cradlepoint
Global Leader in 4G LTE Network Solutions

Developing Smart Cities & Communities

Public Sector Efficiencies Utilizing 4G LTE Networking

WHAT YOU'LL GET:

- An overview of how 4G LTE network solutions are used for Smart Cities & communities
- Learn challenges & solutions facing budget-aware agencies
- 3 customer success stories
- How to create greater efficiencies in the public sector

OVERVIEW

With year-to-year funding constantly scrutinized and up for debate, cities and other public sector organizations are benefiting from increased efficiencies created by wireless networking and Internet of Things (IoT) applications.

"Smart City" is the term most commonly tied to the communities and regions that are using sensors, M2M technology, wireless connectivity, and data to heighten efficiencies, save taxpayer money, protect the environment, and better serve individuals and families. These communities are capitalizing on the ways in which innovation and collaboration can improve quality of life and economic well-being.

The ever-increasing prevalence of the Internet of Things in community operations is taking many Smart City ideas from dream to reality. Everyone wants his or her city to be a Smart City—but it's only possible when organizations embrace technology and find the right-fit solution for their applications.

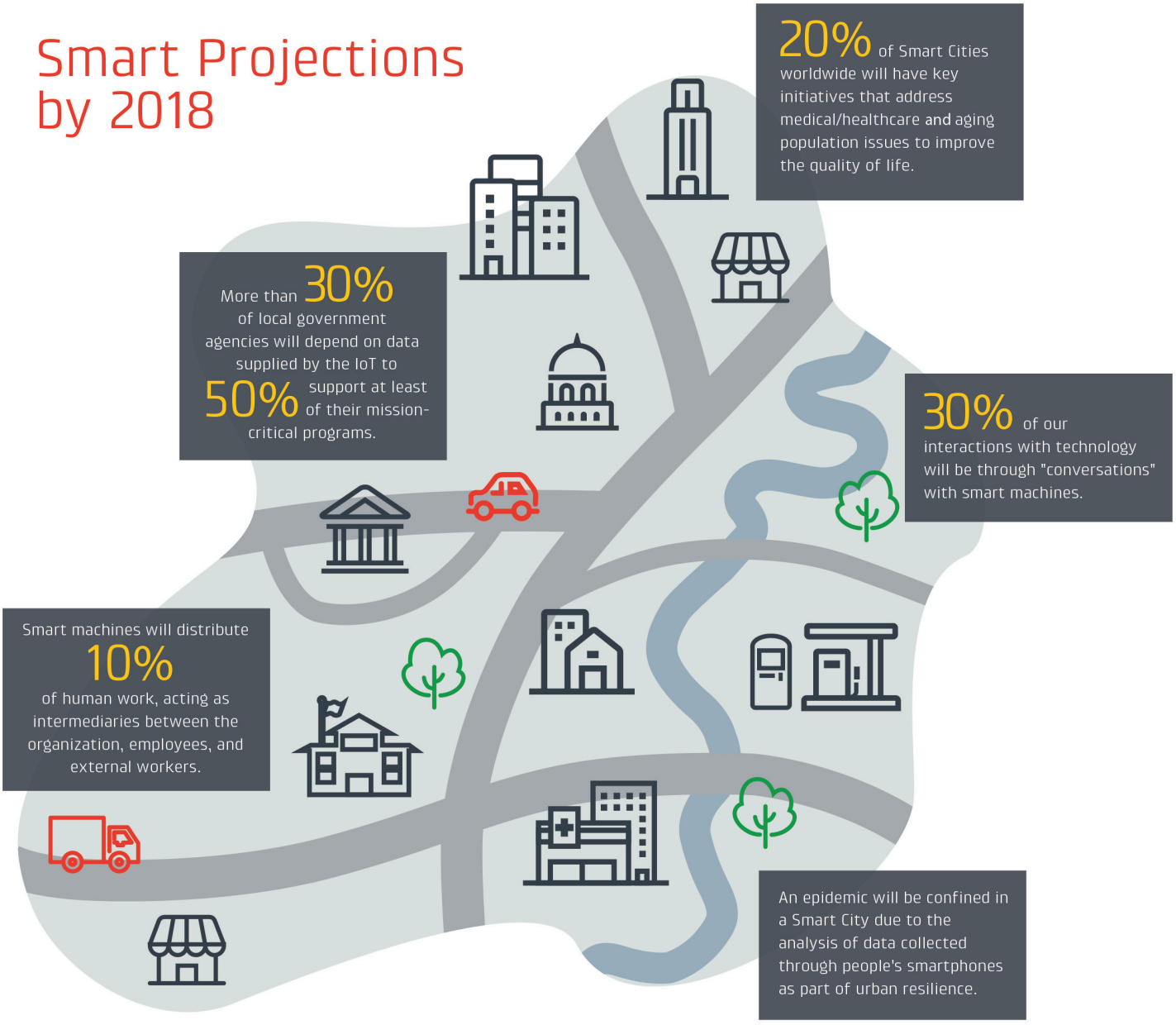
This white paper explores the current and potential benefits of wireless network technologies and the IoT to expand efficiencies and open up new possibilities for public sector organizations such as cities, counties, states, and federal government. It also takes a look at the network challenges facing these agencies, and offers solutions and best practices to mitigate these challenges.

