



Experimental Setup in Ghent

Hendrik Derre

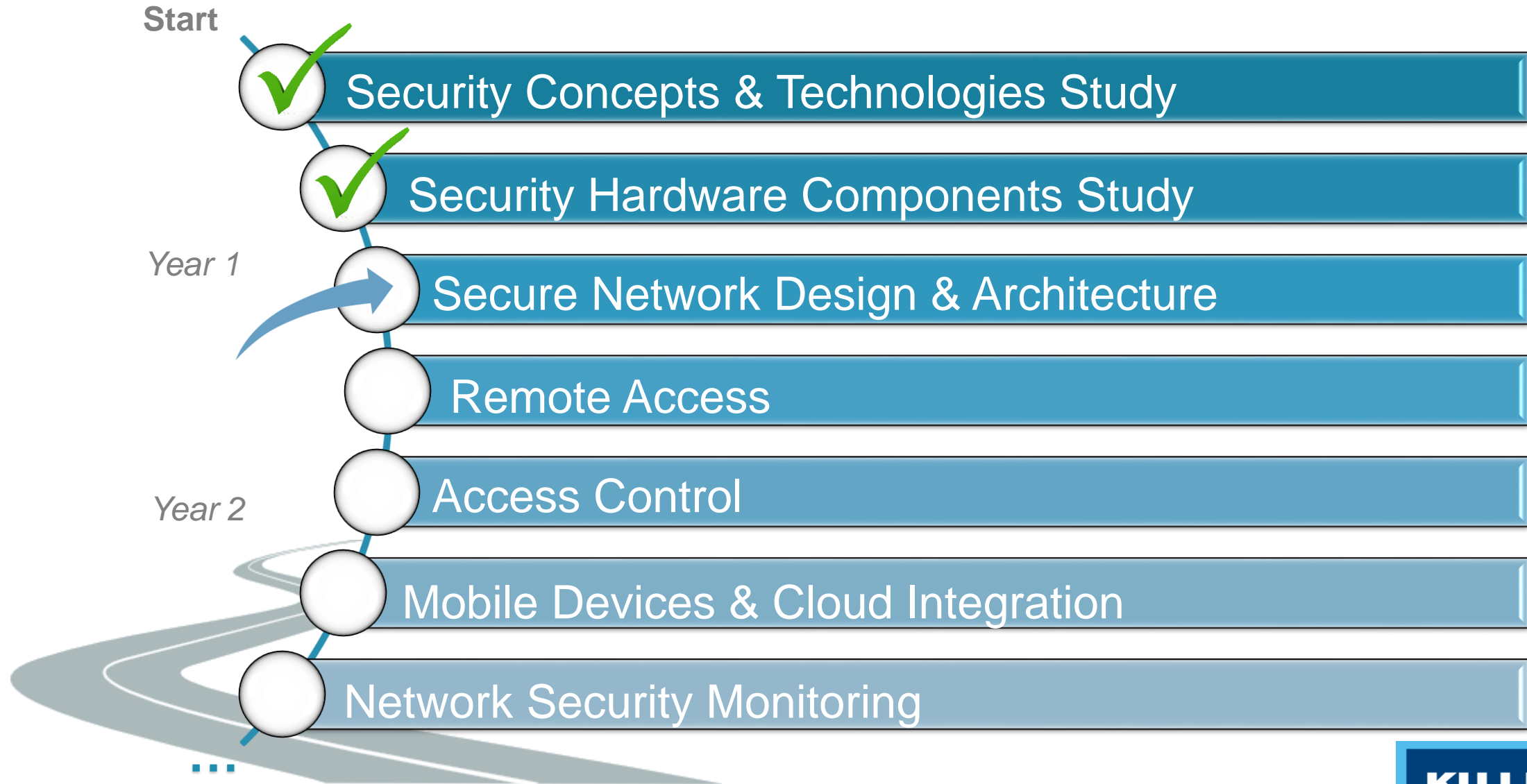
Experimental Setup in Ghent

Presenting the industrial control system network under construction at campus Ghent

- Project Roadmap
 - Road Traveled; *Work Done*
 - Direction headed; *Goals for the future*
 - **Role of the experimental setup**



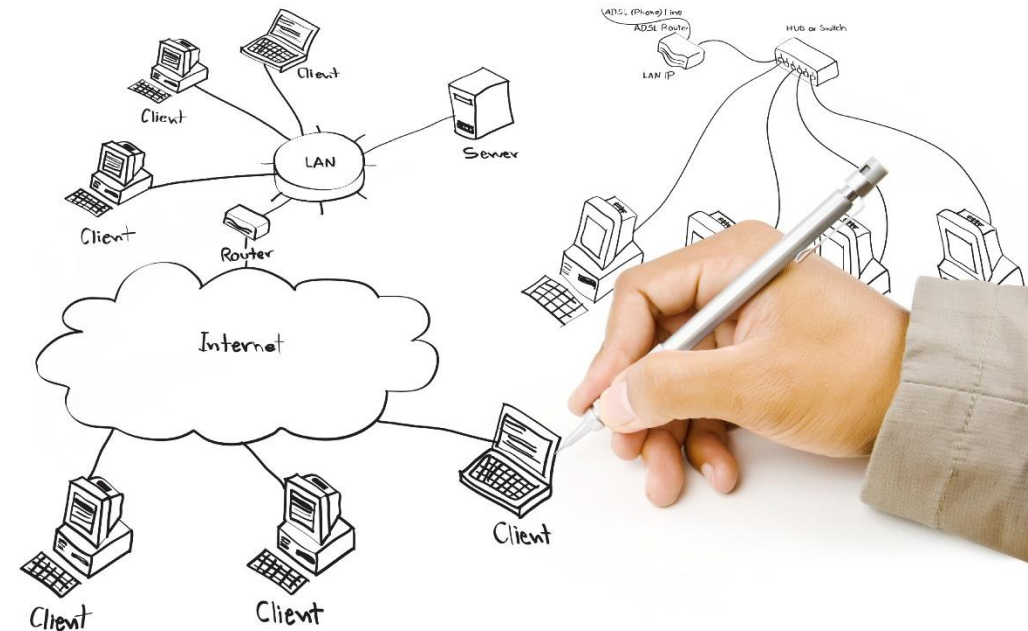
Project Roadmap



Secure Network Design & Architecture

- **Important security concepts for design fase**

- Defense in Depth
- Segmentation
- Establishing security zones and conduits
- Confidentiality, Integrity & Availability (CIA)
- ...

