Qixian 220KV IEEE1588 Substation

Project Introduction

The Qixian 220KV Digital Substation has been the backbone power system of Henan province in China. There was a need to enhance the communication systems for this aging electric grid; this mission critical substation moderniza tion project was completed with Kyland in December 2010. This project is a successful application of IEEE1588 technology. It integrates GOOSE, SV and IEEE1588 timing networks in accordance with IEC61850 standard, and realizes the real time transmission of GOOSE and SV message to guaran tee the network reliability.

Company: State Grid Corporation
Location: Qixian, China

System Requirements

- Supports IEEE1588 precision time synchronization with nanosecond-level time accuracy
- Real time transmission of GOOSE and SV messages
- Zero packet loss
- Compliant with the EMC, temperature and insulation requirements of IEC61850 for harsh environments

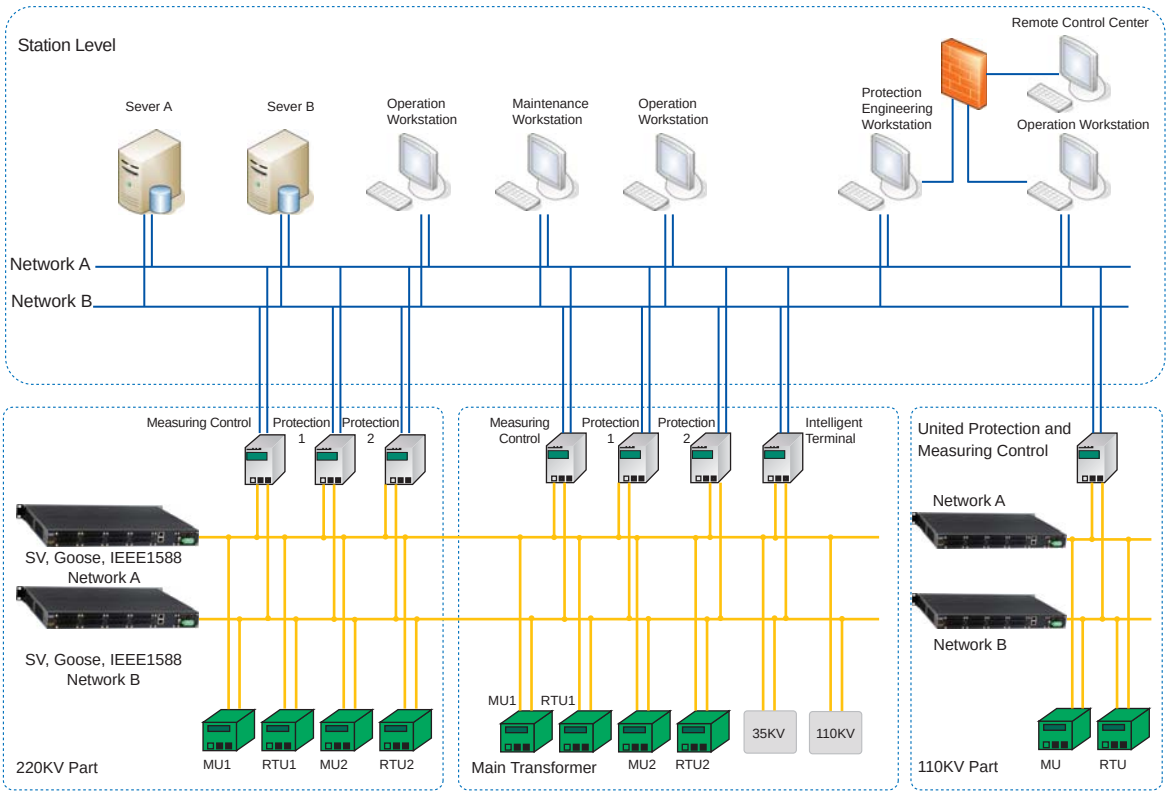
Kyland Solution

Mission critical substation automation networks rely on accurate time synchronization in order to coordinate activities across various subsystems and devices. In this project, the communication between all the IEDs is full IEC61850 compliant and meets IEEE1588v2 precision clock synchronization protocol to support ultra-fast GOOSE messaging with zero packet loss and seamless connection timing system that is accurate within the nanosecond range.

The Kyland SICOM3024PT industrial Ethernet switch was chosen as the network backbone solution. It is an IEEE1588v2 precision time synchronization switch compliant with IEC61850. All SICOM3024PT switches are deployed as Peer-to-Peer Transparent Clocks (P2P TC) in this project. They also support fast automatic switching between two redundant master clocks. The solution provider deployed two redundant master clocks using international GPS system and Chinese own Beidou satellite system to get the timing information. Kyland SICOM3024PT is able to switch the time source from one to the other within 600ns if one master's GPS signal is lost.

In Qixian 220KV substation, GOOSE network and SV (Sampled Value) network form different networks according to the voltage levels. 220KV and 110KV are applying double busbar scheme. The busbar devices, busbar coupler intervals, line intervals and main transformer

System Diagram



Why Kyland?

Supports IEEE1588V2, Boundary Clock (BC), E2E Transparent Clock (TC-E2E), P2P Transparent Clock (TC-P2P).

High accuracy: 100ns with 10 cascaded Ethernet switches.

Time source auto selection with only 600ns to switch time source.

200ns accuracy during ring recovery procedures.

Fast synchronization during power up, 15s per unit to synchronize all devices.

SICOM3024PT

- Layer 2 24+4G Port Managed Rack Mountable Modular IEC61850 & IEEE1588
- Switch
  Supports IEEE 1588 v2, Boundary Clock (BC), E2E Transparent Clock (TC-E2E),
- P2P Transparent Clock (TC-P2P)
- Exceeds IEC61850-3, IEEE1613
- Supports DT-Ring protocols and RSTP
  Operating temperature: -40 to 85°C (-40 to 185°F)

Please refer to **www.kyland.com** for more details