

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Industry Webinar

Project 2021-04 Modifications to PRC-002

August 28, 2023

RELIABILITY | RESILIENCE | SECURITY



- Presenters
 - Standard Drafting Team
 - Chair, Manish Patel, Southern Company Services
 - Vice Chair, Chris Milan, CrestCura
 - NERC Staff
 - Ben Wu (Project Developer)
 - Scott Barfield-McGinnis (Principal Technical Advisor)
- Administrative Items
- Project 2021-04 Status and Background
- Proposed New Standard (PRC-028-1) and PRC-002 Revisions
- Next Steps
- Questions and Answers

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 - This presentation is not a part of the official project record
 - Comments must be submitted during the formal posting
- **Q&A Session**
 - Q/A feature or the raise hand feature

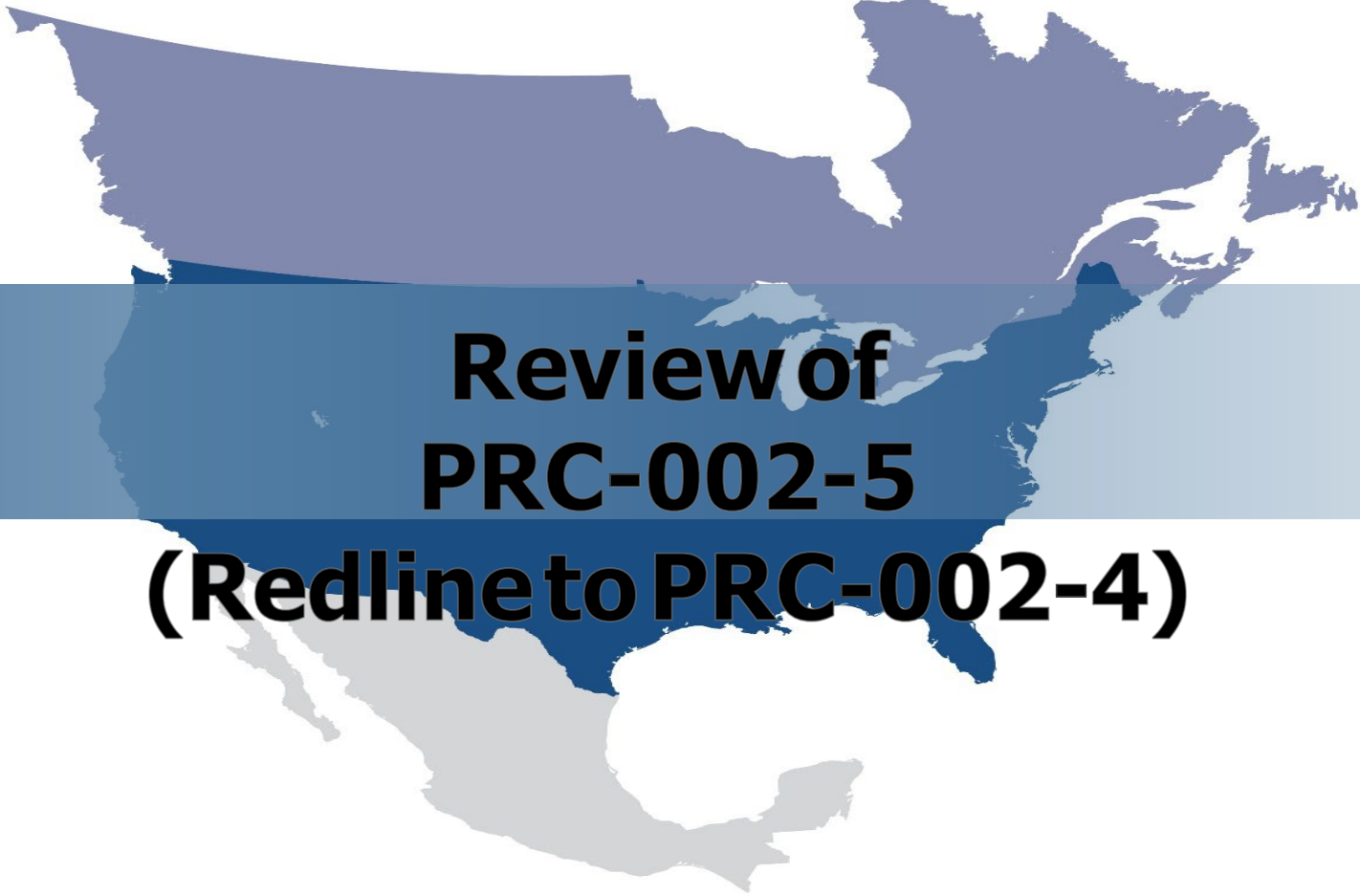
Name	Organization/ Company
Manish Patel (Chair)	Southern Company Services
Chris Milan (Vice Chair)	CrestCura
Bret Garner Burford	American Electric Power
Tracy Kealy	Bonneville Power Administration
Jacob Magee	Transmission Asset Management
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Terry Volkmann	Volkmann Consulting

