

Allied Telesis Provides Networking Foundation to Partner Ecosystem for Full-Scale Smart City Initiatives

Successfully building a Smart City from the ground up, with Allied Telesis intelligent technologies at the foundation layer.

Why Do We Need Smart Cities?

More than half of the world's population now lives in urban areas, and that number is growing. The United Nations projects that in another 30 years, 68% of all people could be living in large cities. That's a large, rapid increase in the number of people requiring city services such as public transport, utilities, clean water and sanitation facilities, public safety, medical services, and much more.

Astute city managers are already laying the foundations for sustainable living—today and into the future—with Smart City initiatives. By leveraging technology, cities can serve more people, more efficiently, while also providing residents with high living standards.

A Smart City uses Information and Communication Technology (ICT), intelligent Internet of Things (IoT) solutions, and applications that produce real-time data from a comprehensive network of cameras and sensors to optimize city infrastructure and manage both public and privately-owned services. In numerous cities of all sizes, all over the globe, Smart City programs make urban areas both sustainable and desirable places to live.

For many cities, initial projects address some of the basic problems today's large cities face such as managing traffic congestion, reducing pollution, and providing a more secure environment via effective policing and crime reduction.



'Smart City' is no longer just a buzz term. The creation of a Smart City lies in its inhabitants and the large volume of data they generate every second of every day. The quality of the smart services provided is thanks to the technologies used to gather, transport, analyze and finally utilize the processed data.

As the need for better access to services (mobility, transportation, health, public administration services and more) increases, the transition to a Smart City approach is rapidly becoming a necessity.

Razvan Dobrescu

General Manager, Fujitsu Romania.

A Complex Technology Ecosystem

According to consulting firm McKinsey, a Smart City has three distinct layers. The first, foundation layer is the base technology, which includes a critical mass of smartphones, cameras and sensors connected by high-speed communication networks. The second layer consists of applications that translate raw data into alerts, insights, and specific actions. The third layer is usage—which requires widespread adoption of both the technology and application layers, by city service operators, businesses and members of the public.

When building the foundation layer, the first challenge for a city is assembling the right team of technology and solution providers. No single company has the full range of hardware and software products, networking capabilities, communications services, security solutions, and technical expertise required to build an extensive computing platform that can support a Smart City.

Rather, equipment vendors each have core offerings of premium products and skilled services, and they then look for complementary partners to round out their solutions to meet customer needs. When tech-savvy partners have a like-minded approach to delivering solutions that exceed expectations, the resulting alliance can take them from one successful Smart City engagement to another. Everyone benefits from relationships that strive to simplify how complex solutions are delivered.

This approach perfectly encapsulates the highly regarded partnerships that Allied Telesis has cultivated to support its Smart City solutions.

Standards-Based Technology Enables Unlimited Possibilities

Allied Telesis has been a leading presence in the global high-performance networking industry for more than 30 years. The standards-based technologies that Allied Telesis designs and builds are ideally suited for Smart City initiatives. The base level network is fully ready for large-scale IoT connectivity, and delivers high availability, high performance and ease of management. In addition, Allied Telesis networks are based on the concept of open standards, meaning that a city deploying this technology is not captive to a proprietary solution. This allows unlimited extensions by a wide array of technology partners that can plug into the network as required, to provide all the essential components of a Smart City framework.

Network requirements vary from one Smart City project to another, but here is an example of how Allied Telesis and a consortium of partner companies built a turnkey system to satisfy one European city's needs. Allied Telesis worked with Axis, Milestone, Fujitsu, Aeroqual, and several other partner companies to build multiple services running over a fiber optic Metropolitan Area Network (MAN).

Three key services were fully implemented in the first phase of this Smart City project:

- ▶ Public video surveillance
- ▶ Traffic monitoring
- ▶ Environmental monitoring

These key services help the police force to provide protection and response services, allow city planners to manage traffic volumes and patterns, and provide vital information to facilitate pollution control. Additional services will follow, such as smart transportation.

