NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

TADS Section 1600 Update

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Reliability and Security Technical Committee Meeting
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RELIABILITY | RESILIENCE | SECURITY




TADS Section 1600 Data Request

Proposed Section 1600 Enhancements

- Load loss data resulting from a transmission system outage
- Geographical data for TADS elements
- Equipment sub-cause codes

TADS Section 1600 Approval Timeline

Date	Action
July 2024	Transmission Availability Data System (TADS) User Group endorsed request for proposed TADS Section 1600 modifications.
August 2024	Performance Analysis Subcommittee endorsed request proposed TADS Section 1600 modifications.
August 2024	Begin FERC 21-day review period (9/6 – 9/27).
September 2024	Provide RSTC information about the request. Begin 45-day posting period for public comment (10/1 – 11/15).
November 2024	NERC with input from TADS User Group and PAS to complete response to public comments.
January 2025	Send request for proposed TADS Section 1600 modifications to NERC Board of Trustees for review.
February 2025	Target NERC Board of Trustees February Meeting to seek approval for proposed modifications.

Targeting 2026 to Go Live

Proposed Load Loss Data Collection

Description

- Data collection of load loss resulting from transmission system outages

Objective

- To improve the load loss component of the Severity Risk Index (SRI) which is used for the State of Reliability report and other analyses.
  - Currently, NERC uses load loss data voluntarily collected, and not representative of a given interconnection.
- To capture times when there is an operational break in continuously transmitted electrical energy to planned in-service points.

Proposed Load Loss Data Collection

Load Loss Data	
Criteria	Load loss data resulting from transmission system outages will be reported when **all** the following criteria are met:
	1. Load previously served from a given Transmission Connection Point (TCP) is no longer being served because of the TADS outage, **and**
	2. Unserved load is not restored within 5 minutes, **and**
	3. The de-energized TCP has a deliverable capacity of 20 MWs or greater.

**The demarcation where the BES transmission system interfaces with the non-BES transmission and/or distribution system.*

