

DER Measurement & Verification and Monitoring & Control

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Previous Materials

Date	Working Group	Discussion points and links to materials
02-02-17	Posted	Distributed Energy Resources Roadmap for New York's Wholesale Electricity Market
05-23-17	Market Issues Working Group (MIWG)	DER Measurement & Verification, Monitoring & Control, and Meter Data Study
09-29-17	Market Issues Working Group (MIWG)	DER Meter Data Study
10-30-17	Market Issues Working Group (MIWG)	DER Meter Data Study Initial Findings – E-Cubed Policy Associates, LLC (Dr. Paul Sotkiewicz)

Today's Meeting

- Background
- Metering and telemetry requirements
- Telemetry for resources participating in Energy and Ancillary Services Markets
- Alternate telemetry approach for small aggregated resources
- Latency requirement for resources participating in Energy and Ancillary Services Markets
- Next steps

Background

- NYISO is evaluating if new or revised requirements for measurement & verification (M&V) and monitoring and control (M&C) need to be considered for integrating DER into NYISO wholesale markets
- In parallel with the Meter Data Study effort being performed by E-Cubed Policy Associates LLC, NYISO is reviewing existing telemetry and other communication requirements internally and considering if different requirements are appropriate for DER
- NYISO has previously proposed that DER Coordinating Entity Aggregations (DCEAs), will be required to meet existing requirements for telemetry of wholesale market resources

Terms and Existing Requirements

- Metering system – includes all components, such as revenue meters, current transformers, voltage transformers, transducers, remote terminal units (RTU), wiring, connecting blocks, and the cabinet/panels that house the above, to provide data to the NYISO for energy billing and real-time operation
- Two types of data often derived from a metering system
 - Revenue quality meter data – metered data for after-the-fact settlement of energy transactions
 - *Real-time operational data – instantaneous data for power system operational visibility and dispatch instructions*
- Telemetry – two-way communication of real-time operational data between the resource and NYISO
- The metering system for the provision of real-time operational data to the NYISO can, but does not need to be, derived from the same infrastructure used for the provision of revenue quality meter data
- The rest of this presentation focuses primarily on real-time operational data and the associated metering system used for telemetry

Terms and Existing Requirements (cont'd)

- **Specifications for Telemetry Data with NYISO**
 - Scan rate - the periodicity that an entity (e.g., NYISO, TO) queries data from a source over telemetry
 - One-way latency – the time delay as measured when telemetered data is transmitted from the source to when it is received by the destination
 - Round-trip latency – the time delay as measured when telemetered data is transmitted from the source to when it has received a response by the destination
 - Full-scale error – maximum combined error of full scale reading (e.g., MW) as measured at the NYISO or TO control room
- **NYISO's existing telemetry requirements for all Generators (including Intermittent Power Resources, Energy Limited Resources, DSASP Resources) participating in NYISO's Energy and Ancillary Services Markets include:**
 - 6-second (or faster) scan rate
 - Not to exceed 10-sec one-way latency (from the resource to NYISO or from NYISO to the resource)
 - Not to exceed 20-sec round-trip latency (from NYISO to resource and back to NYISO)
 - Not to exceed $\pm 5\%$ full-scale error

Telemetry for Resources Participating in Energy and Ancillary Services Markets

- Telemetry of real-time operational data such as the Unit Desired Generation (*i.e.*, base point) and the Resource Gen MW/MVAR are expected to represent the wholesale resource's dispatch instruction and MW/MVAR output, respectively
- In the DER participation model, the DCEA will be the wholesale resource (*i.e.*, PTID)
 - Unit Desired Generation signal provided to the DCEA from the NYISO is the expected response for the aggregation as a whole within a specific 6-second time interval
 - Resource Gen MW/MVAR signal provided from the DCEA to the NYISO must reflect the MW/MVAR output from all resources that comprise the aggregation within a 6-second time interval

Telemetry for Resources Participating in Energy and Ancillary Services Markets (cont'd)

- **NYISO requires 6-second scan rate for telemetered data from all resources participating in NYISO's Energy and Ancillary Services Market in order to:**
 - Maintain situational awareness of the power system, especially during significant unexpected events or changes occurring on the NYCA system
 - Maintain NYISO's ability to instruct resources to respond to significant unexpected events or changes that occur on the NYCA system to maintain system reliability
 - NYISO can dispatch any available resources, including energy-only resources, to respond to reliability events
 - Maintain optimization of its security-constrained economic dispatch (SCED) and co-optimization of energy and operating reserves
 - 6-second analog data (*i.e.*, MW output) from resources providing energy or ancillary services are inputs into SCED and impact Automatic Generation Control (AGC) basepoints including those to Regulation Suppliers
 - Meet reliability criteria including those that are unique to New York State
 - New York State Reliability Council's D.1 reliability requirement requires bulk transmission facility overloads above Short Term Emergency (STE) rating be relieved within 5 minutes
- **Dispatchable DER providing energy and/or ancillary services have similar impacts on grid operations as that of other supply resources. Therefore, dispatchable DER should be required to have the same 6-second scan rate for telemetry**
- **Demand Side Resources participating as dispatchable DER will be seen as generation for the purpose of real-time grid operations and therefore needs the same treatment and visibility as generation resources**

Alternate Telemetry Approach for Small Aggregated Resources

- NYISO is considering an alternate approach for small resources to provide real-time operational data for telemetry at a 6-second scan rate