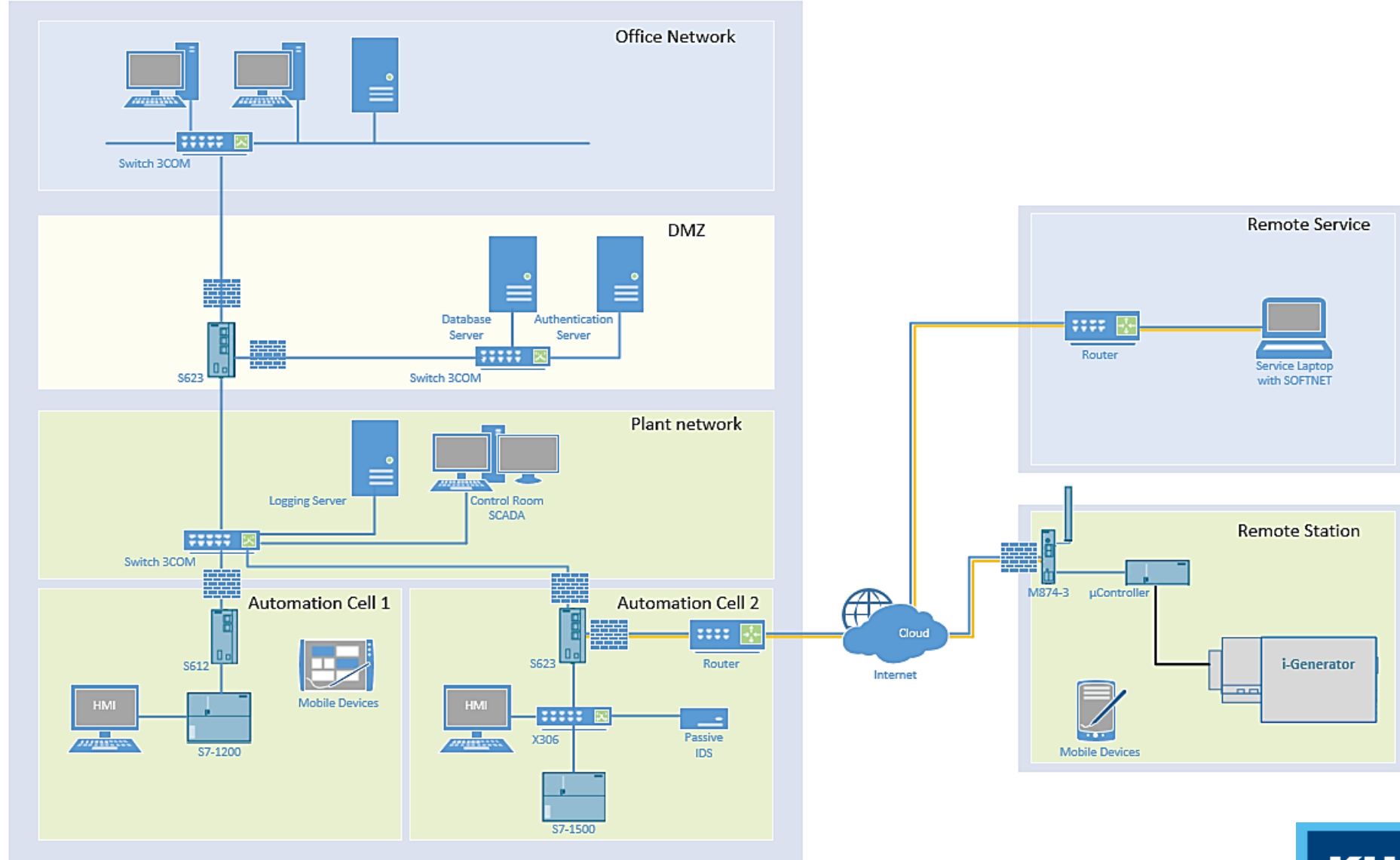


Secure Network Design & Architecture

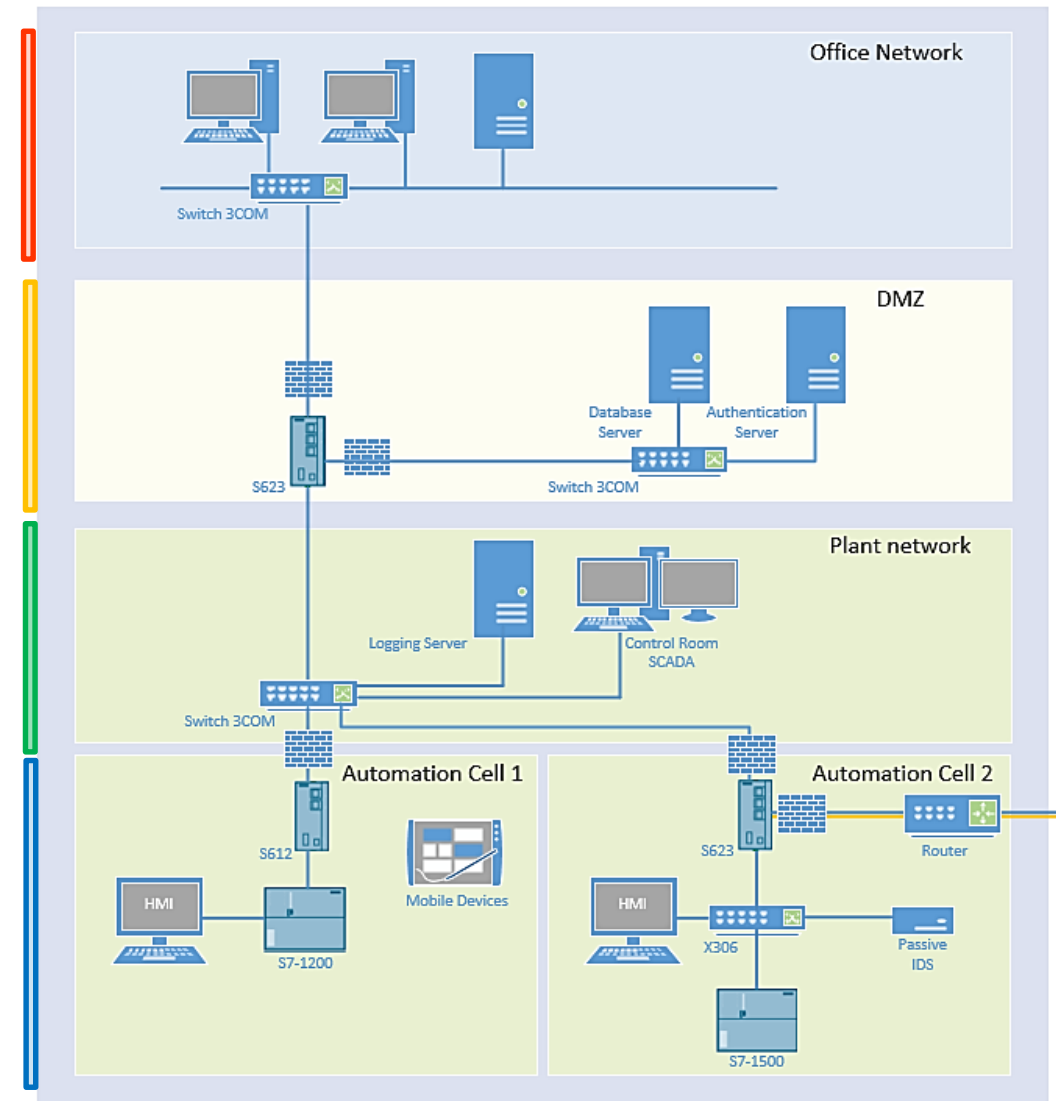
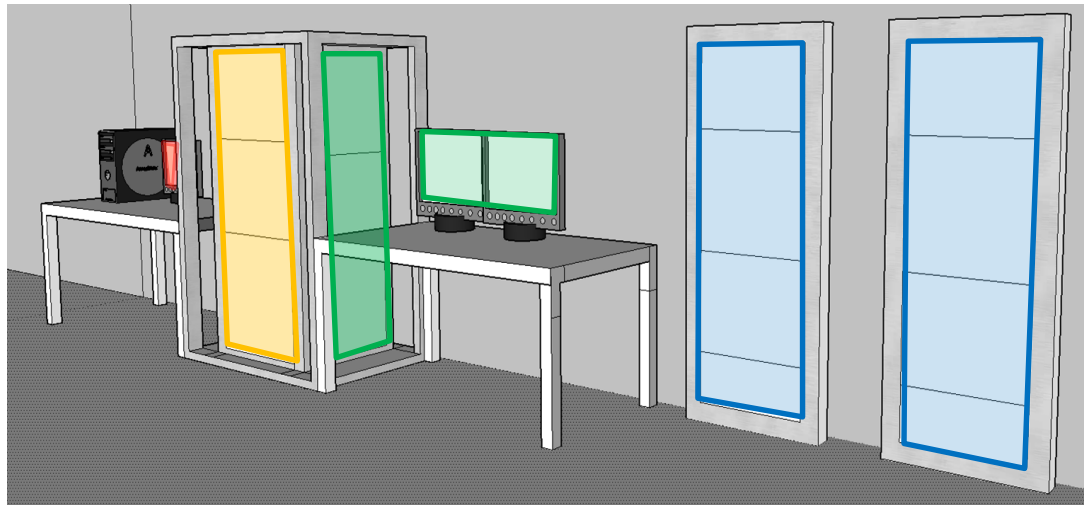
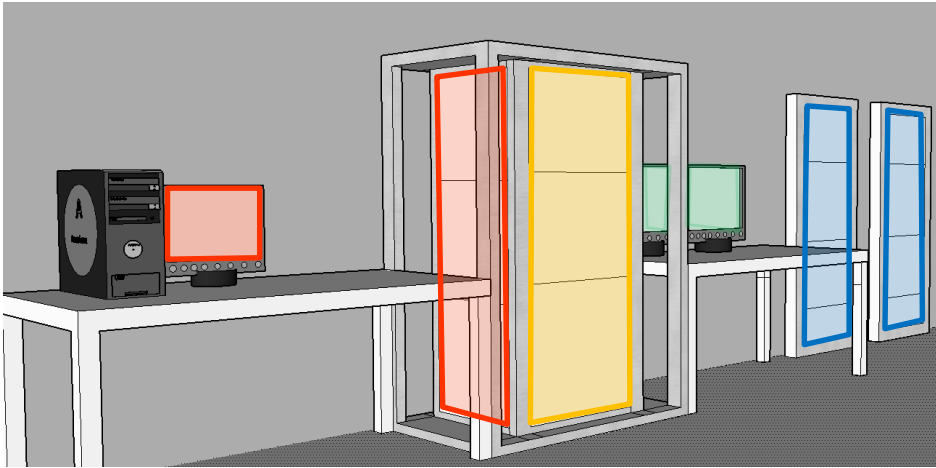
- **Experimental ICS network @ KUL Campus Gent**
 - Multiple zones, from office network down to sensor level
 - Multiple communication Technologies (wireless, mobile, fieldbusses,...)
 - Supervisory Control And Data Acquisition network (SCADA)
 - Remote access capabilities
 - ...