CONNECTED THINGS INSTALLED BASE WITHIN SMART CITIES (IN MILLIONS)[1]

Smart City Subcategory	*2015*	*2016*	*2017*
Healthcare	9.7	15.0	23.4
Public Services	97.8	126.4	159.5
Smart Commercial Buildings	206.2	354.6	648.1
Smart Homes	294.2	586.1	1,067.0
Transport	237.2	298.9	371.0
Utilities	252.0	304.9	371.1
Others	10.2	18.4	33.9
Total	**1,107.3**	**1,704.2**	**2,674.0**

SMART TECHNOLOGY'S PREDICTED ASCENSION

The appetite for intuitive, predictive technology is rising, and forward-thinking executives and IT professionals don't want to be left behind. These industry predictions from Gartner analysts speak to the importance of Smart Cities in years to come.



DEFINING SMART CITIES — AND BEYOND

Smart City applications vary widely, but the need is universal. From midsized towns to entire states, cities, and regions, governmental organizations must adapt to the changing culture and technology surrounding them.

For the betterment of communities throughout the world, more and more public sector IT teams are embracing opportunities to implement technologies that drive down costs, ramp up efficiency, and improve quality of life and customer service levels. From inter-agency collaboration to public/private partnerships, seemingly giant hurdles are being leapt with single, network-connected bounds.

Gartner defines a Smart City as, "an urbanized area where multiple sectors cooperate to achieve sustainable outcomes through the analysis of contextual real-time information shared among sector-specific information and operational technology (OT) systems." [2]

However, the seemingly unlimited potential to bolster efficiencies, better utilize and provide open data, and minimize financial burden has public sector leaders looking far beyond cities.

CHALLENGES IN THE PUBLIC SECTOR

Executives and IT professionals at taxpayer-supported agencies are recognizing technology's ability to address the challenges that routinely hinder their work.

COMMUNITY EXPECTATIONS

From Baby Boomers and their expectations of high-functioning civil services to Millennials and their reliance on intuitive technology and quick results, people hold local governments to a higher standard. They demand opportunities to interact with and benefit from data.

These challenges are difficult, but not insurmountable. Smart City applications are bringing together communities with a vested interested in alleviating the pain points that traditionally have plagued progress.

BUDGET LIMITATIONS

Given the constant pressure to get the most out of each taxpayer-provided dollar, perhaps no industry in the world is more poised to benefit from Smart City technologies than the public sector.

IT managers in the public arena are tasked with future-proofing their agencies and amplifying efficiency while balancing unpredictable, closely monitored budgets. Within this framework, systems that yield cost savings are a top priority.

EMPLOYEE IMPACT

The need for sufficient staffing is an integral part of any agency's ongoing budget battle. With public sector teams already stretched thin, most leaders look for ways to maximize employees' impact, use data to drive decisions, and provide innovative support systems wherever and whenever possible.

SMART APPLICATIONS ADDRESS MANY COMMUNITY-LEVEL NEEDS

Communities throughout the world are tasked with finding new ways to leverage technologies and connectivity for long-term infrastructure improvements, cost efficiencies, better communications, and expanded public services. From remotely managed city water valves to reliable connectivity for public servants in the aftermath of natural disasters, a vast array of smart applications are improving the world in which we live, work, and play.

