



2012 SESSION

Substations

SC B3



# Remote Isolation and Test Using IEC 61850

PS1/Q3: ROD HUGHES (Australia)  
Registration 1724

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# Access any sub at “3am” in the morning

From home ...



which:

- Substation?
  - vendor’s IEDs are installed?
  - X system
  - Y system
  - Condition Monitoring
- Condition Monitoring Server or HMI platform is used to control locally?
  - Vendor A, B ... or Z HMI “standard”
  - Installed last year or 20 years ago
- IED firmware versions are installed?
- IED setting files versions are installed?
- IED setting software operating platform is required?
  - DOS, Windows 3.1 / 3.11 / NT / XP / 7 ... (... Windows42)
- IED setting software version is required?
- Remotely operated isolation and test equipment?

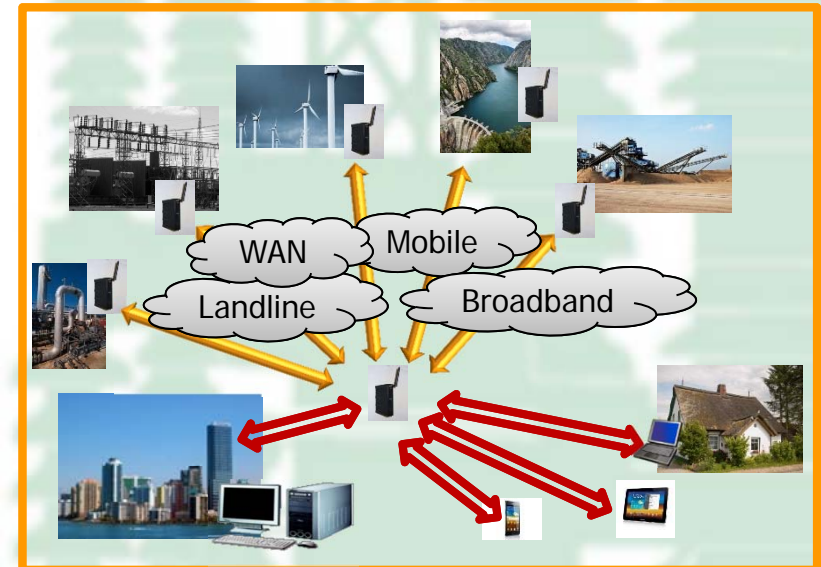


**All through common access point and procedure!**

# Solutions need to provide ....

## Ability to

- Access from any PC mobile device
  - Windows Remote Desktop
- Secure VPN and access control
- Connect to Central Unit
- Select site
- Remotely run software on local substation DCU
  - Virtual Machine for different platform requirements
  - Right software for right IEDs
- Access current site specific files on site server



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# At 3 am in the morning need to ...

**From home:**



**Gain access**

- Physical Connection Authorisation
- Role Based Access Control
  - Specify and procedures for IEEE 1686

**Isolate a function**

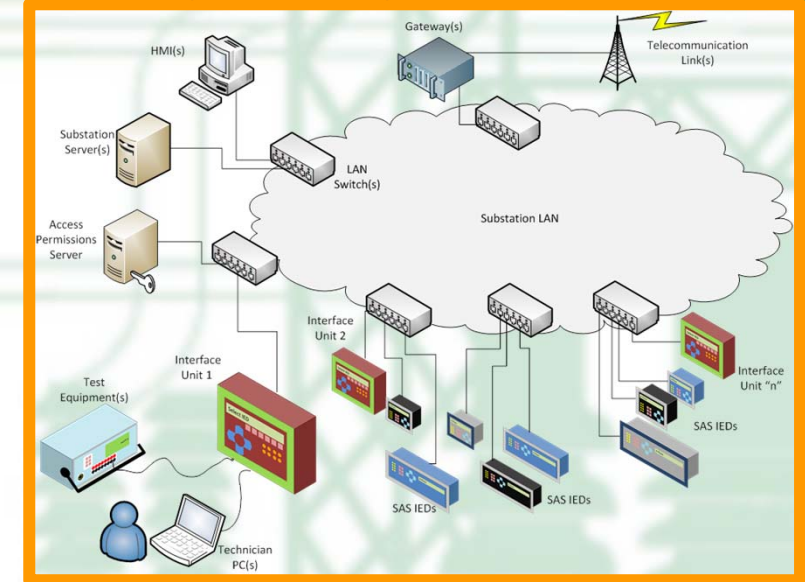
- in the right sequence for that Bay
- Independent of the SAS IEDs
- Independent of which vendor's IEDs
  - Block GOOSE
  - Change a Beh mode
  - Change to SIM mode
  - .....
- Pre-engineered & configured Operator & Test Interface
  - Patent Registered 2009

