Smart city, smart culture

How one city enabled long-term innovation
with scalable technology solutions

For nine days in October, the Albuquerque International Balloon Fiesta fills the skies above the city with a vibrant mix of shapes and colors that reflect the creativity of the city itself.

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Goal

Like many cities, Albuquerque has limited resources for smart city initiatives. Key goals have been reducing startup costs, including those associated with mass LTE connectivity, and simplifying management.

Challenge

Create a smart city backbone that grows with the community, maximizing secure data gathering at the edge, while minimizing LTE and infrastructure costs.

560,218
Population

189.5 mi²
Area

A case example

A community in search of long-term innovation

Residents of Albuquerque, New Mexico, have innovation down to a science. Literally.

From the world's first "clean room" to near-daily breakthroughs at Sandia and Los Alamos National Laboratories, Albuquerque is home to a culture of experimentation. But it's also a community known for a vibrant creativity, such as what fills the air each October at the city's internationally celebrated balloon festival.

Albuquerque also takes pride in innovating with little time and fewer resources, all while securing the privacy and equal rights of citizens.

While many communities across the United States have sought smart city status for prestige alone, Albuquerque's city leaders have set a more functional goal, one that avoids stockpiling data for data's sake. Instead, they are taking a holistic approach that will allow them to leverage data in a scalable manner to solve real-world problems that can help optimize the quality of life for their citizens. And they are doing so while maintaining their reputation as a city powered by innovation as they compete against other communities that may be trying to become tech hubs.

So when the city set out to become a smart city hub for the United States, it selected a partner who shared a similar spirit of experimentation and creativity—Cisco.

For the City of Albuquerque, fulfilling its smart city ambitions presented a challenge that is typical for many midsize cities: creating a scalable wireless network that can serve as a backbone for future smart city applications—and doing so at a cost it can afford.

The solution

A cost-effective, scalable, and secure foundation for future growth

As they began their smart city initiative, leaders in the City of Albuquerque needed a strong Wi-Fi network to support future growth. It would have to be rugged, reliable, and secure. But they also needed to start small (to fit their budget) and easily scale as their needs grew. So, as they do each October when their skies are punctuated with a blazing mix of colors from hundreds of balloons, they looked skyward—to the thousands of streetlights in their community.

A secure and scalable smart node network

The city started by installing 250 remote monitoring and control nodes (known as smart nodes) on strategic streetlights throughout the city. The smart nodes, by Cisco partner Cimcon, help manage each fixture's brightness and power usage. They can also adjust light levels for specific events and compile outage reports.

To reduce LTE costs, multiple nodes then connect to one of six deployed Cisco® 1240 Connected Grid Routers (CGRs). This enhances security since all data is funneled through a single firewall (and Cisco's advanced security protocols) before entering the city's network.

