



# Monitoring Solutions

Monitoring of Overhead and  
Underground MV/LV networks



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MONITORING OF OVERHEAD AND UNDERGROUND MV/LV NETWORKS

**CAHORS is a key player in smart electrical networks** and is involved in the energy transition by offering solutions meeting the requirements of Distribution Network Operators (DNO) as regards:

## Energy Availability

- Shorter and less frequent power cuts
- Less zones affected

## Energy Supply Quality

- Compliance with voltage thresholds
- Management of interferences (harmonics, flickers)
- Monitoring of the voltage level distributed

## Energy Profitability

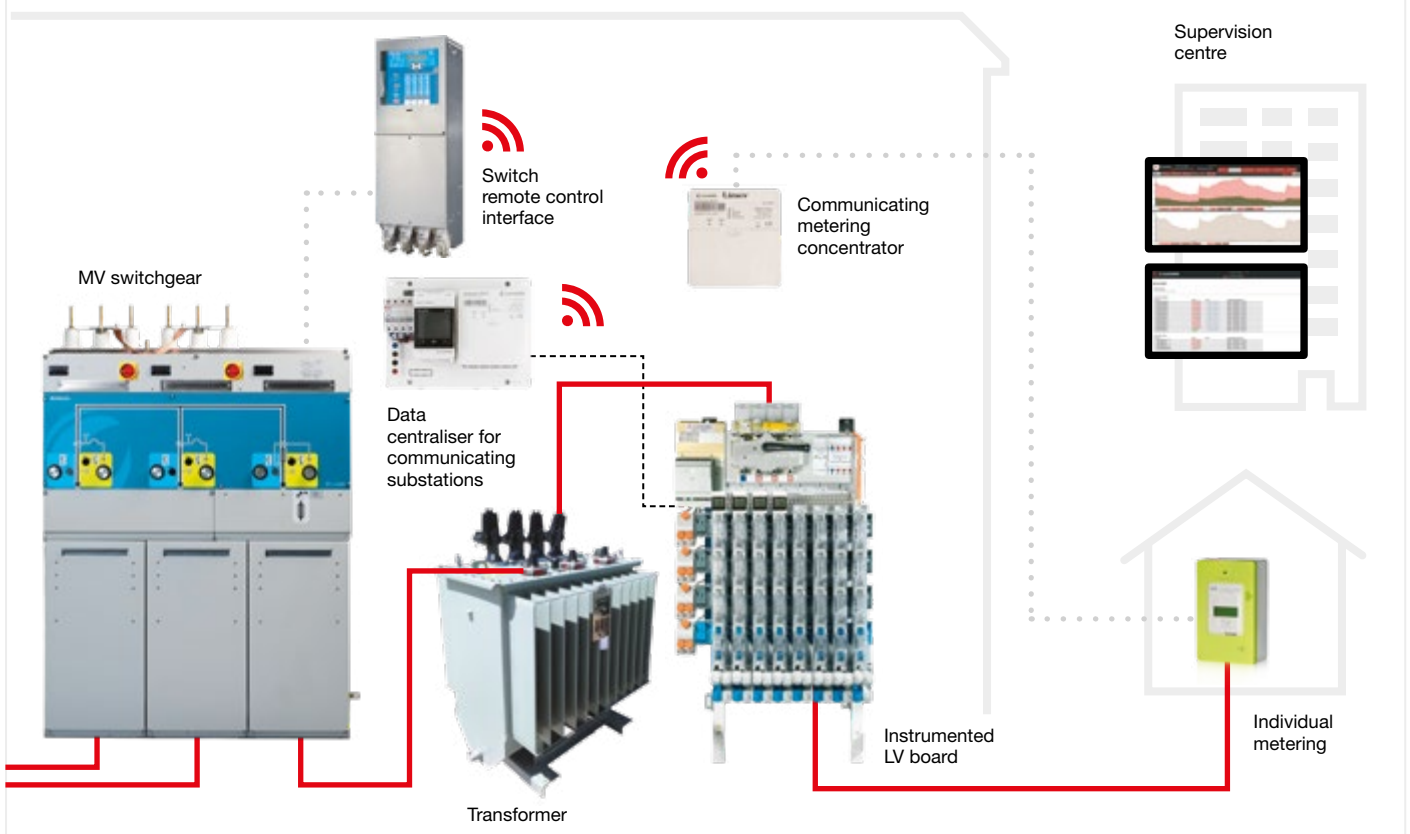
- Investment optimisation
- Durable facilities
- Less power losses
- Controlled operating costs

