The case for community broadband

NOKIA

How high-speed broadband creates wealth, equality and opportunity for citizens

High-speed broadband is the electricity of the 21st Century. It brings growth, prosperity and better standards of living everywhere it goes. And as broadband technology improves and connection speeds get faster, the better things get.

Communities that do not yet have high-speed Internet services for their citizens face a dilemma. Should they take the initiative and start their own high-speed broadband project? Or should they wait and hope that a traditional or alternative service provider will invest in their area?

The United Nations has stated that broadband access is a basic human right. Yet 20% of households in developed countries and as many as 66% of households in developing countries do not have Internet access.

The most underserved locations are typically in rural, remote areas, where the cost per user of bringing broadband is much higher than in urban areas. This is because the majority of the network is common and needs to be built whether there are only a few users or thousands of users connected to it. So, the cost per user in low density rural areas is much higher than in urban areas.

Network operators are providing broadband access, but they focus on urban areas, where the cost of deployment is lower and the revenues are higher. Most of them find that there is no business case to deploy broadband access in rural locations. This is understandable, as operators are driven by profitability and it is not their role to ensure socio-economic development or address the digital divide.

This is where community broadband initiatives play a decisive role in closing the gap. The benefits of broadband for a community are proven and translate into higher adoption of services in rural areas. It follows that community broadband initiatives are needed to accelerate broadband coverage to all citizens, no matter where they live.

Many communities have decided that they don't want – or cannot afford – to wait. More and more community-led broadband projects are emerging. And those communities are reaping the social and economic benefits that high-speed broadband brings.

The socio-economic benefits of broadband

Today, the benefits of high-speed broadband are well-known.

On a social level, it simply makes life better; bringing entertainment, connecting distant relatives, giving better prospects for employment[1] and better access to life-enhancing services like remote healthcare and online education.

Better broadband has also been shown to bring significant economic growth at both a national and local level. In a 2014 study, global management consulting firm McKinsey & Company determined that a 10% increase in the number of households with broadband boosts gross domestic product by between 0.9% and 1.5%[2]. Also in 2014, the Fiber to the Home Council released a study demonstrating higher per capita GDP in communities where very high-speed Internet services were available[3]. Infrastructure investment, job creation, entrepreneurship, and companies relocating or expanding are all manifestations of this growth.

But despite this, 64% of households worldwide still do not have access to the Internet[4] (25% in the U.S.[1]). And only 7% of households worldwide have the high-speed broadband[5] that enables access to entertainment, online education and healthcare services.

Municipalities looking to create more wealth, equality and opportunity for their citizens are naturally interested in high-speed broadband. However, with traditional service providers focused squarely on investment that brings profit and alternative operators, like Google Fiber, scaling back their ambitions[6], municipalities must look carefully at how they bring high-speed broadband to their citizens.

Many communities have taken things into their own hands. These communities range in size from Los Angeles (population 3.9 million) to Westminster, Maryland (population 18,500). Westminster has created an innovative public-private partnership in which the community lays the broadband network infrastructure but leases it to a third party to deliver broadband services.

These municipalities, and many more, are creating economic growth, reversing population decline and revitalizing their communities.

1 https://www.whitehouse.gov/sites/default/files/page/files/20160308_broadband_cea_issue_brief.pdf
2 http://www.mckinsey.com/industries/high-tech/our-insights/internet-matters
3 http://www.ftthcouncil.org/p/bl/et/blogid=3&blogaid=305
4 https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2015.pdf
5 Definitions of high-speed broadband vary, but one common measure is a broadband speed greater than 10 megabits per second (Mb/s)
6 https://fiber.googleblog.com/2016/10/advancing-our-amazing-bet.html

The rise of high-speed broadband

To understand the type of broadband your community might need, it's useful to understand some of the wider trends.

The last few years have seen an explosion in broadband speeds, enabled by new broadband technologies. Do you remember dial-up modems in the 1990s? They delivered speeds up to 56 kilobits per second (kb/s). Today, in the most competitive markets, businesses and even many residential customers now take for granted broadband speeds of hundreds of megabits per second, with gigabit and multi-gigabit services being offered in many markets.

This increase in broadband speeds is being driven by a number of factors.

The first is the sheer number of Internet-enabled devices. Today, a typical family of 4 can easily have 10 devices connected to the Internet, including smartphones, tablets, computers, games consoles and TVs. More devices need more bandwidth.

The next trend is the sharp increase in watching online movies, TV shows and video clips from sites like YouTube. Video consumes a lot of bandwidth and as the latest 4K high definition video arrives, even more is needed. Businesses are also using video in the shape of collaboration and conferencing applications.

Cloud services – using remote data centers to provide storage or processing power for an array of different applications – is another driver. Businesses in particular need higher bandwidth to deal with bigger amounts of data while consumers are increasingly uploading home-made content, such as home movies and photos, to the cloud.

