DER Real-Time Telemetry and Alternate Telemetry Approach for Small DER

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Background

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
11-27-17	Market Issues Working Group (MIWG)	DER Measurement & Verification and Monitoring & Control
12-19-17	Market Issues Working Group (MIWG)	2017 DER Market Design Concept Proposal Summary
12-19-17	Posted	Distributed Energy Resources Market Design Concept Proposal

Background

- **As part of the DER Roadmap document, which was published in February 2017, NYISO proposed to apply the existing 6-second scan rate requirement for real-time telemetered operational data applicable to Generators to DCEAs (i.e., DER aggregations)**
  - NYISO provided details for the operational need to apply existing requirement for 6-second scan rate for real-time telemetry to DCEAs at the May 23, November 27, and December 19, 2017 MIWGs
  - NYISO also provided details at these MIWGs of a potential alternate telemetry approach for small DER in a DCEA to help reduce the cost of providing 6-second telemetry
- **Some stakeholders have requested NYISO to provide additional details for the operational need for 6-second scan rate for real-time telemetry and of the alternate telemetry approach for small DER in a DECA**
  - This presentation provides these details

DCEA Real-Time Telemetry

- 6-second telemetry communicated with NYISO will be at the DCEA level (i.e., DER aggregation)
  - DCEA basepoint telemetry signal provided by the NYISO is the desired response of the aggregation as a whole
  - DCEA response telemetry signal provided to the NYISO should be the actual response of the aggregation as a whole
- DCEA telemetry signal provided to the NYISO must reflect the response from all DER that comprise the aggregation within a 6-second time interval

Real-Time Telemetry Scan Rate Requirement

Additional details are available in a separate document posted along with this presentation

Real-Time Telemetry Requirements for Power System Operations: 6-Second Scan Rate

One of NYISO's is responsibilities is maintaining the reliability of the New York Bulk Power System and timely information on market resource performance supports this mission. 6-second telemetry of resources participating in NYISO's market is crucial to effectively maintain the reliability of the grid.

- Real-time telemetry updated every 6 seconds provides essential two-way communication of operational data between market resources and NYISO
- NYISO relies on real-time telemetry for situational awareness necessary to balance supply and demand within the New York Control Area (NYCA), and to identify and respond to normal and abnormal conditions

Real-Time Telemetry Requirements for Power System Operations: 6-Second Scan Rate (Cont'd)

- **NYISO currently requires 6-second scan rate for real-time telemetry for all market resources participating in NYISO's Energy and Ancillary Services Market † for the following reasons:**
  - Situational Awareness
    - 6-second telemetry is needed for NYISO to maintain situational awareness of the NYCA power system, especially during times of significant or unexpected grid events or changes
    - System operators must have an accurate understanding of the power system conditions at all times in order to make quick decisions and direct resources as needed to maintain reliability
  - Automatic Generation Control
    - 6-second telemetry is necessary for NYISO's Automatic Generation Control process to control market resources in order to maintain NYCA generation and load balance
    - NYISO's Automatic Generation Control process operates every 6 seconds and provides all market resources basepoints of their required operating level

(Continued on next slide)

†DADRP Resources are not required to have telemetry

Real-Time Telemetry Requirements for Power System Operations: 6-Second Scan Rate (Cont'd)

- NYISO currently requires 6-second scan rate for real-time telemetry for all market resources participating in NYISO's Energy and Ancillary Services Market † for the following reasons (Continued from previous slide):
  - Reliability Compliance
    - 6-second telemetry is needed to meet mandatory bulk power system transmission operating reliability criteria, including criteria 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
    - To meet the New York State Reliability Council's requirement, NYISO requires 6-second telemetry of market resources to develop and quickly communicate the required schedules to the market resources
  - Emergency Response
    - Even though NYISO's Security Constrained Economic Dispatch (SCED) nominally operates on a five-minute period, NYISO will use SCED at any time to immediately respond to unexpected system events
    - NYISO requires 6-second telemetry from market resources to develop and quickly communicate the required schedules to the market resources and confirm that they are responding as required
    - NYISO will dispatch any available market resources, including energy-only resources, to respond to reliability events and resolve them timely

†DADRP Resources are not required to have telemetry
‡NYSRC Reliability Rules & Compliance Manual: http://www.nysrc.org/pdf/Reliability%20Rules%20Manuals/RRC%20Manual%20V41.pdf

Real-Time Telemetry Requirements for Power System Operations: Scan Rate (Cont'd)

- **NYISO will require 6-second scan rate for real-time telemetry for DCEAs**
  - DCEAs (*i.e.*, DER aggregations) will have similar impacts on real-time grid operations as that of other market resources
    - Demand Side Resources participating as dispatchable DER will be seen as supply that is equivalent to traditional generation in the real-time grid operations and therefore requires the same treatment and visibility as generation resources
  - A critical aspect of DER integration is the ability to instruct all market resources, including DCEAs, to address reliability events such as providing relief on a overloaded transmission facility
  - NYISO will rely on DCEAs, like all dispatchable market resources, to satisfy the reliability requirements of the New York State Reliability Council
  - DCEAs will provide services comparable to generation resources for the purposes of real-time grid operations