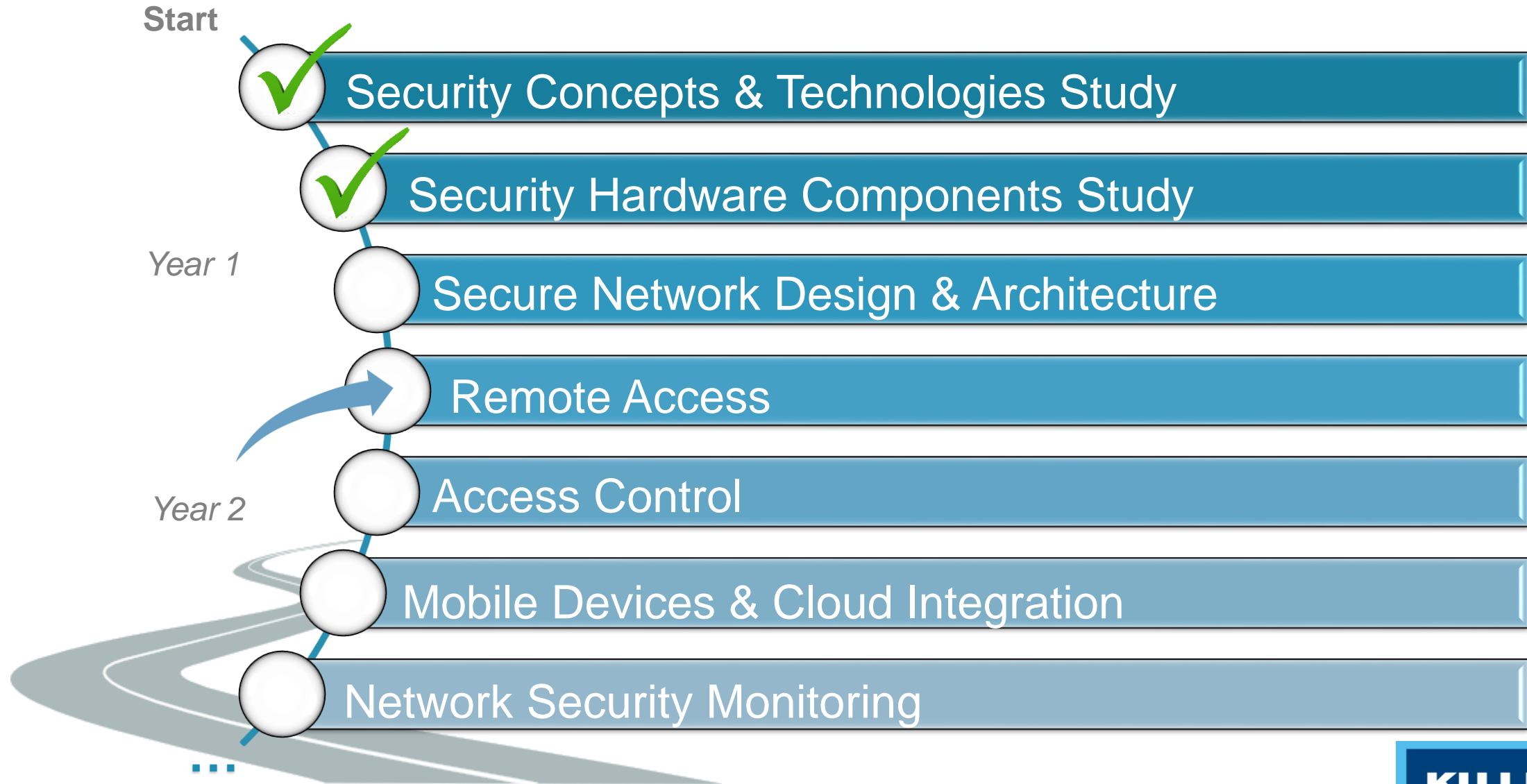
Secure Network Design & Architecture



Secure Network Design & Architecture



Project Roadmap

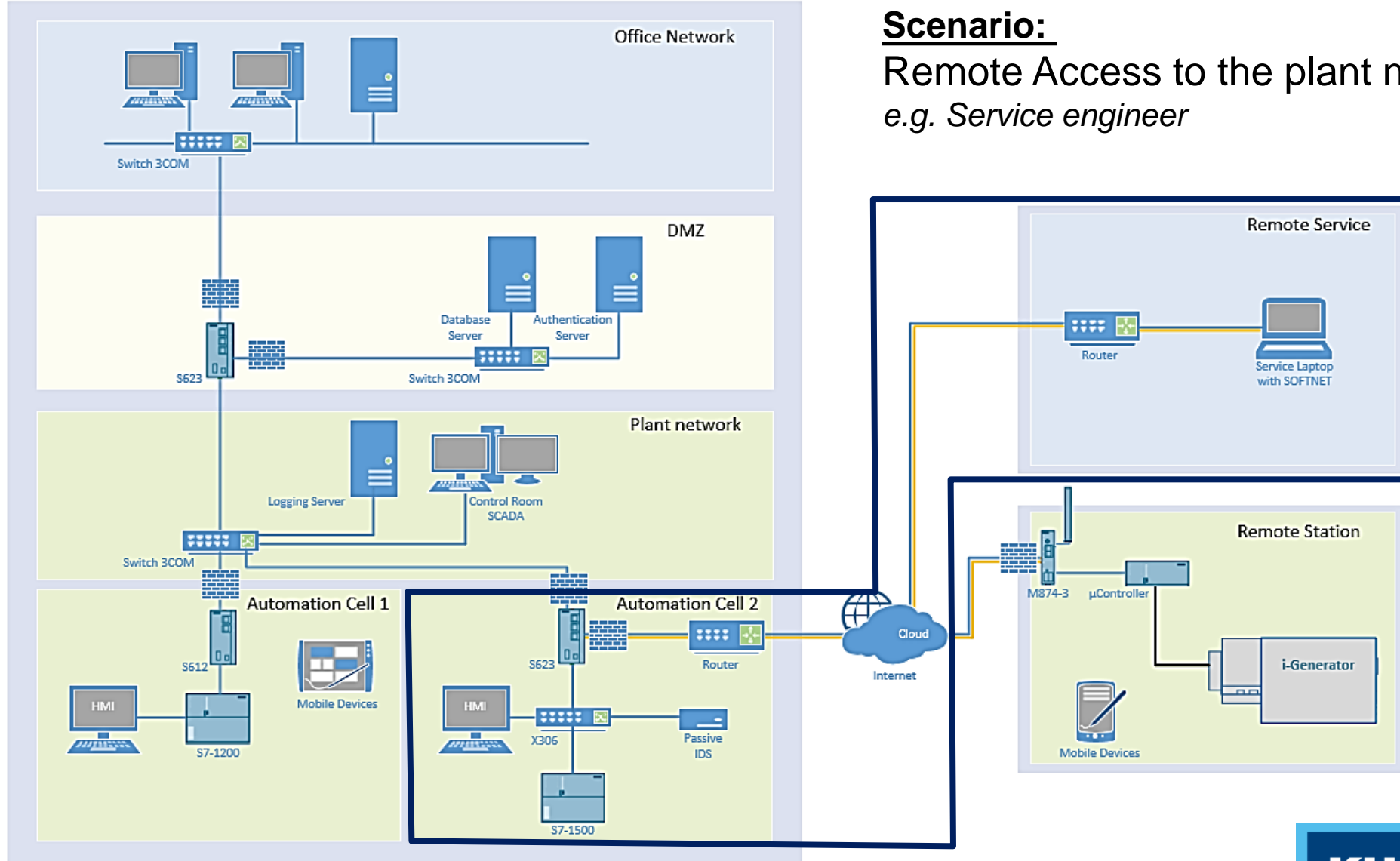


Remote Access

- **Technology & Hardware for secure communication**
 - IPSec & OpenVPN
 - Industrial VPN Router
- **Implementing and testing two scenarios**
 - Remote Access to the plant network
 - Remote Access to a remote station



