

# NOKIA



## Municipal ultra-broadband

Enabling wealth and inclusion for your community  
through gigabit broadband service

Broadband internet access is essential for everyone: for unserved communities in rural or smaller municipalities; for underserved communities in sub-urban areas looking to prosper and access online services in today's connected, digital world; but also for local governments willing to modernize their cities with 'smart city' services. Nokia's ultra-broadband fiber and fixed wireless access (FWA) solutions help cities provide citizens, businesses and governments in underserved areas with gigabit service access, placing them among the most connected communities. Ultra-broadband supports improved economic development, smart grid, education, safety, and telecare and medicine services that enhance quality of life while attracting and keeping jobs. It also provides the communications foundation for reliable, efficient services to all, bridging the digital divide and driving inclusion. Within the community, Nokia's proven, end-to-end fiber to the home (FTTH) and 5G-based FWA ultra-broadband solution enables voice, digital services, along with internet of things (IoT)-based communications. Combined with Nokia's professional services expertise and experience, it bridges the digital divide, enabling municipalities to deliver the socioeconomic benefits of ultra-broadband to their communities.

# The challenge

Broadband internet access is a given in today's major metropolitan areas, providing citizens with a new kind of superhighway that drives commerce, supports superior education and healthcare, builds economic prosperity and enhances quality of life. However, many rural, remote and/or smaller municipalities saddled with "last millennium" communications technology face being left behind.

## **Support economic growth**

Many rural areas and smaller municipalities already have witnessed a steady exodus of people looking elsewhere for job opportunities. During the pandemic, the situation worsened as many weren't able to do decent teleworking or follow school classes remotely. These communities may continue to shrink and flounder unless they are able to provide good working conditions to attract new businesses while retaining and nurturing

the companies that already reside in the area. Ultra-broadband is key to building a strong and attractive communications platform that will allow businesses to compete in a more and more connected economy, draw high-tech employees by replicating the business broadband experience in their homes and attract new businesses with reliable communications.

## **Enhance entertainment, education and healthcare**

Increasingly, citizens have come to desire and expect cutting-edge digital entertainment options and the quality-of-life amenities that stem from such services as video-enhanced education, distance learning, centralized records and telemedicine. Communities wishing to remain attractive to new generations of residents must be able to offer the broadband communications services that support these benefits.



“Providing access to ultra-broadband will attract jobs and investment, improves lives through services like telemedicine and e-learning, and allows families to stay in the communities they love. When we first started looking at the scope of the ultra-broadband project, we knew we would need to rely upon expertise that we did not have. Fortunately for us, Nokia demonstrated both their ability and also a strong desire to help bring ultra-broadband to northeastern Oklahoma.”

Sheila Allgood, Bolt Fiber Optic Services

### Ensure public safety and e-government

Local government officials must ensure the highest standards in public safety, which include interoperability among multiple jurisdictions, agencies, educational institutions and healthcare providers along with smart policing, enhanced situational awareness and the latest advanced public safety applications. Establishing high-speed broadband is critical to success in each of these high-priority missions as well as for developing competitive e-government services for your communities.

### Leverage smart grid and cognitive city technologies

Municipal utilities and electric cooperatives face the challenges of making their distribution grids smarter, more reliable and capable of supporting renewable power sources while cutting demand peaks and thereby reducing supply costs — all capabilities that add to a community's economic value proposition to create a powerful magnet for new businesses. Cities are also considering deploying sensors to optimize their operations in many domains (pollution monitoring, waste and water management, road and transport, etc.), and broadband communications can be leveraged to support them.



