

Improving Security and Reliability at a Nuclear Station

David Parks - Entergy Grand Gulf Nuclear - Turbine / Generator System Engineer Qualified Design Engineering I&C
dparks@Entergy.com

Mathew King – Siemens Application Engineer
Mathew.King@siemens.com

Oscar Rozo – Siemens Application Engineer
Oscar.Rozo@siemens.com

Leonardo Morales – Siemens Application Engineer
Leonardo.Gonzalez@siemens.com

Eric Stranz – Siemens Business Development Manager
Eric.Stranz@siemens.com

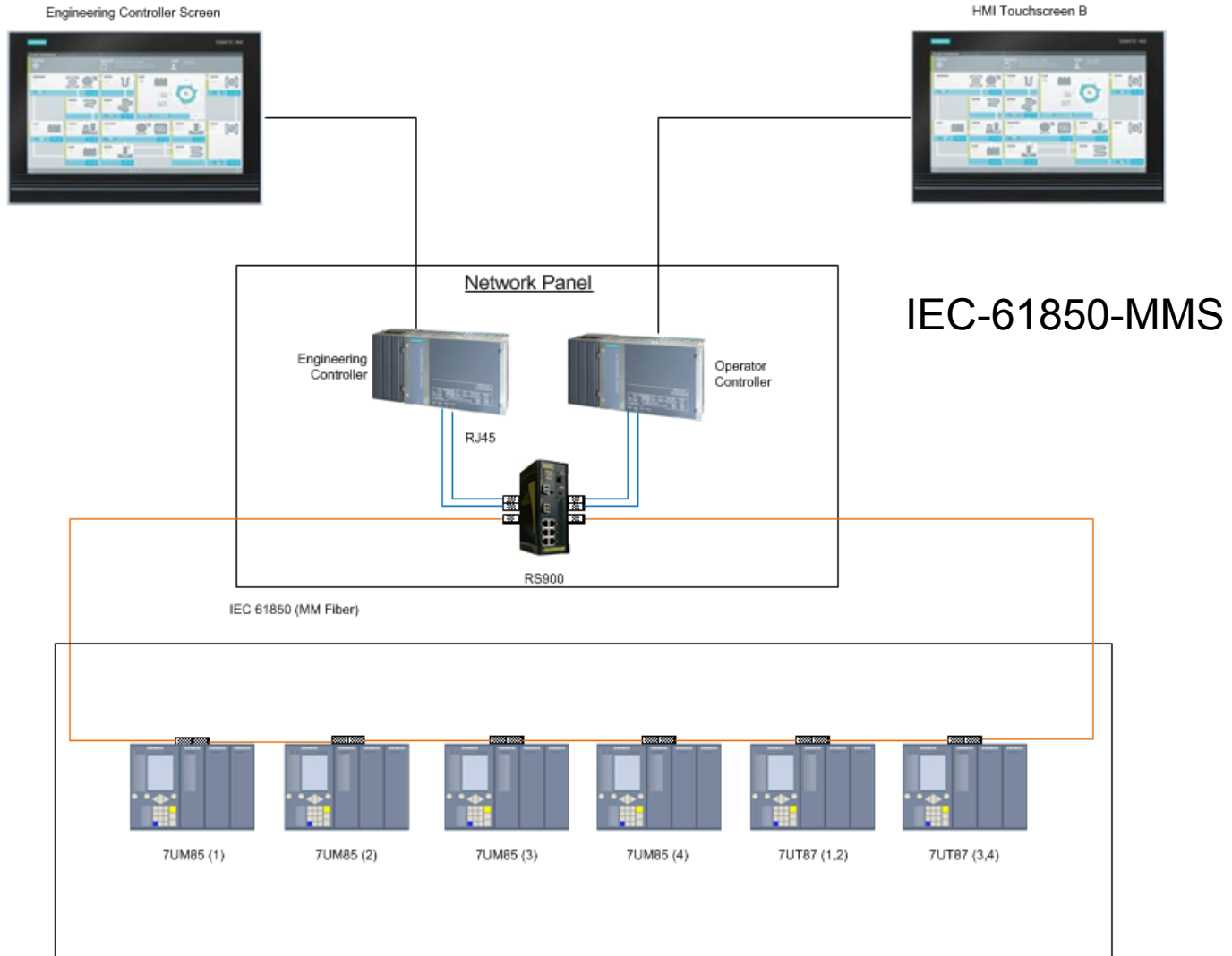


Grand Gulf Unit 1 Relay Project

- PROBLEM STATEMENT
 - Obsolete protection Equipment (no spares)
 - Secure Protection
 - 27 electro-mechanical
 - 40 single point vulnerabilities associated with generator protection.
 - 3 single point vulnerabilities associated with main transformer.