## Safety

- Safety of the interveners
- Safety of customers and third parties

## > UNDERGROUND NETWORKS

### SMART UTILITY DISTRIBUTION SUBSTATION



## > OVERHEAD NETWORKS

### SMART UTILITY DISTRIBUTION SUBSTATION



Self-protected pole mounted transformer

Instrumented LV board



Pole-mounted substation data measurement and communication system



Supervision centre



## > UNDERGROUND NETWORKS

### SMART SECONDARY DISTRIBUTION SUBSTATION

Information Exchange and Operating System



MV switchgear remote control



Modem for industrial meters



Meter



Data centraliser for communicating substations



Step-up or step-down transformer



Main LV board



Supervision centre



## > MONITORING SYSTEM FOR MV/LV DISTRIBUTION SUBSTATIONS

Our monitoring solutions for utility distribution substations are adapted to all network configurations, whether overhead, underground or even private, and are suitable for either new or existing facilities. Our systems comprise an assembly of operational data processing and communication modules:

- **Sentinel® FRTU**: data centraliser for measurements and events, making it possible to monitor MV/LV transformer substations remotely.

- **Sentinel® MMU**: three-phase network analyser specifically adapted to the safety requirements in MV/LV distribution substations

Fitted directly onto the Low Voltage boards, specific plates or inside suitable casings for pole-mounting, these systems make it possible to process, then centralise and communicate all the data and events required to monitor a MV/LV substation and electrical distribution network.

The functionalities of the Sentinel® FRTU system are as follows:

- Measures the ambient temperature and that of the transformer through 2 inputs for PT 100 sensors.
- Monitors faults and events that may occur through 4 digital inputs (fault detectors, DGPT2 transformer protection relay, backup source, etc.)
- Stores and timestamps these events and measurements
- Transmit - either locally or remotely through a means of communication (GSM/GPRS, Ethernet - the alarms, measurements and events to:
  - In-field agents (alerts received by SMS)
  - Operation managers (on-call personnel for example)
  - A remote information system for analysis or supervision

The communicating data centraliser Sentinel® FRTU makes it possible to collect the measurements from several Sentinel® MMU network analysers and any other measurement or metering devices that may already be installed in a substation:

- either downstream of the MV/LV distribution transformer output,
- or at the LV board outputs,
- or upstream of the MV/LV transformer to measure the medium voltage currents,

The Sentinel® FRTU collects the following electrical data through the Sentinel® MMU:

- LV voltages,
- LV currents,
- active, reactive and apparent power,
- the power factor,
- the frequency,
- harmonic disturbance rates (THD, distortion factor).



## > SELECTION

	Sentinel MMU	Sentinel FRTU
Data centralisation		x
Rogowski current sensors (Ø 70 and 120 mm)	x	
Current measurement	x	
Voltage measurement	x	
Event timestamping		x
Measurement timestamping (by default every 10 minutes)		x
Power (P,Q,S)	x	
Temperatures (PT 100 sensors)		2 input
THD (currents, voltages)	x	
TOR inputs		4 input
Text alarms (GSM, GPRS communication - SIM card not provided - M2M subscription)		x
FP / cos φ	x	
Threshold alarms		x
RS485 Modbus communication	x	x
IEC 104 communication (Ethernet/GPRS)		x
Onboard web server (by default 9 MMU)		x
Power supply voltage	230 VAC / 24VDC	Three-phase



## The CAHORS monitoring solutions were developed for utility distribution uses and associate the users in the innovation process.

They meet customers' needs as regards:

- Equipment safety and level of security in compliance with category III or IV of IEC standard 61010,
- Quick to install due to the optimised connections and reduced cabling,
- Simple commissioning

CAHORS offers either partially mobile or fully integrated mobile equipment, along with configurable solutions, that can be used either locally or remotely, with alarms transmitted either by email or text.