- Project 2021-04 contains two SARs (Glencoe Light SAR and the NERC Inverter-based Resource Performance Task Force SAR).
- The Standards Committee (SC) January 20, 2021 meeting, the SC accepted both SARs.
- At the SC's June 19, 2021 meeting, the SC appointed members, chair, and vice chair to the SAR Drafting Team.
- The SAR Drafting Team started to work on the SARs in October, 2021.
- The SC accepted the Project 2021-04 Modifications, authorized drafting revisions on January 19, 2022.
- At the SC's May 18 (2022) meeting, the SC authorized initial posting for Glencoe Light SAR.

- The SDT completed the first phase of work to address the Glencoe Light SAR in the Winter of 2022 with the development of Reliability Standard PRC-002-4.
- The SDT submitted a revised SAR to create a new Standard (PRC-028-1) for monitoring requirements for IBRs for SC approval on April 19, 2023. SC authorized drafting revisions of the SAR.
- At the SC's July 19, 2023 meeting, the SC authorized initial posting for the IRPTF SAR.

- **Industry Need**
 - Have adequate data available to facilitate the analysis of BES disturbances
- **Purpose/Goal**
 - Ensure adequate data is available and periodically assessed to facilitate the analysis of BES disturbances, including in areas of the Bulk Power System (BPS) that may not be covered by the existing requirements
- **Project Scope**
 - Consider ways to ensure that the identification and periodic assessment of BES and/or BPS buses for which SER and FR data / Elements for which DDR data is required provide adequate monitoring of BES Disturbances
 - Consider other manners in which to add to, modify or clarify the existing requirements to ensure adequate monitoring of BES disturbances
 - Consider proposed IEEE P2800 monitoring requirements and NERC Odessa Disturbance Report recommendations

- Purpose of PRC-002 is to capture event data for **large scale** system disturbances. Even with changing resource mix, **still serves the purpose**.
- Recent disturbance analyses of events involving IBRs have demonstrated that IBR's response to a **normally cleared** few cycle fault is undesirable and poses risk to system reliability.
 - Normally cleared faults are not necessarily large-scale system disturbances.
- IBRs involved **did not have or were not required to have** sufficient monitoring data to understand plant's performance.
- Introducing IBR monitoring requirements to PRC-002 may create **unintended consequences** to purpose of PRC-002 and industry confusion.
- The SDT **strongly believes** that to address needs identified in the IRPTF SAR, a **new standard for monitoring requirements for IBRs** should be created instead of revising PRC-002.



**Review of
PRC-002-5
(Redline to PRC-002-4)**

Applicability

4.1. Functional Entities:

4.1.1. Reliability Coordinator

4.1.2. Transmission Owner

4.1.3. Generator Owner

4.2. **Facilities:** BES Elements, excluding inverter-based portions of generating plants/Facilities meeting the criteria set by Inclusion I2, Part (b) or Inclusion I4 of the BES definition.¹

¹ Disturbance monitoring and reporting requirements for inverter-based resources are addressed in PRC-028.

Requirement R5

R5. Each Reliability Coordinator shall: *[Violation Risk Factor: Lower] [Time Horizon: Long-term Planning]*

5.1. Identify BES Elements for which dynamic Disturbance recording (DDR) data is required, including the following:

5.1.1. Synchronous machine based generating resource(s) with:

5.1.1.1. Gross individual nameplate rating greater than or equal to 500 MVA.

5.1.1.2. Gross individual nameplate rating greater than or equal to 300 MVA where the gross plant/facility aggregate nameplate rating is greater than or equal to 1,000 MVA.

Other changes

- Minor editorial changes
- Section C, 1.2 – Data Retention: removed “measures” to align with standardized language
- Minor changes to VSLs of R3, R4, R6, R7, and R11.
 - Edits are clarifying in nature
 - Need was recognized as the SDT developed VSLs for PRC-028



**Review of
PRC-028-1**

Functional Entities

- Generator Owner
- Transmission Owner – when owns equipment within the IBR plant

