communication. The promise is better and richer services. The question for local governments is: how can they harness this potential to improve the lives of the citizens, provide better services at lower cost and make their cities more attractive places to live and work?

Let us imagine what the Broadband City of the Future might look like.

In such a city citizens will be able to access the Internet at very high speeds – from 10Mbps to 1Gbps. They will be able to use a single secure connection to view high-definition digital TV and videos, to listen to thousands of radio channels, to make low-cost telephone calls, to video conference with friends and family, to monitor their homes from remote locations and to manage home appliances remotely. But this is just the start. A whole range of different aspects of citizens' lives will be transformed.

Broadband Vision for a Better Educated City

In the City of the Future education will be open to all. Learning will no longer be confined to particular times in the citizen's life or to particular physical places. It will be a lifelong process, easy to engage in and accessible anytime, anywhere.

Students will benefit from highly interactive, blended digital courses. School projects will be run across several classes with students working from any number of separate places. Video conferencing will allow remote lessons between classrooms, pupils at home and remote teachers; and individual learning will be supported by collaboration through video, voice and other virtual collaboration tools such as screen-sharing applications.

Students (and parents) will have access to online information about their curriculum, their assignments, their performance to-date and any upcoming tests. They will be able to find

appropriate study material to build their skills in areas where they are weak and if a topic is coming up that daunts them, they will be able to sign up for extra preparation.

Teachers will have access to online productivity tools which will dramatically reduce the amount of time they spend on administration tasks, freeing up their time and energy to focus on teaching and student support. Communication between the school, the teachers, the parents and government institutions will be electronic rather than paper-based, creating a real community for learning.

Broadband Vision for a Healthier City

In the City of the Future citizens will have access to online health advice and will be able to have a video consultation with a medical expert at any time of night or day from the comfort of their home. When they do fall ill, their stay in hospital will be much shorter, since medical staff will be able to monitor their condition at home almost as easily as on the ward. Patients with long-term conditions who need regular monitoring will be able to do more of the tests themselves and feed the results back electronically to their doctors.

All the professionals (local doctor, acute hospital, pharmacy, optician, dentist etc) involved in providing medical care will work on the basis of a single, secure electronic patient record, ensuring that the citizen receives the right treatment faster and dramatically reducing the number of medical errors. Recent and historical test results such as radiology images will be instantly available to any appropriate clinician anywhere, while video links will make it far easier for doctors to get second opinions from the most appropriate local or national specialist.

Broadband Vision for a More Prosperous City

In the City of the Future businesses will increase their productivity and revenue streams by implementing Internet business solutions such as Internet commerce, integrated logistics and supply management platforms, workforce optimization and mobile workforce solutions, safety and security solutions, and integrated e-procurement. Setting up a new business will be simple, and a state-of-the art infrastructure will allow new and existing businesses to operate globally. A number of local industrial districts, based on innovation clusters, will support economic development and generate employment.

Broadband Vision for a More Efficient, Citizen-centric City

In the City of the Future public sector organizations will share tasks and processes with each other in order to capture economies of scale and the benefits of specialization. Their employees will have access to electronic productivity tools, such as online purchasing

applications and electronic performance management systems, which will virtually eliminate low value-added administrative tasks. They will be able to communicate better within and across departments and will be freed up to focus on providing better services to citizens. Services will be integrated and more easily accessible, and citizens will have more opportunities to shape the services they receive and to participate in public decision-making.

Broadband Vision for a Safer City

In the City of the Future advanced communication and video surveillance systems will help reduce crime and anti-social behavior and make citizens feel safer. Video-enabled citizen access points will enable people to communicate quickly and easily with the emergency services. Faster information flows will mean better traffic management and improved street maintenance. Public safety teams will be able to respond faster to emergencies.

Creating the City of the Future Now

Many cities around the world are turning the vision of the Broadband City of the Future into a reality. Currently at least 40 cities in Europe are either planning or building broadband infrastructures. New services and applications are emerging all the time designed to improve citizens' lives and to make each city a more attractive place to live, work and invest.

Take the example of Holland. In 2000 the Dutch National Government launched a competition called “KennisWijk” – Knowledge Neighborhood - to develop a national pilot for a Knowledge City. The competition, which offered a grant of 50 million Euros, was won by Eindhoven, whose pilot area covered a total of 40,000 families (84,000 people). Eindhoven's KennisWijk focus has been on:

- Stimulating infrastructure suppliers to deliver broadband to households, so new services can be delivered;
- Finding suitable companies to develop innovative consumer services to be delivered via existing and new infrastructures;
- Market testing these new services with citizens to get a clearer picture on what people really want and how they use these services.

KennisWijk provides a wide range of commercial and public services including:

- Visual traffic information for optimal journey planning;
- Security webcams that can be controlled and viewed via the Internet or on a mobile phone;
- Self-care online health services such as a blood checks or access to individual medicine prescriptions online;

- Thematic Internet-television channels, e.g. one aimed at children and focused on healthy living;
- Digital courses to help people cope with stress, unemployment etc;
- Professional computing and IT courses for non-professional users,
- Live online broadcasting of Eindhoven council meetings;
- Commercial services such as digital IP-based television;
- Neighborhood Internet television for and by inhabitants;
- More traditional broadband offerings such as IP telephony, movies on demand etc.

Other Dutch cities, though losing out to Eindhoven in the final competition, have nevertheless chosen to implement some of the initiatives proposed in their entries. Almere, for example, has launched its own Kennistad – Knowledge City – initiative, taking a very similar approach to Eindhoven.

Broadband for Better Education

The city of Stockholm, in coordination with the city-wide deployment of fiber networks through its local utility Stokab, has connected the city's primary schools and created online primary educational services. Today, 175 schools (35 of which are high schools) are connected to a broadband network at 1 Gb per second, with classroom connection speeds at 100 Mbps. 90,000 students and 8,000 teachers have access to personal email (students from age 6 get an ID through biometry solutions), to 400 educational films online, to 30 online high school courses (open to all) and to a school portal including communication, administration, planning and virtual classroom functions.

Halfway around the world from Stockholm the vision is no less advanced. The City state of Dubai has a policy of equipping its citizens with the means to thrive in the knowledge-based economy of the 21st century. Dubai Knowledge Village is designed to bring together all the elements required to foster a learning culture that will encourage innovation and entrepreneurialism. Knowledge Village is designed to open learning up to people of all ages and at all stages of their careers. It offers a wide range of subjects to study and encourages interaction and exchange of information between learners and beyond by plugging in to other networks around the globe.

Broadband for Better Health

The Arras Hospital in northern France will soon benefit from a regional broadband fiber network linking all the general practitioners and care centers in its area. Via a regional health portal doctors will be able to access securely their patient data as well as to exchange best practices. New hospital buildings are planned that will provide a whole

portfolio of patient entertainment bedside services (television, video conferencing, email), making use of the high-speed infrastructure deployment.

The Mid-Norway Healthcare Region, which consists of eight hospitals with St. Olav's University Hospital as the main hub and central provider of services, has benefited from a broadband network since 2001. Using the centralized digital imaging service and a unified healthcare record, doctors anywhere in the region can access full medical information about a patient electronically. Radiological assessment is much faster due to the ability to send images to service providers in other countries for same-day diagnosis. Next steps include enabling local doctors to book hospital appointments online while the patient is still with them and cutting health insurance bureaucracy by moving from paper to electronic medical certificates.