6-Second Scan Rate Real-Time Telemetry Costs

- **NYISO's evaluation has indicated that multiple cost effective technologies exist for providing 6-second scan rate for real-time telemetry and is not a barrier to entry**
  - NYISO's 6-second telemetry accuracy requirement of ±5% range is less stringent than the ±0.2% range for the settlement data → cost effective approaches could be used for telemetry
  - NYISO gives the flexibility to the DCE (i.e., DER aggregator) to use cost effective technologies to acquire and transmit telemetry data between DER and DCE
  - There is no significant cost difference between 6-second scan rate versus 1-minute scan rate for telemetry
  - NYISO's evaluation indicates that the 6-second telemetry between DER and DCE for a 0.250 MW DER could be met with a cost $1 per MWh/month
    - Based on one time metering device and installation cost of $600 + optional secure gateway device and installation cost of $1000; existing broadband internet connection and router; one time costs levelized over 5 years = $26.70/month; monthly maintenance cost for the metering device and secure gateway of $20.00/month ➔ Total monthly costs = $46.70/month; Based on 6 hour/day energy output ➔ $1.00 per MWh/month cost
- **NYISO is proposing that small DER in a DCEA can utilize alternate telemetry approach to minimize the cost of providing 6-second scan rate for the real-time telemetry**

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Alternate Telemetry Approach

This alternate telemetry methodology could be utilized by small DER participating in a DCEA

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Alternative Telemetry Approach

- NYISO proposes to allow small DER participating in a DCEA to provide real-time operational data for telemetry at a 6-second scan rate through an alternative method to directly metered methods *i.e.,* Traditional
- Alternative telemetry is the manner of deriving the status and output of a resource without a traditional meter on a six second basis.
- Alternative telemetry concepts the NYISO is aware of:
  - Representative devices of the responding resources i.e. thermostat
  - 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
- DER employing an alternative methodology for telemetry will be required to meet the same operational requirements as directly metered telemetry methods
  - NYISO's existing telemetry requirements for all Generators (including Intermittent Power Resources, Energy Limited Resources, DSASP Resources) participating in NYISO's Energy 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 ±5% full-scale error

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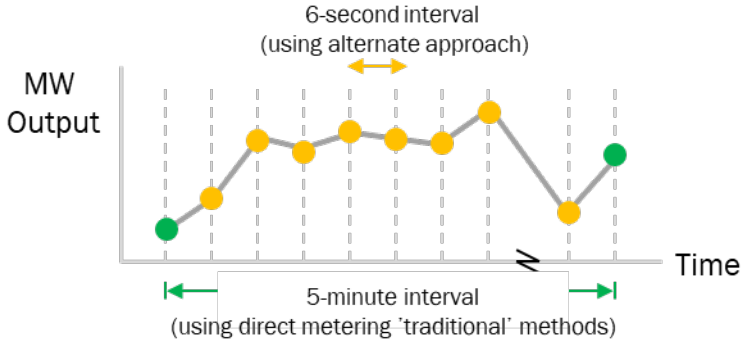
Alternative Telemetry Eligibility

- This option for alternative telemetry will be limited to DER with a peak demand/max injection below 100 kW
  - DER below 100 kW cannot individually participate in NYISO wholesale markets and, because of their capability, their operating information must be aggregated by a DCEA
  - The NYISO is attempting to lower barriers to market entry for resources small enough where traditional telemetry solutions may not be cost-effective
- Alternative telemetry methodologies must employ the status or measurement of a physical device
  - ex. Thermostat
- Alternative telemetry solutions must incorporate traditionally metered telemetry with a periodicity of 5 minutes or faster
- The use of alternative telemetry methodologies must be communicated to and approved by the NYISO before use by a DER
- DCEA's electing to use alternative telemetry would be ineligible to offer Regulation Service

Alternative Telemetry Requirements Recap



- **Operational Requirements:**
  - For each DER within an aggregation, the DCEA is expected to have MW output data for that DER on a 6-second basis to generate its aggregate MW output values for telemetry to the NYISO
  - Resource 6-second MW output values comprise:
    - 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
- **Reporting Requirements:**
  - All data used to develop alternative telemetry is subject to the same data retention requirements as traditionally metered resources *i.e.,* 6 years
  - NYISO reserves the right to audit and disapprove alternative telemetry schemes if found noncompliant with NYISO's telemetry requirements

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Next Steps

- In 2018, the NYISO will develop rules for energy and capacity market offer requirements, mitigation, forecasting and interconnection
- The NYISO will also more fully develop the market rules and tariff language to implement the 2017 MDCP
- The NYISO will evaluate the implementation of rules through the pilot program
- NYISO plans to conclude development of rules in 2018 for the eventual implementation of DER in 2021

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Feedback?

- To ensure all feedback is captured please email additional feedback to: DER_Feedback@nyiso.com
- Reminder – All comments received will be posted on the NYISO Distributed Energy Resources webpage

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 A - Acronyms

- DER – Distributed Energy Resource
- DCE – DER Coordinator Entity
- DCEA – DCE Aggregation
- DSP – Distributed System Platform
- DR – Demand Response
- RT - Real-Time
- DA – Day-Ahead
- RTC – RT Commitment
- RTD – RT Dispatch
- DAM – DA Market
- RTM – RT Market

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Appendix B

Telemetry Related Terms

Terms and Existing Requirements (Previously presented at November 27, 2017 MIWG)

- 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

Terms and Existing Requirements (cont'd) (Previously presented at November 27, 2017 MIWG)

- **Specifications for Telemetering 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 ±5% full-scale error

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