

General presentation

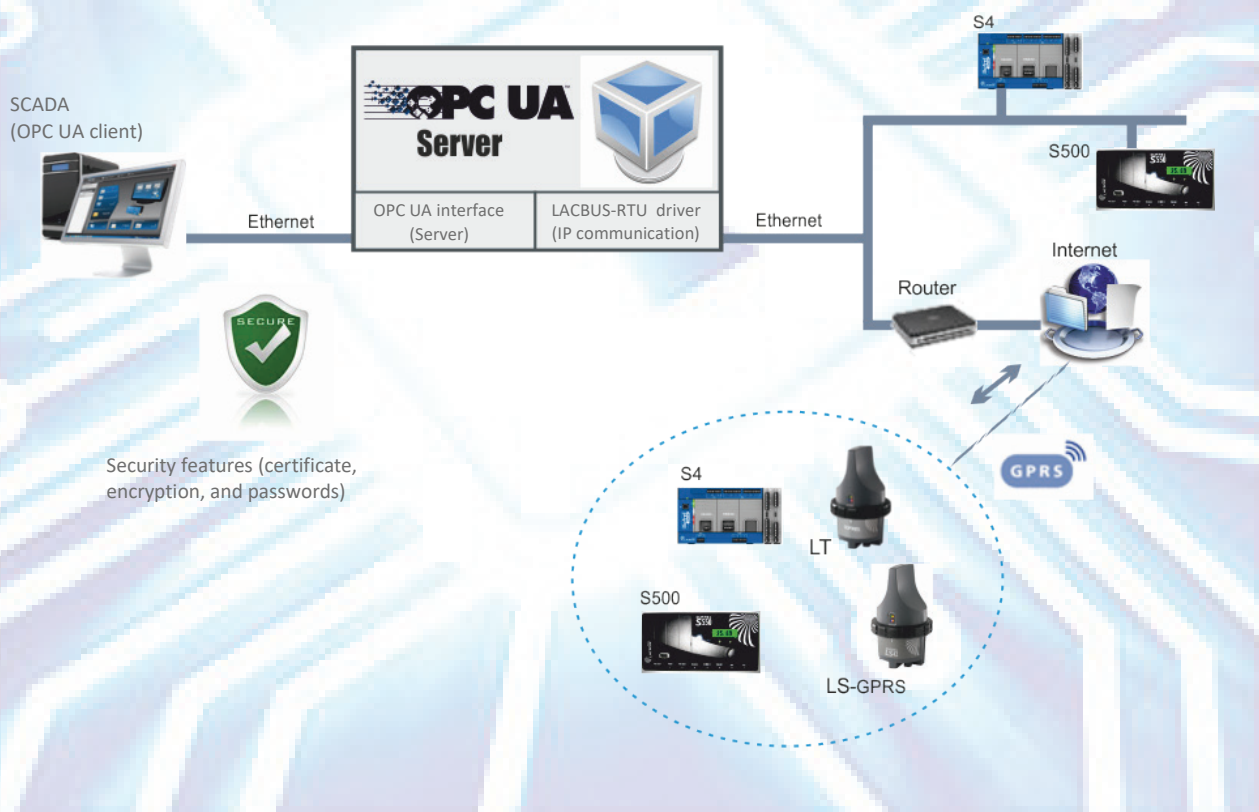
1 Preamble

OPC is a machine-to-machine communication protocol used in industrial automation, developed by the OPC foundation. An independent service-centric platform, **OPC UA** (for "Unified Architecture") includes all the features of the conventional OPC standard. It thus allows data exchanges between third party systems, without the need to develop proprietary protocols.

2 OPC server and clients

The SOFREL OPC UA server **centralizes all data** for a network of SOFREL devices (remote terminal units and/or data loggers) and relays these data to the **OPC clients of SCADA** using the **OPC UA 1.04 Server** standard with Data Access profile (IEC 62541).

The SOFREL OPC UA server communicates with SOFREL telemetry devices via the LACBUS-RTU protocol **over IP** and includes computer security mechanisms.