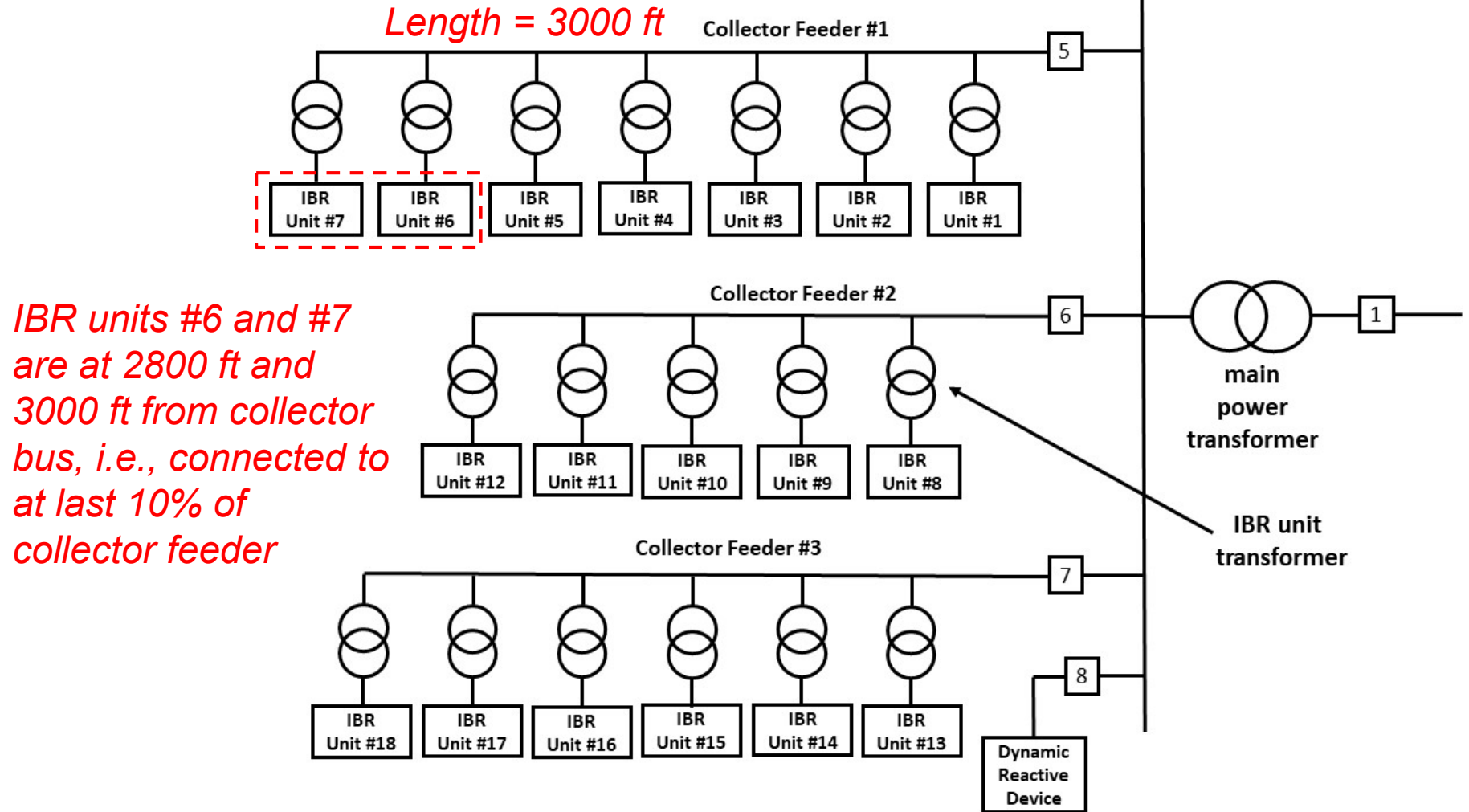
Applicable Facilities

- **Inverter-based portion** of generating plant/Facility meeting the criterion set by **Inclusion I2, part (b)**
- Generating plant/Facility meeting the criteria set by **Inclusion I4**

Elements in scope of the standard:

- Circuit breaker(s)
- Main power transformer(s)
- Collector bus
- Shunt static or dynamic reactive device(s)
- at least **one IBR unit connected to last 10% of each collector feeder length** (i.e., furthest from the collector bus)

Applicability



IBR units #6 and #7 are at 2800 ft and 3000 ft from collector bus, i.e., connected to at last 10% of collector feeder

Requirement R1

Each **TO** and **GO** shall have **SER data** for the following **Elements** that it owns:

- 1.1** CB position (open/close) for CBs associated with the Elements identified in section 4.2.
- 1.2** At least **one IBR unit connected to last 10% of each collector feeder** length. IBR units installed **prior to the effective date** of this standard and are not capable of recording this data are **excluded**.
 - All fault codes & alarms.
 - Change of operating mode.
 - High and low voltage ride-through.
 - High and low frequency ride-through.
 - Control system command values, reference values, and feedback signals

Requirement R2

Each **TO** and **GO** shall have **triggered FR data** to determine following **electrical quantities** for the **Elements** that it owns:

High-side of MPT & Dynamic reactive device

- Phase-to-neutral voltage for each phase
- Each phase current & residual to neutral current
- Real and reactive power

IBR unit

- Each AC phase-to-neutral or phase-phase voltage
- Each AC phase current & residual or neutral current
- DC bus current and voltage – installed **prior to effective date of this standard** and are not capable of recording this data are **excluded**.