Broadband for Prosperity

The city of Almere in the Netherlands has focused in the last four years on boosting economic growth. A key part of its strategy has been the launch of a fiber pilot, connecting 1,800 families and 400 businesses to a broadband infrastructure operated through a public-private partnership. Due to this initiative Almere has been able to attract to its area new businesses such as IBM Netherlands and ASM International.

In other cities existing local enterprises are benefiting from the provision of broadband. The Danish Ministry of Science and Technology has launched an initiative to stimulate take-up of broadband by small and medium-sized enterprises (SMEs). The programme provides SMEs with training and assistance through private consultants, helping them to overcome practical problems and increase competency related to starting out in eBusiness. Consultants, trade associations and regional business organizations are helping 60 SMEs realize their first gains from eBusiness, for example, by establishing an electronic catalogue for eBusiness portals. The experience and good practice stemming from the 60 pilot projects will then be shared with other Danish SMEs.

Another approach is to create business innovation districts based around a high capacity broadband network. This is the thinking behind Initiatives such as Dubai Internet City, Korea Internet City or One-North in Singapore.

A similar example is Oulu, a city of 126,000 inhabitants in the north of Finland. In 2003 Oulu launched its Growth Agreement 2006, an initiative designed to make the city a "diverse, capable, competitive and better place to live". The agreement focuses on the development of five innovation clusters (Information Technology, Content&Media, Wellness, Environment and Biocluster) and two supporting programs (Business

Development and Logistics). The overall objective is to create 150 new companies, 6,000 new jobs and 1.5 billion euros of additional turnover for the city by 2006.

As part of the overall focus on innovation, Oulu also created a number of online public service initiatives (through a public program called SmartOulu) and facilitated the development of a broadband wireless infrastructure across the city (through a private-public partnership initiative called PanOulu). Oulu looks today to be well on track to achieving its strategic objectives.

Broadband for Better Local Government

The Italian province of Brescia has launched an intranet and communications program designed to create an Internet culture among its staff so that it can tackle the cost of internal communications costs and increase productivity. The program employs broadband links between provincial buildings, and includes the use of employee self-service applications (such as an online employee directory, an expense report application, and an e-procurement platform). It also features a number of innovative fixed-wireless communication applications such as a hand-held email application device for politicians and high-ranking civil servants and a video on demand service on how best to run internal administrative processes. The expected benefit from this initiative is a saving of 8.1M Euros over a 5-year period.

The London Borough of Hillingdon is embracing new modes of broadband-enabled working including mobile and home-working. For example, housing repair staff will be able to use broadband connectivity to access central systems without having to return to the office. Other staff will be able to avoid time-consuming commuting and work more flexibly by being able to work at least part of the week from home. The result will increase employee productivity and reduce the need for office space with even the initial years of the programme expected to generate annual cost savings of around 1.5 m Euros.

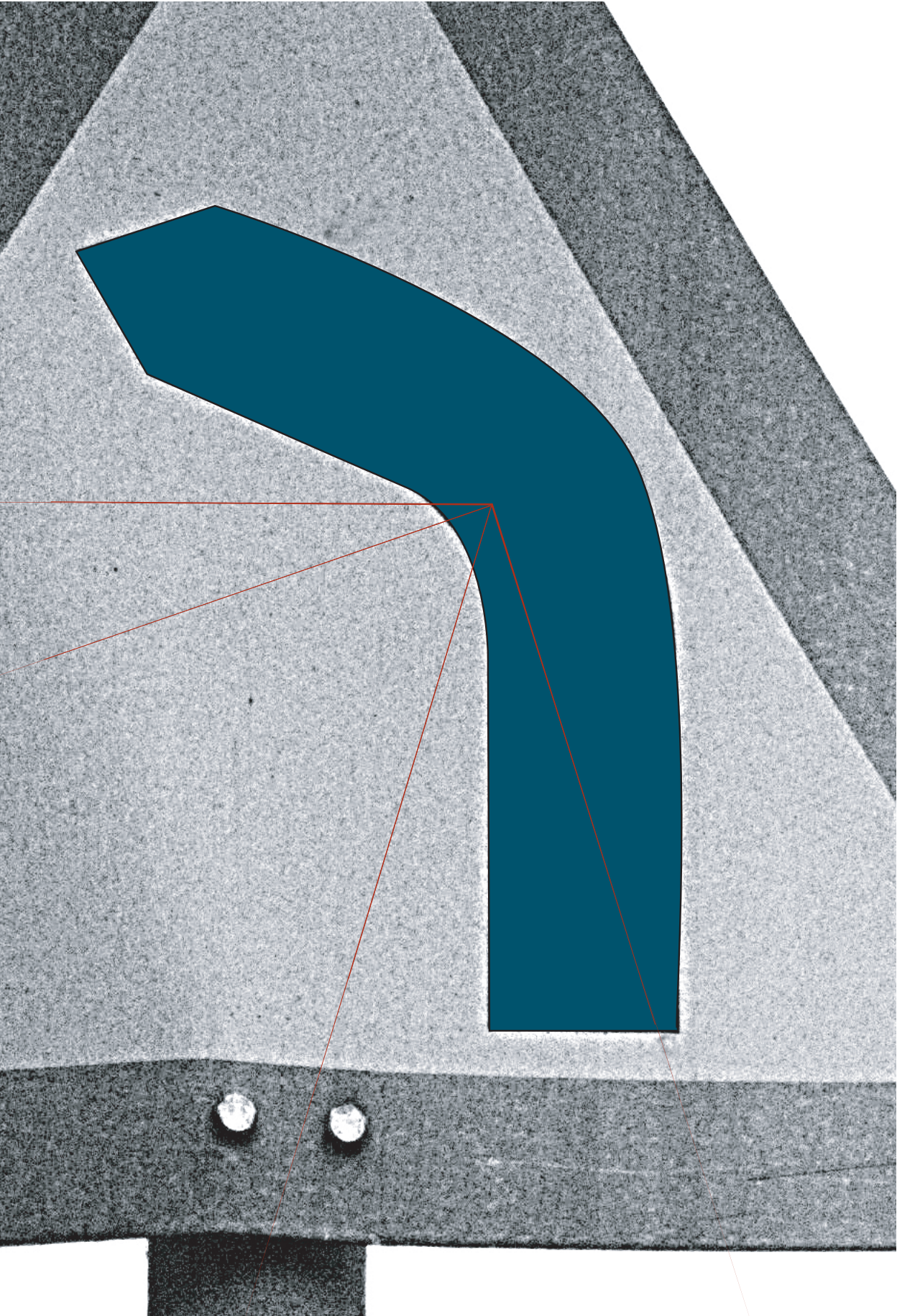
Broadband for Improved Public Safety

The City of Westminster in London recently launched a Wireless City initiative in the central area of Soho, whose lively street life has its negative as well as its positive aspects. Broadband allows the council to use a number of strategically placed wireless IP cameras to monitor crime hot spots and tackle other street issues such as anti-social behavior, unlicensed street trading and dumping of waste. The IP cameras are cheaper than traditional CCTV and, due to the fact that they are easy to move, far more effective. The broadband infrastructure will allow the council to monitor noise and air pollution remotely, while also providing connectivity to all the council's frontline workers out on the street.

Other cities have used broadband to provide security systems closer to home. Wrocław, Poland offered broadband connectivity to more than half the city's apartments by using existing cabling that monitors heating systems. The city has used the network to install IP cameras in all apartment buildings, something that without broadband would have been prohibitively expensive.

