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Smart Communities: Building a Connected Future

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In 2019, the IMD World Competitiveness Center in Singapore created the first index of Smart Cities across the globe.¹ The organization documented and ranked 102 cities worldwide, almost all of the bustling metropolises, such as New York, London, Rome, and Tokyo. From a very high level, Smart Cities are designed to leverage technology resources to improve the quality of life, enhance efficiencies, and drive economic development within urban or metropolitan areas, from health and safety to transportation and environmental management.

Moreover, the key underpinnings of Smart City technology are driven by the ongoing accurate collection of data from a variety of sources, such as electronic sensors, mobile phones, and IoT devices that are woven ubiquitously throughout our everyday lives. Data is collected, processed, and analyzed to monitor and manage our public transportation systems, utilities, and safety, among other community services.

According to reports from the International Data Corporation (IDC), worldwide Smart City spending is expected to grow from \$80 billion in 2016 to \$158 billion in 2022,² as cities transform to improve environmental, financial, and social aspects of urban life.

Smart Towns in Rural America

What's true in large cities is also true in many rural areas that make up more than 95% percent of land area in the United States. But as dense populations spread out and become less centralized, unique challenges arise; localized use cases can dramatically shift the balance of specific requirements relative to urban and rural settings that require special consideration.

To address these differences and to focus attention on the infrastructure development that's needed to bring smart technology to rural America, NTCA - the Rural Broadband Association has recognized and defined a company that serves a Smart Rural Community as one that can:

- Provide broadband to at least 50% of its service area – meeting or exceeding the FCC broadband speed definition of 25 Mbps down/3 Mbps up.
- Demonstrate that 50% of its customers subscribe to and use the broadband service.
- Exhibit a stated commitment to collaborate actively with other local leaders, including school districts, health care providers, public safety officials, and businesses who work together to incorporate broadband-enabled applications into those facets of rural life.

More than 80 rural broadband providers within the NTCA membership currently qualify under these standards. However, there is still room for significant growth—growth that will be essential in the coming years to ensure that rural areas aren't left behind as connections and technology demands continue to accelerate.

The Four Pillars of Technology in a Smart Rural Community

There are multitudes of ways in which smart technology currently affects daily life globally; rural America is not exempt from most of them. However, there are four use cases where Smart Rural Communities may experience unique benefits or require special attention compared to the big cities.

Smart Agriculture. The importance of agriculture to rural communities cannot be overstated — and smart technology enriches the agriculture industry with its ability to provide insight and actionable data quickly and efficiently. Consider soil moisture monitoring that can help maximize crop yields and reduce loss with sprinkler system optimization, which also helps to conserve water or air quality monitoring to comply with emissions regulations of harmful ammonia or nitrogen oxide gases. In contrast, large asset and tank management monitoring can help keep track of equipment and control inventory levels reducing risk and waste.



Telehealth. Using smart technology's data collection capabilities to support long-distance clinical health care reduces the need to travel to doctors' offices from distant rural locations. By reducing travel, critical information can be gathered efficiently and safely, lower risk of exposure to contagious diseases, and provide significant cost savings for both patients and medical professionals.

Remote Learning. As recent experiences have shown, broadband to the home is a critical necessity when it comes to in-home learning. Smart technology relies on that same broadband infrastructure to help manage many aspects of the remote learning experience, whether it's the use of remote attendance systems or database access and test monitoring. Smart technology is instrumental to ensuring the education system is not only efficient but an effective learning tool.



Citizen Services. Reliable and accessible data that can be quickly acted upon represents enormous time and cost savings for our local governments. There's almost no aspect of city management and maintenance that's not improved and made more efficient by the proper use of smart technology — and this is every bit as true for small rural towns as it is for large cities. Smart surveillance systems may deter unwanted behavior but, more importantly, alert personnel at the first sign of suspicious activity, from illegal dumping to fights on the city playground, to locating vehicles of interest through license plate recognition software. Utility services also offer numerous opportunities; waste management can employ smart trash cans to reduce service costs; thermal monitoring on electrical power plants can alert overheated transformers, and remote vegetation management can help electric service providers clear lines in response to fallen tree limbs before costly failures occur.

Individual citizens may not immediately recognize the values until applications that engage with them come to fruition. A low-cost example would be customized beacons at areas of interest that push information to citizen's devices when placed in strategic locations such as historical landmarks, public venues, or frequented spots in town.

The Promises and Benefits of Smart Technology

Many of the efficiencies associated with Smart Cities and Smart Rural Communities have already been touched upon — and they are manifold. The ability to control and manage assets, plan effectively and react swiftly, reducing wasted time, effort, and resources all bring enormous cost savings.

Furthermore, the quality of life improves greatly for the average person in a smart community. Whether it's a more timely and efficient transit system or the promise of improved public safety, the effects are pronounced. In 2018, after studying dozens of Smart City applications and measuring their effectiveness across 50 cities, the McKinsey Global Institute determined the quality of life can be improved by as much as 10-30% by introducing such initiatives.³

Smart initiatives also drive economic development by positioning smart communities as desirable places to live and conduct business. For example, the Logan County Economic Development Corporation (LCEDC) in Colorado developed a high-speed internet infrastructure to create opportunities for workers in rural and disadvantaged areas with the view that remote jobs could provide local work opportunities. It was a strategy that paid off, with an influx of new teleworking opportunities for local residents and the attraction of more than 25 new businesses into the area, including restaurants, boutiques, an arts co-op, and a microbrewery.

The Technical Foundations of Smart Rural Communities

Underneath it all, solid foundations are required to make the collection and transmission of information possible: 1) sensors and mobile devices for collecting and measuring the data, 2) a robust mobile wireless network, which is increasingly migrating to 5G; and 3) an underlying fiber network which enables both of the above while also providing broadband connectivity to every area in the community.

Broadband fiber network: It has become generally acknowledged that broadband fiber must be woven into the rural landscape's fabric to ensure the continued viability of these populations to thrive in an ever-increasing technological environment. This challenge will require enormous investments. A 2017 Deloitte study suggested that a \$130-150 billion overall investment would be required. Another study from CostQuest in 2018 claimed \$61 billion would be needed to build out exclusively unserved rural areas of the U.S.

Fortunately, several grants and resource funding opportunities have recently become available to make an aggressive push in the right direction.

Robust wireless connectivity, including 5G: 5G and Wi-Fi 6 are completely different technologies, but they both promise support for more connected devices and better wireless connection speeds—factors that are critical to the rise of smart communities.

IoT devices and sensors: The Internet of things currently consists of more than 30 billion connected devices, with more being added daily—in cities, farms, and homes. Data collection is constant and ongoing in every facet of everyday life.

Marching Forward

The development of Smart Rural Communities and smart technology will have an enormous impact on the future of rural life — from significant efficiencies related to the management of local towns and farms, to critically improved health services, remote learning, and remote job opportunities. New York, London, and Rome may get international attention as they step up their game, but on the local, rural, and individual levels, the advances will be felt just as deeply, and the outcomes will be just as profound.

¹SMART CITY INDEX, https://www.imd.org/globalassets/wcc/docs/smart_city/smart_city_index_digital.pdf

²Brooks, Alison, et al, IDC FUTURESCAPE: WORLDWIDE SMART CITIES AND COMMUNITIES 2019 PREDICTIONS, <https://www.idc.com/research/viewtoc.jsp?containerId=US44970019>

³Research: Smart Cities: Digital Solutions for a More Livable Future, <https://www.mckinsey.com/business-functions/operations/our-insights/smart-cities-digital-solutions-for-a-more-livable-future>

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