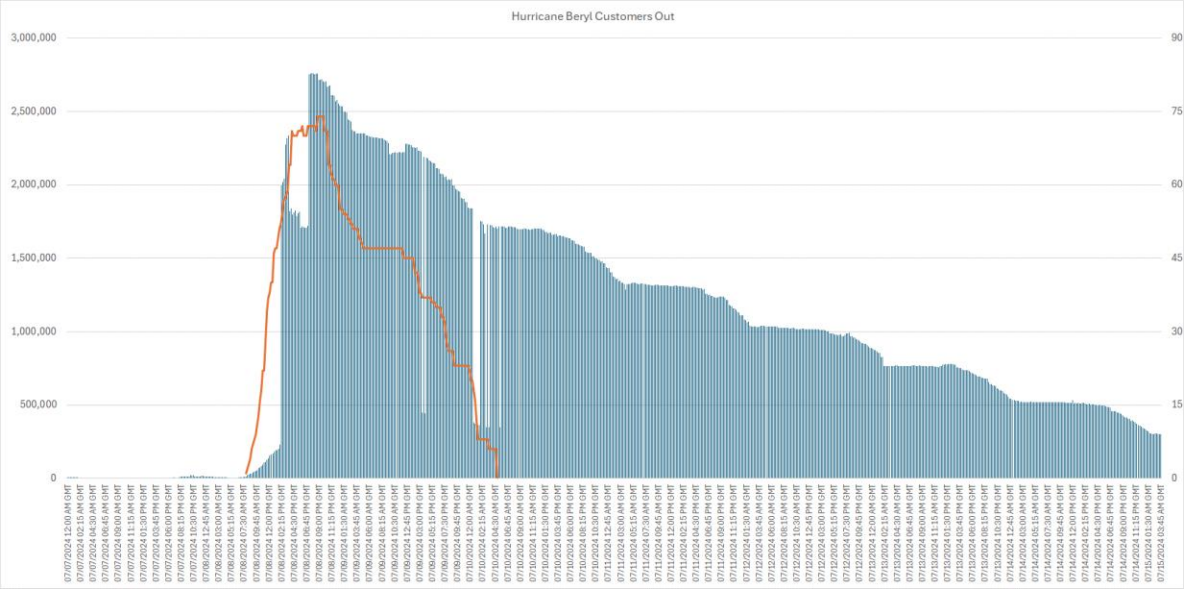
Proposed Load Loss Data Collection

Proposed TADS Data Fields	
Capacity at the TCP	Capacity at the TCP is the capacity at the transmission side where the BES transmission system interfaces with non-BES transmission and/or distribution system.
Amount of Load Dropped	The (actual or estimated) amount of Load Dropped (MWs) at time of outage minus redistributed load being served to alternate locations.
Method for Quantifying Load Loss	Multiple Choice: SCADA System, Estimation, Peak Percentage, Customer Count, Other.
Load Loss Outage Duration	Load Loss Outage Duration (hhhh:mm) is the duration when load is dropped resulting from transmission system outages until the load has been restored. This duration may be shorter than the outage duration if load is restored prior to the transmission equipment's restoration.
Load Loss	Load Loss (MWhrs) is the (actual or estimated) amount of load lost multiplied by the duration of the outage.
Method for Ending Duration	Multiple Choice: Load restored at TCP, Load Restored at Alternate TCP(s), Load Restored within Delivery Network, Load No Longer Exists, Other.

Proposed Load Loss Data Collection

End of load loss resulting from transmission system outages

- Time when load is “available” to be served, or load is being served to the TCP:
  - De-energized transmission system equipment is restored, and load is available at the TCP, or
  - Load has been energized through an alternate means.



Proposed Geographical Data

Description

- Geographical data will be added to the transmission system inventory database to identify the longitude and latitude coordinates of TADS elements.

Objective

- To improve the accuracy of evaluating the extent of system outages.
  - Geographically associating localized events to assess the actual size and impact.

Proposed Equipment Sub-Cause Codes

Description

- Add an equipment sub-level cause code to enhance existing initiating and sustained equipment related cause codes.

Objective

- To better understand the cause of transmission system outages.
- To track and trend outages due to equipment failures in more detail.
  - Recommend proactive measures to prevent outages.
  - Identify BES trends for the State of Reliability and other reports/studies.

Proposed Equipment Sub-Cause Codes

Current outage equipment failure related cause codes
Failed AC Circuit Equipment
Failed AC Substation Equipment
Failed AC/DC Terminal Equipment
Failed DC Circuit Equipment
Failed Protection System Equipment

Proposed additional fields for Equipment Sub-Cause Codes	
AC/DC Converter	Station DC Supply
Communications System	Substation Conductor - Bar
Conductor	Substation Conductor - Line
Digital Relay	Switch
Gas Breaker (manufacturer if available)	Tower Structure
Series Compensation (Capacitors / reactors)	Transformer
Other	

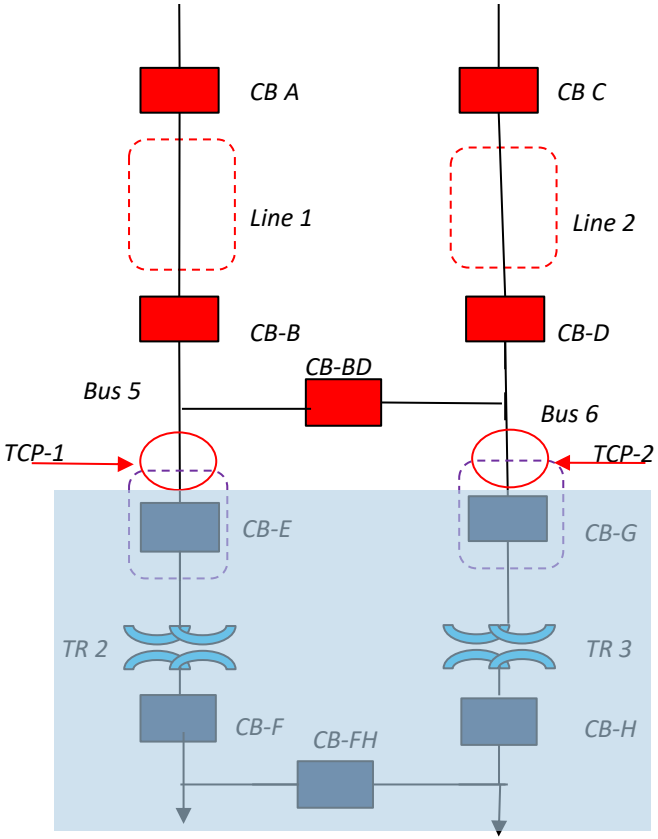
One equipment sub-level code will be allowed per equipment cause code.