Starting to Build the Broadband City Now

As these examples demonstrate, the city of the future is already being built. Investors and citizens are responding to the vision that these innovative local governments offer. Though each city's aims are different, every one has been directly involved in the creation of the broadband infrastructure that makes their respective visions possible. Other cities wishing to join their number need to find ways to stimulate the development of their own broadband infrastructures. The next part explores some of the strategic issues that they will face in doing so.



03.

Strategic Options

03.

Strategic Options

In Europe a new ADSL connection is made every few minutes, 24 hours a day, seven days a week. But ADSL is still not available to everyone and currently does not provide the benefits that arise from two-way connectivity at 4Mbps or over – what is termed “real broadband”.

To improve this situation and generate the widest possible access to high-speed connectivity, local governments are likely to have to intervene in the market. But what role should cities and regions play in encouraging the speedy deployment of real broadband infrastructures? What are the available business models? What are the advantages and disadvantages of each?

With pressures on their budgets already, local governments need to be sure that their broadband strategies are as cost effective as possible. Typically, this will involve leveraging existing private sector investment and expertise, but what is the best way of doing this? How should a city structure its undertaking so as to attract the right level of private sector interest while still ensuring that the outcome maximises public value?

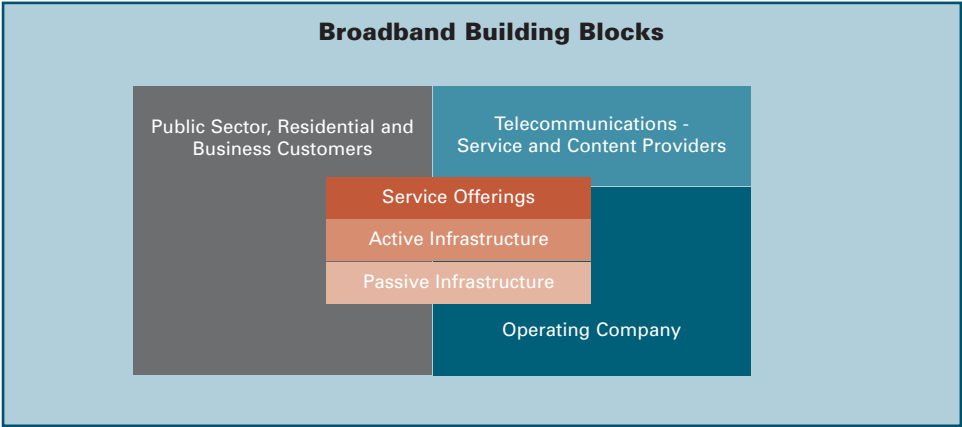
Working with the world’s most innovative broadband governments, Cisco Systems has created a conceptual framework for broadband provision. The ultimate goal from a public sector point of view is to create a situation in which access and services are offered by a number of competing service providers, driving down costs for consumers and businesses and generating a broad range of high-quality, innovative broadband services.

There are a number of factors that will affect how quickly governments can realize this scenario. These include:

- The geological/geographical situation of the city or region (e.g. rural mountain area vs. metropolitan area);
- Demographics and concentration of population / businesses in given geographical areas;
- The amount of dark fiber infrastructure already in the ground and/or the availability of civil infrastructure which can host fiber (e.g. pipes and ducts used for water, gas or electricity);
- Local expertise in operating broadband infrastructure, managing access and providing services;
- The degree of existing competition in telecommunication services and the strategy of the main telecommunication provider in relation to the provision of real broadband;

- The availability of public or private capital for investment in broadband.

These factors provide the context for any action by the local government and will shape the strategy it adopts. That strategy can be considered in terms of six building blocks, covering the technical, financial and organizational aspects of developing a Broadband City.



Building Blocks

Building Block 1: Passive Infrastructure

This is the physical infrastructure that is used to provide the broadband connectivity and may consist of fiber optic or copper cable. Many local authorities already own infrastructure of this kind or own assets such as shafts and ducts under the streets that dramatically reduce the cost of creating such an infrastructure. For example, the city of Vienna owns - via its utilities - over one thousand kilometres of a fiber-optic network and over one thousand kilometres of empty ducts. The cost-efficient re-use of existing city-owned assets is a key success factor in developing a broadband strategy.

Building Block 2: Active Infrastructure

The active infrastructure consists of the elements used to transmit, forward and route information data packets over fiber optic or copper cables. The main elements are switches (typically used to relay information packets within buildings) and routers (typically used to route information packets between buildings over large areas).

Building Block 3: Service Offerings

These are the actual services offered to customers. For residential customers they might be: high speed Internet access @ 10Mbit/s or higher; time-shift TV; high definition TV; video

telephony, video on demand; gaming portals; e-Government and e-Health services etc. For business customers they might be: Virtual Private Network services; video conferencing; web hosting; data storage; video surveillance etc.

Building Block 4: Operating Company

This is the company that maintains and operates the active and passive network elements. Depending on the business model the operating company either sells access wholesale to other telecommunications service and content providers who serve the end-user customer (open access) or itself acts directly as a service provider. Similarly, the operating company may be the legal owner of the passive infrastructure or it might have a contract with the legal owner.

Building Block 5: Telecommunications Services and Content Providers

These are the companies (existing telecommunications service providers, cable operators, Internet Service Providers (ISPs) or content providers) that provide services and content to the end-user broadband customers.

Building Block 6: Public Sector, Residential and Business Customers

These are the end-user customers and potentially consist of all the businesses, residents and public sector organizations in the area served by the broadband infrastructure.

Strategic Options

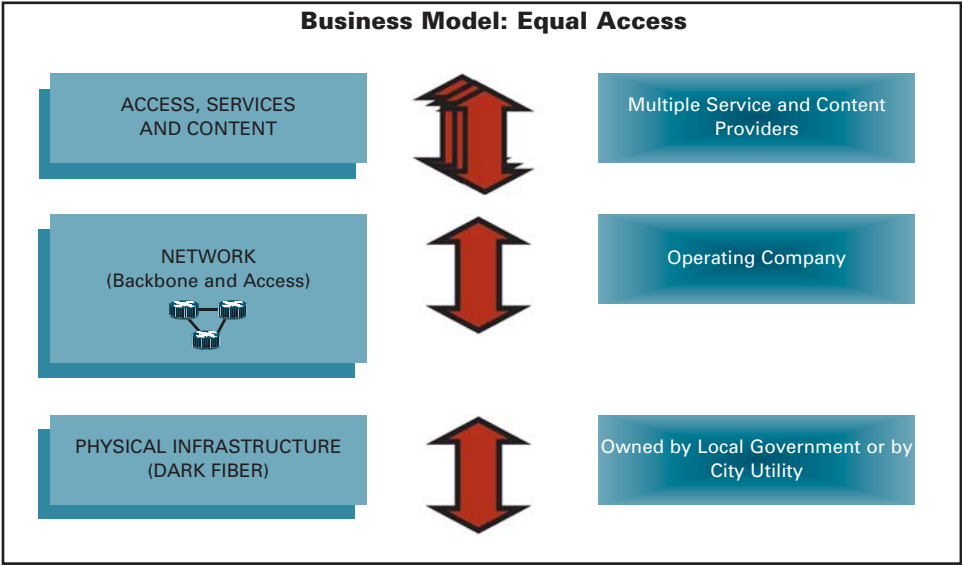
The above building blocks can be put together in a number of different ways depending on the local context and the preferences of the local government. Broadly speaking, there are three main strategic models:

