



Metering System and Communication Requirements

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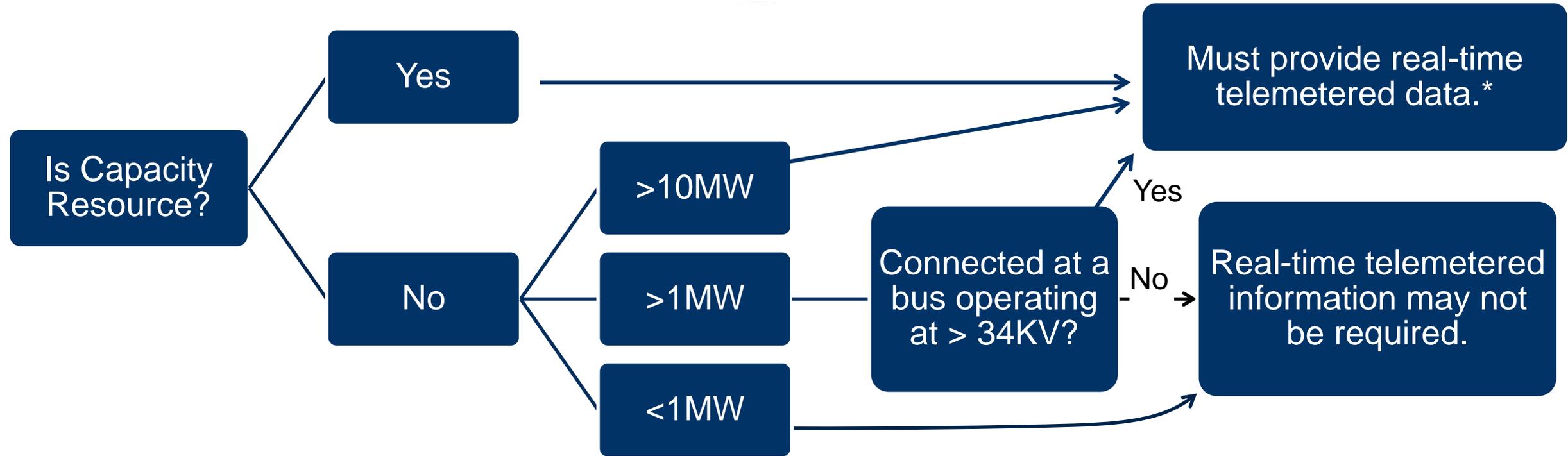
- **Metering system:** includes all components from the meter location through to the system operator destination. A metering system can measure parameters for billing and/or real-time operations.
- **Billing (accumulator data):** for after-the-fact settlement of energy transactions. E.g.: **MWh** uploaded daily.
- **System control and monitoring (instantaneous data):** for operational monitoring in real-time. E.g.: **MW** telemetered on 10-second scan rate.
- **Communications** = telemetry and networking for exchange and movement of data
- *Synchrophasor measurement devices (PMUs) are not covered here.*
 - *PMUs required for units >100MW that entered PJM's interconnection queue on or after October 1, 2012.*

- Generation
 - Some small resources do not require real-time telemetered data (see flow chart)
 - BUT: any resource (regardless of size) that wants to do Regulation must have real-time telemetered data
 - Metering system accuracy requirements for billing and telemetered data are the same regardless of size
 - Resources <100 MW can use the internet, large resources must use a private network
- Demand response
 - Settlements based on utility-owned meters or, if private meters, revenue-grade
 - Real-time telemetered data only required for Ancillary Services
 - Internet allowed for communications

- Generation
 - Settlement data: $\pm 1\%$ of true value
 - Real-time telemetered data: $\pm 2\%$ for almost everything, $\pm 5\%$ for the rest
- Demand response
 - Utility retail metering system OR
 - If private metering, must meet ANSI c12.1 and c57.13