*@ IBR unit
terminals **OR**
HS of IBR unit
transformer*

Requirement R3

Each **TO and GO** shall have **FR data** that meets the following:

- A single or multiple records
- **2 cycles** of pre-trigger record
- Total record length of **2 seconds**
- Minimum **recording rate of 128 samples per cycle**

High-side of MPT & Dynamic reactive device

- Trigger settings: Neutral (residual) current, AC phase UV/OV

IBR unit

- Trigger Settings: AC phase UV/OV, DC OV, DC OC, DC reverse current, over/under frequency

Requirement R4

Each **TO** and **GO** shall have **continuous** DDR data and storage to determine following **electrical quantities** for **each MPT** it owns:

- 4.1** One **phase-to-neutral or positive sequence voltage** on high-side of the MPT(s)
- 4.2** **Phase current** for the phase associated with **4.1**, or the **positive sequence current**
- 4.2** **Real and reactive power** on three-phase basis
- 4.2** **Frequency**

Requirement R5

Each **TO and GO** responsible for **DDR data** shall meet the following:

- 5.1** Input sampling rate of at least **960** samples per second
- 5.2** Output recording rate of at least **60** times per second

Requirement R6

Each **TO and GO** shall time synchronize SER, FR, and DDR data as following:

- 6.1** Synchronization to UTC with or without local time offset
- 6.2** Synchronized device clock accuracy within \pm **100 μ sec** of UTC

Requirement R7

Upon request, **TO and GO** shall provide data to its RC, RE, or NERC in accordance with following:

- 7.1** Data shall be **retrievable** for period of **30 calendar days**, inclusive of the day the data was recorded
- 7.2** Data shall be provided **within 30 calendar days** of request, unless extension is granted
- 7.3 SER data** shall be provided in **ASCII CSV format** per attachment 1
- 7.4 FR/DDR data** shall be provided in electronic files formatted in **C37.111 (COMTRADE)**, revision 1999 or later
- 7.5** Data files shall be **named** per C37.232 (COMNAME), revision 2011 or later