Questions and Answers

Steady State Example: No Load Loss

Example showing BES transmission equipment going to distribution equipment

- There are no outages and no-load loss
- All BES equipment is energized



Networked Distribution

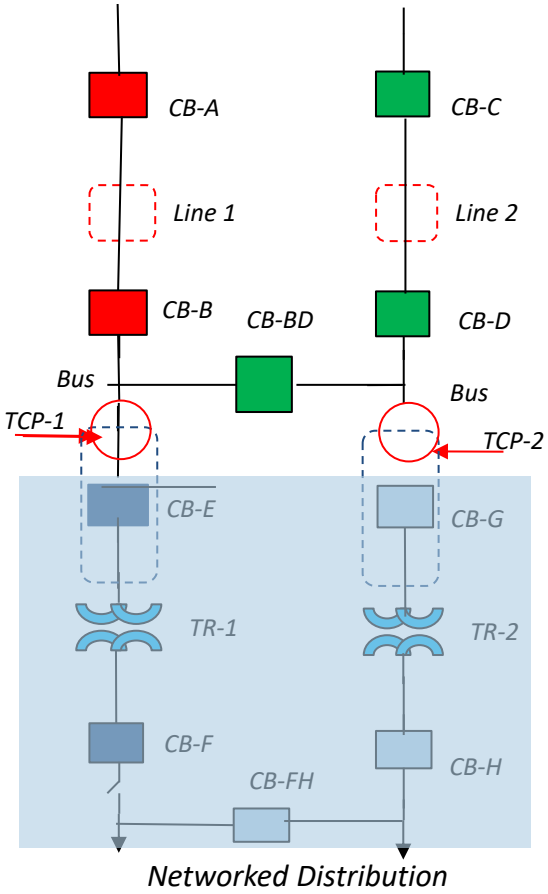
- *The Transmission Connection Points (TCPs) are the first disconnect switched from the BES bus, indicated by TCP-1 and TCP-2 (the disconnect switches are not shown).*
- *The TO may have SCADA visibility of the status of these TCPs (and/or the non-BES-breakers) but may or may not have control of the distribution system.*

BES Circuit Breaker (CB)
Open BES CB
NON-BES CB
NON-BES Open CB
BES Transmission Line
Non-BES

Load Loss Outage Initiation Example

Example showing BES transmission equipment going to distribution equipment

- BES transmission equipment is de-energized
- Load loss due to a load drop ≥ 20 MWs and duration ≥ 5 mins.



- *CB-BD is out for maintenance.*
- *Outage occurs on transmission Line 2 due to fault from a storm.*
- *To clear the fault CB-C and CB-D are opened, along with CB-BD, which results in no load being served at TCP-2.*
- *CB-FH mis-operated due to fault on Line 2 resulting in load loss.*

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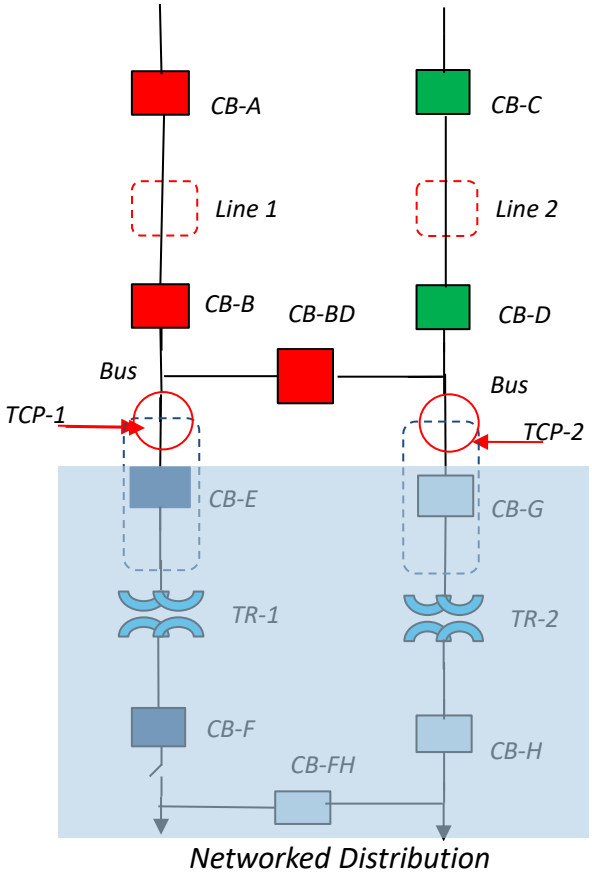
Open BES CB
NON-BES CB
NON-BES Open CB
BES Transmission Line
Non-BES

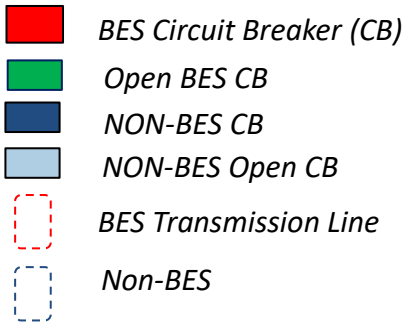
Load Loss Example
Transmission Restoration