$39.5 BILLION

WILL BE SPENT ON SMART CITY TECHNOLOGIES IN 2016.[3]

WATER APPLICATIONS

The ability to monitor and manipulate water levels and related systems remotely with wireless connectivity saves organizations substantial staff time and expedites emergency response.

- Water managers who use SCADA systems to collect and analyze water usage at various access points are better able to predict usage patterns and challenges on the horizon.
- Sensors equip water management teams to measure key variables such as salinity, pH and chlorine levels—and send alerts to field workers through their mobile devices. Because of this, public safety issues can be resolved with greater speed.
- Remotely controlling water valves is a proactive approach to pressure management and leak prevention.
- Using sensors and connectivity, smart systems automatically respond when sprinklers in public areas need to be shut off or activated.

SUCCESS STORY
BOISE POLICE DEPARTMENT

Like many public sector organizations, the City of Boise, Idaho, is continually seeking ways to do more with less. Recently the City's IT department needed to upgrade the Boise Police Department's network technology inside its cruiser fleet, which was outdated, expensive, and difficult to maintain.

Eugene Smith, Deputy Chief of Operations, wanted to enable officers to spend more time patrolling, adapt to evolving technology, and reduce the amount of IT resources needed to maintain the network—all in the face of an unmoving budget.

The City deployed ruggedized Cradlepoint wireless routing devices and Enterprise Cloud Manager to ensure a stable, flexible, and easily maintained network. These solutions also reduce taxpayer-supported capital costs and operating expenses.

Before using Cradlepoint, it would take the City as many as 160 man-hours to complete network updates for the whole police cruiser fleet. With Cradlepoint's solution, it takes about 5 minutes.

ENERGY & UTILITIES

Energy exploration and production is an ongoing challenge for our world, so interest in innovative technologies that conserve resources is at an all-time high. Wireless connectivity is enhancing the way the energy industry and utilities meet ever-rising output needs, while also protecting the environment.

- Energy conservation receives a boost from smart energy grids, which help utility companies give each user only the amount of energy or water they truly need.
- Interactive meters monitor set variable rates and reward energy-efficient customers based on usage.
- Sensors identify leaks and other breakdowns right away, instead of days or even weeks after the fact, saving thousands of dollars.
- Energy providers use data to predict supply-and-demand shifts and prepare for challenges before they arise.
- Connectivity for fleet vehicles improves safety and creates efficiencies for scheduling staff in the field for repairs and customer services.

PUBLIC SAFETY

Highly publicized threats to citizen safety drive deep public interest in how law enforcement professionals are using available technologies to protect communities. In response, agencies are finding new ways to utilize wireless technology to maximize productivity and minimize time spent on administrative duties that take officers away from the field.

- Mobile reporting shifts a department away from paper-based systems and toward nearly real-time data access that drives improved agility and faster incident response times.
- Body cameras, which send footage to the main office directly from the field, improve agent safety and deter irresponsible behavior between civilians and officers. This application provides transparency to enhance the chain of command and public knowledge of officer actions. Body cameras also protect officers in the communities they serve.

- Completing paperwork and reports from the field free up more time to keep public safety officers in the communities they serve, cultivating safety and better relationships with the community.
- Dispatchers remotely examine incident scenes, using that information to determine a prudent number of officers to deploy for backup.
- Constant network connectivity speeds up traffic stops and other network-dependent work.
- With zero-touch deployment via a cloud management system, law enforcement IT managers drastically reduce staff time devoted to troubleshooting and in-vehicle firmware upgrades.
- Turning public safety vehicles into mobile hot-spots enables officers to issue tickets, allow tickets to be e-signed by violators, and can even be used across organizations in response to natural disasters, accidents, and incidents.
- License plate recognition from monitors at freeway intersections notifies authorities of stolen vehicles, AMBER alerts, and illicit activity.
- Mobile fingerprint scanners significantly expedite the investigation process in the field.
- Police officers improve crowd control at large city events with real-time video monitoring via tablets and mobile phones.

"WITH A CRADLEPOINT ROUTER SECURED IN EACH TRUNK, OFFICERS KNOW THAT WHEN THEY GET INTO THEIR CRUISER, THEY WILL BE CONNECTED — END OF STORY."