# Nokia's solution

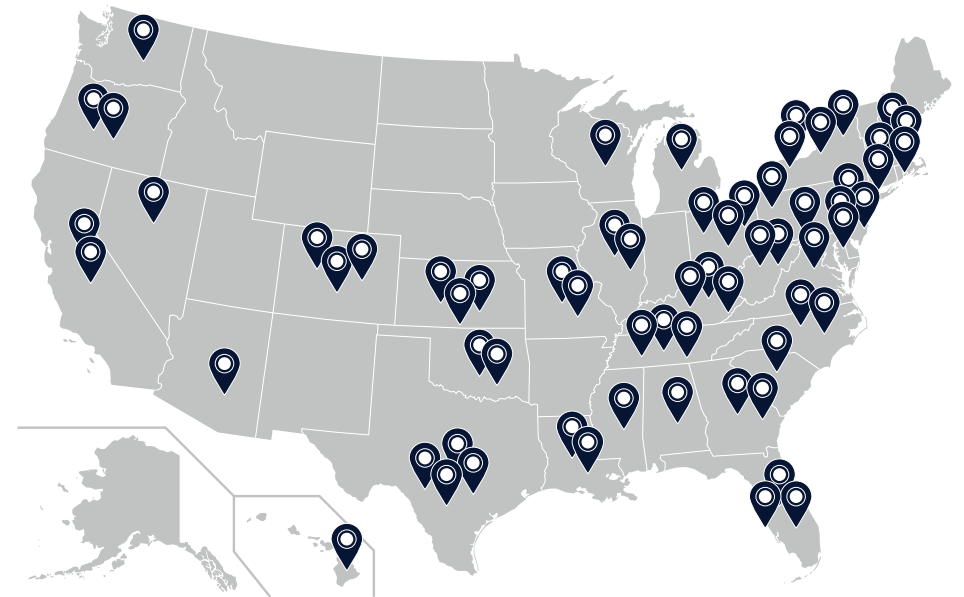
The good news for rural areas and smaller municipalities is that it has never been easier to deploy broadband services. Nokia has a variety of solutions that can help bring ultra-broadband in the most efficient way, no matter where the users are. You can deploy gigabit or even multi-gigabit fiber broadband or leverage existing mobile assets to quickly bring internet in hard-to-reach areas or offer gigabit services in high rises—without having to worry about wiring.

Nokia has shipped >0.5 billion broadband lines, of which >100M are fiber lines. Many small and medium-sized gigabit cities are delivering cutting-edge consumer and business services that rely on Nokia solutions.

- In Opelika, Alabama, a gigabit FTTH network is already generating millions in triple play revenue and expects to earn back its investment in less than five years through service to 5,000 customers.

- In Chattanooga, Tennessee, through its municipal electric utility, the municipality offers gigabit services to over 100,000 homes and businesses in the metropolitan and surrounding rural areas, generating an estimated benefit of \$2.69B for the community during the first 10 years
- The Northeast Oklahoma Electric Cooperative's Bolt Fiber Optic Services will be supplying its 30,000 rural members with an end-to-end triple play solution and gigabit ultra-broadband connectivity, placing them in an elite group of communities around the world with super-fast internet access.
- In Bexar county, near San Antonio, the Independent School District is trialing a private wireless network to provide students from under-served areas broadband access at home to remote learning services.

Residents of communities like these can stay in the places they love, build their businesses, attract new industry, and preserve multi-generational family traditions — all while enjoying a better quality of life.



Nokia understands that finding the right financing and partners to deploy and operate such networks is also an important part of the solution.

Local governments that own their power utility can create even stronger synergies from such investment.

