ERO Event Analysis Process and Analysis of EMS Events (2019-2020)

Wei Qiu, Senior Engineer of Event Analysis, NERC EA
October 20, 2020
• Introduction to North American Electric Reliability Corporation (NERC)
• ERO Event Analysis Process
• Data, Analysis, and Trends for EMS events (2019-2020)
• Key Takeaways
• Q&A
• A not-for-profit international regulatory authority
• The electric reliability organization (ERO) for North America, subject to oversight by the Federal Energy Regulatory Commission (FERC) and governmental authorities in Canada
• Assure the effective and efficient reduction of risks to the reliability and security of the grid
  ▪ Develop and enforce reliability standards
  ▪ Annually assess seasonal and long-term reliability
  ▪ Monitor the bulk power system through system awareness
  ▪ Educate, train, and certify industry personnel
 NEC Regions

Midwest Reliability Organization (MRO)
Northeast Power Coordinating Council (NPCC)
Reliability First (RF)

SERC Reliability Corporation (SERC)
Texas Reliability Entity (Texas RE)
Western Electricity Coordinating Council (WECC)
Defining an Event

• “An unwanted, undesirable change in the state of plants, systems, or components that leads to undesirable consequences to the safe and reliable operation of the plant or system”

• Often driven by Risk Clusters
  ▪ Programmatic deficiencies
  ▪ Deficiencies in barriers and defenses
  ▪ Latent organizational weaknesses and conditions
  ▪ Errors in human performance and contextual factors
  ▪ Equipment design and/or maintenance issues
• Promote a structured and consistent approach to performing event analysis
• Learn from events and share information with industry
• Collaborate between registered entities, Regional Entities, and NERC
Prioritizes EA based on risk and significance, response is systematic and the depth of analysis increases as the category rises.
1h - Loss of monitoring or control at a Control Center such that it significantly affects the entity’s ability to make operating decisions for 30 continuous minutes or more.

Some examples that should be considered for EA reporting include but are not limited to the following:

I. Loss of operator ability to remotely monitor or control BES elements
II. Loss of communications from SCADA Remote Terminal Units (RTU)
III. Unavailability of ICCP links, which reduces BES visibility
IV. Loss of the ability to remotely monitor and control generating units via AGC
V. Unacceptable state estimator or real time contingency analysis solutions
Number of Events Reported

Oct 2010 - Sept 2011: 25
Oct 2011 - Sept 2012: 32
Oct 2012 - Sept 2013: 28
Oct 2013 - Sept 2014: 87
Oct 2014 - Sept 2015: 80
Oct 2015 - Sept 2016: 94
Oct 2016 - Sept 2017: 94
Oct 2017 - Sept 2018: 87
Oct 2018 - Sept 2019: 83
Oct 2019 - Sept 2020: 57
Trend on EMS Functions

Number of Events

Oct 2016 - Sept 2017: AGC 1, ICCP 8, RTU 12, SCADA 23, SE/RTCA 23
Trend on EMS Functions (cont’d)
• EOP-004-4 is likely affecting the EMS event reporting
  ▪ Complete loss vs. Partial loss
• Great efforts made by the industry
  ▪ Implementing features and procedures
    o TOP-001-3 and IRO-008-2: Real Time Assessments
    o TOP-010-1(i) and IRO-018-1(i) R2: Real Time Assessment Quality of Analysis
    o Business continuity plans for COVID-19
    o Software Stable
  ▪ Building and strengthening in-house expertise
    o Better response speed
    o Dedicated team (24 X 7)
    o Workshop, training for knowledge transferring from vendors
• External modeling and modeling exchange
  ▪ Different EMS vendors
  ▪ EMS model vs. Market model
  ▪ Naming convention, unique ID

• Bad data detection
  ▪ How to detect? “bad” data with “good” quality SCADA status
  ▪ How to replace?
• Alarming
  - SE/CA Solution States
    o Diverged/Unsolved
    o Crashing/Hanging
    o Not triggering
    o Stale data
  - Alarm Management
    o AOR
  - Independent Alarm
    o A watch dog
• Software testing
  ▪ Problem: Memory corruption, memory leak
  ▪ Vendor: software quality
  ▪ Entity:
    o A complete testing process: Scope/Design/Execution/Closure
    o Increase CPU and system memory usage to an extreme level if possible
    o “run to failure” testing
• EMS reliability and resilience is continuously improving
• Loss of SE/RTCA events significantly dropped
  ▪ EOP-004-4 is likely affecting the EMS event reporting
  ▪ Software stable
  ▪ Better response speed
• Things we all can improve
  ▪ External modeling and modeling exchange
  ▪ Bad data detection
  ▪ Alarming
  ▪ Software testing
Questions and Answers

Contact Information:
wei.qiu@nerc.net