**Control remotely operated test equipment**

**Disable faulty equipment**

**Still keep the system working!!!!**

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# In Service System

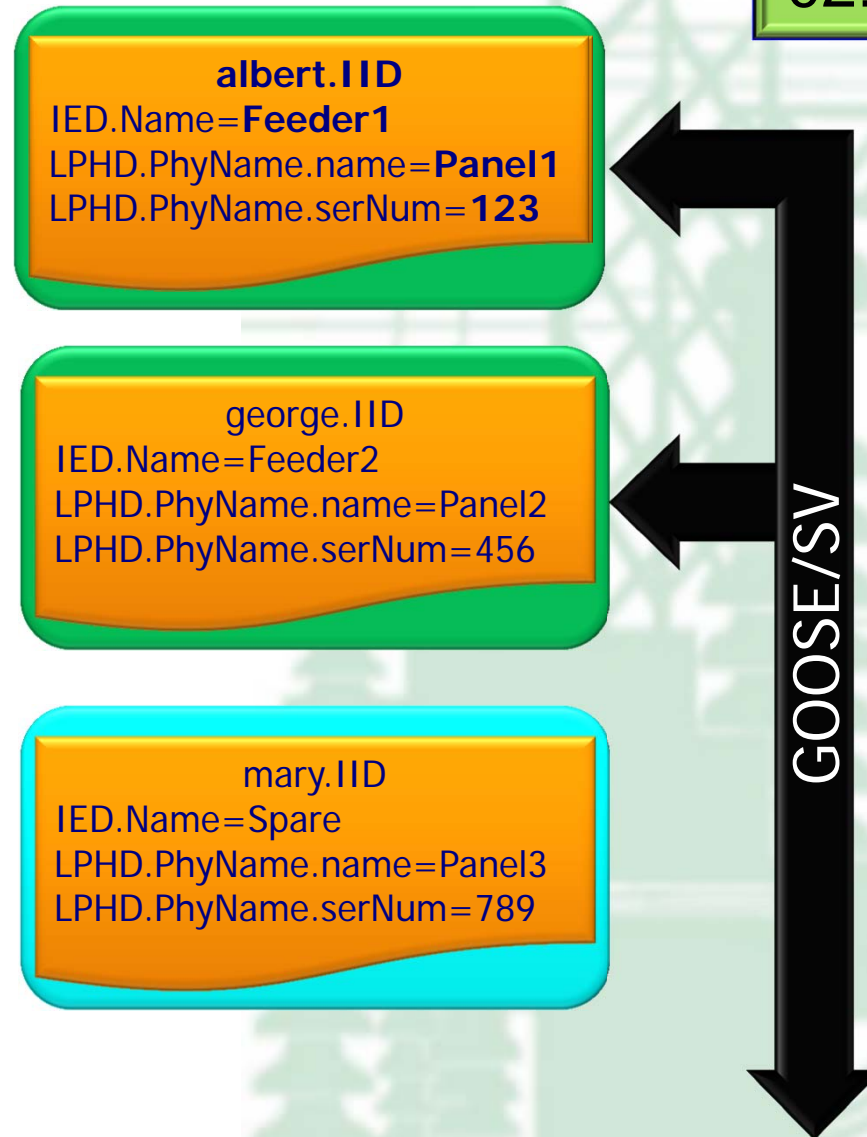
Two Feeder Panels  
One Spare Panel

IEC 61850 System  
Top-Down Engineering

- SSD=>SCD=>CID/IID

Process Bus  
Station Bus

02:59am



# In Service System

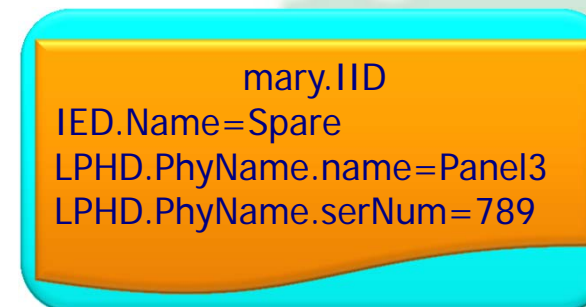
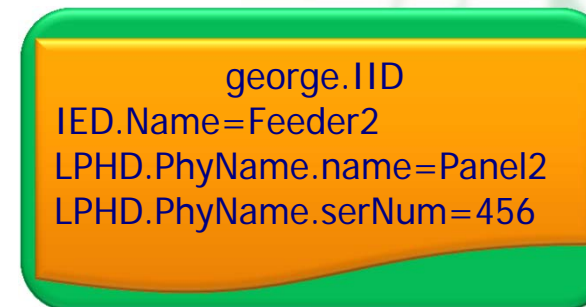
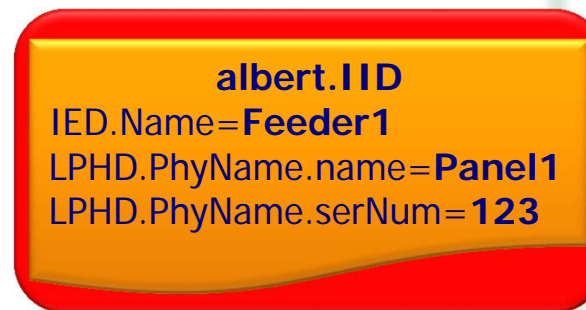
Two Feeder Panels  
One Spare Panel