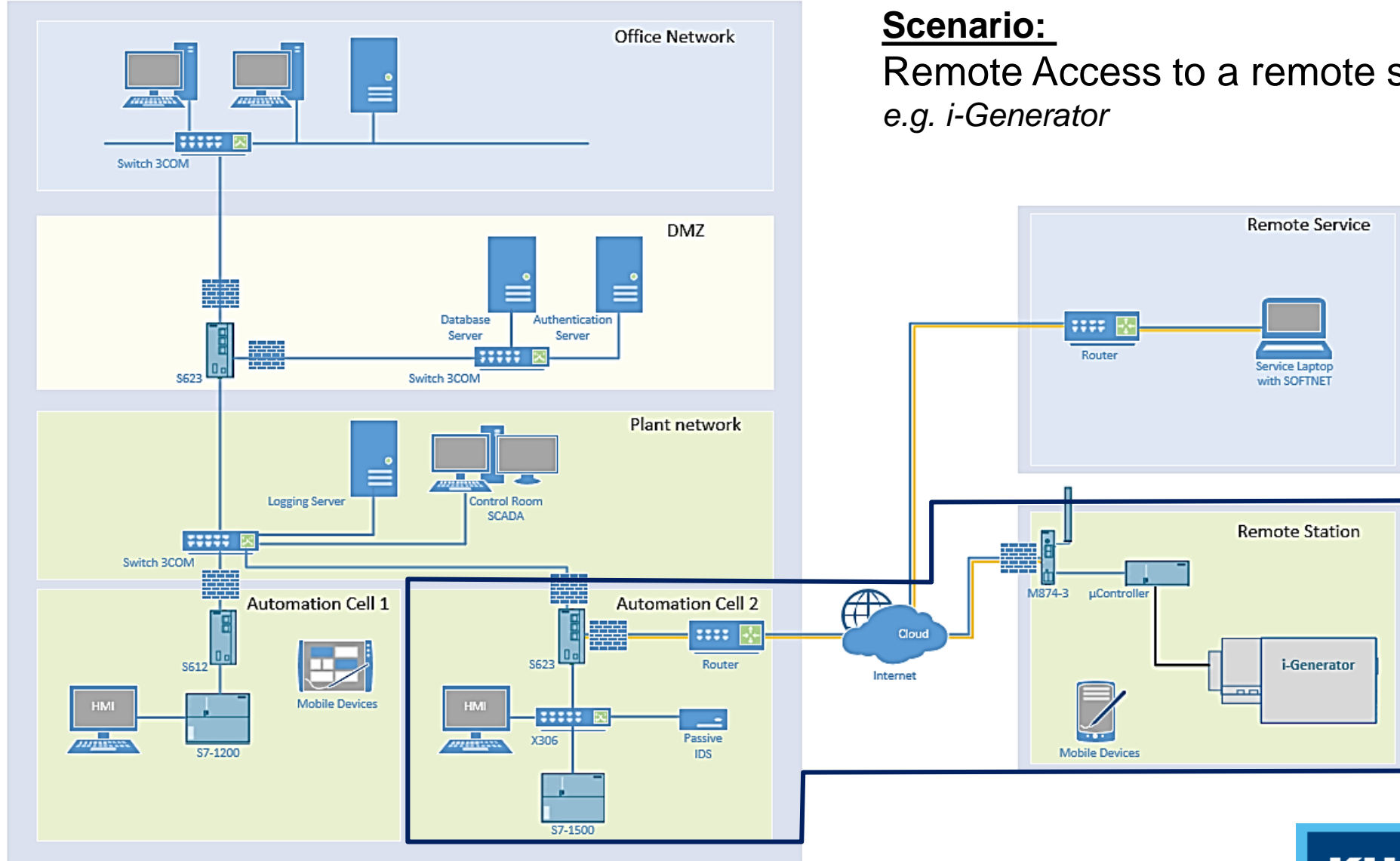
Remote Access



Scenario:

Remote Access to the plant network
e.g. Service engineer

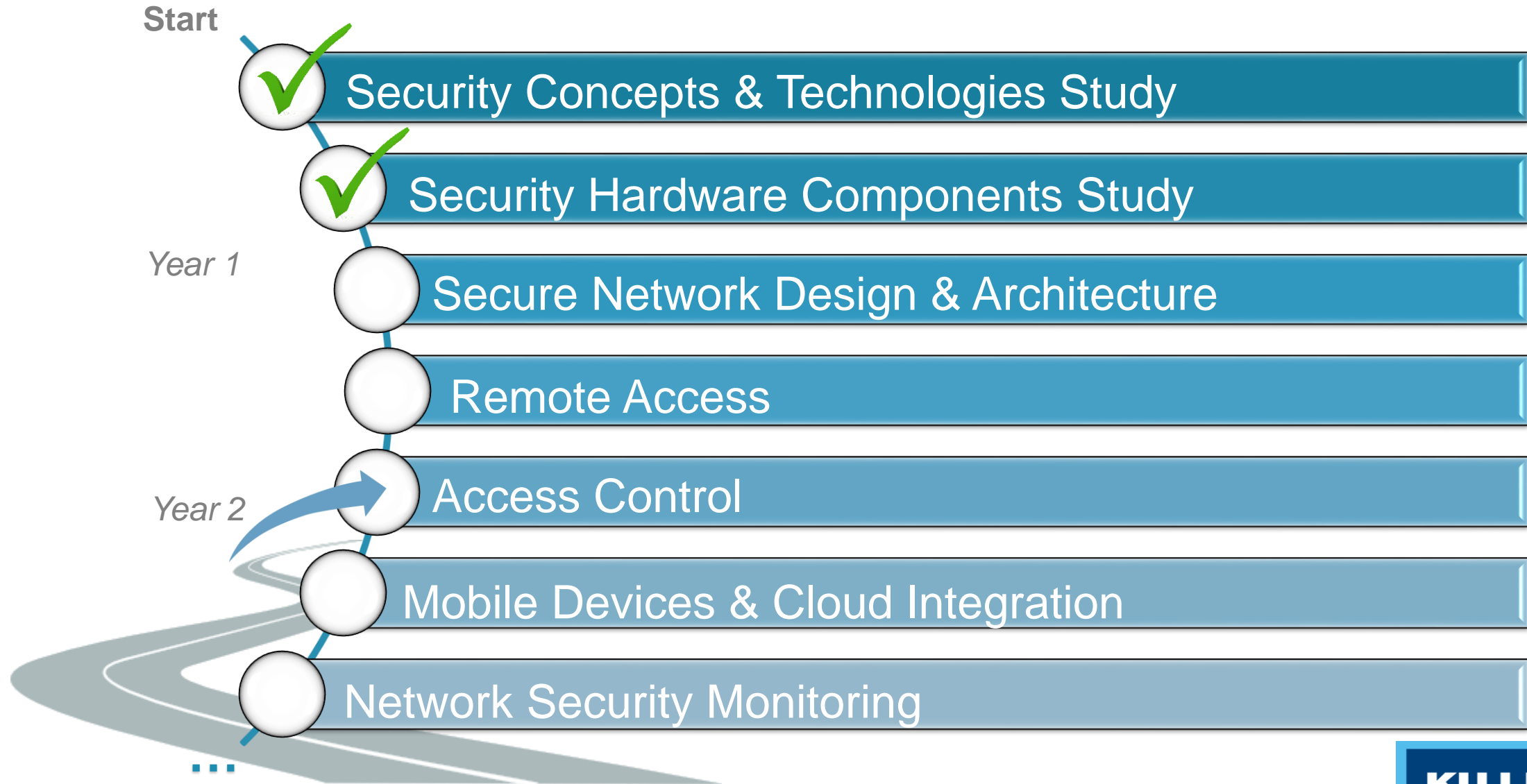
Remote Access



Scenario:

Remote Access to a remote station
e.g. *i-Generator*

Project Roadmap



Access Control

“Access control is the process of allowing only authorized users , programs, or other computers systems to observe, modify, or otherwise take possession of the resources of a computer system.”

