Fundamentals of Transmission Operations

Telecommunications

PJM State & Member Training Dept.

Objectives

The student will be able to:

- Explain the back-up satellite phone testing requirements
- Explain how to coordinate outages of telemetry and communication equipment with PJM (RTUs, datalinks, etc.)
- Identify the requirements of Member companies to have a plan for loss of Control Center Functionality

Satellite Phone Testing Process

Satellite Phone Review

- Tests are conducted to verify that all equipment is working correctly and proper communication protocols are being used

- Two tests are conducted including the use of the Push-to-Talk (PTT) and Two-way Point-to-Point systems

Satellite Phone Review

When Does Testing Take Place?

- Test are normally conducted on weekly basis
- Tests may need to take place more frequently depending on current security level
- Satellite phones are also tested during a PJM sponsored emergency procedures drills

Satellite Phone Review

Who Participates In The Testing?

- All Member Companies with satellite phone systems participate in the tests
- Transmission Owners must have satellite phones at both their primary and back-up facilities
- Generation Operator (GO) Control Centers must have satellite phones when one or more units total 500 MW or greater

Satellite Phone Review

What Are The Main Purposes of Testing?

- The testing ensures proper functionality and reliability of the satellite phone system at both PJM & Member Company locations

- Allows the opportunity to test readiness level of Operators

- Operators have the opportunity to become familiar with the satellite phone equipment

Satellite Phone Review

Communication Protocols & Testing

- Testing ensures proper communication protocols are being followed when using the satellite phone system
  - Speak clearly, slowly and be mindful of pronunciations

- Use proper “code words” when communicating
  - “Over” when message/statement complete
  - “Out” when terminating transmissions (Initiator)

- Always identify your company and your name

Coordinating Telemetry and Equipment Outages

Data Outages

Miscellaneous Reportable Outages

- Email coordination notice 24 business hours in advance of significant system changes that could affect ICCP data link communications or the data exchange with PJM
  - Data Set Switches (this does not include database updates, editing data exchange lists, etc. unless they include an outage)
  - Significant Software Enhancements
  - Communication line outages
  - Backup center testing
  - Failovers to alternate sites
  - ICCP server failovers
  - Network and Firewall maintenance
  - RTU outages or changes to RTU data sent to PJM for RTUs connected to EHV (345kv and above) facilities
    - 1 day notice required

Data Outages

Miscellaneous Reportable Outages

- The PJM EMS Networking group will coordinate any technical details, additional support, etc. with the member company
- Members providing notification should send it to the following email address (outage@pjm.com). In an emergency, call the PJM Support Center at 610-666-8886 or the Dispatch Supervisor at 610-666-8806
- The notification should include:
  - The action being taken by the member company
  - Planned length and expected time of the outage
  - Potential impact to PJM
  - Member contact information
- Member Company System Operator should coordinate final outage with the PJM Dispatch Supervisor 15 minutes prior to the event

Data Outages

Scheduling Data Outages

- PJM staff has the authority to:
  - Reschedule or cancel a member company scheduled planned outage based on system conditions
  - Reschedule or cancel a member company scheduled planned outage based on existing ICCP data link outages
  - Deny a request for a member company planned outage if requested time has been previously scheduled

Data Outages

Scheduling Data Outages (cont.)

- During Peak Load Operations, to the extent possible, emergency changes should occur:
  - During Summer operations - prior to 11:00 EPT
  - During Winter operations - between 10:30 – 14:30 EPT
  - Weekly routine maintenance should be canceled or rescheduled to days when emergency procedures are not anticipated

Data Outages

Unscheduled Data Outages

- Considerations / actions:
  - **MOC or Generator Owner/Operator**
    - Contact PJM Dispatch to report/discuss problem
    - Recognize prior SCED approved base-point is stale while ICCP problems exist
    - Resolve communications issue (support staff)
    - Manually dispatch directions to plants verbally if problem is not resolved within 10 minutes
    - Log manual dispatch directions
    - Provide a contact person to PJM Dispatch to enhance operations during reliability issues

Data Outages

Unscheduled Data Outages

- Considerations / actions:
  - **TO or Merchant Transmission**
    - Contact PJM Dispatch to report/discuss problem
    - Resolve communications issue (support staff)
    - Contact PJM Dispatch regarding transmission constraints
    - Verbally communicate critical data to PJM Dispatch as needed
    - Provide a contact person to PJM Dispatch to enhance operations during reliability issues

Data Outages

Unscheduled Data Outages (cont.)

- Considerations / actions:
  - **PJM Actions**
    - Contact MOC/TO to discuss communication issues
    - Resolve communication issue
    - Recognize prior SCED approved base-point as stale while ICCP link is down
    - Communicate zonal cost if communication issues are not resolved within 10 minutes
    - Communicate targeted generation dispatch if transmission constraints arise
    - Log manual dispatch/reassign regulation as necessary
    - Communicate impact on ability to monitor transmission system
    - Elevate communication to Shift Supervisor if reliability issues arise

RTU Outages

- All outages that affect PJM's ability to receive telemetered data must be reported
    - In the case of RTU's for 345 kV and above, personnel at the station will have to relay critical data to the TO and PJM
    - Data to be kept manually updated includes:
        - MW line flows for 500 kV and higher line and all tie lines
        - Bus voltages for all 500 kV and higher stations
    - Affected data must be updated:
        - After loss of major generator or transmission line
        - When value has a change of 100 MW or more for 500 kV and above, 50 MW for 345 kV and below
        - At least every 30 minutes

Loss of Control Center Functionality Requirements

Member Back-Up Control Center Requirements

- PJM Members are required to construct and man Control Centers that are subject to the criteria outlined in Manual 01 – “Member Control Center Requirements”
- In addition, Manual 01 specifies that each Member TO must have a plan for loss of control center functionality that includes procedures and responsibilities for providing annual training to ensure that operating personnel are able to implement the plans

Member Back-Up Control Center Requirements

- All PJM Members shall develop a backup recovery plan to cover various contingencies, including maintaining an off-site storage location for updated copies of all software and data files necessary to restore control center functions
- The backup recovery plan is subject to review by PJM

Summary

- Satellite phones must be tested periodically to ensure operation and familiarity
- Data outages also have an impact on system operations and need to be coordinated with PJM
- Members need to have plans and procedures in place for loss of control room functionality

Questions?

Disclaimer:

PJM has made all efforts possible to accurately document all information in this presentation. The information seen here does not supersede the PJM Operating Agreement or the PJM Tariff both of which can be found by accessing: http://www.pjm.com/documents/agreements/pjm-agreements.aspx

For additional detailed information on any of the topics discussed, please refer to the appropriate PJM manual which can be found by accessing: http://www.pjm.com/documents/manuals.aspx

Resources and References

- PJM. (2012). *PJM Manual 1: Control Center & Data Exchange Requirements (Rev 21)*. Retrieved from http://www.pjm.com/~/media/documents/manuals/m01.ashx

- NERC. (2007). *Standard Com-002-2 – Communications and Coordination*. Retrieved from http://www.nerc.com/files/COM-002-2.pdf

- NERC. (2012). *Standard TOP-001-2 – Transmission Operations.* Retrieved from http://www.nerc.com/files/TOP-001-2.pdf