

## Practical Applications

### Automation

**Wireless Sensor Networks (WSNs) provide information of the environment and react physically to it, expanding users' capabilities and automating daily actions.** The implementation of WSNs is becoming more widespread in industrial, domestic and services sectors. **Currently, there are key areas where the use of sensor networks is an increasing need in order to improve productivity, safety and efficiency.**

n-Core® offers through its API a powerful and robust automation engine that makes use of the Sirius devices' ZigBee™ infrastructure.

### Basic infrastructure

- 1. Network of Sirius A, Sirius D and Sirius RadIOn devices.** These devices form the fixed network infrastructure. In every implementation there must be a Sirius device acting as "Coordinator", responsible for managing the devices network, allowing the dynamic connection of new devices and acting as a gateway to the application server.
- 2. Sirius Quantum and Sirius B mobile devices.** They include two configurable buttons that allow sending custom events (e.g., activate a siren connected to a Sirius IOOn or Sirius A device, among many other options).
- 3. Application Server.** It is based on the n-Core® API and is responsible for managing the connection with the devices network and processing events through the automation engine. It offers its functionalities to different interfaces such as mobile devices, PCs or Web services.

### Basic operation

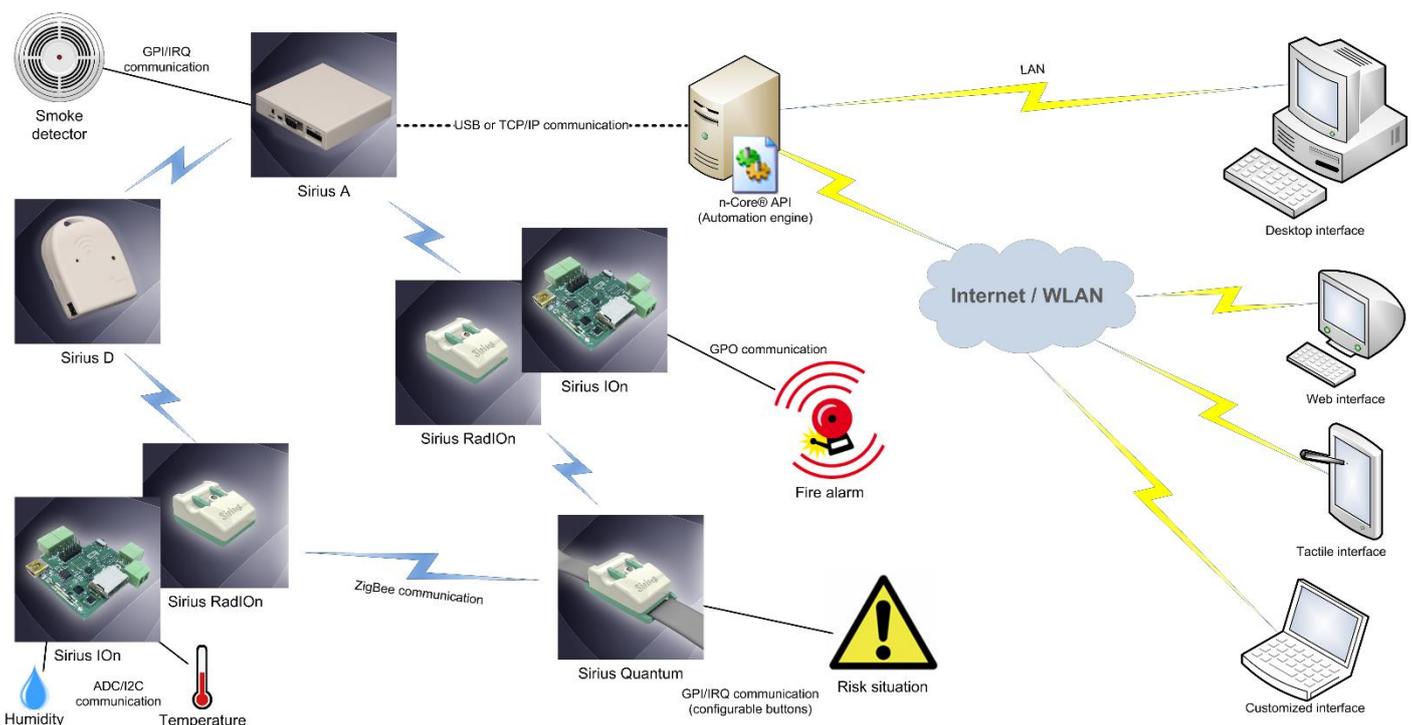
Sirius devices collect continuously and automatically events from the different sensors connected to them (e.g., temperature sensors, humidity, smoke, etc.). These events are transmitted through the devices network in order to the system to act accordingly, either activating an actuator (e.g., a fire alarm) or being processed by the automation engine in the application server.