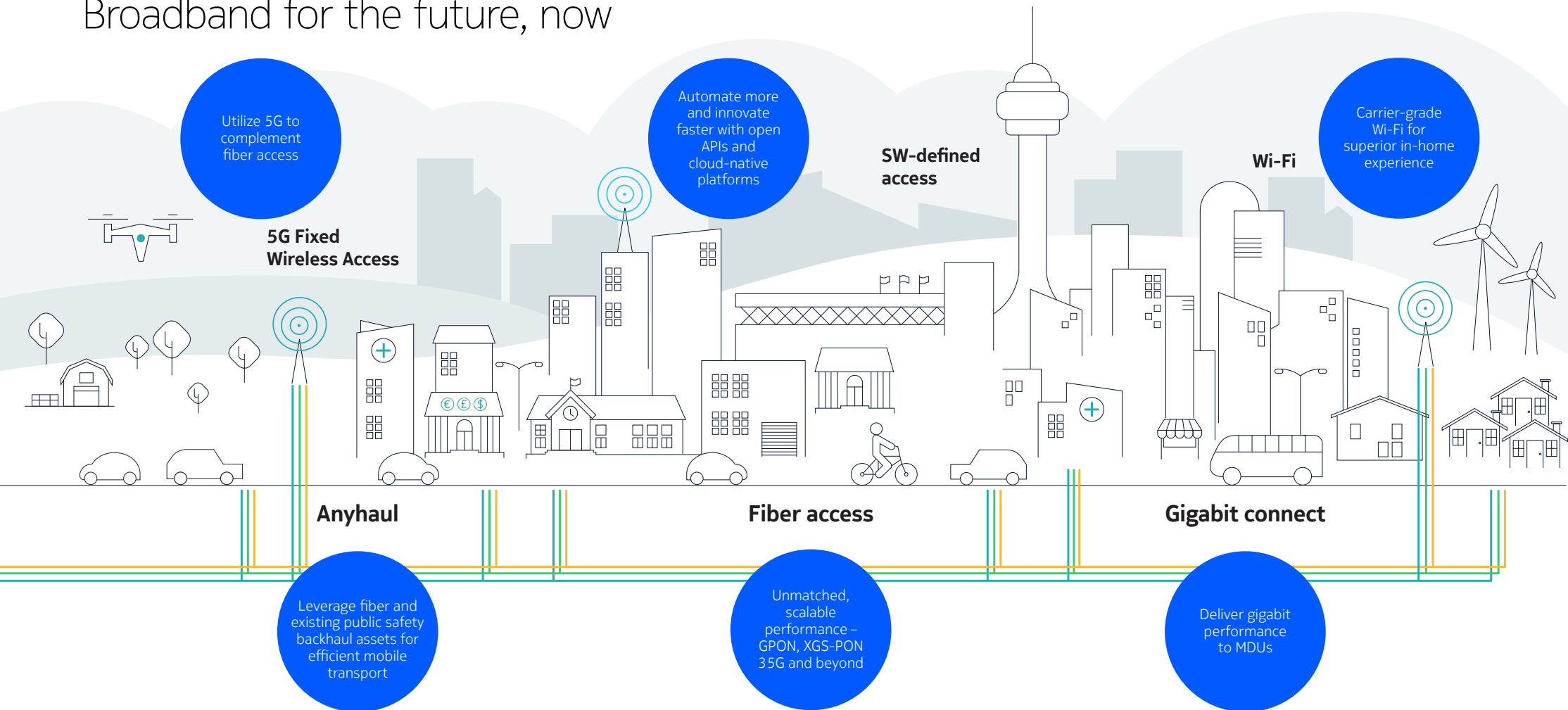
Utilities can add Industry 4.0 intelligence to their electrical grids, ensuring mission-critical bandwidth, priority and reliability for operational applications that include remote monitoring and substation automation, as well as teleprotection, seamless integration of renewables,

and smart metering for effective demand management. Consumer services include a quad play solution with voice, data, TV, and smart meters for demand management.

For those looking for a different model, Nokia also works with third-

party partners through special purpose vehicles (SPV) that can help finance and operate such community broadband deployments.

## Broadband for the future, now



# Operational benefits

The Nokia solution provides network capacity that is future-proof, safe and easy to operate, designed to meet user requirements for decades to come.

- **Fast, economical operations:** Our market-leading solution and associated professional services allow operators to rapidly deploy services, saving time and money. Industry-proven tools and processes eliminate risks, especially if local operators don't have expertise in broadband.
- **Complete, effective management:** One of the most critical components of a highly functional broadband network is a full set of management tools and capabilities to acknowledge, interrogate and resolve issues immediately, addressing network problems before they can impact operations. Nokia offers industry-leading tools that simplify the management of complex networks while providing statistics and billing information that reduce costs.
- **Unmatched security:** Network security is critical for ensuring that

services are reliably delivered with protection from potential threats and vulnerabilities, including uncontrolled or unauthorized peer-to-peer connectivity, theft of service and denial-of-service attacks. To accomplish this, security elements from multiple vendors must work together seamlessly. Having designed and deployed hundreds of mission-critical security solutions for networks around the world, Nokia offers a superior understanding of what is required, with a consolidated solution architecture that protects every aspect of the network.