–Sharon Jensen, Manager of Planning and Analysis, Boise Police Department's IT Department

EMERGENCY SERVICES

With lives at stake every day, connectivity disruptions are not an option for emergency workers. For these professionals who are constantly on the move, always-on wireless connectivity is the only way to ensure reliable communications and other vital services when they matter most.

- Search and rescue crews save more lives with 4G LTE wireless Internet for a variety of mission-critical communication functions in the field, including administration during time-sensitive rescue operations.
- Information is relayed directly from sensors and instruments to the outside world during disasters and other emergency situations.
- During emergencies, cellular broadband expands agencies' operating frequencies and consolidates multiple agencies' frequencies on one device.

"OUR LAST SOLUTION WAS MORE FOR CONSUMERS. CRADLEPOINT GIVES US AN ENTERPRISE-GRADE, PUBLIC SAFETY-GRADE SOLUTION THAT WE THINK DELIVERS THE BEST FUNCTIONALITY TO OUR POLICE OFFICERS AND THE BEST RETURN ON INVESTMENT FOR TAXPAYERS."

–Pat Roam, Public Safety Systems Administrator, Medford Police Department

FIRE

Many firefighter-specific wireless applications are heightening the ability of fire personnel at headquarters and in the field to communicate life-saving information to each other—often automatically and in real time.

- For firefighters on the way to a blaze, immediate wireless access to building schematics, HazMat data, and traffic information shaves off critical response time and gives them imperative information while traveling to the scene.
- Smart apparel details each firefighter's location, body position, heart and respiratory rates, and body temperature.
- Drones and remote control devices potentially will have indoor capabilities, which could help departments gather critical environmental information after a fire has started but before firefighters enter the premises.[4]

ON-SITE PROTECTION

Remote management of video surveillance technologies can protect staff members and save thousands of dollars by deterring or quickly reacting to theft and other illegal activity.

- Advanced remote surveillance captures and analyzes video footage to pinpoint and prevent problems such as theft, illegal dumping, and suspicious activity. In some cases, this simple solution saves agencies hundreds of thousands of dollars.
- The number of on-site guards at public housing units, office buildings, and remote locations is reduced with "remote guarding" via real-time video surveillance.

BUILDINGS

With the ability to reduce staff hours and drastically streamline energy usage, automated, responsive controls are a valuable aspect of building management.

- Sensors warn managers of structural problems in buildings, bridges, and dams to help prevent dangerous emergencies.
- Real-time updates regarding power, heating, and cooling usage allow organizations to regulate their indoor climate as needed.
- Smart building automation greatly reduces water, energy, and wastewater usage.
- Maintenance of public sector facilities is easier with on-site sensors that provide immediate information about machine and parts failure.
- Eventually, smart buildings likely will receive pollution and weather updates that lead to automatic ventilation and window setting adjustments.[5]

IN NEW YORK CITY, TRAFFIC CONGESTION HAS BEEN RESPONSIBLE FOR ROUGHLY $13 BILLION PER YEAR IN LOST BUSINESS REVENUE.[6]

TRAFFIC OPERATIONS

Instead of expensive road construction projects, many communities are reducing traffic congestion with innovative technologies, sensors, and wireless connectivity. Americans spend about 4.2 billion hours struck in traffic each year.[7]

- Entities that place sensors in streets and traffic signals use data to guide traffic patterns to benefit local commuters.
- Cities, counties, and states minimize traffic jams and accidents by updating commuters through mobile devices and digital signs.
- Video technology works with traffic signals to lengthen the duration of a pedestrian crossing period if a large group of people is detected or even cancel the crossing period if a person attempts to begin walking too early.
- Connected cameras via traffic lights can bolster traffic safety, catch traffic offenders, and aid law enforcement investigations.

BY 2020, STREETLAMPS WILL BE THE PRIMARY INFRASTRUCTURE FOR 80% OF SMART CITIES.[9]

INEFFICIENT PARKING REPRESENTS UP TO 30% OF ALL URBAN CITY TRAFFIC.[10]

STREETS & STREETLIGHTS

The potential to leverage streets and streetlights for a variety of purposes is virtually limitless. Communities already are using existing infrastructure to conserve energy and improve public safety.

