




IEC 61850 LAN Design, Testing & Cybersecurity

 3 days

 English

 Cpuc04en

Ethernet is considered a fast, reliable, and scalable local area (LAN) technology that is becoming the predominant LAN technology within electrical substations. Through a combination of lectures and instructor demonstration lab exercises, students will learn how to correctly design and test Ethernet LANs for digital substation applications. The course will then progress to provide a strong foundation in the fundamentals of substation OT LAN cybersecurity.

Objectives

- ▶ Understand the requirements of an IEC61850 OT Ethernet LAN
- ▶ Understand the fundamentals of Ethernet LAN operation
- ▶ Understand how to design, configure, and commission an Ethernet LAN for the digital substation
- ▶ Understand the fundamentals of OT LAN cybersecurity

Content

- ▶ Introduction to IEC 61850
- ▶ OMICRON IEC 61850 Testing Tools
- ▶ Ethernet Layer 1
- ▶ Ethernet Layer 2
- ▶ Operation of RSTP
- ▶ Configuration of primary and alternate data paths
- ▶ Substation LAN Redundancy
- ▶ Virtual LANs
- ▶ Precision Time Protocol Operation
- ▶ Ethernet Layer 3: The network layer
- ▶ IPv4 addressing
- ▶ Introduction to IP Static routing
 - ▶ NAT/PAT
- ▶ Introduction to firewalling (layers 1 to 4)
- ▶ IPsec
- ▶ Cybersecurity attacks we can learn from
- ▶ Substation Cybersecurity
 - ▶ IT versus OT-security versus substations
 - ▶ FERC, NERC & CIP
 - ▶ Defense-in-depth principle applied to the electrical substation.
 - ▶ Electrical Energy OT Substation Architecture (Purdue Model)
 - ▶ NIST Security Framework
- ▶ Typical substation attack vectors
- ▶ Stateful firewalling

- ▶ Introduction to traffic filtering beyond layer 4
 - ▶ Deep packet inspection
 - ▶ Intrusion detection
 - ▶ Signature-based intrusion detection
 - ▶ Learning-based intrusion detection
 - ▶ Functional security monitoring intrusion detection System (StationGuard)
 - ▶ Demonstration

Solutions

DANEO 400
IEDScout
StationScout
StationGuard
Quick CMC
CMC GOOSE module
CMC IEC61850 Client/Server
module

Audience

Electrical Engineering staff, IT and Security officers from utilities, transmission and distribution networks, railway grids, service companies, and manufacturers involved in protection design.

Prerequisites

Basic knowledge of electrical engineering