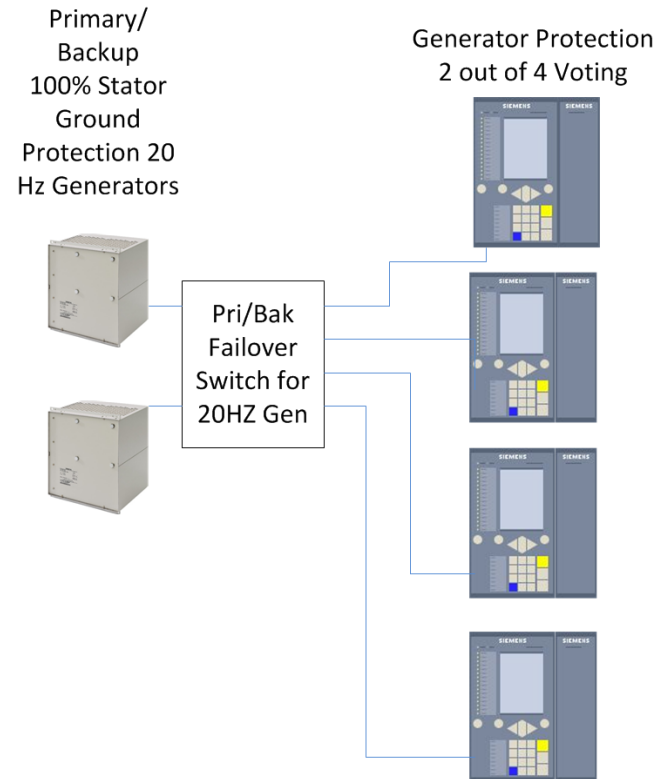


Proposed Solution



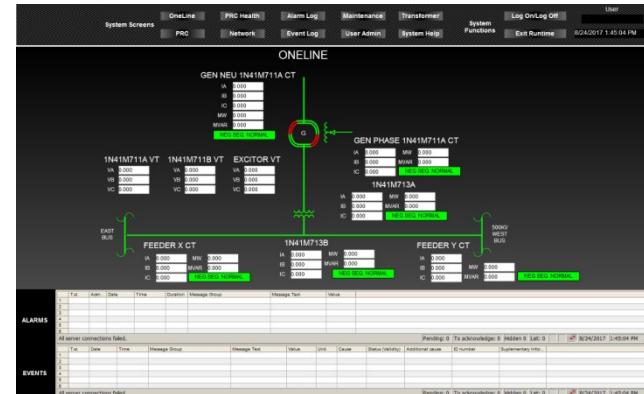
Solution:

- Replace 22 electromechanical relays with 6 relays to include all protective functions
- Add engineering work station (cyber security benefit)
- Add operator HMI with real time display of CT and PT values.
- 1-out-of-2 taken twice scheme for secure, dependable protection
- Online serviceability



Solution:

- Add operator HMI
 - First out function.
 - Pre-trip data collection.
 - Post trip data collection
 - PRC005-2 capabilities
 - PRC004 monitoring
 - Mod25-2 Values



Solution:

- Solution
 - Modern protection Relays
 - Two out of Four voting Scheme
 - Eliminate SPV's
 - HMI for visual awareness
 - Replaceable Online



Cyber Security

- All unused access ports to the devices are blocked.
- Isolated network with dedicated time.
- No wireless connection.
- Key control for engineering work station.
- Password Level control access for relay and HMI.
- Alarms for relay in programing mode annunciated in main control room.
- Meets all Entergy procedure and the NEI 08-09 guidelines requirements for Cyber Security.

Grand Gulf Unit 1 Rewards

- Assist Entergy transmission for better grid voltage/frequency control by removing V/Hz limitation of +/- 297.5 MVars.
- Elimination of NERC standard PRC 005-02 Preventive Maint. tasks associated with PTs and CTs input to generator & main transformer protective relays by adding real time monitoring and deviation alarms for PTs and CTs input.
- 40 Components reclassified as non- single point vulnerabilities.
- Addition of sequence of event data in real-time.
- Addition of first out display for relay trips
- Installed engineering work station
- Networked relays for time synchronization to GPS.
- One button Export capabilities for Sequence of event data to csv files.
- Real time Power Indications high side of main transformers (previously unavailable MOD 25-2)

Questions??