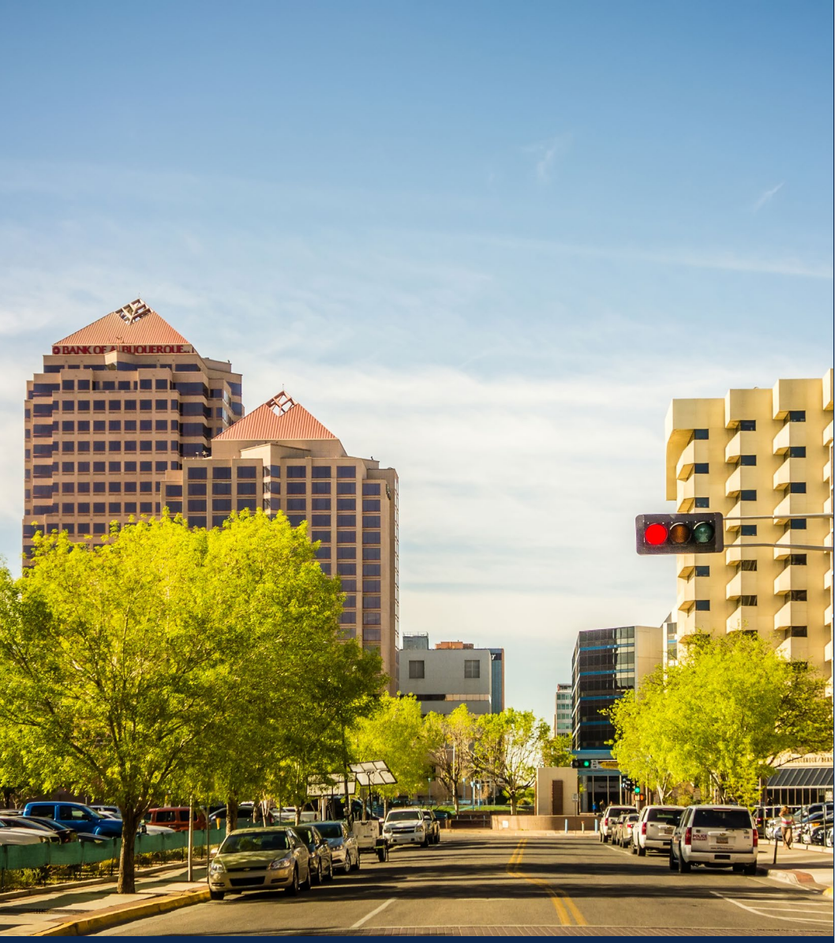
A reliable pathway for public safety

Albuquerque also deployed 30 license plate readers (LPRs) throughout the smart node network. The LPRs are connected to an edge analytics server that "reads" the images via machine learning. This data is funneled through Cisco 809 Industrial Integrated Services LTE routers that feature VPN capabilities and are ruggedized to operate between -40° F and 140° F. The LPRs are providing the city's public safety leadership a real-world laboratory to better understand how new technologies can be leveraged for their benefit.

Why Cisco

Cities like Albuquerque are just a click away from a data breach that could cost millions or severely damage their physical infrastructure. So concerns about adversaries hacking into street-side routers was real. That's why the city chose Cisco's industry-leading security to protect its smart city network. Plus, by partnering with Cisco, the City of Albuquerque also benefits from:

- Industry-leading rugged, reliable and secure routers built for harsh environments
- "Single pane of glass" management that connects end devices and infrastructure for efficient, secure, and responsive outcomes
- A shared culture that values innovation and collaboration at every level



22K Streetlights	250 Smart nodes
6 Connected grid routers	1 Single pane of glass for management

A single pane of glass to manage everything

Cisco routers provide a secure and reliable pathway into the city's network. From there, all collected data is aggregated and made useful by the Cisco Kinetic™ for Cities (CKC) cloud-based management platform and dashboard.

CKC provides Albuquerque with a single pane of glass to manage data from all around their smart city. It lets staff:

- Extract data from disparate sources (sensors, cameras, and more)
- Compute data closer to the network edge for faster decision making, dramatically reducing latency
- Move the right data to the right applications at the right time.

CKC also empowers the city's staff and software vendors to develop their own apps. These can then be easily plugged in to the platform to power customized public service capabilities.

The value of a shared culture

For the City of Albuquerque, Cisco has proved a collaborative and like-minded partner. Both Cisco and the city relentlessly pursue innovation, encouraging creativity at every turn. Cisco was even voted the World's Best Workplace in a survey by Great Place to Work because of its commitment to providing an open and conscious culture for all.

This shared sense of culture helped grow Albuquerque's Smart Communities Proving Lab (built on Cisco routers). The lab lets public and private-sector entities test smart technologies in a real-world setting. It also lets city departments explore potential scenarios before spending time and money on broader deployments.

In addition to creating a proving lab, the City of Albuquerque and its trusted partner Cisco have expanded their relationship to explore other opportunities. This has included an executive briefing for the city's team at Cisco headquarters and a joint partnership between local universities and the Cisco Networking Academy.

> "There really is a unique partnership with Cisco built on trust and openness, as well as genuine respect."
>
> —Brian Osterloh, IT Director, City of Albuquerque, NM

The technology

Proven, reliable, and secure

Cisco empowered long-term smart city growth for Albuquerque via an integratable, secure, and scalable smart city foundation. As the members of the initiative like to say, “Cisco is the green mat that you can fit the building blocks on top of.” For Albuquerque, this included advanced routers and management platforms, as well as enabling a capability to collect, aggregate, and use all the data efficiently (solutions listed below).