### The Advantages of the Solution

- Monitoring design adapted to all MV/LV substation configurations,
- Better perception of the loads/productions balance,
- Optimised integration of renewable energies
- Highlighting of phase imbalances
- A tool for analysing and understanding technical and non-technical losses



### Customer Benefits

#### Operating Gains

- Less power losses
- Shorter and less frequent power cuts

#### Improved supply quality

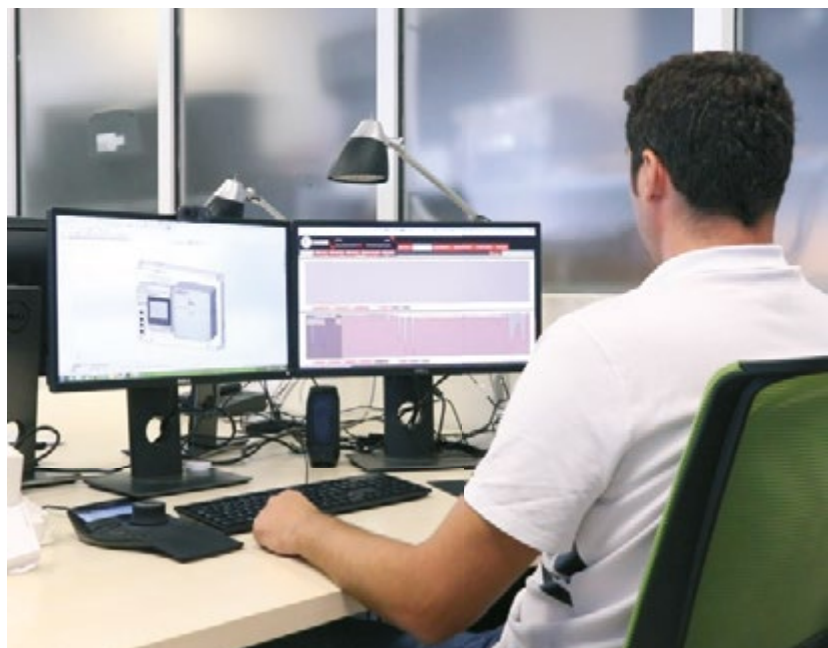
#### Efficient management of maintenance operations

- Facilitates the scheduling of preventive maintenances operations
- Increases equipment service life