- Equal Access
- Sole Private Service Provider
- Full Public Control

Model 1: Equal Access

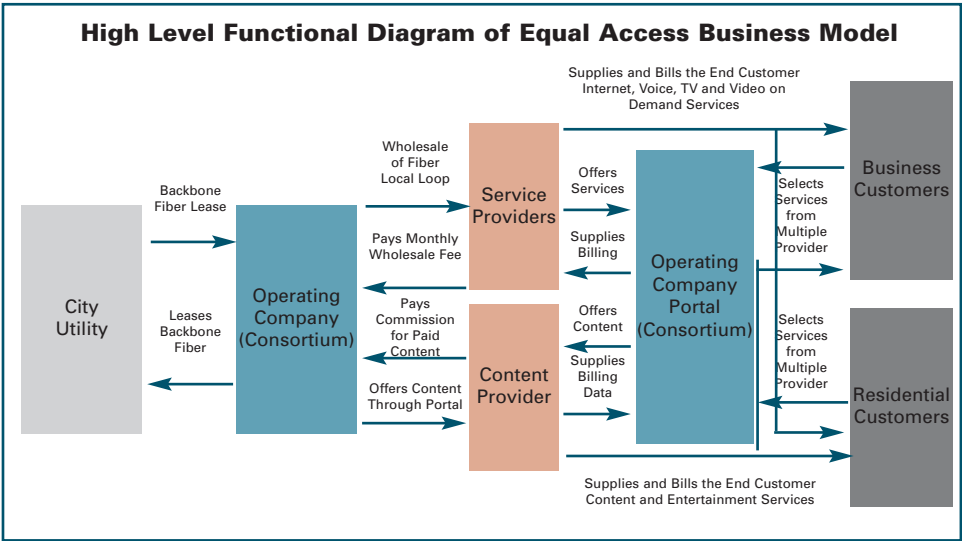
Typically, the long-term public goal is to create a thriving market for broadband services and content. The equal access model takes the most direct route to this goal by seeking to build in competition from the start.

In this model the city (or the city utility) builds the passive infrastructure (for example, building the physical fiber network) and then leases or sells this infrastructure to a consortium or broadband operating company.



The operating company adds the active network layer and sells access to the high-speed broadband network on a wholesale basis to existing and new telecommunications service providers.

The service providers pay a monthly fee per residential or business customer to the operating company. Independent content providers sell their content through the operating company’s portal. Residential and business customers select their services directly on this portal.



The portal assembles billing records for each residential or business customer and passes on this information to the telecommunications and content service providers, who maintain a direct billing relationship with the customer.

The role of the local government in this model is to stimulate competition at the level of content and services. By investing in the passive infrastructure, it reduces the costs for the service providers and lowers the barriers to entry into the market. Through its contract with the operating company, it ensures that there is a level playing-field on which all providers can compete.

In this model the roles and responsibilities of the different organizations need to be carefully structured and managed. Operating and cost models are likely to become complex once the overall model is developed and this necessitates a robust governance system and a strong legal framework. It is vitally important that “ownership” of the customer is clear. If a customer experiences any type of issue (technical or administrative) responsibility for its resolution needs to be clearly agreed and defined up front.

The Equal Access model is strongly supported by a number of international bodies (the European Union among them) and it is a common feature of many of the national broadband plans of EU countries.

Examples of the equal access model can be found in Alberta (Canada) with Axia, a public-private partnership broadband service provider; in Grant County (US) with the Zipp Network; and in Enschede (the Netherlands) with the NDIX (Dutch/German Internet Exchange).

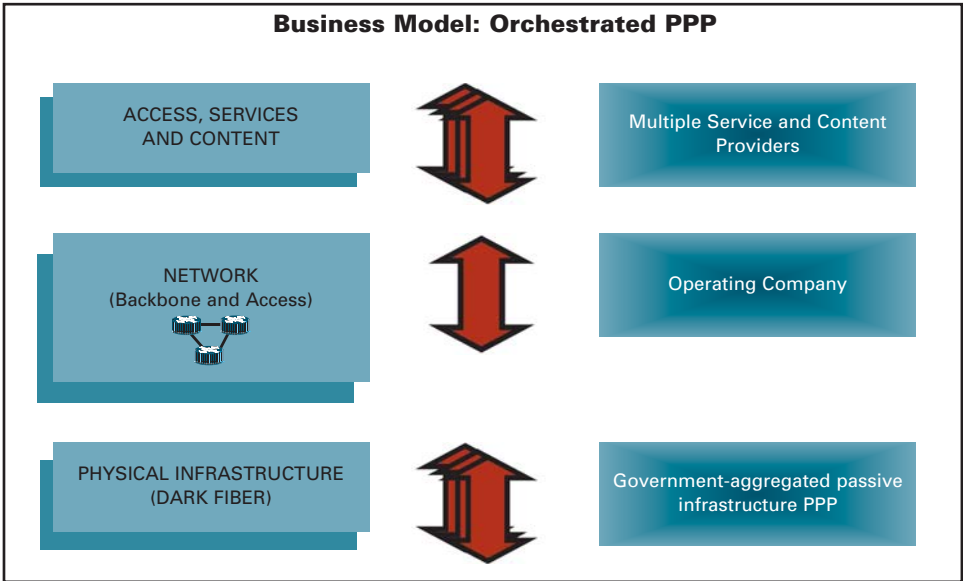
Variants on the Equal Access Model

There are two variants of the basic equal access model that are worth mentioning. The first variant arises where there is significant existing broadband infrastructure in the area and major investment in new infrastructure is unnecessary. Here the role of the local government may be to act as an orchestrator and by bringing private organizations together ensure that existing assets are used to create a thriving market for broadband services.

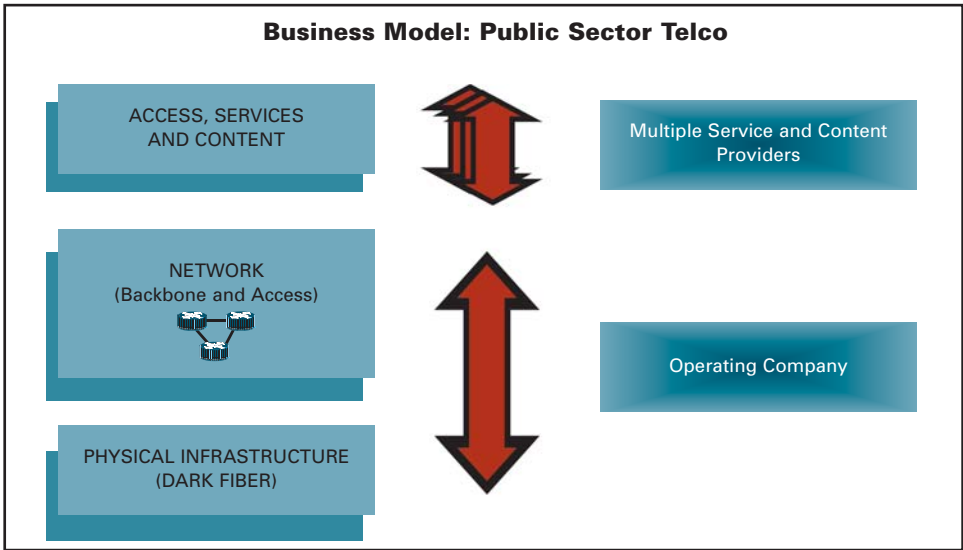
This is usually done by the local administrations and the owners of the existing infrastructure creating a joint venture to manage the passive infrastructure as if it were a single asset. The active and access services layers are usually managed by one or more service providers on the basis of a partnership agreement with the joint venture.

