SEL Satellite Clocks: SEL-2401 & 2407

- Substation Rugged
- Accuracy: ±100 ns
- Holdover: 18 secs
- –40° to +80°C temp range
SEL Integrated PMUs

- Full IEEE C37.118 compliance
- Up to 60 messages per second
Stand-alone PMUs Are Available

- SEL-487E Station PMU
- SEL-351A PMU
SEL-3373 Station PDC
SEL-5073 Synchrowave PDC

- High performance
- Simple configuration
- Security features
- Substation Rugged
- Database archiving
- Status and logs
- Windows® OS
5073/3373 PDC Architecture

SEL-5073 SYNCHROWAVE PDC Functional Block Diagram

PMU or PDC Inputs

• >200 PMU or PDC inputs
• Variable input message rate from 1 to 240 messages per second
• Ethernet and/or serial inputs

Time Alignment

Data Concentration

Calculations
• Power (1P, 3P, P and Q)
• Positive, Negative, Zero sequence
• Phasor and analog algebra
• Phasor and analog scaling

Outputs

Independent Outputs

• Fully configurable output message streams
• Send data to internal and external clients or entities
• Variable message rates from 1 to 240 messages per second

Archive
• Continuous
• Triggered
• Logs
  – Access/Diagnostic
PDC Security

- User- and role-based accounts
- Strong passwords
- Port control (3373)
- UDP_S protocol
- Access and queried logs
SEL-3378 Synchrophasor Vector Processor

Phasor Data Concentration
Integrated Protection and Control
Built-in Functions like Modal Analysis, etc
SEL-3620 Substation Firewall

- Stateful Firewall using “deny-by-default” settings
- Encryption of data using IPsec VPN
Integrated Communications Network

Site A

Site B

Site C

Site D

Ethernet

IRIG-B
● OC-48 SONET multiplexerer with 256 bit AES encryption
● SONET/Ethernet multiplexerer
● Time Distribution with <1µs accuracy maintained with loss of GPS clock
● Measures and reports communication latency
Summary

● SEL offers a very complete set of solutions for synchrophasor systems

● SEL has a lot of experience helping customers implement systems

● SEL can help design, install and commission your system
PRC-002-2 Disturbance Recording System

- Sequence of Events Recording
- Fault Recording
- Dynamic Disturbance Recording
Questions?