#### Analysis of the power distribution quality according to standard EN 50160

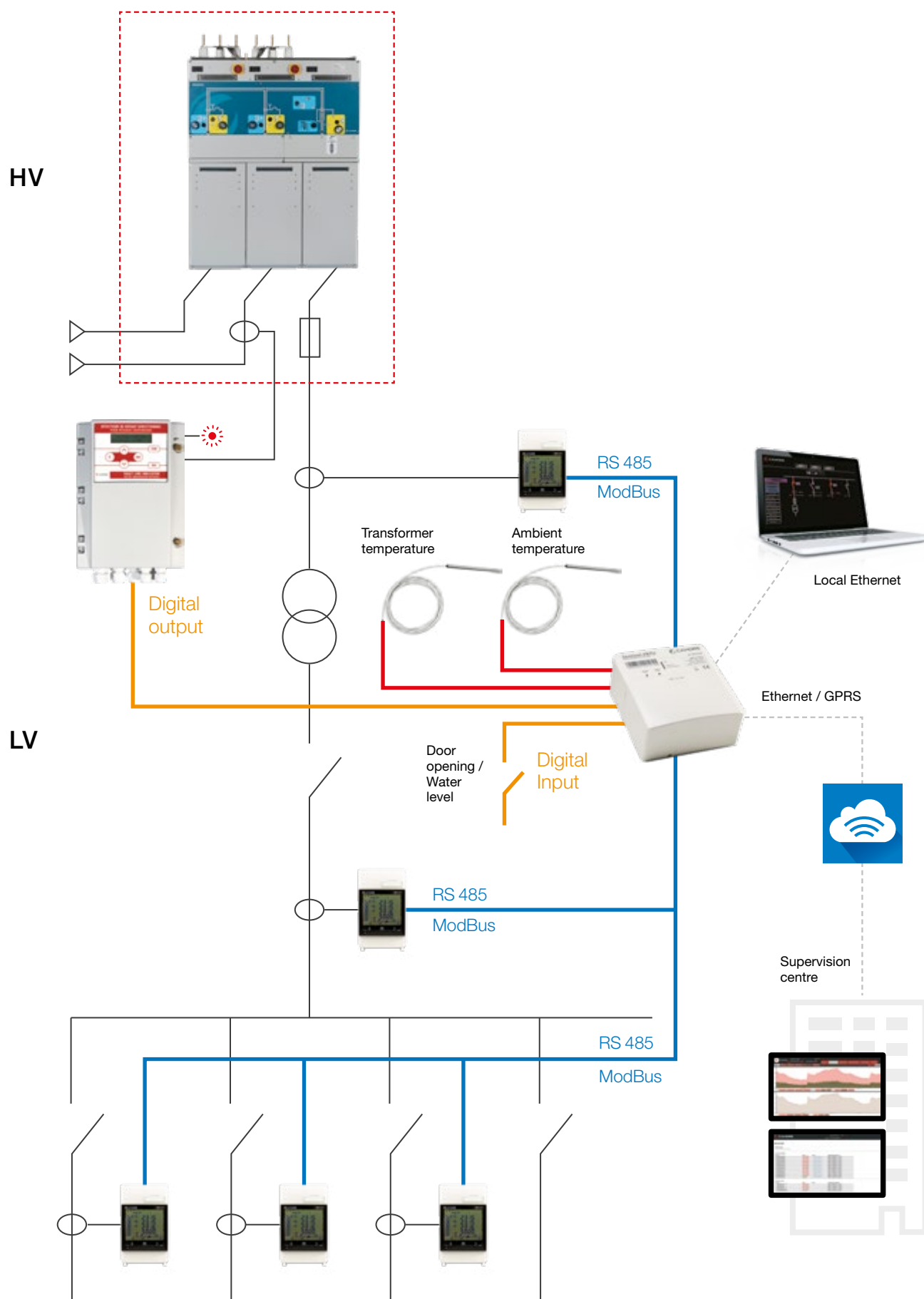


Sentinel® EN 50160  
mobile monitoring kit

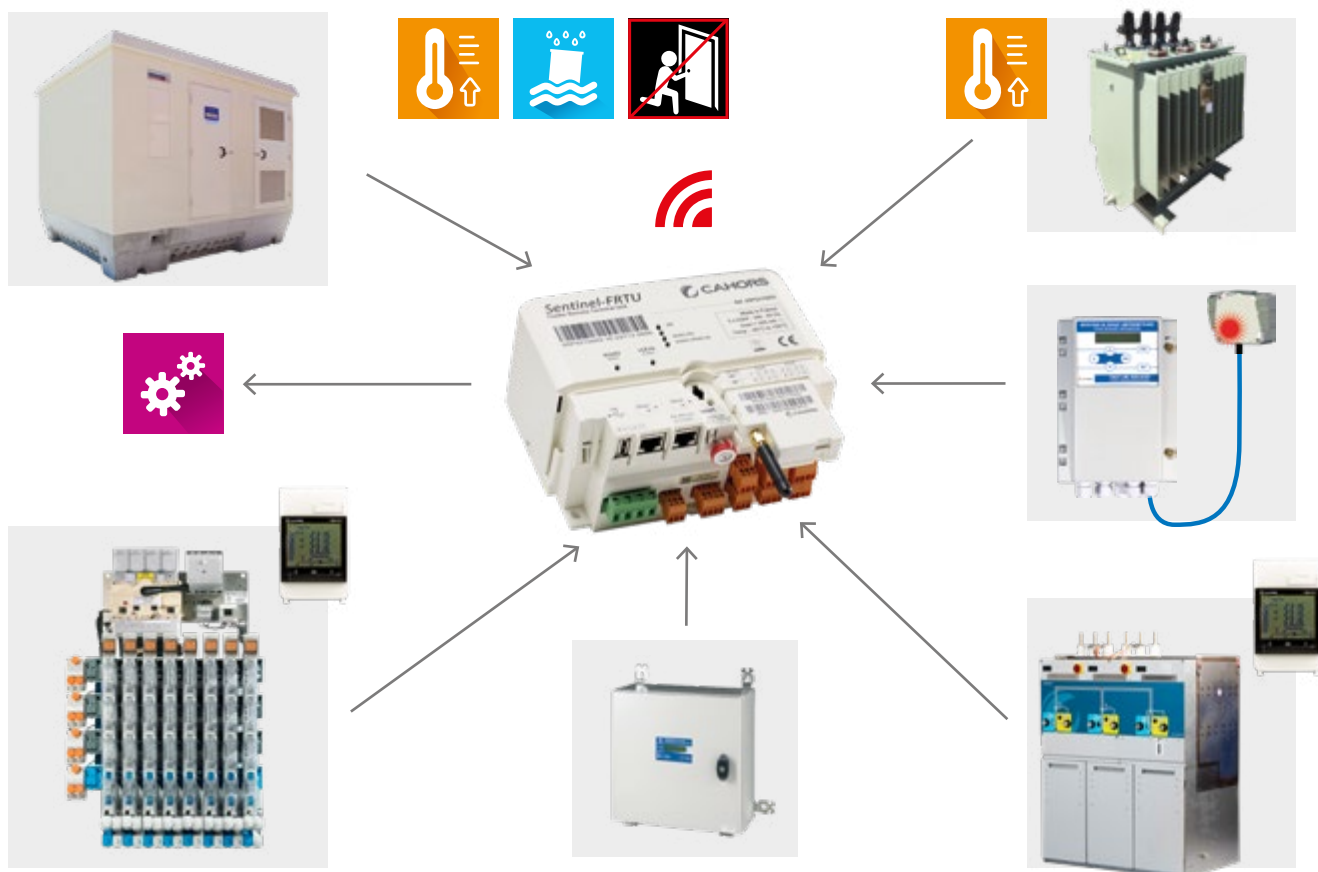


Visualisation of archived data,  
in real time and remotely