The Internet of Things (IoT) – that is, the connection of household objects like thermostats, lights and fridges, and industrial objects like sensors and machinery – is also driving the need for better broadband coverage and capacity. For communities, IoT is essential for the concept of the smart city. Smart cities use IoT technology to embed data collection hardware and software into municipal infrastructure to enhance services and improve the transparency of government agencies. Residents are able to interact with these smart systems using smartphones, tablets, and wearables. McKinsey recently estimated that IoT offers a potential economic impact of $4 trillion to $11 trillion a year in 2025 in settings such as factories, cities and retail[7].

The thirst for always-on connectivity; for online entertainment; for ways to automate, innovate, enhance and improve, and to push the boundaries of digital possibilities: All these factors are driving investment in high-speed broadband networks. And it's no longer the realm of the traditional service provider. Alternative operators like Google, savvy energy and transportation companies, and small rural communities like Westminster all see the benefits of a high-speed broadband future.

7 http://www.mckinsey.com/insights/business_technology/the_Internet_of_things_the_value_of_digitizing_the_physical_world

Broadband at the service of the community

There are many ways that a high-speed broadband network can bring value to citizens.

Citizen lifestyle

According to RVA Market Research & Consulting, residents with a fiber-to-the-home (FTTH) broadband services work an average of 1.3 extra days at home each month, and about 14% have home-based businesses resulting in over $10,000 in extra income for the household[8]. Given that the average consumer spends over five hours per day online at home and has multiple online devices, this infrastructure is only growing more valuable and more necessary. In fact, RVA found that high-speed Internet was often one of the most important considerations when residents evaluated neighborhoods, houses and multi-dwelling units (MDUs).

Reversing the population flow

Many rural communities, particularly those outside commuter belts, face growing pressures. Village amenities, such as shops, schools and pubs, are under threat as the population ages or shrinks and younger people move to towns and cities. This is a vicious circle; as amenities close, more people leave, reducing the population further.

Reliable and high-speed connectivity can reverse this trend. It encourages those that want to move out from cities by providing them with the ability to work from home, and access the same entertainment and other services that they are used to in urban areas. Often these incomers are families, helping to safeguard the future of local schools, while at the same time stimulating the local economy with new investment.

Revitalizing rural communities

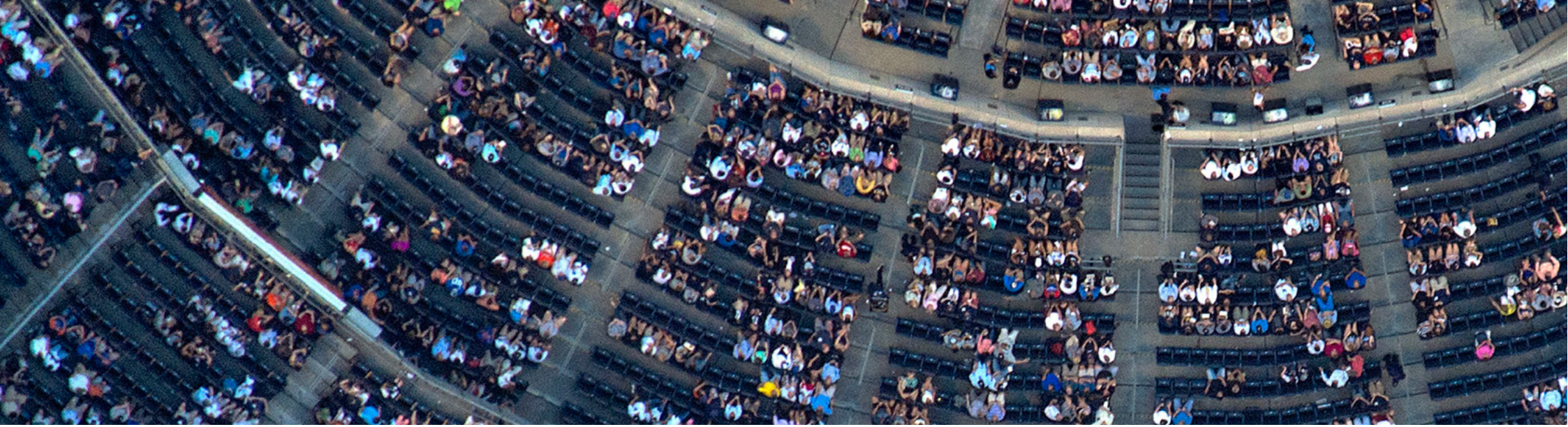
As well as bringing in new people, high-speed broadband encourages existing residents to stay. It also provides local businesses with the ability to expand, invest and seek new opportunities by providing rapid connections to major markets. In Cornwall, south west England, 58% of local businesses said that they were growing thanks to the connectivity that high-speed broadband has delivered[9].