One of the most successful examples of this variation is the city of Amsterdam, which created a subsidiary called CityNet in charge of the deployment and re-use of existing fiber infrastructure available in the city. This reduced the capital investment required by

the public sector; while competition at the access and service level contributed to lower prices and more innovative services for businesses and consumers.



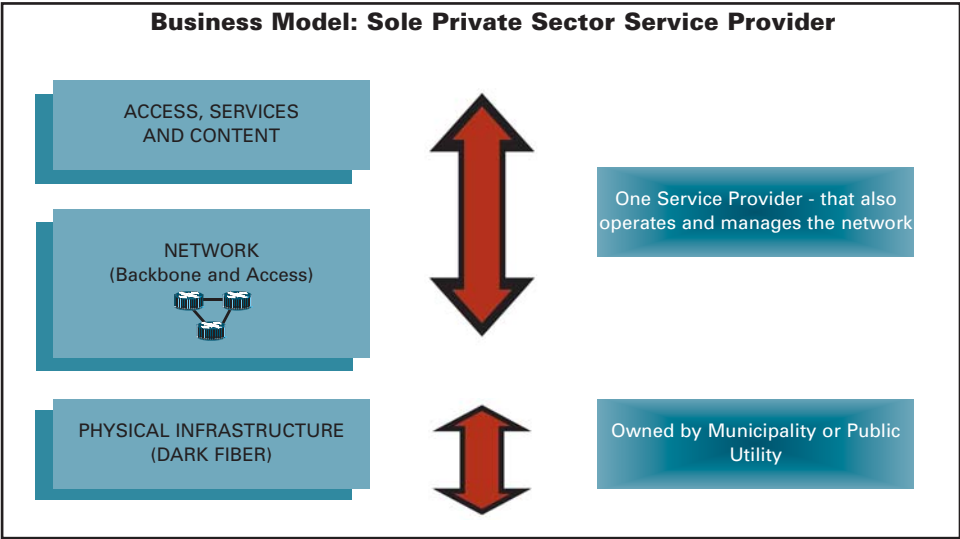
A final variation on the basis equal access model is where the public sector takes responsibility for the active infrastructure as well as providing the passive infrastructure.



Examples of this variation are: Oncat, the operating company in the Spanish region of Catalonia; and Infratel Italia, an initiative by the Italian Ministry of Economic Affairs & Finance, aimed at stimulating broadband development in the rural areas in the south of the country.

Model 2: Sole Private Provider

The equal access model assumes that there are a large number of service and content providers already on hand to compete in the provision of services. In reality this is often not the case: the development of an active market in broadband services and content will take some time. Equal Access also assumes that the broadband initiative will quickly generate sufficient revenue to support a large number of companies. Again this is unlikely to be true in the early years as the network is rolled out and a critical mass of customers created.



Local governments may, therefore, choose a different model in which the operating company is also the service provider.

The advantage of this model is that the project becomes commercially viable at much lower levels of customer revenue. However, customers are unlikely to be offered as wide of range of services and will not benefit from the impact of competition on pricing. For these reasons the local government will often want to ensure that the monopoly is only offered as a temporary measure over a fixed term, during which time it hopes the sole service provider will generate sufficient numbers of customers to sustain a competitive market. Obviously getting the length

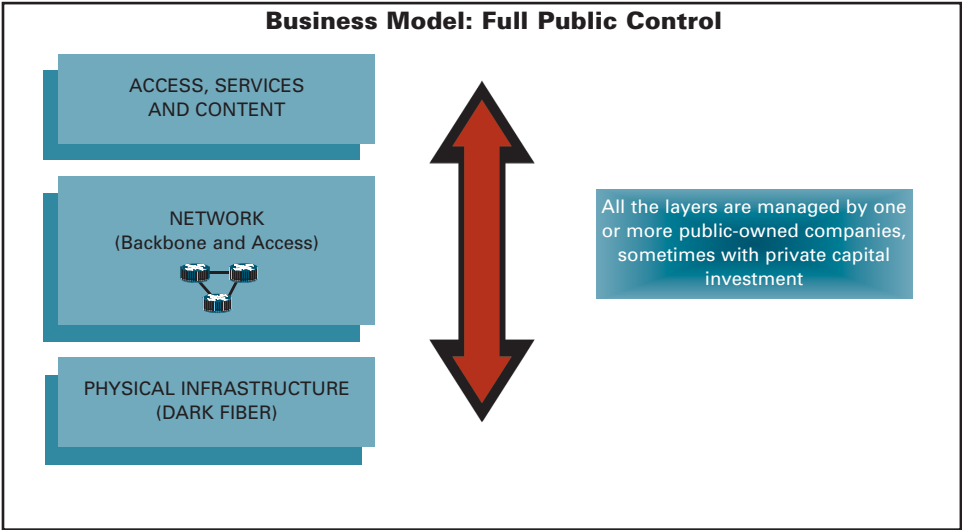
of this fixed period right is a key issue. Furthermore, transition to the equal access model at the end of the fixed period will require careful commercial and legal management.

This model involves fewer players than the equal access model and so involves a lower level of management complexity. It is also more attractive to service providers, since the operation becomes commercially viable much more quickly and at lower levels of customer revenue.

Examples of this model are Stockholm (Sweden) through its Stokab subsidiary and the fiber pilot programme in Almere (the Netherlands) through its local service provider Unet.

Model 3: Full Public Control

The final model involves direct public involvement in all aspects of the project including the passive infrastructure, the active infrastructure and services.



This model may be chosen because the local authority is not prepared to allow one private sector supplier even a temporary monopoly over service provision or because this is prohibited by legislation. This model may also be chosen because there are no local or national service providers willing to invest in the broadband venture, as may be the case for remote or rural communities in particular.

This model can operate as a public private partnership or as a wholly public venture. Management of the project is simplified because only one organization is involved. The high level of public control also means that the provision of services can be driven more directly by public policy concerns, e.g. maximizing access to connectivity within a rural area.