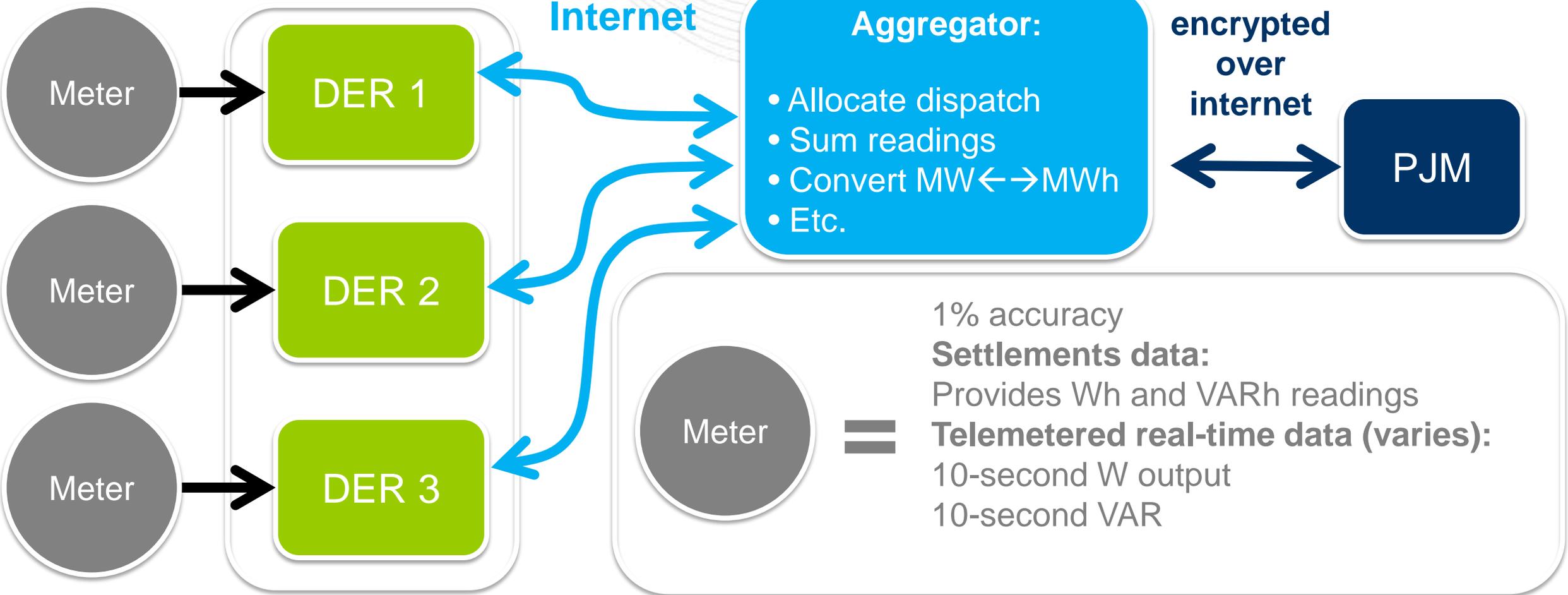
M14D 4.2.2 Metering Plan

To satisfy PJM metering requirements, all generators connecting to the PJM system are required to install and operate metering and related equipment capable of recording and transmitting all voice and data communications.



* Distributed generators modeled at >10MW must provide instantaneous power data at the BES injection point within 10% of hourly MWh revenue accumulated data.

SAME ELECTRICAL LOCATION



APPENDIX

M14D 4.1.1 **PJMnet** Communications System

- PJMnet is the primary wide-area private network for secure Control Center data communication to and from PJM. PJMnet will support: Inter-Control Center Communications Protocol (ICCP) data links to Control Centers and SCADA links to plants via remote terminal units (RTUs) using Distributed Network Protocol (DNP3.0 Implementation Level 2 over TCP/IP).

M14D 4.1.2 **Jetstream**

- Jetstream is a data system to connect remote assets and PJM to satisfy real-time, market and other data transactions. Small generators, load response assets and other market participants can communicate with the PJM Energy Management System through the Jetstream system.



Gen: Comm's Requirement by Size: Manual 14d 4.1.7

Size	Connection	Intelligent Electronic Device	Data Model	Configuration	Scan Rate	Protocol
< 10 MW	Jetstream	Data concentrator	All data types available OR just MWh and MVAR	Dedicated TCP/IP w. encryption gateway over secure internet	varies	DNP 3.0
10-100 MW	Jetstream	Data concentrator	All data types available	Dedicated TCP/IP w. encryption gateway over secure internet	varies	DNP 3.0
100-500 MW	PJMnet	Data concentrator	All data types available	Dedicated TCP/IP with single router to redundant PJMnet	2-10 sec.	DNP 3.0 OR ICCP
>500 MW	PJMnet	Data concentrator, SCADA, EMS or GMS	All data types available	Dedicated TCP/IP with dual routers to redundant PJMnet – Single Local Area Network	2-10 sec.	DNP 3.0 OR ICCP