8 http://www.rvallc.com/ftth-reports/
9 http://www.alphr.com/news/broadband/385321/fibre-broadbands-economic-impact-by-the-numbers

All of this leads to increased investment in the rural economy, providing residents with more choice and stimulating growth.

Business

High-speed connections accelerate business development by providing new opportunities for innovation, expansion, and e-commerce. Connected communities create wealth and opportunity by attracting businesses that want to locate in areas with a strong broadband presence. Broadband allows businesses to move more rapidly in the product development cycle from the idea stage to final product. For example, a company could have teams in various locations around the world working on related portions of the same project, using broadband connectivity to provide seamless communication and information sharing. Additionally, broadband can have a particularly strong impact on research and development (R&D) leading to innovative technologies.



Government

Like all enterprises, governments are using broadband to both improve their services and lower the costs of delivering those services. By using broadband to provide information and assistance, both governments and their citizens save time and money and citizens become active participants in improving municipality services, such as by better targeting of public safety and transportation resources. With high-speed broadband, two-way video can improve interactions between citizens and their governments.

Smart Cities

Cities around the world have used broadband to improve how they deliver basic services, such as trash removal, traffic management, public safety and water and sewer services. This will only increase, and require greater bandwidth, as cities move to take advantage of the civic Internet of Things (IoT), a market that McKinsey estimates will, within a decade, be worth over a trillion dollars.

Healthcare

While broadband is already driving the adoption of electronic medical records and wearable technology to monitor personal health, high-speed broadband will be a catalyst for new services. Imagine being able to access a personal trainer online, or have a medical consultation about your sick child from the comfort of your own home. Or in-home monitoring that is reliable and simple enough to delay or even avoid the need for nursing home care.

Around the world, more and more of these services are being introduced. These services:

- Reduce healthcare costs.
- Improve patient outcomes by involving the most appropriate medical professionals at an earlier stage.
- Make it easier for patients to access medical services; and encourage healthy lifestyle choices.

Education

Education technology is one of the fastest growing fields for entrepreneurs as broadband connections make the delivery of personalized, constantly improving educational content possible. As the U.S. government recently recognized in increasing the support for broadband to classrooms by 50%, fiber is a necessary part of the mix for enabling students to have access to all the kinds of content now being created. The U.S. Chamber of Commerce said that by 2019, 50% of all courses in U.S. may be delivered online.

Energy

Electric utilities have found that a fiber-optic communications network can create a smart grid that improves electrical efficiency, reduces outage time, and saves costs by better targeting of utility manpower. Those same fiber connections can serve as the basis for high-speed broadband[10].

10 http://energy.gov/oe/downloads/smart-grid-investments-improve-grid-reliability-resilience-and-storm-responses-november

Broadband technology considerations

Fixed or mobile?

The first question is: should the community network be built with wired or wireless technologies? Several aspects need to be considered: a desire for faster and faster Internet speeds; an increased number of user devices, services and applications; and trends in user behavior.

Wired (fixed) technologies have much more capacity than wireless, enabling communities to absorb increases in demand and get value from the network for decades to come. Wireless, on the other hand, allows citizens to use services while on the move. But even wireless networks need wire to transport the mobile traffic between small cells and base stations. As wireless networks evolve towards next generation (5G) technologies, transport over wired networks is even more necessary. The world is going wireless, but wireless is going fixed. So, the right answer to the question "wired or wireless?" is: "both". Wired networks to enable high speeds to businesses and residential users and to backhaul mobile traffic, and wireless to enable mobility.

There are many factors to consider when deciding which technology is suitable for a high-speed community broadband network. There are three infrastructure choices: fiber, copper or coaxial cable. When looking at all the key criteria, fiber is the logical choice.

Future-first

Fiber is a future-proof medium whereas we are reaching the upper limits of the bandwidth that can be provided over both copper and cable networks. As technology evolves, the same basic fiber network will be able to increase in capacity. This is important as we have no way of knowing how fast we will need our broadband networks to be in 10 or 20 years. What history has shown us, however, is that every time broadband speeds get faster, entrepreneurs create innovative applications that need that extra speed. No municipality would build a highway or airport that can only service today's traffic. A broadband network is no different. Fiber is the only future-proof choice.

11 http://learninglab.sdabocconi.it/prysmian/wp-content/uploads/group-documents/3/1363252132-Prereading_Fiber.pdf
12 http://www.ftthcouncil.org/blog/fiber-optic-broadband-boosts-value-of-multifamily-homes

Citizen as customer

What the last few years have shown is that when a service provider offers fiber, customers flock to it. And when a community gets fiber, their marketing and branding value grows dramatically.

Fiber access networks have lower latency than both copper and cable, which means no noticeable delay in exchanging information. This is important for applications that depend on real-time communication and high-resolution images, such as remote medical diagnostics and surgery, as well as online gaming and other interactive entertainment services.