- **Implementing Authentication & Authorization**

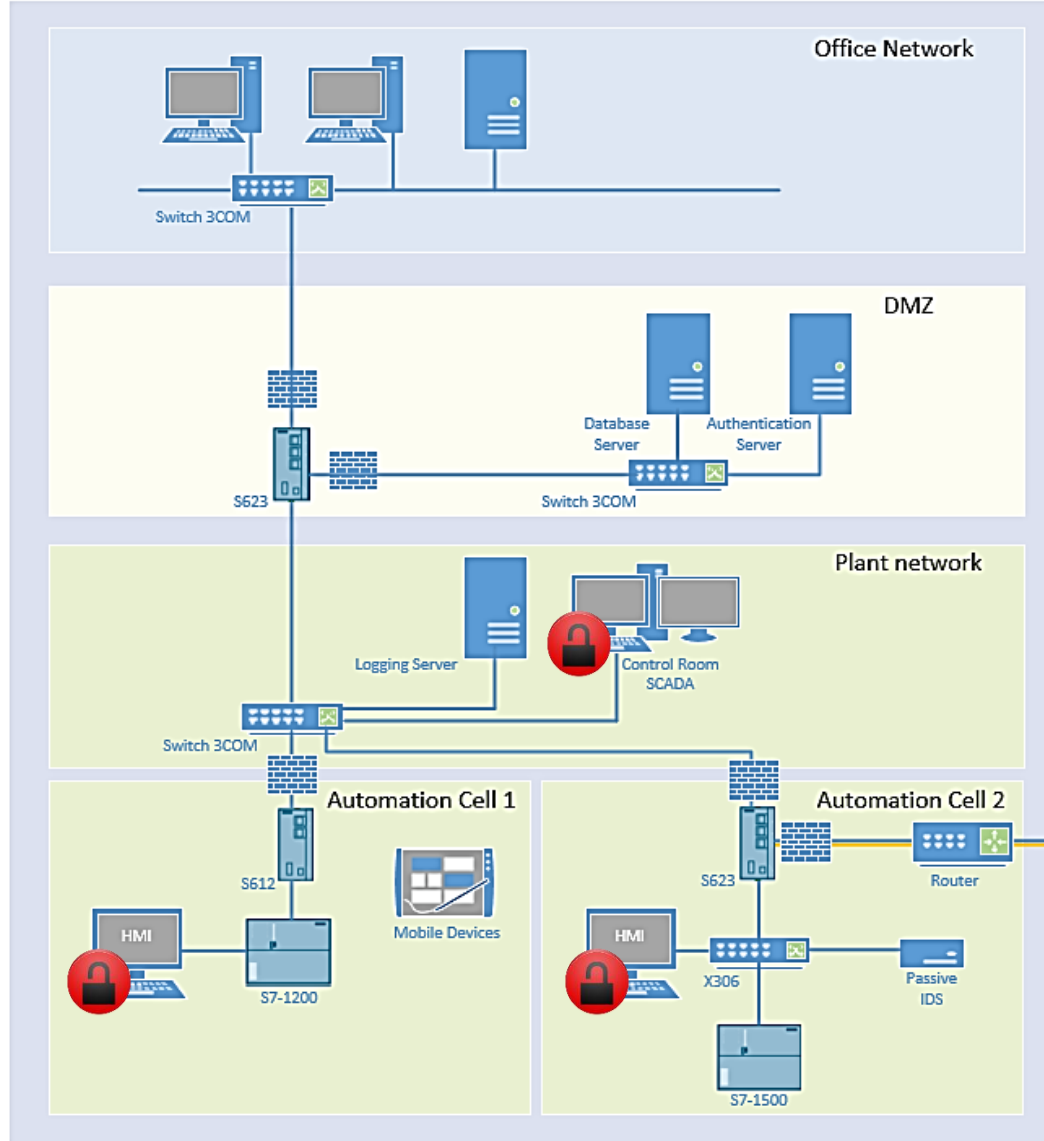
- Securing Operator & Engineering Stations
- Securing Mobile Devices
- Multi-Factor Authentication
- User Rights & Roles