## **Solution details:**

### **The elements for success**

Nokia's gigabit solution provides all of the building blocks to help communities of any size create a state-of-the-art gigabit network. It unifies products, services, and guidelines for faster and easier deployment, startup and operations. Its market-leading fiber access platform (Nokia 7360 ISAM FX), end-user home devices (Nokia 7368

ISAM ONTs), and access network management system (Nokia 5520 AMS) are supported by an unmatched set of products and services:

- The highest capacity fiber platform in the market
- Gigabit Playbook guidelines, which show how to provision and operate the network, including predefined configurations and guidelines for testing and troubleshooting to rapidly get services up and running
- Bell Labs Advisory Services to help plan, design and optimize each network for minimum cost and maximum return on investment
- Multiple access options including passive optical network (PON), point-to-point Ethernet, and FWA technologies to best support specific applications and topologies
- WiFi solutions to deliver an extraordinary experiences to customers in all corners of the home or the SME



# Steps in building a broadband network

The transformative benefits of ultra-broadband are within reach for smaller or rural municipalities and underserved areas. So, where do you start?

It's a step-by-step process.

## 1 Create your vision

Create a vision for where you want to take your network, whether it's triple play only, or one that also supports smart grid and other internet of things (IoT) based services to improve city operations and quality of life.

## 2 Build your business case

Look at what resources you already have (people, fiber, etc.) and determine what you need. Talk to peers in other regions. Consider your choice of business models and funding sources, and then develop detailed numbers on the likely costs and revenue based on the experiences of other municipalities.

## 3 Conduct a feasibility and financing study

Validate your business case by engaging an independent consultant to evaluate your particular marketplace and how you can fully benefit from development and recovery funds put in place by the government. Use focus groups and local financial data to insure that your community will support the network you want to build.

## 4 Create your network architecture and design

After you have validated your business case, design your network and take it to RFP. Evaluate bids and select a trusted, experienced partner with a proven track record to execute your vision.



“Much of our original motivation to do this had to do with economic development and competition for services so that the citizens can have good, affordable options.”

David Horton, Director of Opelika Power Service

Now deploy your network with a solution that may initially include daily operations support from a partner — a model that will allow you to deliver an excellent level of service as your organization builds its broadband skill set and experience.

### **Business models: PPP, neutral host or retail?**

When crafting your business plan, decide whether to follow the public-private partnership (PPP), neutral host or full-retail model. With PPP or neutral host, respectively the city or a

separate broadband entity owns the network infrastructure, but in both cases, the network operator leases to other companies to provide end-user services over the network. In the full-retail model, the city or separate broadband entity provides broadband services to customers. There are also variations on those models, with the city or separate broadband entity providing some, but not all, services. Your best way forward will depend on your resources, regulatory environment and goals. Whichever model you choose, Nokia has the proven

expertise to help you build and execute your plan.

### **Establishing a financial blueprint**

This critical step in finalizing your business case involves identifying your funding sources. These can include municipal bonds, community loans, private investments and grants by government agencies and programs such as the Rural Digital Opportunity Fund, CARES Act or BEAD program. The more stakeholders that you get onboard with your plan — schools, hospitals

and major businesses — the more funding options and success you will have, and the easier it will be to scale your project and solve the affordability issue. Consider local and state regulations as you determine the best corporate entity for funding and operations. One size doesn't fit all, so consult with a good telecom lawyer who is familiar with the state and local laws to help create the best financial entity for your purposes.



# The Nokia advantage

Creating an ultra-broadband network that will serve the community for decades requires an experienced partner with a track record of delivering successful solutions. Nokia is powering some of the largest and most advanced fiber networks in the US and in the world, with more than 30 years of experience in providing communications for utility operations and local broadband providers.