Through increase bandwidth and lower latency, fiber provides the best experience to citizens accessing critical services, like healthcare, and non-critical services, like entertainment.

Taxpayer return

A fiber network is cheaper to run than copper or cable, thanks to easier maintenance, lower electricity consumption, and higher network reliability. Utility companies in the U.S. and Europe have reported savings of 40 – 90% per year compared to the cost of running a copper network[11], though an average saving for a community network is more probably 30%.

Fiber is also the most reliable type of fixed network and so makes the best long-term investment. Once fiber is installed, it may not have to be replaced for many decades. Overall, fiber is far more rugged and reliable than copper wires. Fiber does not corrode and there is no fire hazard. Nothing hurts fiber except a physical cut or destruction of the building it is in.

Enhancing real estate

In 2016, the Fiber to the Home Council Americas released a study showing that fiber broadband increases rental and property values in multiple dwelling units (MDUs) by 8 percent and 2.8 percent respectively[12]. Using financial data from the National Apartment Association, the study estimates fiber can add 11% to net income for MDU owners.

In the UK, property websites all now include broadband speeds, and newspaper property supplements highlight rural areas where fiber is being installed as potential hotspots that will see an increase in value.

A fiber future

Digitalization and the creation of innovative online services will continue to accelerate. In the future, a wide variety of community essentials, such as healthcare and education, will be delivered using high-definition video, transforming the way these services are provided. Information and entertainment will be delivered by smart appliances that do not resemble computers at all and automatically adjust to suit the preferences of the user. Total-immersion gaming including virtual reality and holography will entirely change the way people spend leisure time. Unlimited network storage will make personal music and video collections redundant. Computers will not need to have applications installed and will be less vulnerable to viruses because network-based services will be cheaper and easier to use.

The possibilities of the digital age are endless and unknown. But as long as there is high-speed broadband, these possibilities have the potential to transform and enrich communities. That is why fiber networks should be considered a critical part of every community's future.

Nokia: bringing high-speed broadband to communities

A community project could well be the fastest way for communities to get access to high capacity broadband services that bring benefits to the whole community. However, undertaking such a project is far from business as usual for a municipality. Every community is different and each project requires deep expertise and careful planning to ensure that the network meets the community's objectives, today and for years to come.

Nokia is a global leader in the technologies that connect people and things wherever they are, with the industry's most complete end-to-end networks portfolio that brings together the best of fixed and mobile broadband, IP routing, core networks, cloud applications and services. With its market-leading technology and experience, Nokia can help you. We have 20+ years of fiber broadband experience, and our equipment powers the biggest, fastest and best-performing fiber networks in the world. With our technologies and expertise, you can build a community broadband network that delivers the social and economic benefits you deserve.

The Chattanooga example

Chattanooga, Tennessee is one of the only places on earth with Internet as fast as 1 gigabit per second (Gb/s) that is available to any home or business. This is about 50 times faster than the U.S. average. Chattanooga's Gig – powered by Nokia's fiber ultra-broadband technology – is an example how one city's super-fast internet is driving a tech boom, creating new jobs and attracting investments. Money keeps flowing into Chattanooga. The city is buzzing again, this time with tech entrepreneurs taking advantage of the fastest Internet in the western hemisphere[13].

Economy. In the 3 years immediately following its decision to invest high-speed broadband, Chattanooga became the 6th fastest growing economy in the U.S.

Real estate. Over the same period, household income rose by 13.5 percent and home values increased by 14 percent[14].

Energy. In July 2012, a summer storm affected EPB Chattanooga's electricity network. Thanks to their smart grid, enabled by their fiber broadband network, the utility had a 55 percent reduction in duration of outages, saving EPB Chattanooga $1.4 million.

Business. In a recent study, the Ewing Marion Kauffman Foundation credited Chattanooga's high-speed broadband network as a key factor in attracting hundreds of start-ups as well as major organizations such as Volkswagen.

Employment. In addition to bringing startups to Chattanooga, the network has generated at least 2,800 new jobs and added at least $856.3 million to the economy, according to an independent study from the University of Tennessee at Chattanooga[15].

Healthcare. The same study highlights the benefits of a telemedicine program provided by Regional Obstetrical Consultants that seeks to reduce unnecessary patient transportation and hospitalizations as well as the length of stay in neonatal intensive care units. A total of 47,298 hours were saved from patients not having to drive to consultations, an average of 3.56 hours per patient. When the savings in consultation time is added, this time savings adds up to 51,044 hours.

13 https://www.chattanoogachamber.com/news-media/news/2016/8/how-chattanooga-became-gig-city
14 http://www.huffingtonpost.com/carl-gibson/chattanooga-socialism_b_6812368.html
15 http://technical.ly/2016/10/26/chattanooga-startups-gigabit-network/

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