- **Implementing Accountability**

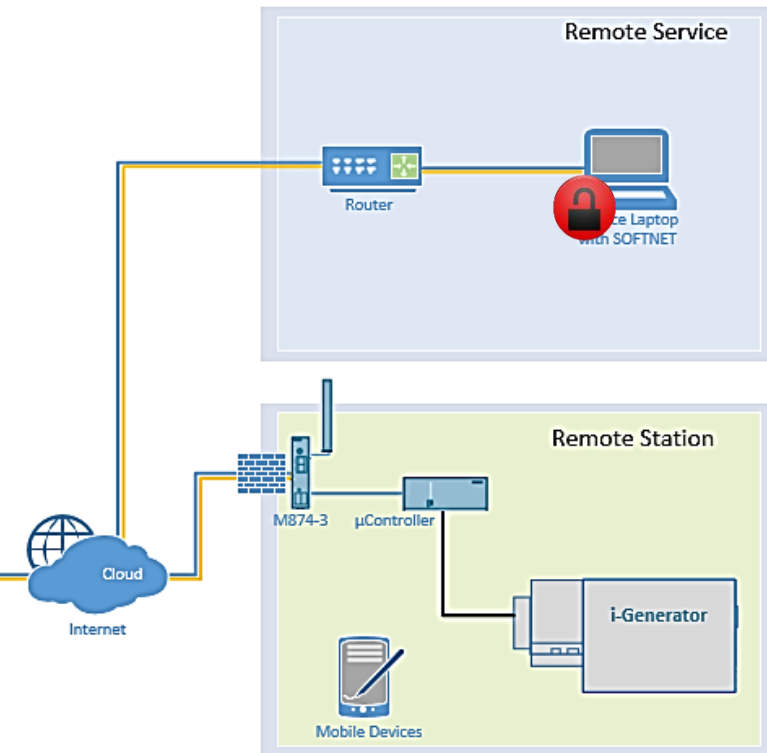
- Logging Operator Actions



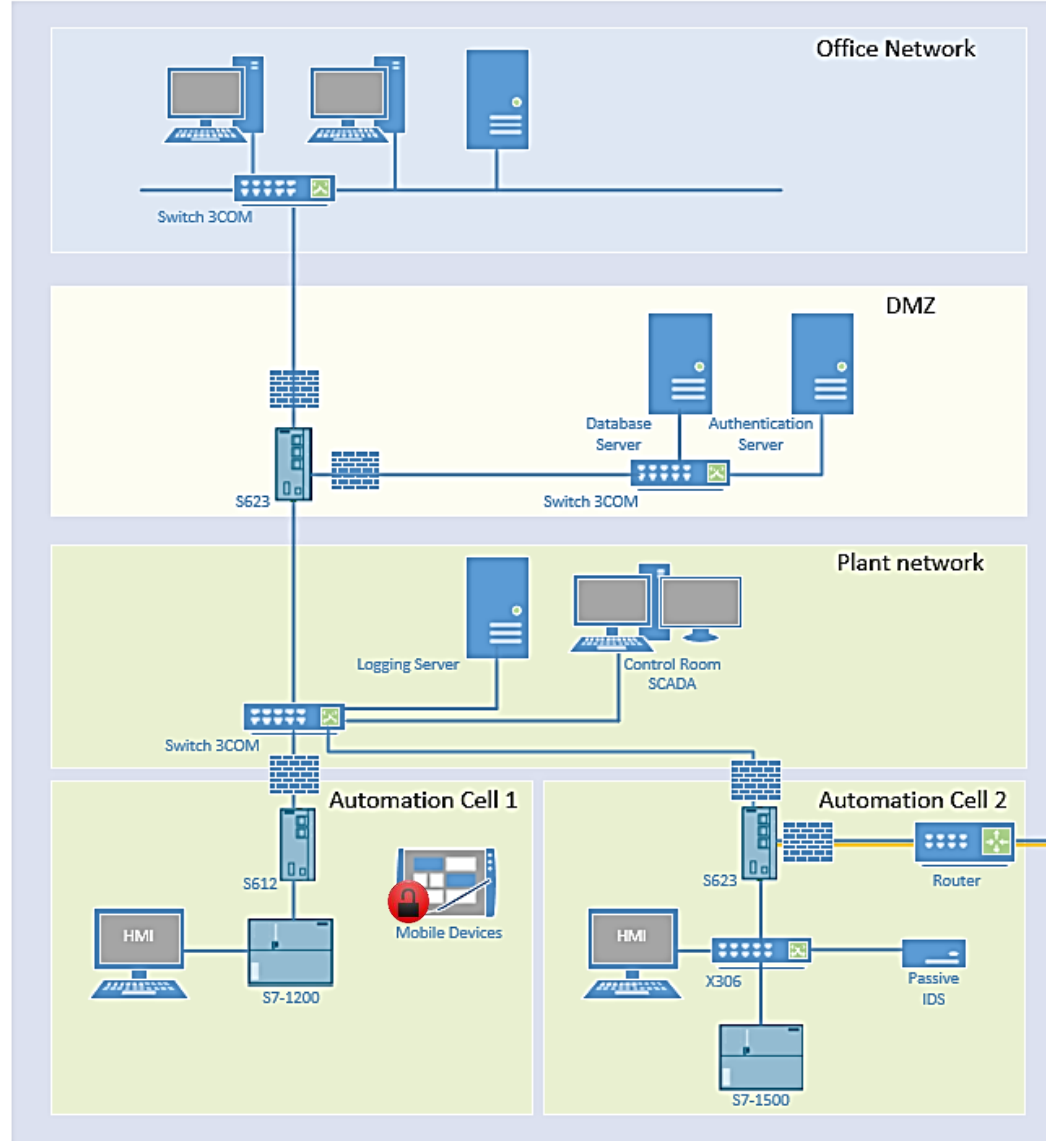
Access Control



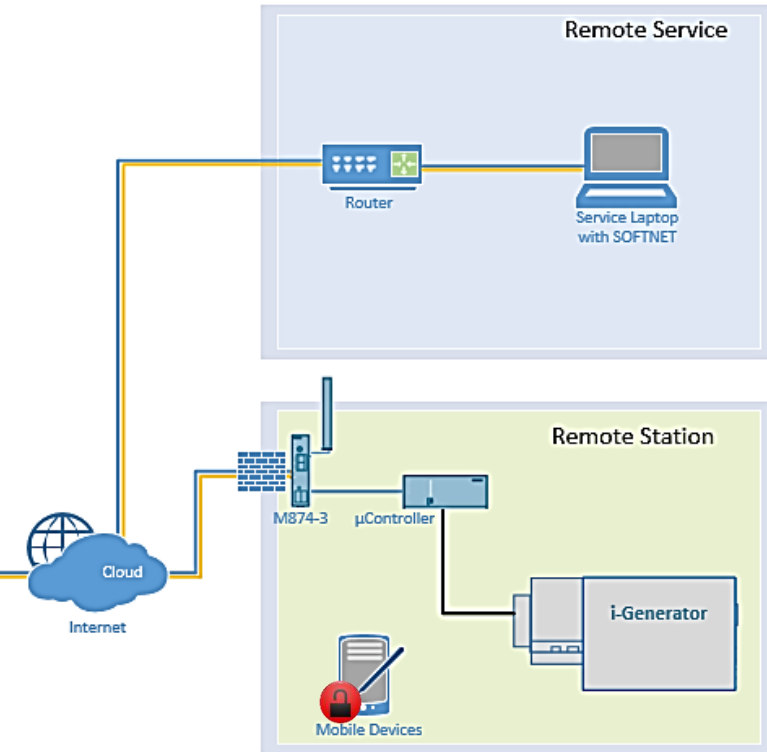
Authentication & Authorization: Operator & Engineering Stations