Example showing BES transmission equipment going to distribution equipment

- BES equipment is re-energized
- Initial load loss due to a load drop ≥ 20 MWs and duration ≥ 5 mins.
- Load restored at TCP



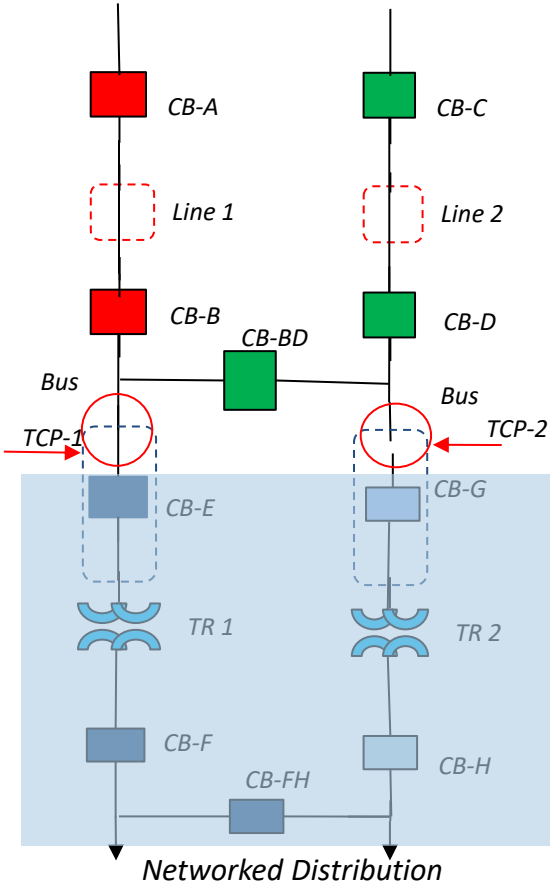
- *Energy is available to TCP-2; through alternate transmission equipment, CB-BD.*
- *End of load loss initiating transmission outage.*
- *Distribution system is not energized; however, it is no longer a result of BES transmission system equipment.*



Load Loss Example
Distribution Restoration

Example showing BES transmission equipment going to distribution equipment

- BES equipment is re-energized
- Initial load loss due to a load drop ≥ 20 MWs and duration ≥ 5 mins.
- Load restored at alternate TCP and within the network distribution



- *Energy is available to distribution network. (CB-FH is now closed)*
- *End of load loss initiating transmission outage.*
- *Although original BES transmission system equipment remains out of service, load was energized via distribution network.*

BES Circuit Breaker (CB)
Open BES CB
NON-BES CB
NON-BES Open CB
BES Transmission Line
Non-BES

Load Loss Worksheet Examples

Outage ID Codes 0001-2024 and 0002-2024 are load loss examples because the MWs dropped were greater or equal to 20 MWs and the duration was 5 mins or greater, sustained.

Outage ID Code 0003-2024 is not a load loss example because although the MWs dropped is greater or equal to 20 MWs, the duration is less than or equal to 5 mins.

Outage ID Code and 0004-2024 is not a load loss example because although the duration is greater than or equal to 5 mins., the load dropped was less than 20 MWs.

Outage ID Code	Amount of Load Dropped (MWs)	Load Loss Duration (hhh:mm)	Estimated Load Loss (MWhrs)	Load Loss Outage
0001-2024	25	0001:00	25	Yes, ≥ 20 MWs and ≥ 5 mins.
0002-2024	20	0002:00	50	Yes, ≥ 20 MWs and ≥ 5 mins.
0003-2024	25	0000:02	0.83	No, ≥ 20 MWs but < 5 mins.
0004-2024	10	0002:00	20	No, ≥ 5 mins. but < 20 MWs

Proposed Equipment Sub-Cause Codes

2018-2023: 23% of TADS outages are due to equipment failure

- The equipment sub-cause codes will assist in understanding the type of equipment issues resulting in failures

Example Uses

- Easily identify equipment within the substation or out on transmission structures.
  - Identify where a majority of the outages emanate, thus where mitigation should focus
- Identify specific equipment type and manufacturers that are trending higher when compared to other equipment types/vendors.
  - To focus on targeted equipment types/manufacturers for proactive inspection/ replacement.
  - To investigate if it is a supply chain/design issue that could propagate across multiple entities.
- Identify equipment manufacturers that may have an increasing failure rate on the system (identifying end of life type time lines).
  - Higher failure rates by equipment type can be easily identified (e.g., compare vintage microprocessor-based relays to new designs or electromechanical relays to microprocessor-based relays).