IEC 61850 System  
Top-Down Engineering

- SSD=>SCD=>CID/IID

Process Bus  
Station Bus

03:00am



GOOSE/SV



# Reconfiguring the System

03:03am

albert.IID  
IED.Name=Feeder1  
LPHD.PhyName.name=Panel1  
LPHD.PhyName.serNum=123

**albert.IID**  
IED.Name=**Feeder1**  
LPHD.PhyName.name=**Panel1**  
LPHD.PhyName.serNum=**123**

george.IID  
IED.Name=Feeder2  
LPHD.PhyName.name=Panel2  
LPHD.PhyName.serNum=456

mary.IID  
IED.Name=Spare  
LPHD.PhyName.name=Panel3  
LPHD.PhyName.serNum=789



# Reconfiguring the System

03:03am

albert.IID  
 IED.Name=Feeder1  
 LPHD.PhyName.name=Panel1  
 LPHD.PhyName.serNum=123

Re-configure  
 Spare with  
 proven  
 configuration  
 file

**albert.IID**  
 IED.Name=**Feeder1**  
 LPHD.PhyName.name=**Panel1**  
 LPHD.PhyName.serNum=**123**

george.IID  
 IED.Name=Feeder2  
 LPHD.PhyName.name=Panel2  
 LPHD.PhyName.serNum=456

mary.IID  
 IED.Name=Spare  
 LPHD.PhyName.name=Panel3  
 LPHD.PhyName.serNum=789





# Reconfiguring the System

03:03am

albert.IID  
 IED.Name=Feeder1  
 LPHD.PhyName.name=Panel1  
 LPHD.PhyName.serNum=123

Re-configure  
 Spare with  
 proven  
 configuration  
 file

**albert.IID**  
 IED.Name=**Feeder1**  
 LPHD.PhyName.name=**Panel1**  
 LPHD.PhyName.serNum=**123**

george.IID  
 IED.Name=Feeder2  
 LPHD.PhyName.name=Panel2  
 LPHD.PhyName.serNum=456

**albert.IID**  
 IED.Name=**Feeder1**  
 LPHD.PhyName.name=Panel3  
 LPHD.PhyName.serNum=789



# Reconfiguring the System

03:03am

albert.IID  
 IED.Name=Feeder1  
 LPHD.PhyName.name=Panel1  
 LPHD.PhyName.serNum=123

Re-configure  
 Spare with  
 proven  
 configuration  
 file

Comms restart

**albert.IID**  
 IED.Name=**Feeder1**  
 LPHD.PhyName.name=**Panel1**  
 LPHD.PhyName.serNum=**123**

george.IID  
 IED.Name=Feeder2  
 LPHD.PhyName.name=Panel2  
 LPHD.PhyName.serNum=456

**albert.IID**  
 IED.Name=**Feeder1**  
 LPHD.PhyName.name=Panel3  
 LPHD.PhyName.serNum=789

GOOSE/SV



# Reconfiguring the System

03:05am

albert.IID  
 IED.Name=Feeder1  
 LPHD.PhyName.name=Panel1  
 LPHD.PhyName.serNum=123

Re-configure  
 Spare with  
 proven  
 configuration  
 file

Comms restart

**Report changes:**  
**configRev** revision to the device model  
**paramRev** changes of setting groups and settings  
**valRev** changes of any particular attribute of a Logical Node.

**albert.IID**  
 IED.Name=**Feeder1**  
 LPHD.PhyName.name=**Panel1**  
 LPHD.PhyName.serNum=**123**

george.IID  
 IED.Name=Feeder2  
 LPHD.PhyName.name=Panel2  
 LPHD.PhyName.serNum=456

**albert.IID**  
 IED.Name=**Feeder1**  
 LPHD.PhyName.name=Panel3  
 LPHD.PhyName.serNum=789

GOOSE/SV

# Conclusion

**Availability (CAIDI, SAIDI) is affected by Utility defined Restoration facilities and procedures**

**Remote access must provide mechanisms to use**

- Right tools specific to the
- Right devices, with the
- Right documentation, and the
- Right configuration files

**Technicians must have**

- Familiar isolation and control facilities the same in every substation
- Regardless of IEDs present
- As reliable as the SAS – not a PC
- Physical and cyber-security mechanisms
  - Connection Authorisation and Role Based Access Control
- Automated 'designed-in' isolation mechanisms and sequences

**Fast restoration if used full IEC 61850 - 6 engineering**

- Top-Down (SSD>SCD>CID/IID)
- Station and Process bus (Intelligent CB I/O, conventional CT/VT MU)
- Designed in Spares reconfiguration mechanisms
- As Operating Documentation using revision index change reporting