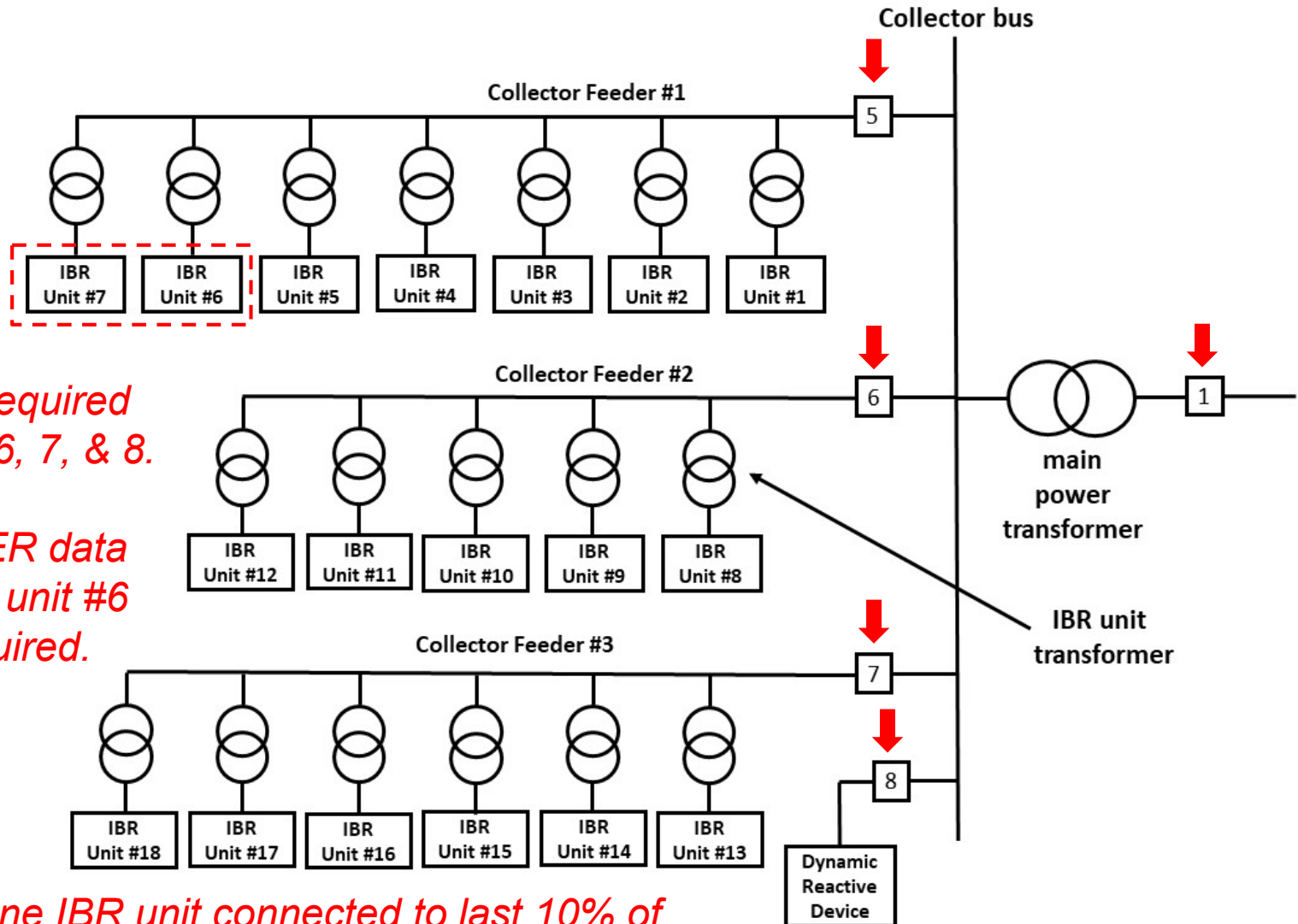
Requirement R8

Each **TO and GO** shall, within 9 calendar days of the discovery of a failure of the recording capability for the SER, FR, or DDR data, either:

- 8.1** Restore the capability, or
- 8.2** Submit a CAP to the Regional Entity and implement it.

A stylized map of North America is centered on the page. The map is divided into three horizontal color bands: a light blue band at the top covering Canada, a dark blue band in the middle covering the United States, and a light grey band at the bottom covering Mexico. The word "Examples" is written in a large, bold, black sans-serif font, centered over the dark blue band representing the United States.

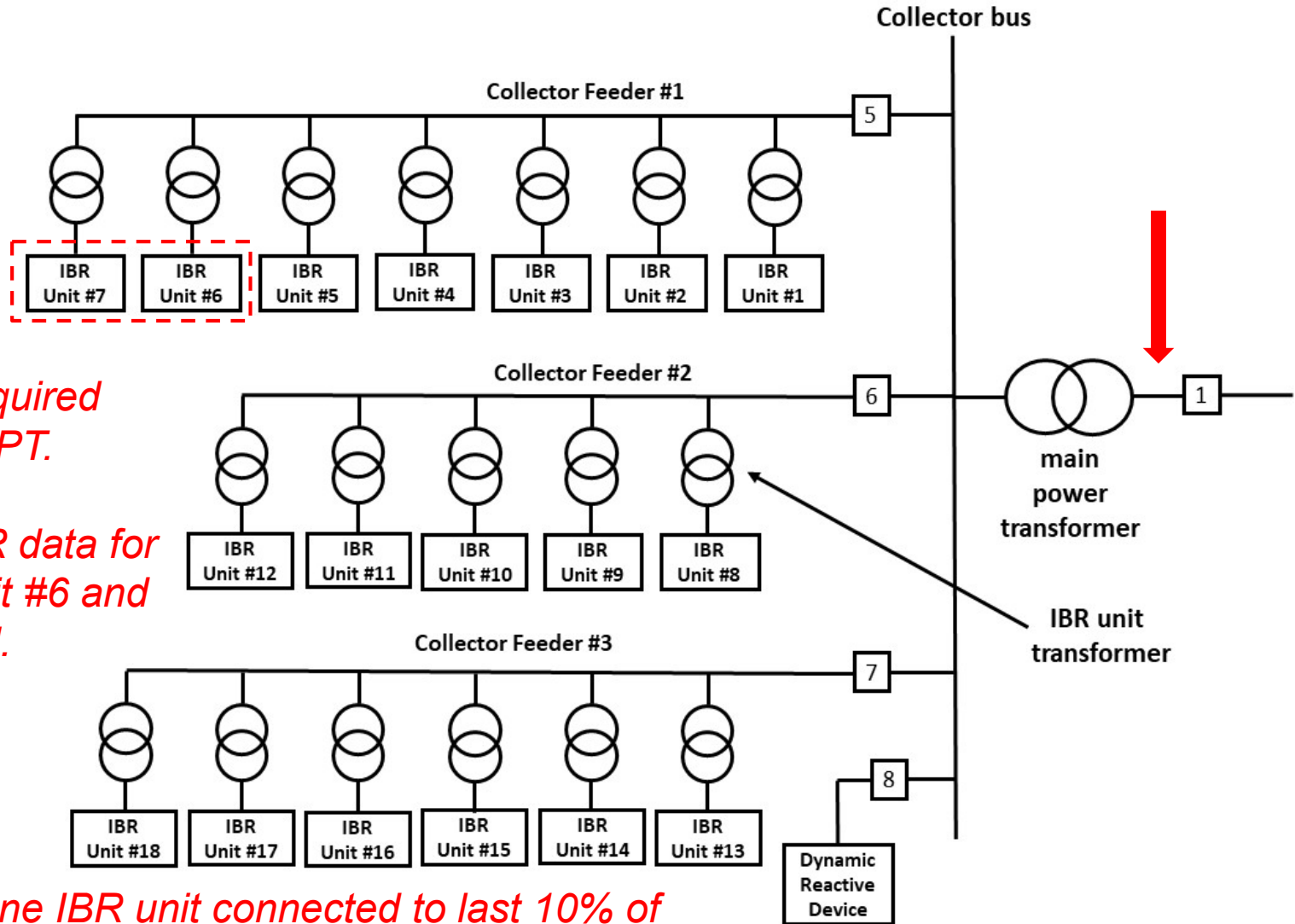
Examples



SER data is required for CBs 1, 5, 6, 7, & 8.