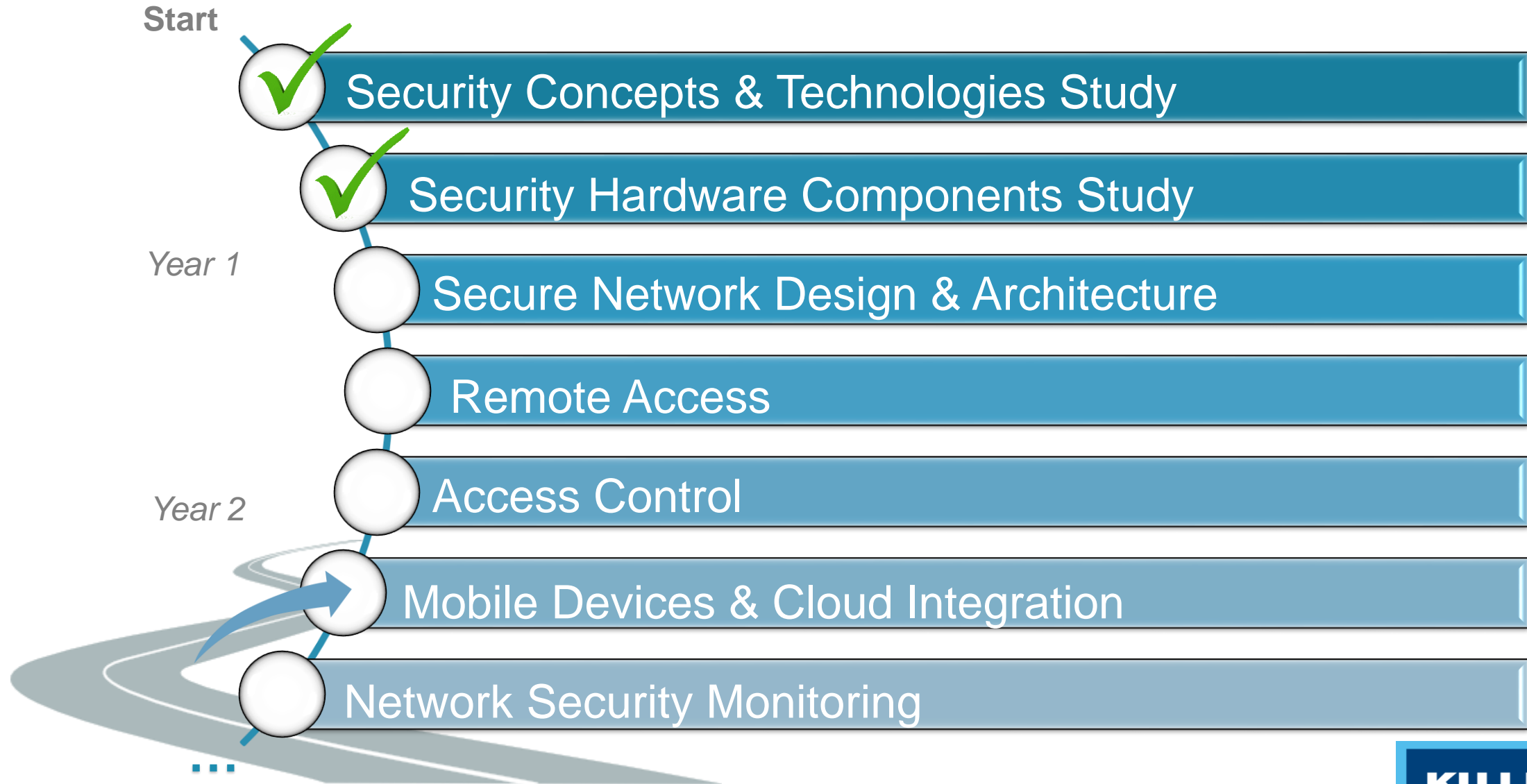
Access Control



Authentication & Authorization: Mobile Devices



Project Roadmap

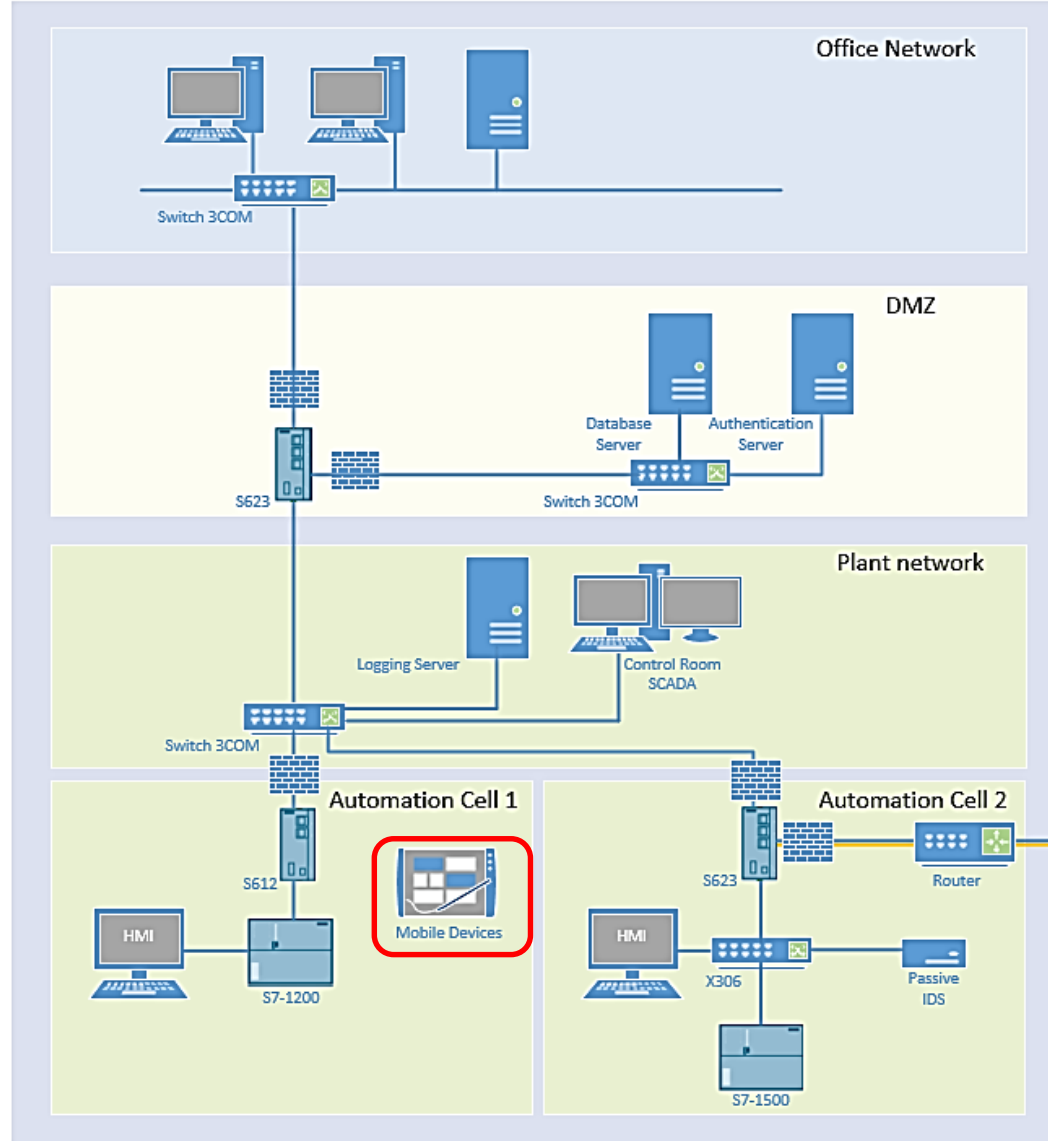


Mobile devices & cloud

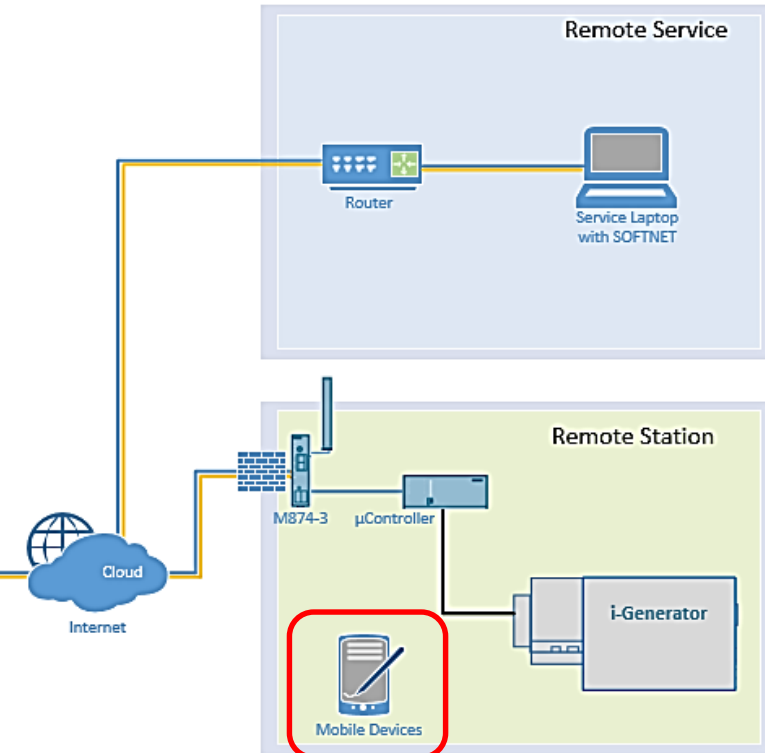
- **Mobile Devices in Industrial Control Systems**
 - How can mobile devices fit in the industrial environment?
 - Security Aspects
- **Cloud Networking & Computing**