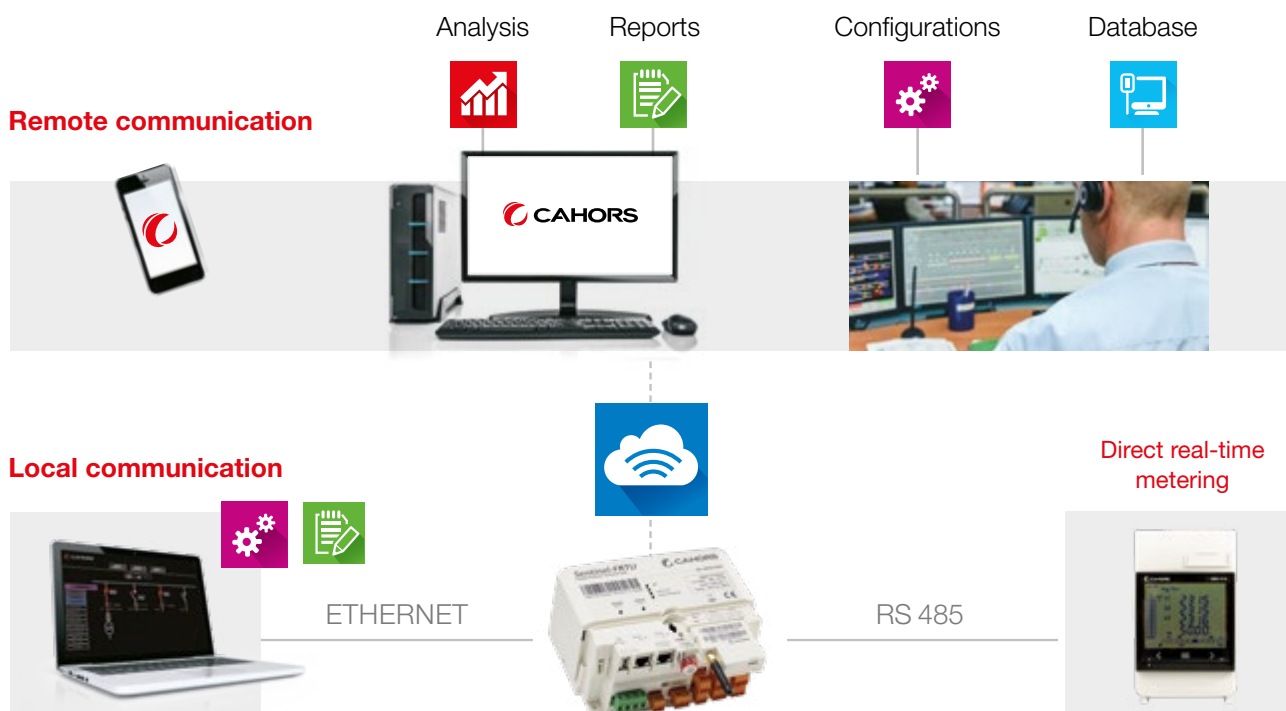
## > GENERAL ARCHITECTURE OF THE UNDERGROUND SUBSTATION



## > GENERAL ARCHITECTURE OF THE UNDERGROUND SUBSTATION



## > COMMUNICATION ARCHITECTURE





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