The Cisco 1240 Connected Grid Router for smart lighting nodes: connects nodes through the 6LowPAN protocol and is controlled/configured through the Field Network Director (FND) (see below). They’re 4G LTE and 802.15.4g wireless equipped, adding speed and industry-leading security to the city’s Wi-Fi backbone.

The Cisco 809 Industrial LTE router for license plate readers: features a VPN to transfer hits to the city’s infrastructure.

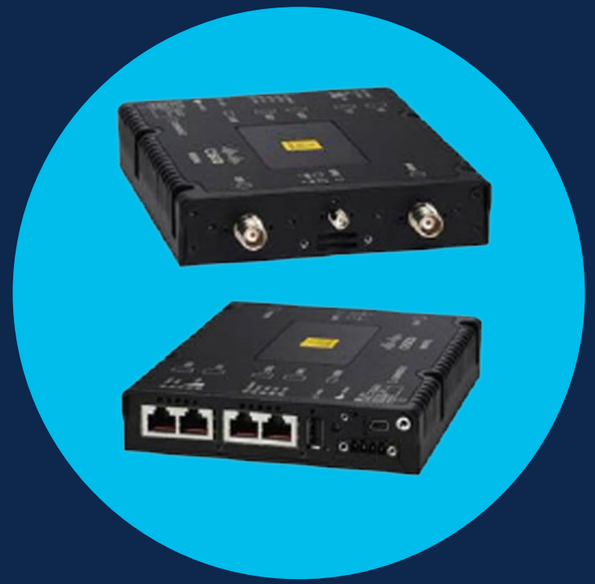
Cisco’s Industrial Operations Kit (IOK): a virtualized solution for operating large-scale IoT deployments.

- Includes the Field Network Director (FND) to control and configure the CGRs.

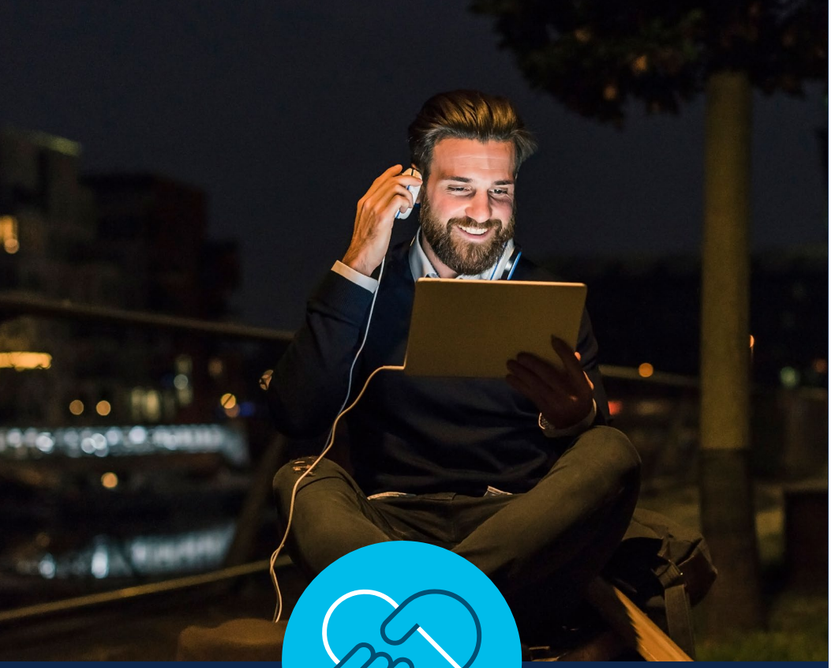
Cisco Kinetic for Cities: a cloud-based management platform and dashboard that compiles large Internet of Things (IoT) solutions for a single-pane-of-glass view. The city has installed a sandbox for CKC and has given Central New Mexico Community College (a Cisco Networking Academy hub) access.

Industry-leading cybersecurity solutions: Detect and stop threats better thanks to Cisco Firepower® Services, Cisco AnyConnect® Remote Access VPN, Stealthwatch®, and the award-winning Identity Services Engine (ISE) for future user/endpoint authentication.

