NETWORK SERVER AND LORAWAN

A2A Smart City develops and manages enabling technological infrastructures for digital services that are integrated and connected in networks. Since December 2015, A2A Smart City has been a member of **LoRa Alliance™** and has therefore been able to create LoRaWAN™ networks at European level in agreement with other members of the organisation.

LoRa™ (acronym for Long Range) **is a technology devised by Semtech for long range communications, very competitive compared with other current technologies**. The modulation is based on spread-spectrum techniques and the frequency variation (chirp) of the spectrum, with FEC error corrections.

LoRa™ improves the sensitivity of the receiver because **it makes use of the entire channel band to broadcast a signal**. This aspect makes it robust to noise and insensitive to frequency offsets typical of low-cost devices. LoRa modulation is a physical layer (PHY) that can be implemented on different network topologies and protocols such as Mesh, Star, 6lowPAN, etc.

LoRaWAN™

LoRa architecture provides for 4 roles.

END DEVICES
Field sensors that collect and transmit measurement data

GATEWAYS
Network devices that collect data from the ends points

NETWORK SERVER
Centralised LoRaWAN™ data authentication and exposure servers

APPLICATION SERVER
Application Layers for data collection and processing

Digital Innovation for always connected cities
A2A Smart City has set itself up as a technological accelerator, building the enabling infrastructure of the towns and cities of the future. The ever faster, reliable and widespread new generation optic-fibre network makes it possible to reduce the Digital Divide. A technologically advanced infrastructure enhanced by strategic agreements with major providers makes high-performance fibre connections and networks available to Agencies and Operators, which is the ideal situation for customer connectivity and the technological development of the territory.

Intelligent Wi-Fi and Smart APPs: the advantages of Big Data
A2A Smart City produces advanced Wi-Fi systems. The implementation of these systems and the development of apps for mobile devices exploit Big Data Analytics solutions to make citizens more involved, connected and reachable at all times. Big Data will make it possible for Public Authorities and companies to gather useful statistics and produce targeted promotional activities.

The development of urban areas and upgrading of public installations
A2A Smart City provides services for upgrading urban areas or public installations by transforming them into new digital centres that are always connected and eager to expose inhabitants to technology in its finest form, A2A Smart City generates new opportunities for the social and cultural growth of the territory, both in the present and in the future, while also enhancing security, economic efficiency and life-style quality.

Discover a Smart world at
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THE FUTURE OF CITIES

from a new point of view

A2A Smart City is a company in the A2A group, the largest Italian multi-utility group, at the top of the energy, environment, heat, networks and smart city sectors. **A2A Smart City develops and manages enabling technological infrastructure** for digital services that are integrated and connected in networks. Through the Smart City Lab, a research centre for the production of innovative digital technologies based on the IoT (Internet of Things), A2A Smart City is continually investing in developing and improving its services and technological offer. Its expertise and integration with the territory ensure fast realisation of the most innovative projects, able to improve the quality of life in cities.

2.000	3.742	3.000	700	490.000
PUBLIC AND PRIVATE CAMERAS	KM OF OPTICAL FIBRE BY 2022	ACTIVE SENSORS	OPEN WIFI	SMART METERS

SMART INDUSTRY

From the Smart Lab to Industry 4.0

Industry 4.0 is the advent of digital innovation in operational, manufacturing and logistic processes, with the adoption of technologies able to increase the interconnection and cooperation of the resources used (physical assets, people and information).

The activator of all this is the human capital, which will have to develop the skills required to best exploit the new technologies. Companies will be able to innovate their business model radically, thus **improving their working conditions and increasing the production quality of their plants**. Industry 4.0 also envisages a set of measures and incentives aimed to foster transformation and investment. The benefits of its implementation will be enormous.

Smart services
Information infrastructure and techniques that make it possible to integrate systems and facilitate the cooperation of companies with each other and with external structures (supplier - customer)

Smart energy
Solutions to rationalise the spending of industries on energy through the creation of more efficient systems and the reduction of waste

Smart Production & Smart Supply Chain
New production technologies which foster the collaboration of all the elements involved in the production and distribution of goods, i.e., operators, machines and tools

Smart security
Systems to improve the security of the company and the workers

Smart wellness
Systems for monitoring comfort in the premises and the welfare of the employees

SMART GREEN

From smart agrifood to smart urban garden

Services for precision agriculture, dedicated to crops and animal husbandry, **solutions for urban greenhouses and gardens, smart monitoring** for risk prevention.

Smart Green is a complete system of tools and information for effectively controlling the health of plants, soil irrigation requirements and climatic conditions, and for managing the welfare of livestock both outside and inside barns.

Smart agrifood
Research and innovation make precision agriculture possible, with the implementation of targeted operations on limited areas or on certain plants

Smart cow
Technologies make it possible the remote monitoring of the climatic conditions of stock farms and the geolocalisation of livestock

Smart urban garden
A system of sensors that covers the main aspects of parks to create a system for sharing information

Smart green house
The construction of artificial smart greenhouses able to keep interior environmental parameters under control

Smart risk
Use of technologically advanced tools to monitor the physical features of the territory and timely cope with hydrogeological risks

SMART LIGHTING

Smart and controlled public lighting

The "Smart Lighting" service ensures smart control of public lighting for reducing related costs and expenses.