3 Compatibility and capacities

3.1 Capacities

The SOFREL OPC UA server uses the Ethernet board and a **single Ethernet port**; it can communicate with **4 SCADA clients** by default.

Communications	Type	Maximum capabilities	Device types
LACBUS-RTU protocol (to SOFREL devices)	RTU	500 Remote Terminal Units	S500 range, S4 range
	DL	2000 Data Loggers	LS/LT range
	10 clients for polling the RTUs (200 maximum) 50 servers for receiving spontaneous transmissions from the devices (1000 maximum)		
OPC UA interface (to SCADA)	4 SCADA clients (100 maximum)		

3.2 Operating System

The SOFREL OPC UA server runs on compatible **"64-bit" Windows OSs** (see Windows compatibility table).

3.3 Operation in a virtual machine

The SOFREL OPC UA server can run in a **professional virtual machine** (see Windows compatibility table for VMs recommended by LACROIX Sofrel).

3.4 Software key protection

The software options (capacities) associated with each installation are controlled by a software key.

4 Configuration

The SOFREL OPC UA server is configured **via a simple XML file**.

5 Diagnostics

The SOFREL OPC UA server records all traces of the various protocol exchanges in logs:

- between OPC client of SCADA and the SOFREL OPC UA server,
- between the SOFREL OPC UA server and the devices.

6 Description of communications

6.1 Communication with Remote Terminal Units (RTUs)

The SOFREL OPC UA server acquires data from the RTUs and makes them available to the clients:

- current state values,
- time-stamped values,
- operating parameters.

Upon request by the SCADA client, the SOFREL OPC UA server sends operating instructions and operating parameters to the RTUs.

The SOFREL OPC UA server is also in charge of adjusting the time of the RTUs and of receiving spontaneous transmissions via the LACBUS-RTU protocol.

◆ Primary and secondary media

The SOFREL OPC UA server can be used to define two different IP communication media for each RTU:

- The primary medium is used preferentially whenever polling is triggered.
- The secondary medium is used as a backup to obtain and send data if the primary medium fails, or upon request by the SCADA.

◆ Sustained polling of a Remote Terminal Unit

The SCADA may trigger the polling of a RTU with "sustained communication" for a given duration (e.g.: when the SCADA user wishes to check updates to the data exchanged with this device). This sustained communication request is effective for one communication only.

6.2 Communication with Data Loggers (DLs)

The SOFREL OPC UA server receives messages from DLs via the LACBUS-RTU protocol; message transmission is always initiated by the DLs.

◆ Remote update of DL configurations

The OPC UA server integrates a remote update function of the DL configurations (for DL in version V5.10.14 at least).

The user deposits a DL configuration file, produced by SOFTTOOLS, in the installation tree of the OPC UA server.

During the first daily communication of the DL, the OPC UA server indicates the availability of a new configuration; the DL can then acquire it. When a configuration has been transmitted to the DL, the OPC UA server deletes it from its tree structure where it was temporarily stored.

6.3 Communication with SCADA

The **SOFREL OPC UA server** is totally controlled by requests from OPC client of SCADA and calls from devices:

- The SCADA send polling requests and sending requests for operating instructions or operating parameters.
- The OPC UA server then triggers the appropriate communications with the concerned Remote Terminal Units and relays the data received via the OPC items to which the SCADA are subscribed. Time-stamped data, corresponding to OPC items to which no SCADA are subscribed, are lost.

The SOFREL OPC UA server also generates internal data used to diagnose network communications.