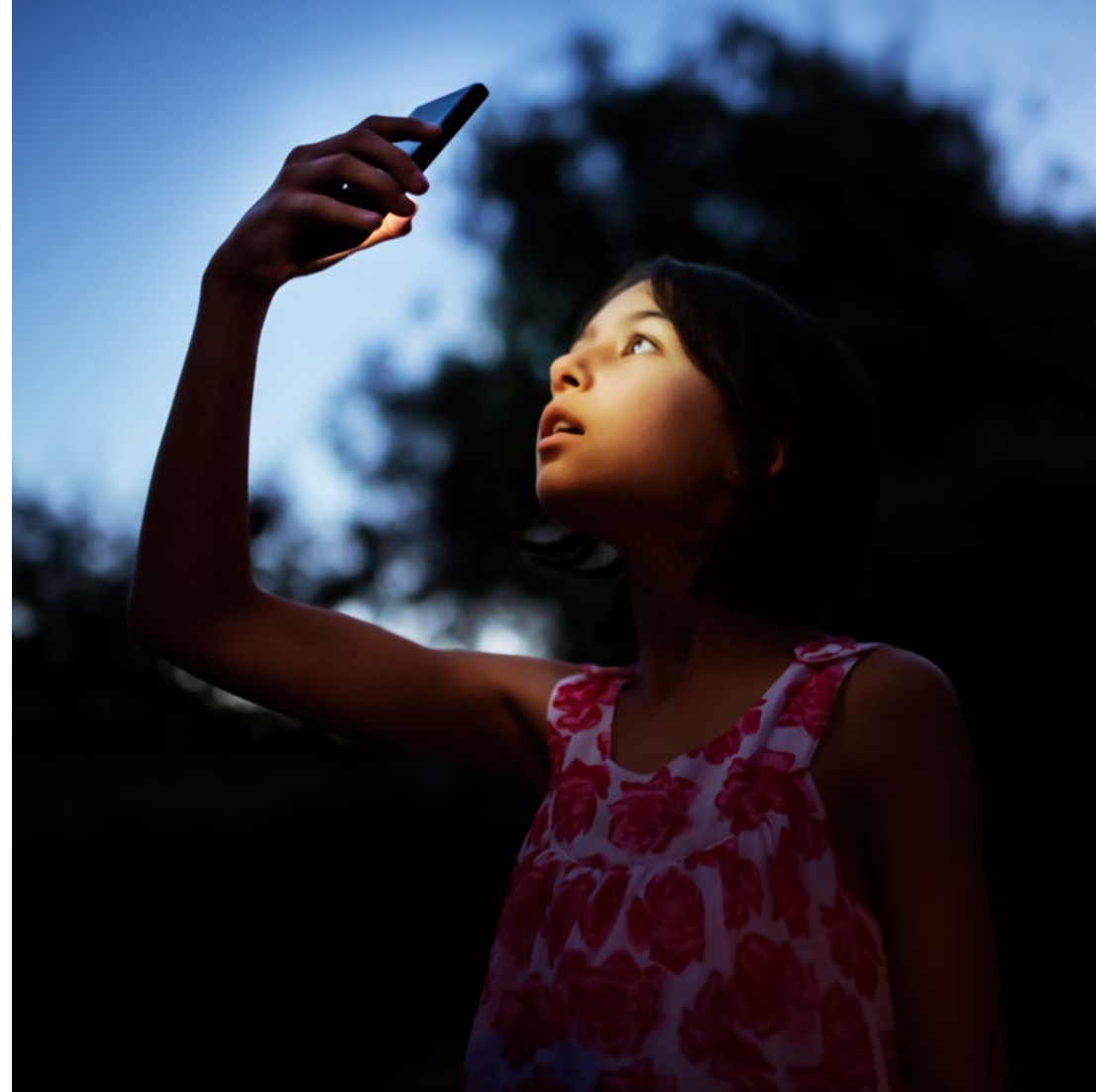
- #1 XGS vendor in US and worldwide
- #1 PON vendor in US
- #1 5G FWA vendor worldwide
- 1st with GPON, 10G PON, 25G PON
- 1st Gigabit and 10 Gigabit network in the US in Chattanooga

No other supplier can match Nokia's breadth and depth of expertise and flexibility in providing solutions for broadband services to municipalities.

## Taking action

A number of cities and counties have already successfully transformed their communities' economic and social future with ultra-broadband. With funds being made available by the government to accelerate the deployment of ultra-broadband connectivity, the time to begin is now. Talk to your peers and the vendor community. Go to webinars and seminars. Start to develop partners and work with them to create references. Consider alternative solutions — wireless, fiber optics or a combination of both. Consider the different skill sets that will be required for your transformation and look beyond the basics. Any community can reap the global socio-economic benefits of ultra-broadband, so why wait any longer?

It's time to get started.



“Networks of this sort are the highway of the future, it’s infrastructure that cities will have to have if they are going to be competitive in the coming decades.”

Ron Littlefield, Mayor of Chattanooga, Tennessee

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# NOKIA

At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering the future where networks meet cloud to realize the full potential of digital in every industry.

Through networks that sense, think and act, we work with our customers and partners to create the digital services and applications of the future.

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