On CF #1, SER data for either IBR unit #6 and #7 is required.

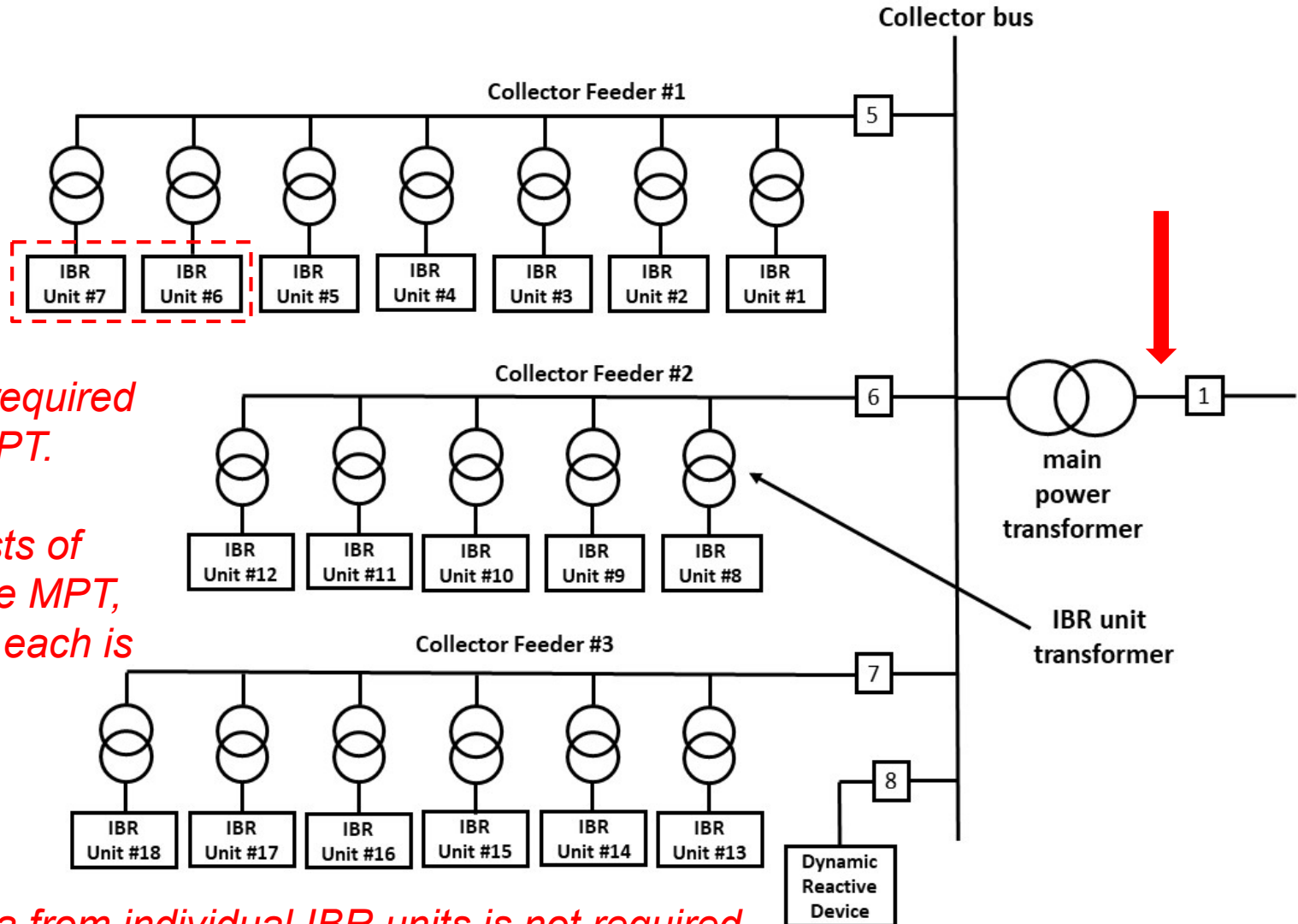
At least one IBR unit connected to last 10% of CFs #2 and #3 is also required to have SER data



FR data is required from HS of MPT.

On CF #1, FR data for either IBR unit #6 and #7 is required.