7 Operating security

7.1 Current value backup

In order to allow shutdowns/reboots without loss of context, the SOFREL OPC UA server integrates a mechanism:

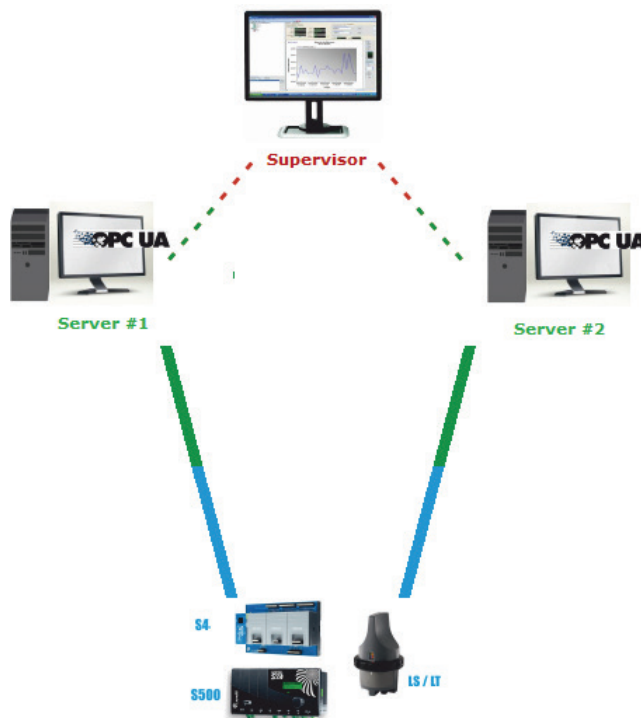
- ensuring the persistence of current OPC item values (values are stored as they change),
- for reloading stored values when the server reboots.

7.2 SCADA identification

By default, the SOFREL OPC UA server allows anonymous connections from SCADA. But the access to the SOFREL OPC UA server can be secured by forcing the SCADA to identify themselves.

SCADA identification is mandatory to ensure no time-stamped data is lost (see § 7.4).

7.3 Redundancy



SOFREL device redundancy is implemented by the ability to transmit all data to multiple recipients. Both SOFREL OPC UA servers converse constantly with the devices.

SCADA redundancy is implemented by the double data source function for an item. The SCADA is connected to only one SOFREL OPC UA server at any given time. In case of failure, the SCADA switches to the other SOFREL OPC UA server.

In most cases, the SCADA do not support receipt of duplicates (e.g.: 2 time-stamped values for the same time). Activation of redundancy on both SOFREL OPC UA server allows to conform to this constraint (see § 7.4).

7.4 Time-stamped values management

Several cases are to be considered:

1- If a SCADA is connected:

The SOFREL OPC UA server transmits it all the time-stamped values received for the items it subscribed to. All other time-stamped values are lost.

2 If no SCADA is not connected:

- **If no identified client (ClientId) is defined in the configuration file of the server:**

The SOFREL OPC UA server only keeps the last time-stamped value received. All other time-stamped values are lost.

- **If at least one identified client (ClientId) is defined in the configuration file of the server:**

The SOFREL OPC UA server refuses, if possible, to recover the time-stamped values from the devices. Otherwise the SOFREL OPC UA server stores the received time-stamped values in RAM to transmit them to the SCADA at its reconnection.



Warning: The SOFREL OPC UA server can only keep these time-stamped values for a few hours or a few days depending on the size of the network and the available RAM.

Starting with **software version 5.10.14**, Data Loggers keep their time-stamped values if the SOFREL OPC UA server is not able to process them. Updating Data Loggers is therefore recommended.

- **If a SCADA uses redundancy:**

The SOFREL OPC UA server only keeps the last time-stamped value received. All other time-stamped values are lost.

8 Computer security



The mechanisms built into OPC UA guarantee **secure communication over the Internet**:

- Security via X509 certificates and OpenSSL encryption,
- ID / Password,
- User permissions.

8.1 Integrity

Message signing prevents third parties from altering their contents.

8.2 Privacy

The confidentiality of data exchanged is guaranteed by message encryption.

8.3 Authentication and application authorisation

OPC UA servers and clients identify themselves to each other using certificates.

8.4 Firewall configuration

The server implements the OPC UA protocol in "TCP-based binary UA" form.

To configure the firewall, the SOFREL OPC UA server requires that the following ports be open:

- 4840 for communication with the OPC client of SCADA,
- 502 for communication with the devices,
(802 for secure communication with S4 devices).