### Benefits

There are many areas where automation systems can be applied, such as **healthcare** (medical materials and instrumentation management, patient monitoring), **agriculture** (irrigation and weather conditions control), **industry** (risk prevention, automated meter reading), **security** (presence detection and control of assets), **control of structures** (bridges, buildings, etc.) **climatic control** (monitoring of climatic conditions) or **home automation** (lights, doors opening, etc.).

One of the main advantages of n-Core® is that, thanks to its automation engine, both programming and infrastructure deployment tasks are dramatically reduced. It is only necessary to configure the Sirius devices through the tools offered by n-Core®, which implies a significant saving in time and effort.

Due to its versatility, n-Core® allows integrating virtually any sensor or actuator available on the market. The multiple input and output interfaces on the Sirius A and Sirius IOOn devices ease such integration.



## Practical Applications

### Location

There are a wide variety of applications where knowing the exact location in real-time of people or objects is of great usefulness, sometimes becoming a necessity. Hospitals, assembly chains, mining exploitations, parks, fairs, etc., are just a sample of the possible areas where the implementation of a **Real Time Location System (RTLS)** can make a difference.

n-Core® offers through its API a powerful and robust locating engine that makes use of the Sirius devices' ZigBee™ infrastructure.

### Basic infrastructure

- 1. Network of Sirius A, Sirius D and Sirius RadIOn devices.** These devices have fixed positions and detect the presence of people or objects. In every implementation must be a Sirius device acting as "Coordinator", responsible for managing the devices network, allowing the dynamic connection of new devices and acting as a gateway to the application server.
- 2. Sirius Quantum and Sirius B mobile devices.** They are carried by people or objects that are needed to be tracked, allowing them to be located by the system. They include two configurable buttons that allow sending custom alerts.
- 3. Application Server.** It is based on the n-Core® API and is responsible for managing the connection with the devices network and processing events through the automation engine. It offers its functionalities to different interfaces such as mobile devices, PCs or Web services.

### Basic operation

Sirius Quantum and Sirius B devices transmit periodically a signal containing its identifier in the network. This signal is detected by all Sirius A, Sirius D and Sirius RadIOn devices within its coverage area. Each Sirius A/D/RadIOn device has a table of the Sirius Quantum and Sirius B devices detected at every moment along with measures of power and quality of the received signal. The Sirius A/D/RadIOn device configured as the "Coordinator" node collects these tables from all active Sirius A/D/RadIOn devices in the network and based on them makes an estimation of the position of each Sirius Quantum and Sirius B devices present in the system.

### Benefits

One of the main advantages of the n-Core® hardware infrastructure is that, unlike systems such as GPS, it can work both outdoors and indoors.

This infrastructure is dynamic, adaptable, scalable, non-intrusive and also has a low implementation cost, which makes it able to suit quickly and easily to virtually any application environment.

The different locating algorithms implemented in the n-Core® locating engine allows creating RTLSs with better performance than conventional systems.

It should be noted that the n-Core® platform is not intended to be a replacement for GPS or other similar systems, but a robust and efficient alternative where these systems could not be, either because of their technical, cost or deployment limitations.