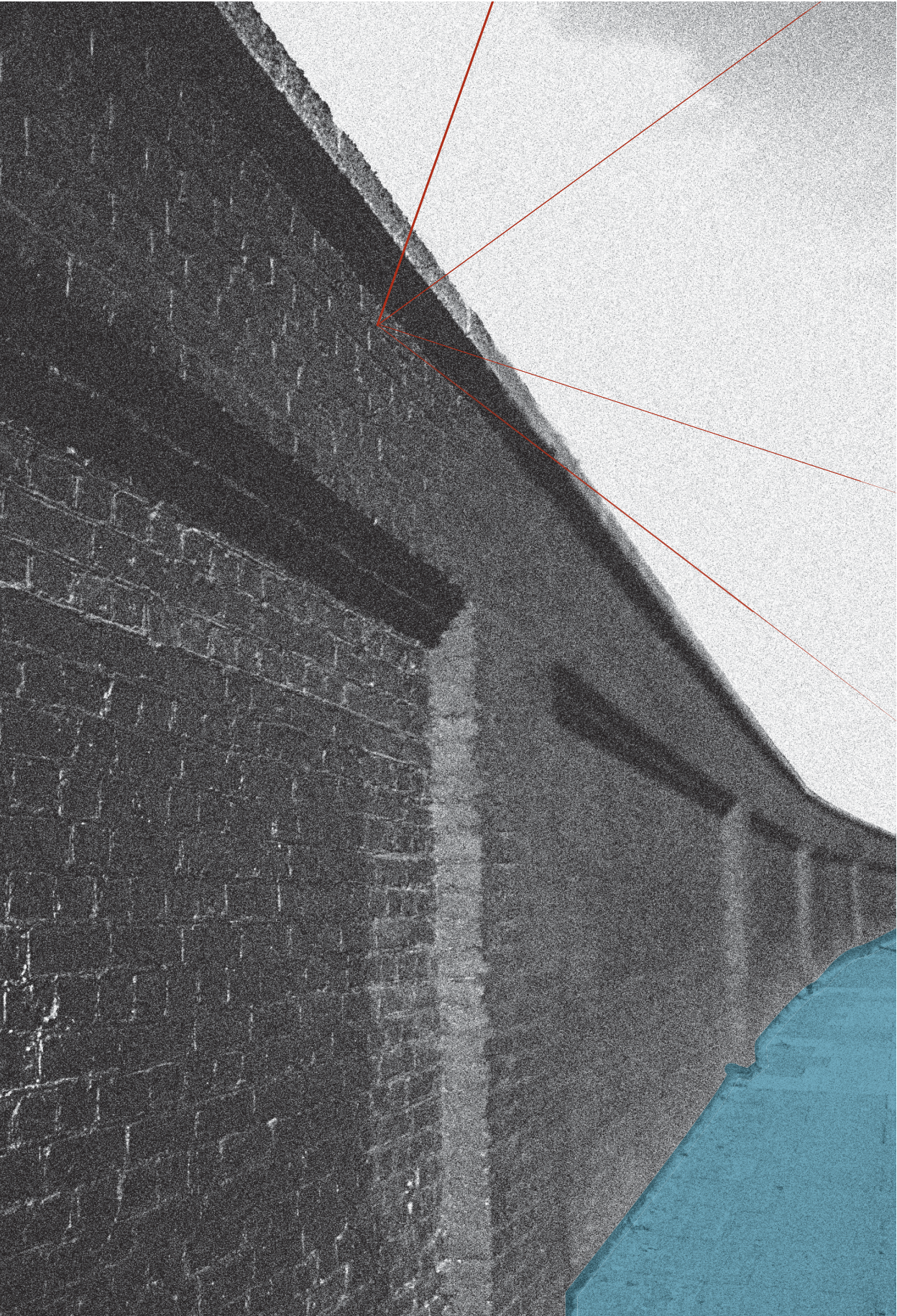
However, there are a number of drawbacks. Like the previous model, it does not deliver competition in the provision of content and services, so customers will have less choice, there may be less innovation and there will not be the same downward pressure on prices. Furthermore, this model requires the local government to act as a telecoms provider – a field in which it is likely to have little experience. Acquisition of this kind of expertise – typically requiring the use of consultants and hiring managers and staff from the telecommunications sector – is likely to be costly and time-consuming.

The degree of public involvement, and the fact that the project is less commercially oriented, also means that there is likely to be a greater need for public investment in terms of capital expenditure initially and operating expenditure on an ongoing basis. Finally, in some countries this model may not be an option, since legislation may prohibit local governments from operating ventures of this kind.

Examples of full public control are: Terrecablate in Siena (Italy); Wienstrom in the City of Vienna (Austria); and the initial business model of Acantho in the Emilia Romagna region (Italy).

Moving from Strategic Choice to Implementation

As the analysis of these models indicates, there are no simple solutions. Rather, different models work in different situations. The aim of this section has been to provide local government executives with a framework for developing a solution that fits their circumstances and priorities. The next section puts this in a wider context by discussing the key stages a local government might go through when implementing its vision for a Broadband City.



04.

The Broadband City Roadmap

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The Broadband City Roadmap

The broadband sector moves fast. New technologies, services and players enter and influence the market all the time. It can therefore seem a challenging area for a local government to enter. In developing a broadband strategy the authority will need to balance the requirements and objectives of many different stakeholders. It will also need to create a proposition that is attractive enough to secure private sector involvement but still delivers the maximum amount of public value.

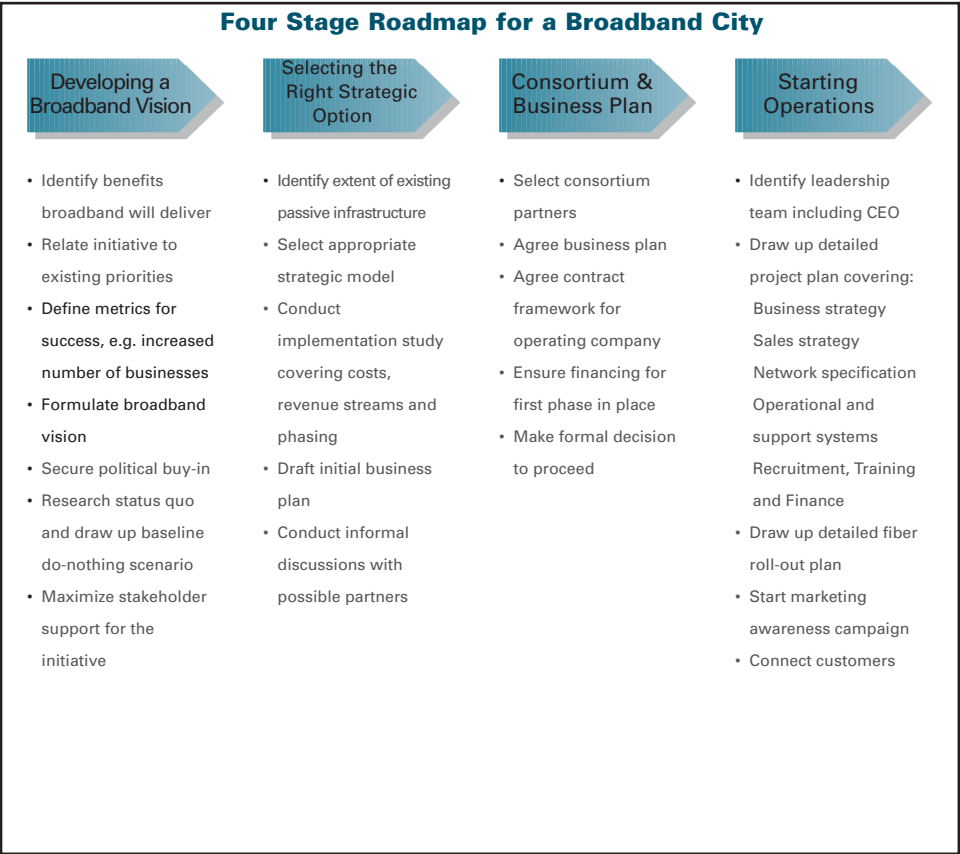
In tackling these challenges local governments can learn a lot from others who have already faced them. Cisco's Internet Business Solutions Group has worked with many of the local authorities round the world who have taken a pioneering role in encouraging real broadband. The insights generated by these pioneers have allowed us to develop a four-stage process to help guide local government executives towards the creation of their own Broadband City.

This four-stage process does not purport to provide an exhaustive answer to the many and complex organizational, financial and political issues that local authorities will need to tackle. Rather it is intended as a practical tool that executives can use in taking forward their own broadband initiative. The four stages provide a framework for exploring the key challenges and choices that arise when developing and implementing a broadband strategy.

This methodology is particularly appropriate where the local government is considering implementing a fiber-to-the-home or a fiber-to-the-business infrastructure. In relation to other initiatives (e.g. projects to ensure connectivity is available to everyone in a large, sparsely-populated area) similar issues would arise, but the different context and different technologies mean some aspects of the methodology would need to be adjusted.