Smart Lighting makes it possible **control lighting remotely, thereby reducing energy and maintenance costs and improving the management of resources**.
Public lampposts are currently used in different contexts - both metropolitan and rural - as strategic assets on which to develop measurement and monitoring services through special sensors.

The sensors used allow further energy saving and together with LEDs represent a sustainable and optimised solution.

Advantage
Better management of public lighting with great energy saving

Focus on
Environmental sustainability and the consequent optimisation of consumption

Technology
Type of sensor: dimmer
Emission frequency: 868 MHz
Protocol: LoRaWAN

SMART WATER

Smart Water Management

Water is an increasingly valuable asset in the world economy: monitoring and rationalising its use and avoiding wasting it is a top priority for the safeguarding of our planet.

In Italy, in recent years, the value of water has increased on average by 50% per litre. In some cities the water bill has more than doubled. This, together with the paramount environmental value of water, makes it essential for companies that deal with water distribution to carefully and accurately monitor leaks (equal to 40% on average in Italy), consumption and quality of the mains, in order to organise prompt repairs and maintenance. Infrastructure based on LoRaWAN technology make it possible efficient monitoring, automated meter reading and therefore an overall reduction of management costs.

Monitoring water quality
A multi-parametric probe allows several different measurements.

Checking for leaks
Monitoring pressure, flow rate, water hammer capture and meter consumption data

Monitoring the RTCP system
Solution designed to automatically and immediately adjust the pressure at critical point, on the basis of different water demand

Telemetry and automatic meter management
The new generation meters will incorporate all the measurement functions of traditional meters and will be able to transmit data through the new smart communication infrastructure

Monitoring and increasing the efficiency of purification plants
Design of new plants to avoid wasting water and ensure compliance with applicable legislation

SMART MOBILITY

From Smart Parking to Slow Mobility

The mobility of the future will be increasingly agile, thanks to smart parking (control of parking spaces occupancy), to the detection of traffic flows and the ever wider smart recharging point network. **Mobility will be ever more sustainable thanks to environmental monitoring and development of slow mobility**.

Smart parking
Occupation sensors, payments feedback

From traffic lights to Smart Gates
Sensors and tracking devices on public transport, variable-message panels and vehicle flow analysis

Charge points with defibrillators
Charging columns for mobile phones (and optionally electric bicycles), equipped with the defibrillators. Charge points also serve as WiFi Access Points, 4G repeaters and LoRaWAN gateways

Charging columns for electric vehicles
Electric mobility is becoming increasingly common, which will require more devices to be made available nationwide*

Smart Bicycle Paths
Sensors that monitor the transit of people, air quality, safety of individuals and animals, as well as the degree of enjoyment of those cycling on them

* Starting 2025 Norway will no longer register non-electrical cars

SMART SECURITY

Smart Security

Citizen wellbeing and security are the priorities of the new smart cities, in order to improve the quality of life in home, work and urban environments. **"Smart" cities will be safer and offer effective communication, thanks to the combined use of modern technologies.**

The widespread availability of broadband and video surveillance solutions have enabled a transition from a reactive to a proactive approach to security, thereby preventing crime in the places we live.

Anti-intrusion solutions
The security networks are able to set off alarms, sirens, videocameras and alert security forces

Video surveillance and video analysis
Cameras are connected to one another and converge in a centralised operating platform

Area supervision
Wearable cameras, video streaming and drones

SOS towers
Installed in public parks and in isolated areas, these towers allow you to call the police headquarters

Foot traffic monitoring service
In order to optimise management of energy resources and the security of the premises

Sound monitoring service
Provides sound analysis, with recognition of screams, shots, explosions, etc

Anti-flooding solutions
IoT sensors that constantly monitor water pipes and systems, liquid and gas leaks

Fire prevention and gas and fume detection solutions
A network of sensors for monitoring premises, detecting emergencies and understanding the magnitude of the issue

SMART BUILDING

From stability sensors to video surveillance

The smart building is an improvement in energy efficiency through the management, monitoring and supervision of energy systems. In a smart building the management and use of all assets are economically efficient and guarantee optimal services.
The aims are to reduce the environmental impact, enable simple management and remote control and improve security.

Technology
Inside a smart office everything works thanks to electronics: from the tele-communications systems to security

Communication
All systems within the building can communicate with one another in an automated way, through an infrastructure for the supervision and control of all systems (electricity, water, HVAC)

Green construction
Smart construction is also green: thanks to the systems for efficient energy and heat management, energy waste and the emission of harmful substances into the air are reduced

Security
The buildings are more secure, thanks to more efficient control systems

Management and control
IoT systems, actuators, controllers, communication interfaces, bus connection systems, cloud solutions and software applications enable the communication, management and control of all of the building's systems in an integrated way

SMART ENERGY

Management and control of energy consumption

The Smart Energy solution proposed by A2A Smart City can be applied to all energy systems (electricity, water, gas network, HVAC) based on the network standard LoRaWan, which is composed of:

Sensors
Detect the light or heat level in the premises

I/O switches
Detect the energy consumption of the entire building

Meters
Manage the energy supply to systems

Gateways
Transmit the data to a Network Server that stores and processes them

Management software
Available on a cloud system or an an app for smartphones and mobile devices that display energy consumption and enable analysis (real-time or as a report), as well as the remote control of the energy systems themselves