Allied Telesis Provides a Solid Network Foundation

The Smart City project took place in stages. Firstly, there was a citywide expansion of the existing fiber optic network, which ran a prototype video surveillance system. The network had to be expanded across the entire city, and modernized with more robust and reliable technology to support both current and future connectivity needs. Next, devices and sensors were installed along with other hardware and software, to support the collection, transmission, storage, processing and presentation of data pertaining to the three key services.

Allied Telesis provided a modern and scalable connectivity solution that formed the foundation for all services. This involved designing a whole new data infrastructure, combining the concepts of high-speed network rings with tree-like network segments across the city center, and connecting hundreds of devices and data sources located right across the city. This is an architecture specifically designed for IoT applications—able to collect data from numerous dispersed points around the city, analyze it, and visualize the results on a single operational dashboard.

The network consists of 3 distinct areas:

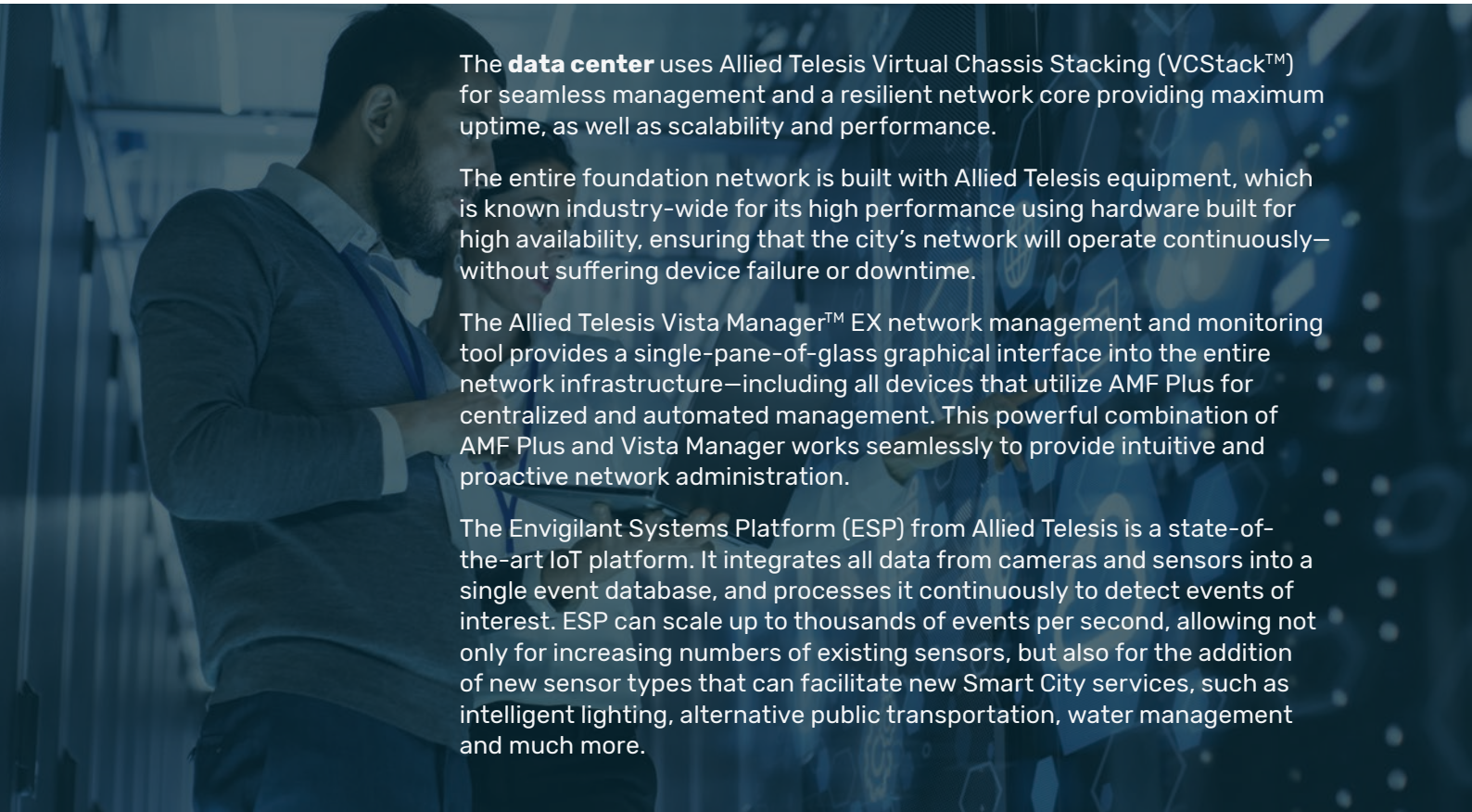
- ▶ An **access** area where data is collected.
- ▶ A **backbone** area that transports data and ensures redundancy and easy service addition.
- ▶ A **data center** where the IoT platform collects and processes all data. Results are then sent for visualization or deep analysis to other applications.