The four stages in the process are:

- Stage One: Developing a Vision and Securing Buy-In
- Stage Two: Selecting the Right Strategic Option
- Stage Three: Creating the Consortium and Detailed Business Plan
- Stage Four: Starting Operations



Stage 1: Developing A Broadband Vision

The first thing a local government should do in developing its broadband vision is to explore the potential impact of widespread broadband connectivity on the city’s existing objectives and priorities. Which of the benefits of broadband are most relevant to the key concerns of citizens and to the declared political aims of the city? Could broadband allow the local government to respond in a totally new way to a problem it faces? If so, what sort of outcomes might this deliver?

Exploring these questions will help the local government ensure that its broadband vision fits into the wider picture of what the city is trying to achieve. It also provides a good opportunity for building a broad coalition of support for this initiative.

On the basis of these discussions the authority should be able to develop a Broadband Vision for the city. This should translate the potential benefits of broadband into a specific and

realistic picture of what broadband might deliver for that particular locality. What will success really mean for the citizens of the area? What metrics will be used to assess progress towards the vision?

Obviously appropriate measures will depend very much on what the local government is seeking to achieve, but they might include such things as:

- increasing the number of businesses locating in the area;
- increasing the number of hi-tech companies locating in the area;
- increasing the rate at which small and medium-sized businesses are set up in the area;
- decreasing the number of unemployed and/or long-term unemployed;
- increasing the number of people moving into the area;
- increasing pupil attainment at 16 and the percentage of school children in the area who continue in education post-18;
- increasing the number of adults who return to education and gain qualifications;
- decreasing the average time it takes for a citizen to see an appropriate medical expert;
- decreasing the number and average length of hospital stays and/or increasing the percentage of patients treated at home;
- decreasing the percentage of transactions between the citizen and the local government that require the citizen to physically go to a government office;
- decreasing the crime rate in the area;
- decreasing traffic congestion in the area;
- increasing citizen satisfaction with the area as a place to live;
- increasing citizen satisfaction with the effectiveness of public services;
- delivering measurable efficiency improvements within the public administration.

Once a vision has been developed, the next step is to secure political buy-in for that vision. Given that the broadband initiative is a long-term project, it is desirable to secure wide, and if possible cross-party, support for the broadband vision. In any event to give the project the right degree of urgency, the political support should be translated into a clear and public commitment, e.g. “By 2010 Cityville will be recognized as the region’s most innovative digital city with a highly Internet-literate population and thriving small business sector including many successful hi-tech start-up companies”.

Developing the vision also provides an opportunity to engage citizens and other stakeholders. Engagement can take many different forms - from public meetings to workshops involving the key decision-makers in stakeholder groups. The earlier these discussions are held, the easier it is to involve all stakeholders and give them a real sense of shaping the project.

As well as clarifying what it is trying to achieve, the local government needs to explore the context for its broadband initiative. What degree of connectivity is currently on offer to businesses, citizens and public sector organizations? How affordable is this connectivity absolutely and relatively? Are there areas or communities that have markedly worse access? What sort of content and what range of services are being offered over that connectivity? How well do these services meet the existing and foreseeable needs of customers?

These questions relate to current provision, but the local government should also make some assessment of what is likely to happen without public intervention. This exercise is likely to be harder than it might initially seem, since potential providers typically have an interest in overstating the speed and extent to which they are likely to offer new services. The strategy of the main incumbent telecommunications provider will be an important consideration. On the one hand, broadband may pose a threat to the revenues the incumbent currently generates from conventional telephony and low-speed Internet access. On the other hand, a far-sighted incumbent may recognize that broadband is the technology of the future and be keen to be involved. Whatever the situation, the local government needs to assess in detail the strategy and interests of all stakeholders and probe carefully before reaching a final view on what really is likely to be delivered without public intervention.

By the end of this stage of the process the local government should:

- Know how its broadband project relates to and supports other City priorities;
- Have a clear vision of what being a Broadband City will deliver for the area;
- Know how it will measure success;
- Have secured political and popular buy-in.

Stage 2: Selecting the Right Strategic Option

Having developed its broadband vision, the local government needs to think through the strategic issues set out in Part Three of this book. It should begin by exploring the situation in relation to the passive infrastructure. For example, how much fiber is there already in the ground? Who owns this fiber and is it currently being used? Are the owners of the fiber likely to be open to the idea of participating in a public/private partnership to use these assets? Where no fiber is currently available, are there civil infrastructures (ducts etc) through which fiber could easily be run?

Once the local government has a reasonable idea of whether the passive infrastructure will need to be built from scratch or whether it can leverage existing assets, it needs to determine which strategic option is the most appropriate for its circumstances. As we noted in Part Three, the equal access model is generally the most attractive option from a public

value point of view, but it is a difficult model for the first years of broadband roll-out. This is because revenue from customers in the early years may be insufficient to generate enough profit to sustain a number of competing service providers in addition to the operating company that is managing the active infrastructure.

One common solution to this problem, particularly in Europe, is to allow the private sector operating company a time-limited monopoly over provision of services to customers. This mitigates the problem of initial low revenue flows because there are cost savings in having one company both operating the network and delivering services and because a lower level of profit is sufficient to sustain one company rather than many. A further attraction of this model is that it gives the single company a very strong incentive to make the undertaking successful. A local government might therefore decide to operate this model for the first few years of the broadband project and then gradually move to the equal access model.

Another possibility is to assume full public control of the project until there is sufficient revenue to sustain the equal access model. This may seem the simplest solution, but it has its risks. One problem is that the local government is likely to lack telecommunications expertise, and recruiting this expertise is likely to be both expensive and time-consuming. More generally, the culture and skill set of the local government is unlikely to be well adapted to this kind of highly entrepreneurial project where speed of decision-making and commercial judgement are at a premium. So while initial co-ordination and governance is simplified, the initiative may move forward more slowly, costs may be higher and the chances of success may be reduced. Furthermore, in some circumstances local legislation may prohibit this type of solution.

Once the local government has some idea which strategic option is the most appropriate, it needs to conduct an implementation study. This may well require outside help, since the local government is unlikely to have experience of analyzing and preparing for this kind of project. The implementation study should consider:

- Likely costs of the physical infrastructure;
- Likely costs of service delivery;
- Potential service offerings to different customer segments;
- Likely demand for those service offerings and hence potential revenue flows;
- A roll-out plan indicating how the project might be phased and relating the cost and revenue estimates to the different phases.

The section on the physical infrastructure should include a map of the entire city showing the city's existing infrastructure assets and those of any other stakeholders (private and public) that could be leveraged for the project. It should also indicate where the city (or associated public bodies) have ducts or rights of way that would assist with building of any

new physical infrastructure or other opportunities that might play a role here, e.g. new roads being built or major regeneration projects. This information should allow the city to assess the extent of new passive infrastructure that will be required and to estimate the cost of achieving its desired range of broadband penetration to homes and businesses.

The implementation study needs to take a rigorous approach to assessing what services different customers might want and the potential revenue streams this demand might generate. It also needs to consider the service model for the public sector – will services be offered on a commercial basis in the same way as to private sector organizations. Or will public sector organizations receive services for free in return for some form of initial or ongoing support for the project?