- Flexible street lighting puts control of switches and dimming devices in the hands of individual cities—enabling efficient, timely management.
- A combination of video cameras and sensors gives cities the ability to track, in real time, which streets have been plowed during inclement winter weather.
- In the near future, connected roadways constructed of heavy-duty solar panels may be able to not only capture and store energy, but also charge vehicles as they drive by.[8]

PARKING

Connected parking systems help alleviate traffic and makes parking a much easier experience for local residents, which improves livability on multiple levels.

- Residents check the real-time availability of parking spaces wherever they're headed and even book a spot before leaving the house. This reduces CO2 emissions by dropping the average time spent searching for a space and benefits citizens in congested metro areas.
- Cities use 4G LTE wireless solutions to ensure always-on network connectivity for parking payment machines.
- Drivers pay for street and lot parking with their mobile phones, preventing interruption of lunch or a business meeting to "feed the meter."

ENVIRONMENT MANAGEMENT

Environmental data enables agencies to make informed decisions that help protect and preserve the areas where community members live, work, and play.

- Managers remotely access, monitor, and manipulate control systems at multiple locations from one central office.
- Interconnected sensors facilitate accurate, real-time readings of pollution levels, wildlife counts, and water levels.
- When sewer systems approach over-flow, local residents are sent SMS recommendations to temporarily reduce flushing.
- Costly environmental concerns, such as insect and fungi infestations that threaten vegetation, are tracked remotely via online map systems, which quicken and streamline government response.

TRASH & RECYCLING

Wireless technologies are streamlining the collection, sorting, and disposal of trash—benefitting both the environment and municipal bottom lines.

- WiFi-enabled, solar-paneled trash bins notify waste management teams when they need to be emptied, which streamlines manhours and reduces the amount of money spent on fuel and vehicle repairs.
- Garbage and recyclables are identified then sorted via wireless devices—without individuals ever touching the items.

FLEET MANAGEMENT

Governmental agencies are utilizing 4G LTE connectivity and remote cloud management to as much productivity and longevity as possible out of taxpayer-funded vehicle fleets.

- Public sector managers make cost-effective, environment-friendly decisions about their fleets based on alerts about vehicle locations, engine diagnostics, idle time, fuel levels, and more.
- Remote speedometer access and real-time vehicle reports discourage speeding and reckless driving.
- Vehicles can be tracked via geofencing and GPS applications, keeping employees and fleets safer.

SUCCESS STORY
VIA METROPOLITAN TRANSIT

VIA Metropolitan Transit serves the Greater San Antonio region seven days a week on 90 routes, providing approximately 134,000 passenger trips each day. Previously, 3G wireless services had been provided on VIA's express and bus rapid transit routes.

VIA needed a cost-effective option for providing more reliable WiFi service to its passengers. VIA also sought the ability to update units remotely.

Using Cradlepoint's ruggedized COR IBR1100 solutions and Enterprise Cloud Manager, VIA upgraded to 4G LTE WiFi service in every bus, van, and passenger facilities. Cradlepoint's solution provided VIA with the ability to quickly and easily manage and configure the network all at once. Instead of taking several months of turnover time for installation, VIA was able to install 769 platforms in about 30 days.

"After the installations, Cradlepoint provided the resources needed to merely flip a switch and offer free 4G LTE-based WiFi to all of our riders instantly."

—Larry Mixon, Acting Vice President of Information Technology for VIA

PUBLIC TRANSIT

With public transit at the forefront of regional planning throughout the world, mobile connectivity is essential for everything from Point-of-Sale (POS) and WiFi, to fleet management.

- Along with providing guest WiFi access for commuters, managers of metro bus and train fleets remotely monitor POS machines and update firmware, and use off-board mobile equipment to collect fares.[11]
- To ensure on-time service, public buses send signals to traffic lights to keep green lights on longer or to transition red lights back to green faster.
- WiFi-enabled digital kiosks at public transit stations inform riders about nearby cultural, dining, and entertainment destinations.
- Digital signage aboard public transportation or in central hubs alerts passengers with up-to-date arrival and departure schedules.
- GPS applications update central scheduling with alerts when a bus is late or delayed.

PARKS, RECREATION & TOURISM

Publicly funded parks and recreation areas are offering a broader, more personalized customer experience for visitors.