Allied Telesis Builds Performance, Resiliency and Ease of Management into the Network

The **access** area uses Allied Telesis Ethernet Protection Switched Ring (EPSRing™) to provide optimal redundancy. EPSRing creates a high-speed ring of Ethernet switches to ensure that the network isn't susceptible to a single point of failure, as any issue with a link or switch is automatically resolved by the ring in as little as 50ms—ensuring non-stop connectivity for video surveillance, sensors and other data. EPSR rings can be connected at 10s or even 100s of Gigabits per second to enable reliable transport of all IoT device data city-wide. In addition, Power over Ethernet Plus (PoE+) is used by switches in the access area to connect and power (over a single data cable) devices like surveillance cameras and environmental sensors, which might otherwise be inconvenient to locate power sources for.

Supporting all this infrastructure is the Allied Telesis Autonomous Management Framework™ Plus (AMF Plus), a comprehensive suite of features that combine to simplify and automate management across all network equipment from the core to the edge. AMF Plus enables one, many, or all network devices to be managed at once, greatly reducing administration time and effort. Powerful automation features like auto-backup, auto-recovery, auto-provisioning, and auto-upgrade enable zero-touch management for truly plug-and-play networking.

The **backbone** area uses a combination of EPSR and Open Shortest Path First (OSPF) routing technology to provide further redundancy, and to facilitate the simple addition of new services. OSPF allows complex Layer 3 networks with multiple routers to easily balance network traffic loads. Any new service, or access to current services, can be easily accommodated by simply plugging into any part of the backbone network. Plus, AMF Plus automatically keeps track of these configurations.



The **data center** uses Allied Telesis Virtual Chassis Stacking (VCStack™) for seamless management and a resilient network core providing maximum uptime, as well as scalability and performance.

The entire foundation network is built with Allied Telesis equipment, which is known industry-wide for its high performance using hardware built for high availability, ensuring that the city's network will operate continuously—without suffering device failure or downtime.

The Allied Telesis Vista Manager™ EX network management and monitoring tool provides a single-pane-of-glass graphical interface into the entire network infrastructure—including all devices that utilize AMF Plus for centralized and automated management. This powerful combination of AMF Plus and Vista Manager works seamlessly to provide intuitive and proactive network administration.

The Envigilant Systems Platform (ESP) from Allied Telesis is a state-of-the-art IoT platform. It integrates all data from cameras and sensors into a single event database, and processes it continuously to detect events of interest. ESP can scale up to thousands of events per second, allowing not only for increasing numbers of existing sensors, but also for the addition of new sensor types that can facilitate new Smart City services, such as intelligent lighting, alternative public transportation, water management and much more.



The complexity of Smart City projects is so big that no single vendor can complete them successfully on their own. This is why Allied Telesis joins forces with trusted technology partners.

As a data communication and data management infrastructure vendor, we sit between the sources generating the data and the applications processing it. This special position, which connects the partners' technologies together, makes us both proud and responsible.

As we have done for many years, we will continue to work very closely with our partners to ensure a perfect fit between our technologies, to the benefit of our customers.

Calin Poenaru

General Manager Allied Telesis Romania.

Technology Partner Contributions

With the Allied Telesis network foundation firmly in place, other vital services could be built on top, and this is where the partner companies come in. Network access segments feature connected video cameras and specialized environmental sensors that send operational data into a control room. This data consists of either plain video streams collected and sent to a centralized Video Management Software (VMS) solution, or events generated by processing video streams—such as traffic and License Plate Recognition (LPR), and operational data from sensors.