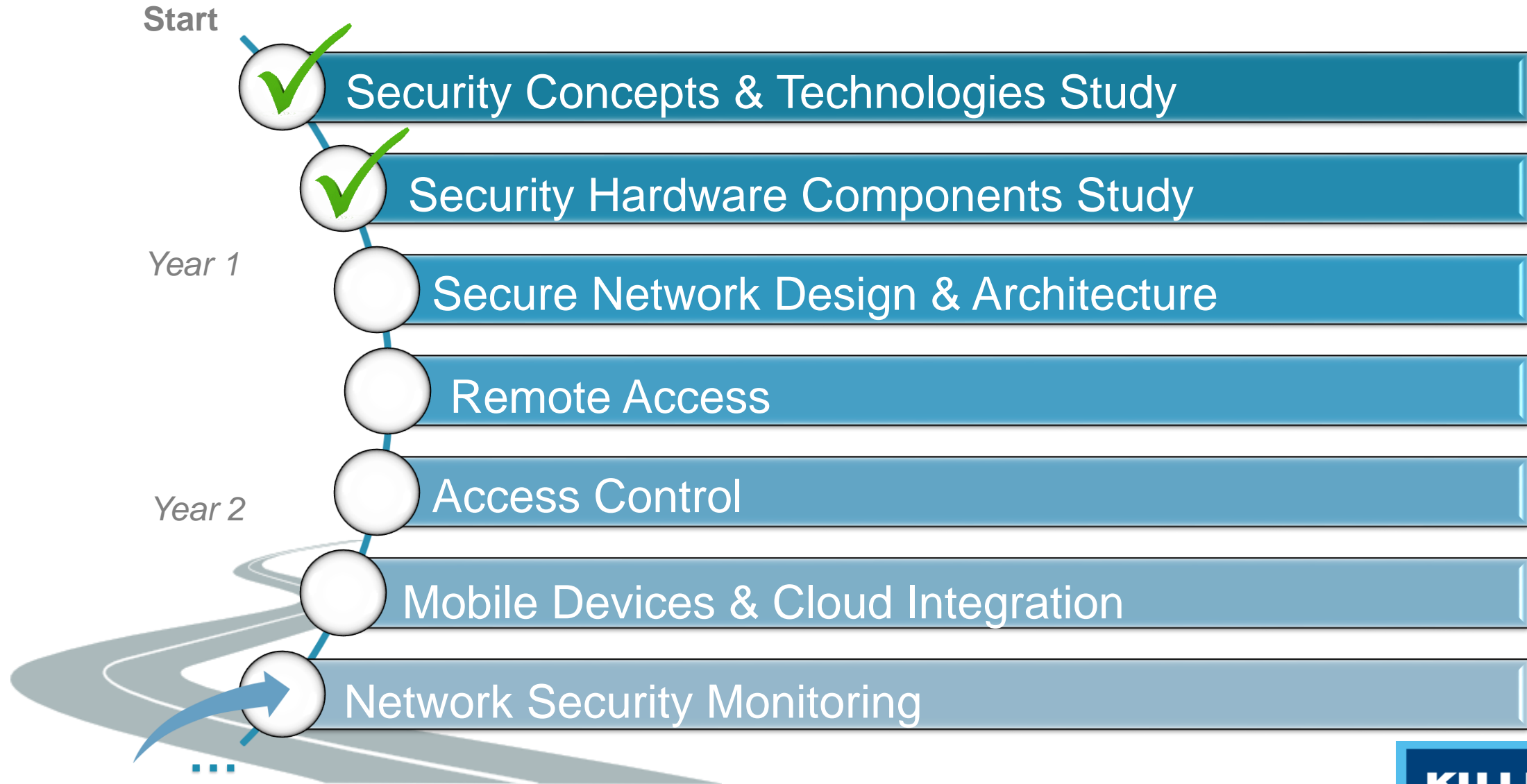
Access Control



Mobile Devices



Project Roadmap

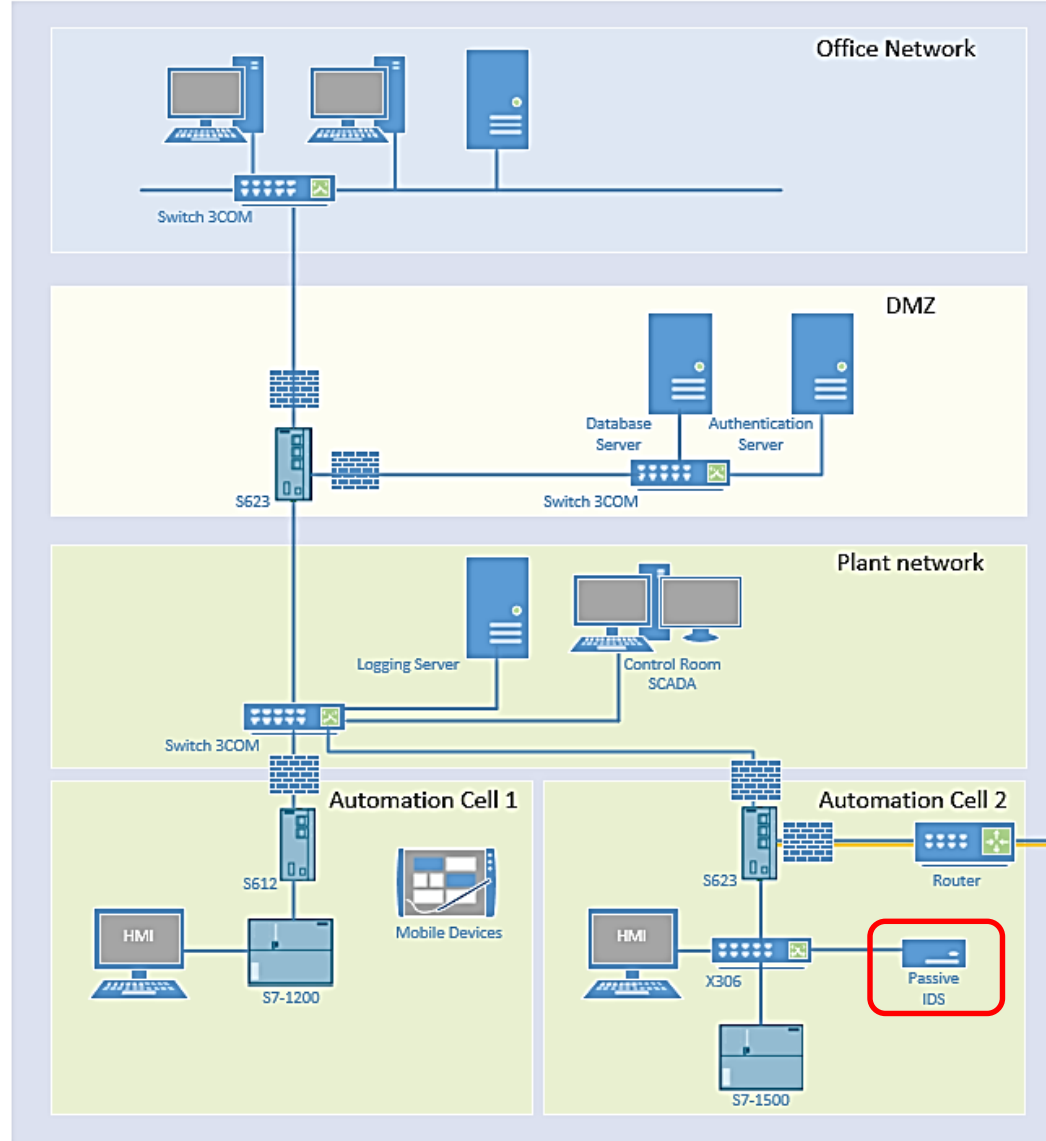


Network security monitoring

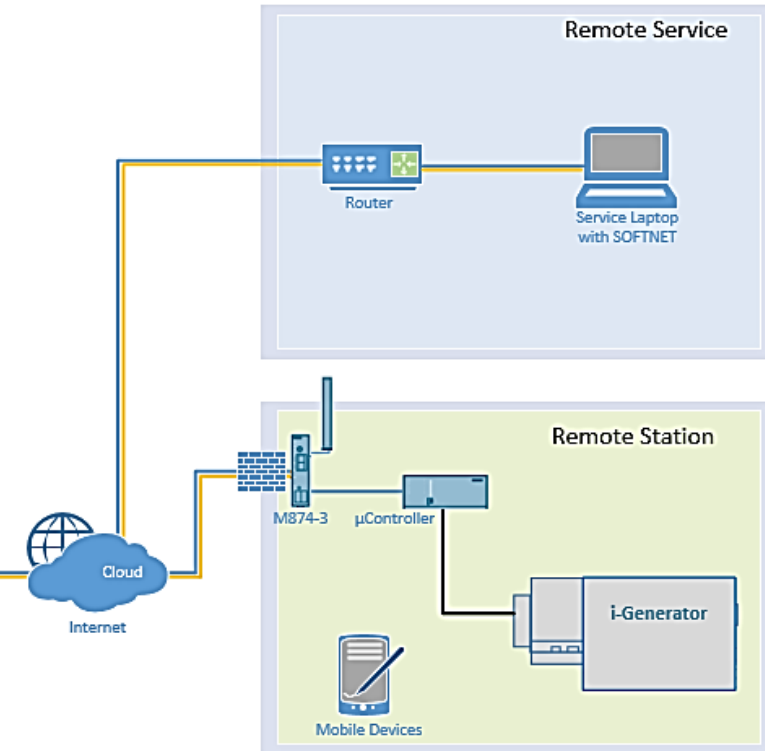
- **Intrusion Detection System for industrial networks**
 - Rules for SCADA & Fieldbus Communication
 - Network parameters monitoring (load, jitter,...)
 - Based on SNORT opensource Software
- **Implementing an IDS in a low cost setup**
 - Testing of IDS rules in multiple scenarios



Access Control



Intrusion Detection System (IDS)



Project Roadmap