- **Purpose**

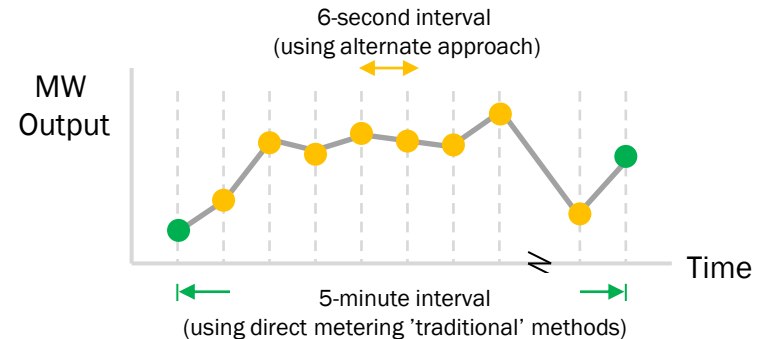
- To reduce cost of telemetry for smaller resources through alternative methods, and
- To maintain NYISO operational visibility to smaller resources on a 6-second basis

- **Expectation**

- For each resource within an aggregation, the DCEA is expected to have MW/MVAR output data for that resource on a 6-second basis to generate its aggregate MW/MVAR output values for telemetry to the NYISO
- Resource 6-second MW/MVAR output values are comprised of both:
 - Measurements through direct metering ('traditional') methods (e.g., CT/PT) from the resource with periodicity of 5 minutes or faster, and
 - Calculated values through an alternate approach to augment direct metered values as needed to produce operational data on a 6-second basis

- **Eligibility**

- NYISO is considering this alternate telemetry approach for smaller DER facilities such as residential customers
- DER in a DCEA providing ancillary services would be ineligible to use this alternate telemetry approach



Alternate Telemetry Approach for Small Aggregated Resources

(cont'd)

- **Some alternative methods or concepts that the NYISO is aware of:**
 - MW output based on a physics-based or empirically-derived model (e.g., digital twin)¹
 - Use of status changes, communicated by exception, that indicate when the resource is output limited, de-rated to a specific range, or operating under a specific operating parameter (e.g., fixed ramp rate)
- **NYISO will evaluate on a case-by-case basis any alternate approaches proposed by stakeholders that can be used for determining operational data for telemetry**
- **Some aspects that NYISO will be evaluating for alternative methods include: precision (*i.e.*, consistency), accuracy data integrity, and replicability**
- **NYISO must formally approve alternate approaches before they can be used by a Market Participant for eligible small resources**

¹Digital twin refers to a digital model of physical assets or processes that often uses sensory field data, historical performance data, technical domain knowledge and/or learning algorithms for asset prognostics

Latency Requirement for Telemetry

- **Direct Communication Procedure requirement specifies the one-way and round-trip latency requirements as:**
 - **Article 4.1.1** - For those Suppliers that wish to receive dispatch and control signals via their own centralized Control Center, the NYISO will provide a single communication link containing data points for all Resources belonging to that company that are participating in the NYISO dispatch. Latency time at the Supplier's Control Center on the one-way pass-through of AGC commands shall not exceed 10 seconds. Total latency for the round trip (base point signals sent to Resource, analog output received back at NYISO) shall not exceed 20 seconds.
 - **Article 4.2.2** - The TO shall pass Resource set-point signals generated at the NYISO through its EMS and out to the Resource in a timely fashion. Latency for those Resources participating in AGC shall not exceed 10 seconds. Total latency for the round trip (base point signals sent to Resource, analog output received back at NYISO) shall not exceed 20 seconds.
- **Considering the intent of this requirement, NYISO views individual DER within an aggregation as the 'Resource' referenced in Article 4.1.1 and Article 4.2.2**
- **Dispatchable DER participating in the energy and ancillary services markets will have the same latency requirements as other suppliers (i.e., 10 second one-way latency and 20-second round-trip latency)**

Next Steps

- Incorporate proposal for the following into DER concept paper:
 - Existing 6-second scan rate, 10-second one-way and 20 second round-trip latency requirement for DCEAs
 - Further consideration of alternate telemetry approaches for small aggregated resources in 2018

Feedback?

- Email additional feedback to: DER_Feedback@nyiso.com

The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefits to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policy makers, stakeholders and investors in the power system



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Appendix: NYSRC D.1 Mitigation of Major Emergencies –

Section A. Requirements

- **R1. Transmission Thermal Overloads** - If a transmission facility, which constitutes a part of the NYS Bulk Power System, becomes overloaded, relief measures shall be applied immediately to bring the loading within established ratings.
 - R1.1 - When a facility becomes loaded above its LTE rating, but below its STE rating, corrective action must be taken to return the loading on the facility to its LTE rating or lower within fifteen (15) minutes; provided, however, that after taking corrective action, loadings on the facility are not below its LTE rating within five (5) minutes, a Major Emergency shall be declared and corrective measures taken – which may include voltage reduction and/or load relief – to return the loading on the facility to its LTE rating or lower within fifteen (15) minutes from the initial overload. At the NYISO’S discretion, a Major Emergency may be declared at any time a facility becomes loaded above its LTE rating.
 - R1.2 - When a facility becomes loaded at or above its *STE rating*, immediate corrective action which may include *voltage reduction* and/or *load shedding*, must be initiated to reduce the loading on the facility to below its *STE rating* within five (5) minutes and furthermore, to continue to reduce the loading on the facility to below its *LTE rating* within ten (10) minutes from the initial overload. If the loading is substantially above the *STE rating*, *load relief* should be considered as the initial action to be taken.