- Parks, recreation, and tourism agencies are using constant 4G LTE uptime to monitor the usage of interactive kiosks and digital touch screens throughout parks and public places that enhance user experience and services.
- Apps designed for children help families maximize the benefits of recreation areas and opportunities, as well as special events.
- Digital signage in welcome centers and parks alerts travelers about traffic delays, construction, and events.

REGIONAL PLANNING & MANAGEMENT

The ability to integrate information both inside and outside the office allows regional planners to make better decisions affecting their constituents.

- Emerging tools can analyze social media attitudes and opinions within a constituency, which drives deeper understanding by leaders. Subsequent decisions affecting the public can be informed by this rich citizen data.
- Web-based, interactive geological and geographical data maps guide responsible decision-making by land managers, developers, and regional planners.
- Mobile connectivity enables regional teams to be in constant contact when working in the field.

HEALTH & SAFETY

With cellular-based connectivity, people and healthcare professionals are able to track health conditions and variables wherever they go and at any time of day, which saves lives when health complications arise quickly and unexpectedly.

- Vast reserves of data about public health and safety in each city, county, and state are shared with the community via online and social media channels to foster more informed personal health decisions.
- With mobile connectivity, health professionals such as EMTs respond more quickly, and with more critical information in hand, during emergencies.
- Healthcare wearables, in the form of diapers, watches, and jewelry, enable real-time tracking of key factors such as heart rate, sleep patterns, calories burnt and consumed, body temperature, and more. These devices sync with users' smartphones and tablets for constant data accessibility.[12]

SUCCESS STORY
SOUTH CAROLINA PARKS, RECREATION & TOURISM

Late in 2013, The South Carolina Department of Parks, Recreation & Tourism (SCPRT) was tasked with a unique challenge: generate enough income to cover all of South Carolina state parks' operating expenses. SCPRT needed to attract enough visitors to state parks to cover its operating budget. Central to its plan was updating its technology to meet today's visitor demands for quick and efficient services.

SCPRT chose to utilize Cradlepoint routers and Enterprise Cloud Manager to implement interactive kiosks and digital touch screens, introduce digital signage inside and outside its welcome centers, and expand WiFi access in parks across the state.

Central management of the network and easy deployment at new sites allows staff to provide WiFi and other services that modern-day visitors are looking for.

"Before using Cradlepoint, it was hard for us to provide WiFi where visitors wanted it. With Cradlepoint as the backhaul and using access points, we can provide WiFi anywhere we have power and signal to a cell tower."

— Marion Weaver, Network Engineer for SCPRT

SOLUTIONS FOR SMARTER COMMUNITIES

There are a multitude of connectivity options for Smart City applications. Choosing the correct solution to increase efficiencies, streamline work process, and enable central management will be key to keeping up with these innovations. Cradlepoint's software-defined, cloud-managed 4G LTE solutions serve as foundational building blocks for connectivity to support smart applications.

Real-Time Intelligence at the Network's Edge

Cradlepoint Enterprise Cloud Manager™ (ECM) delivers network intelligence securely via the cloud to help distributed enterprises speed deployments, increase reliability, and reduce the costs of managing networks at the Edge.

Learn more: cradlepoint.com/ecm

Routing & Failover for Application Specific Networks

ARC ROUTER FEATURES

- Remote cloud management, configuration & monitoring
- Out-of-Band Management
- Integrated 3G/4G/LTE
- Integrated multi-carrier software-defined radio
- Power-over-Ethernet (ARC CBA850)

Learn more: cradlepoint.com/arc

Rugged, Reliable Routing for M2M & In-Vehicle Networks

COR ROUTER FEATURES

- Remote cloud management, configuration & monitoring
- Integrated 3G/4G/LTE
- Integrated multi-carrier software-defined radio
- Dual-band, dual-concurrent WiFi (802.11ac) (COR IBR1100)
- Optional Dual-Modem Dock available

Learn more: cradlepoint.com/cor

Advanced Edge Routing for Branch Networks

AER ROUTER FEATURES

- Remote cloud management, configuration & monitoring
- Dual-band, dual-concurrent WiFi (802.11ac)
- Advanced security (Unified Threat Management)
- Power-over-Ethernet (AER3100)

Learn more: cradlepoint.com/aer

TO LEARN MORE, VISIT **CRADLEPOINT.COM** OR CALL +1.855.813.3385.

Sources

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