At least one IBR unit connected to last 10% of 26 CFs #2 and #3 is also required to have FR data

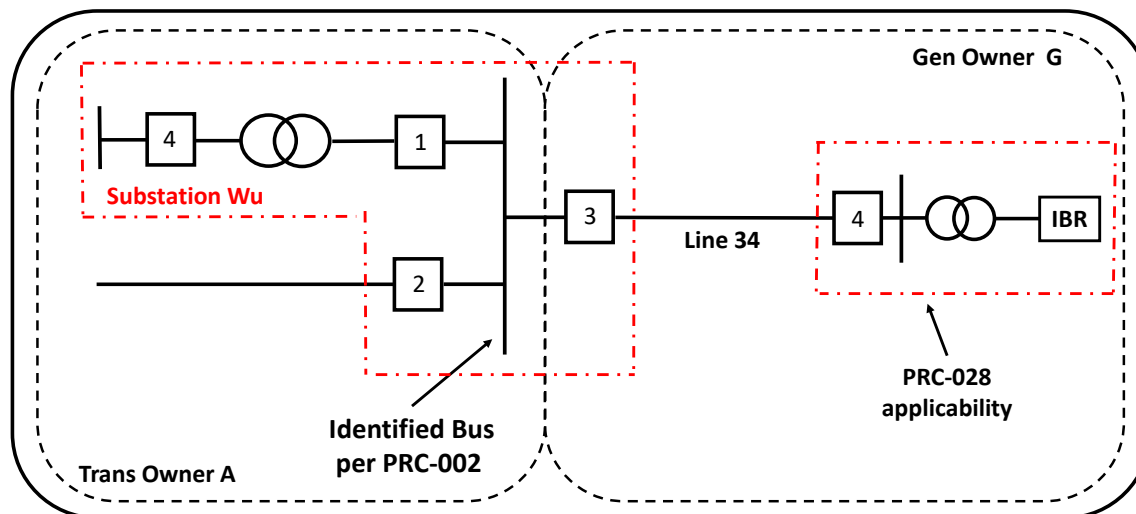


DDR data is required from HS of MPT.

If plant consists of more than one MPT, DDR data for each is required.

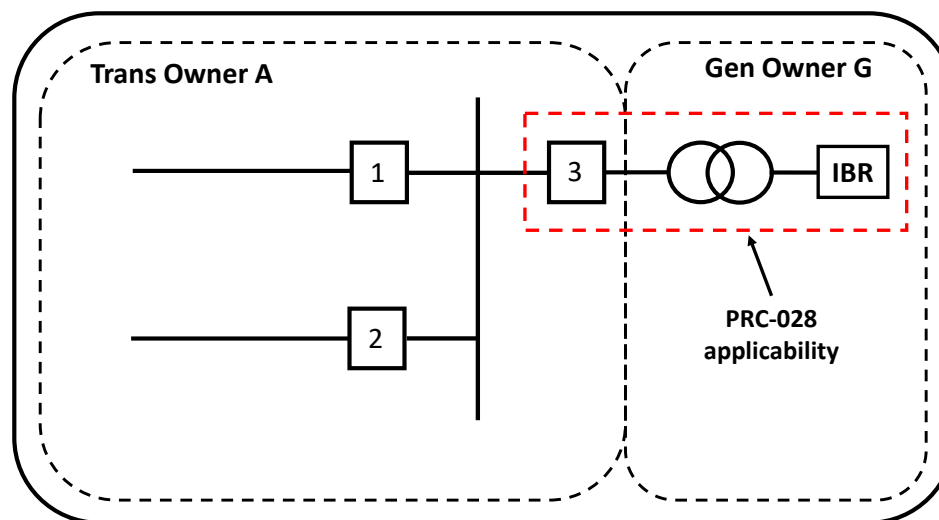
DDR data from individual IBR units is not required.