The Cisco 1240 Connected Grid Router



The Cisco 809 Industrial Integrated Services LTE router for license plate readers



The perks of partnering with Cisco

- Low cost of entry for smart city initiative
- Easy integration with existing and new infrastructure
- Industry-leading cybersecurity
- Additional funding avenues (CapEx vs. OpEx, subscription services, and Cisco Capital)

The benefits

Simplicity, security, and affordability

The number of smart city providers is drastically increasing. While competition is good, it can result in integration issues, unexpected costs, and an open door to cyberthreats. A proven and secure foundation is a game-changer for aspiring smart cities. Cisco provides a cost-effective, funding-flexible, integrated, and secure approach. Need proof? Visit Albuquerque.

Cost containment

Cost containment succeeds with transparency and trust. With Cisco, Albuquerque has experienced reduced failure costs, less political stress, and a more sustainable network architecture. These benefits are the result of a shared creative spirit and an active proving lab that tests concepts before deployment. This enables operational improvements like the discovery of significant voltage fluctuations in smart nodes, or the modification of license plate readers to capture two vehicles at once, doubling efficiency.

The City of Albuquerque has also enjoyed a low cost of entry into the smart city arena. Its scalable approach can start small and grow with the city. Other upgrades like environmental monitoring or additional transportation solutions can be easily piggybacked onto the existing smart node network as funding allows.

> “We want to create something that will help us feel more secure without also making us fearful. So we’re taking a holistic viewpoint as we continue to develop solution sets for our smart city initiatives.”
>
> –Brian Osterloh, IT Director, City of Albuquerque, NM

The city's budget structures also benefited by switching from CapEx to a more easily managed (and approved) OpEx stance. Cisco also offers a subscription basis (that can adjust as your needs change) and funding through the Cisco Capital Funding program.

Integration

Cisco solutions provide the City of Albuquerque with greater integration with its existing network, vendors, and other solutions. As the city grows, it can grow smart city initiatives affordably and efficiently.

Industry-leading security

The city is protected by a holistic security approach that provides deeper visibility and advanced breach defense. With Cisco ISE, the smart city network enables secure access authorization before any connected end device gains entry into the network.

In addition, Stealthwatch protects the city's network with advanced threat detection, accelerated threat response, and simplified network segmentation that uses multilayer machine learning and entity modeling. Stealthwatch also enables advanced behavioral analytics, so the city always knows who is on its network and what they're doing.

Financing your city's smart future

Through our City Infrastructure Financing Acceleration Program (CIFAP), Cisco is offering US$1 billion in debt and equity capital to cities and operators of urban services for financing innovative smart city technologies.

Cisco provides CIFAP through Cisco Capital and its financing partners, but your options don't end there. You can also fund your smart city initiative using:

Traditional loans and leases

Pay for your infrastructure investment over time, taking advantage of current low interest rates.

Consumption-based financing

Pay for technology based on usage and increase or decrease capacity as needed.

"As-a-service" financing

Rather than purchasing and maintaining technology, consume it as a service.

Concession financing

Gain the benefits of technology at little or no cost while getting the incremental revenue or cost savings generated.

Continue your journey

Create your own blueprint for a more vibrant and smarter community.

Create blueprint

Do you know the five secrets to writing better procurement contracts?

Discover now

Empowering innovation

Building safer, more resilient communities

By partnering with Cisco, a company that shares its culture of experimentation and creativity, the City of Albuquerque is maximizing its smart city investments while strengthening its spirit of innovation.

At Cisco, we're dedicated to improving quality of life in Albuquerque and the other communities where we live, work, learn, and play. This includes helping communities explore unique opportunities beyond technology that can drive innovation for their citizens.

From reducing carbon footprints and fostering entrepreneurship to enhancing citizen experiences through digital transformation, Cisco is driving smart city innovation for communities big and small. From lighting and parking to public safety and environment, plus many things in between, Cisco is helping guide communities like yours to greater security and resilience.

Find out how

Watch how the Town of Cary, North Carolina, is driving innovation to improve the lives of citizens.

Watch how Kansas City is creating change for its citizens through smart city technologies.

CISCO

The bridge to possible