Axis Communications provides all the video cameras and associated technologies included in this project. There are several types of cameras,

with each type specialized for a distinct set of purposes. Some cameras are dedicated to physical security, such as fixed and Pan, Tilt and Zoom (PTZ) cameras. Others are dedicated to traffic monitoring like LPR and traffic analysis. Each type of camera runs dedicated applications that support the purpose of its installation. Both video surveillance data and edge computing analysis data are carried by the MAN to the data center, where specialized applications process them. Events go for further analysis to the Envigilant IoT platform, and the video streams go to the VMS platform.

Axis Communications also delivers the dedicated video analysis software that analyzes road traffic, and flags potential problems such as obstructions, accidents and hazardous drivers. This allows the city to intervene in a timely manner to resolve and prevent accidents, traffic jams, and more.



Combining industry-leading expertise with scalable, innovative camera and IoT solutions, Axis makes Smart Cities more livable by improving efficiency for public safety, urban mobility and environmental monitoring.

A Smart City relies on connected devices and data to improve efficiency. Integration, cooperation and partnerships are critical to making this happen. Axis has always been committed to a partnership approach, working with a vast number of solution providers, each bringing their knowledge and expertise to benefit cities through development of customized solutions.

Bogdan Gavril

Axis Communications Romania, Chief Technical Lead.

Milestone provides the Video Management System that enables video stream storage and management, including on-request retrieval of specific sequences. This VMS manages the feed from hundreds of cameras across the city. Analytics from the system help to reduce incident response times for police and emergency medical services, and provide faster post-event investigations. Areas of traffic congestion are monitored so that mitigations—such as changing traffic light patterns, or charging toll fees to enter certain zones—can be imposed in real time. In many cases, increased situational awareness helps to control matters before a situation becomes serious.

Aeroqual provides the specialized environmental monitoring platforms that measure the main parameters for air quality (dust and particles, oxides of nitrogen, carbon and sulphur) and their contextual parameters (temperature and humidity). Based on these measurements in different parts of the city, municipalities can assess the overall quality of air in the surroundings.

Fujitsu provides both the data center and the visualization equipment needed for this project. All the applications, from network management to the IoT platform and dedicated applications, run as virtual machines deployed on PRIMERGY computing and ETERNUS storage platforms. At the front end, the employees who operate infrastructure and services ^{24/7} work on Fujitsu CELSIUS workstations and displays.



As Fujitsu is one of the oldest technology providers in the world, our concern has always been to stay at the forefront of technology innovation, constantly striving to research and develop the best solutions.”

This applies to helping develop Smart Cities all around the globe, so it was a natural step to join forces with likeminded technology providers, to ensure solutions are a success and can become ‘best practice’.

Razvan Dobrescu

General Manager, Fujitsu Romania.

Data Puts the “Smart” in “Smart City”

The Envigilant Data Integration Platform from Allied Telesis acts as a central repository for all the network’s operational data, and is key to the success of this Smart City. The various partner systems are integrated with the Envigilant platform, providing a turnkey solution that delivers reports on a display panel in the city’s always-on Operational Centre. Reports can be produced daily, weekly or by request. On the monitoring side, the platform displays video feeds and situational maps on large video walls, where city employees can watch for “hot spots” and problems such as traffic congestion.

The Envigilant platform takes care of the granular activities—collection, transmission, storage, and processing—that make data analysis-ready, and therefore able to support decision-making by the City.

Tangible Results Improve Livability

The city is already seeing tangible benefits from its Smart City network, and has begun work on additional services like smart transportation. Now that a futureproof underlying infrastructure has been built, the city can easily add services as required. Moreover, the infrastructure facilitates access to existing EU funding, making investment very efficient for the city. Long-term, the city’s goal is a higher standard of living for residents—realized through cleaner air, a safer city, better public transportation, and less time spent in traffic.

The individual components contributed by the technology partner companies have been integrated into a complete and tested solution that can be replicated elsewhere, adapting as required to the differing needs of other cities. This shortens the timeline for new implementations and deployments, and reduces the overall Time to Value for a fully instrumented Smart City.