Applicability of PRC-002 versus PRC-028



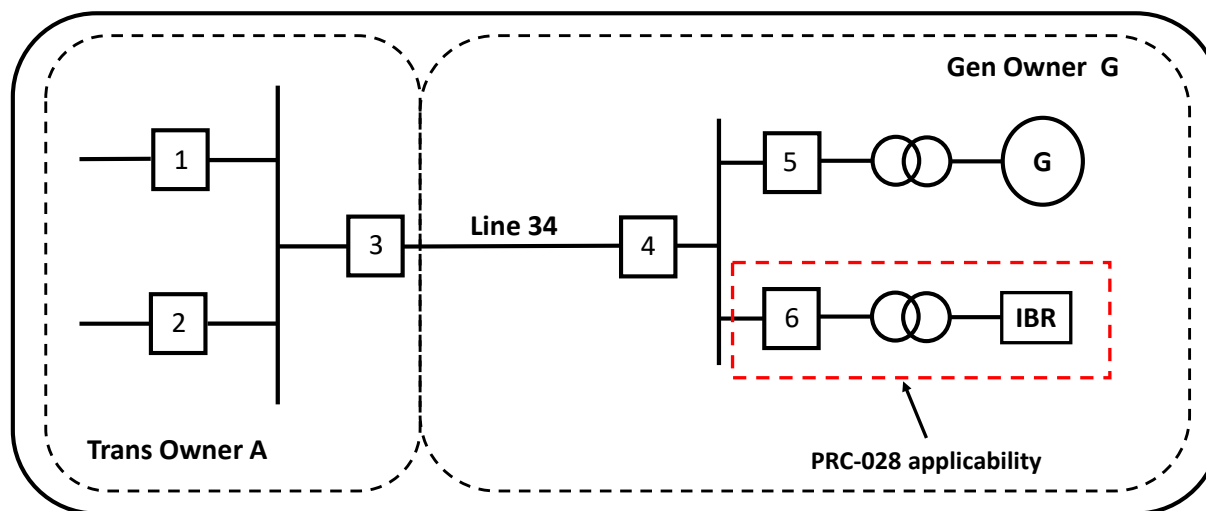
- The BES bus in substation Wu is the identified BES bus per methodology in **Attachment 1 of the PRC-002**. SER & FR data requirements for the identified BES bus are per PRC-002.
- PRC-028 is applicable to the IBR generating facility as it meets the criteria set by **inclusion I4** of the BES definition.

TO equipment within IBR generating facility



- TO A owns CB 3 associated with the IBR generating facility. **TO A is responsible for SER data for CB 3.**
- Not common for TO to own the MPT or portions of the collector system. However, when true, TO is responsible for SER, FR, and DDR data, as applicable, per PRC-028.

Hybrid Plant (SM + IBR)



- The aggregate nameplate rating of this hybrid generating facility is greater than 75 MVA and meets the criteria set by **inclusion I2, part (b)** of the BES definition.
- SER, FR, and DDR data for **inverter-based portion** of this hybrid generating facility is required.

A map of North America, including the United States, Canada, and Mexico, is shown in a light blue color. A dark blue horizontal band is overlaid across the middle of the map, containing the text 'Implementation Plan' in a bold, black, sans-serif font.

Implementation Plan

General Considerations

Additional time to implement PRC-002-5 is **not provided** because the revisions are clarifying in nature to **exclude IBRs** from PRC-002 applicability.

The revision to PRC-002 **does not require** any procurement or installation of DME.

Prior Implementation Plan

The following element of the Implementation Plan for PRC-002-4 is incorporated herein and modified in case PRC-002-4 is superseded by PRC-002-5 prior to becoming effective:

Reliability Coordinators in the Eastern Interconnection shall be fully compliant with Requirement R5 within six (6) months of the effective date of PRC-002-4 or six (6) months of the effective date of PRC-002-5, whichever occurs first.

General Considerations

- The PRC-028-1 is expected to have **wide ranging impact on TOs and GOs** as many existing and new facilities would be required to have DME.
- A **graduated approach** to implementation recognizes that progress will be made while attempting to minimize any potential significant impact to the entities.
- The Implementation Plan takes into account **scheduling outages** needed to implement SER, FR, and DDR capability.
- The Implementation Plan accounts for any **increase in requests to vendors** for this technology or capability that could impact implementation timelines for the respective entities.

Compliance Date for Requirements R1-R7

- Entities shall be fully compliant at
 - **50%** of their generating plants/Facilities within **three (3) calendar years**
 - **100%** of their generating plant/Facilities within **five (5) calendar years**
- Entities that are required to monitor only **one (1) generating plant/Facility** shall be fully compliant within **three (3) calendar years**.
- Entities with more than one (1) generating plant/Facility are encouraged to **develop a strategy**, to be shared with ERO Compliance Monitoring and Enforcement Program staff as requested, for **how they will implement PRC-028** across their generating fleet.

Compliance Date for Requirements R8

- Entities shall be **100%** complaint on first day of the first calendar quarter **nine (9) months** after the effective date of PRC-028.

A stylized map of North America is centered on the page. The map is divided into three horizontal color bands: a light blue band at the top, a dark blue band in the middle, and a light grey band at the bottom. The text "Next Steps" is overlaid in the dark blue band. The text is in a bold, black, sans-serif font.

Next Steps

- Posting
 - [Project Page 2021-04](#)
 - 45-day comment period and formal ballot August 1 – September 14, 2023
- Point of contact
 - Ben Wu, Senior Standards Developer
 - Ben.Wu@nerc.net or call 470-542-6882
- Webinar posting
 - Three business days
 - Standards Bulletin

A stylized map of North America is centered on the page. The map is divided into three horizontal color bands: a light blue band at the top, a medium blue band in the middle, and a dark blue band at the bottom. The text "Questions and Answers" is overlaid in the middle band. The map shows the outlines of the United States, Canada, and Mexico.

Questions and Answers