In relation to the commercial service offerings, the local government will need to think through how the potential market might be segmented, since different types of customers might want different types of services or put a different value on them. Furthermore, offering each potential service individually with a separate tariff is unlikely to be the best option; it is likely to make more sense to devise different bundles of services targeted at different parts of the market. For example, one service offering to residential customers might consist of:

- Flat fee to cover all telephone calls;
- Video communication from PC and/or using web/TV camera;
- Next generation Internet (10Mbit/s down and up load);
- Power Gaming (the ability to play interactive games with other users round the world);
- Video on Demand;
- Time shift TV where the user can view programmes before or after their scheduled time;
- Electronic video recorder.

A service offering aimed at business might include:

- Free telephone calls within the city area;
- Flat fee for national telephone calls;
- Giga Internet (100Mbit/s down and up load) no limits;
- Desktop video conferencing;
- Internet Video Surveillance Camera;
- Motion detection service for surveillance camera;
- Web Hosting;
- LAN Security (e.g. firewall, intruder detection etc).

The local government will usually not be providing commercial services itself, but it still needs to understand these issues in order to understand the commercial basis of the project and to be in a position to negotiate effectively with potential service provider partners.

The implementation study can be used as a basis for discussions with potential investors and consortium partners both to test its realism and to begin to get a sense of which stakeholders are serious about participation in the City's broadband initiative. Potential partners include telecommunication service providers, local Internet service providers, local electricity or other utility companies, system integrators, content suppliers, local banks and large private investors.

On the basis of these discussions the local authority should be able to draft an initial business plan. This will address anticipated timescales for each phase of the plan, an indication of the likely revenues, and an assessment of likely costs including a detailed estimate of the level of investment the city will need to make.

By the end of this stage of the process the local government should:

- Have chosen a strategic option;
- Have an initial plan for how the project might be phased;
- Know what level of public investment will be required for each phase;
- Have an initial business plan that includes a clear timeline and gives an indication of how costs and revenues might be allocated between all of those involved in the project.

Stage 3: Creating the Consortium and Detailed Business Plan

Having selected the appropriate strategic option, the local government needs to start detailed preparations for realizing its broadband vision. The activities at this stage will be strongly influenced by the strategic model the local government had chosen. However, in all models there is likely to be some element of private sector involvement and a key issue will be selecting the right partner (or partners).

There are likely to be a large number of organizations that show an interest in the broadband initiative, but the local government needs to assess clearly what each can offer to the initiative and whether it has other potentially conflicting interests. The aim should be to bring together a group of organizations with a shared vision for the project and similarly aligned interests and culture.

Finding the right partners will require a series of discussions and as these progress the details of how the business is likely to function should start to firm up. At this point, potential partners should be asked to sign non-disclosure agreements, since planned service offerings and other details will start to become commercially sensitive.

Eventually the local government needs to select the partners it wants to move forward with and agree with them a detailed business plan. This should include a framework agreement setting out exactly what role each partner will play in the initiative and what

responsibilities each will have. It should now be clear what the financial responsibilities of all partners are and the local government needs to ensure that all partners are in a position to meet their responsibilities in line with the envisaged timetable for the project.

Potential Partner Organizations

Type of Organization	Role/Interest
City Utility	Owner of Fiber and/or ducts/land where fiber could be laid
Local Internet Service Provider	Provisioning & Billing System
Content Provider	Provision of Services such as Video on Demand
System Integrator	Integration of new innovative services
Local Bank or Venture Capitalist	Private Sector Investor

Before contracts are finalized, it may be worth organizing a strategy session of the consortium. This will give the local authority the chance to assess compatibility between consortium members and to ensure that they are likely to work well together. Such a meeting could take the following approach:

- Each partner presents their expectations, as well as how they see their role and responsibility with regard to the project;
- Workshop sessions then involve all partners in refining and adapting the existing business plan, paying particular attention to revenue forecasts, capital spending and operational spending outlook;
- A first implementation and activity plan is agreed, leading towards the creation of a legal entity to implement the vision.

At this stage all members of the consortium including the local government need to make a final commitment to the project. The local government should be clear about the scale of public investment required for each phase of the project and on potential exit strategies in relation to each phase. It also needs to do a final check that the project as it has now been agreed will indeed deliver the kind of benefits sets out in the Broadband City vision it developed at the start of the process.

By the end of this stage of the process the local government should have:

- Selected its consortium partners and agreed with each of them a memorandum of understanding describing their roles and responsibilities;

- Reached agreement with its partners on a detailed business plan;
- Agreed a contract framework with its partners to set up the operating company;
- Ensured that all partners are in a position to provide the necessary finance for at least the first phase of the project;
- Made the formal final decision to go ahead with the project.

Stage 4 Starting Operations

By this stage all the key strategic decisions should have been made and the focus should be on implementation. A key success factor will be finding the right leadership team and, in particular, the chief executive for the operating company. Where a new company is being created, the ideal CEO is likely to be someone with broadband start-up experience.

Drawing up a detailed project plan should be a top priority. This plan should include a Gantt chart or other similar device that breaks down the project into key tasks and provides a project timeline with indications of how long each task should take and any dependencies between them. The project plan needs to cover the following types of activities:

- Business Strategy including competitor analysis;
- Marketing, including market research, market strategy, advertizing etc;
- Sales, including sales strategy, commission model, demo material etc;
- Network, including network specification, network roll-out timeline, site preparation, testing etc;
- Operational and Business Support Systems such as provisioning and billing systems;
- Customer Care/Help Desk;
- Recruitment and Training;
- Finance including sources of finance and financial flows.

As this list indicates, a wide range of activities need to be undertaken at this point. On the technical level fiber rollout plans have to be finalized together with the ultimate design of the active network. The back office functions such as operational support systems for customers and services, as well as the systems to bill customers, have to be specified. Business processes have to be designed and the organization finalized. This includes job descriptions to hire the remaining start-up staff. The company also needs to start a marketing campaign within the city area. The campaign should focus on generating awareness and enthusiasm, encouraging citizens to pre-subscribe to services before they actually go live.

Depending on the strategic model the local government has chosen, it may well not be involved in a daily basis in all these activities. However, it needs to ensure that appropriate governance arrangements are in place to keep it in touch with how the project is

progressing. In particular, it needs to be sure that it has real insight into the financial situation of the project (both costs and revenues) and that key milestones are being met. If, as is likely, the project is phased, the local government should have a formal role in the decision to embark on each new phase of activity.

Conclusion

The above roadmap captures some of the lessons pioneering local governments have learnt in realizing their broadband visions. Speeding up the availability of high bandwidth connectivity is a challenging but exciting undertaking with real potential to deliver significant benefits for an area and its citizens.

Broadband can help a local government stimulate economic development both through its positive impact on the image of the city and by encouraging affordable, innovative networked services and a more IT-literate population. It can bring citizens and government closer to each other, allowing easy and convenient participation for all, and it can play a key role in improving public services from health to education, making these more efficient and convenient for the citizen.

Experience suggests that the best way of achieving these benefits is through private public partnerships where the core competencies of the public sector are complemented by those of the private sector. A strong business case approach, based on a well-structured approach with clear roles and responsibilities definitions for all stakeholders involved will be the key to success. But the aim should not just be the creation of the right infrastructure – at least as important are the services that are delivered over that infrastructure. It is these services that will be the drivers of business and social innovation, of productivity and of inclusion. Only through the development of value-added, multi-media services will the private investors achieve a return on their investment and the local government its public value goals.

The aim of this book has been to offer local government executives a roadmap in addressing the opportunities offered by broadband. Cisco Systems is actively engaged on a global basis both with public sector organizations and with service providers and hence is ideally placed to assist in the development of broadband government initiatives. We hope this book has helped you and we look forward to discussing with you the lessons you learn as you turn your broadband vision into a reality.

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