Smarter, Safer Cities Need Fiber

The internet of things promises to streamline municipal functions. Key to the success of any smart-city initiative is a robust fiber backbone.

By Diane Bloemker / *Arch Fiber Networks*

Cities are growing. By 2050, more than 67 percent of the world's population will live in cities, according to the United Nations. That's an increase of more than 50 percent over today's numbers. Although cities can expect a host of benefits from this population increase – more talented professionals, more businesses, more tax revenue – they'll also see major strains on their infrastructures and resources.

Smart solutions for waste management, safety, public transportation and more are needed to keep up with population growth and streamline municipal operations. Technology, specifically the deployment of internet of things (IoT) devices across metropolitan areas, may be the answer city officials have been searching for to keep up with this fast-approaching growth. But the success of smart cities will depend on the successful deployment of 5G networks and the availability of strong fiber backbones to support the significant bandwidth required to run hundreds of smart sensors and devices.

Barcelona, which started laying a fiber backbone decades ago, now uses in-ground sensors to prevent overwatering in city parks.

HEIGHTENING SAFETY, STREAMLINING OPERATIONS

IoT is a relatively simple concept with far-reaching implications for enterprises and cities alike. At a basic level, IoT refers to a network of interconnected devices and sensors that collect data and communicate with one another. With minimal human supervision, this data can be analyzed, monitored and acted upon in real time.

The term "smart cities" was coined to describe pioneer cities that have started to leverage the power of these devices to tackle operational, safety and quality-of-life challenges – empowering them to accomplish more with less human power. Though the concept of smart cities is still in its infancy, there are already some standout examples of how IoT is transforming the way cities approach and solve decades-old challenges:

- **Preventing water shortages**
  Among other smart initiatives, Barcelona has made use of in-ground sensors to monitor park irrigation, preventing overwatering and even water shortages. Though its transition to being a smart city is relatively recent, the foundation of its robust fiber network was laid decades ago when two municipal buildings were connected with fiber. Today, Barcelona boasts more than 300 miles of fiber throughout the city – which it will leverage as it transforms into a smart city.
- **Increasing the safety of high-risk areas**
  Oklahoma City has just installed a system of more than 300 cameras throughout the city,

continuously capturing footage. This enables police and firefighters to monitor hundreds of locations throughout the city from anywhere in real time.

This smart safety initiative goes a step beyond the use of latent sensors to monitor crime and promote safety. The police department's vehicle fleet is equipped with laptops that have access to the network, meaning that any police officer, anywhere, has the same access to data and documents he or she would have in the office.

- **Monitoring and maintaining key infrastructure**
Hong Kong's ideas for transforming into a smart city are still in the blueprint stage, but its vision is lofty: "Embrace information and technology to build a world-famed Smart Hong Kong characterized by a strong economy and high quality of living."

To do this, the city will roll out smart solutions to everyday problems that affect the well-being of its citizens with a view toward revitalizing its economy, reducing its resource consumption and better maintaining its infrastructure.

One such solution Hong Kong is looking into is whether drones or sensors can monitor its aging infrastructure continuously and signal when maintenance needs to be done. Yet another involves using remote sensors to monitor air pollution and waste bins for a cleaner, greener city.

Cities have long dealt with the problems of preserving key resources, maintaining infrastructure and promoting the safety of their citizens. Smart devices automate and streamline the process of solving these problems, offering infinite opportunities to lower operational costs and stay competitive.

5G AND FIBER
A mere five years from now, nearly 30 billion sensors will be deployed across the globe with the goal of automating and managing essential city functions,

> Hong Kong is investigating using drones or sensors to monitor the city's aging infrastructure for needed repairs and monitoring air pollution and waste bins to make the city cleaner and greener.

according to the International Data Corporation. To support this astronomical growth in bandwidth needs, smart cities of the future will depend on the deployment of 5G mobile connectivity and strong fiber backbones.

5G is the long-awaited, next-generation model of mobile networks, promising blistering speeds, near-zero latency and as much as 1,000 times the bandwidth of current mobile connectivity. It will make possible a future of smarter, safer cities.

At least in cities, 5G will use high-frequency waves in the millimeter spectrum. Millimeter-spectrum waves are capable of carrying much more information than the spectrum used for 4G wireless, but they do not travel as far. To overcome this hurdle, telecom companies will transition from large cell towers to small cell sites – which may be deployed at streetlights – each covering a range of about 250 meters.

Though 5G small cells will drastically increase the speeds and quality of experience of mobile connectivity, they will be responsible for carrying data only those last 250 meters – data will make most of its journey along the wireline network. In fact, 90 percent of all internet traffic will still travel along the wireline network, even in a 5G mobile network. To realize the theoretical speeds of 5G mobile networks, cities must continue to invest in deploying strong fiber backbones.

Although copper can be used – and worked well for 2G and 3G speeds – legacy copper-based mobile backhauls are already stressed at 4G speeds and are simply insufficient for 5G. Fiber

beats copper in almost every attribute important to networking: speed, reliability, security and scalability. Fiber can carry 10-gigabit signals more than 12 miles before speed drops off, and copper can carry 1 Gbps signals only 300 feet. Fiber is also much more secure and has nearly 6,000 times the bandwidth capabilities of copper.

The speeds fiber backbones provide are limited only by the equipment transceiving data, meaning fiber infrastructure has virtually limitless scalability as technology continues to improve. That's why cities across the world continue to invest capital in fiber. More than $144 billion will be spent through 2019 on fiber-related expenses, according to a report from the International Telecommunication Union.

Cities such as London, Barcelona and even Louisville have already begun experimenting with the potential of IoT devices to improve the efficiency of internal processes and enhance the quality of life for their citizens, using fiber to ensure the strongest, most reliable connections. Those that lay a strong fiber foundation today will be the cities that reap the greatest benefits from the transition to 5G and a smarter, safer future. ❖

Diane Bloemker is a sales representative for Arch Fiber Networks, a fiber optic development company. Arch Fiber Networks specializes in the design, permitting, construction and deployment of multiduct conduit systems in the Greater St. Louis metropolitan area. Learn more at www.archfibernetworks.com.