



# AMI1.2 Release for ANSI Meters

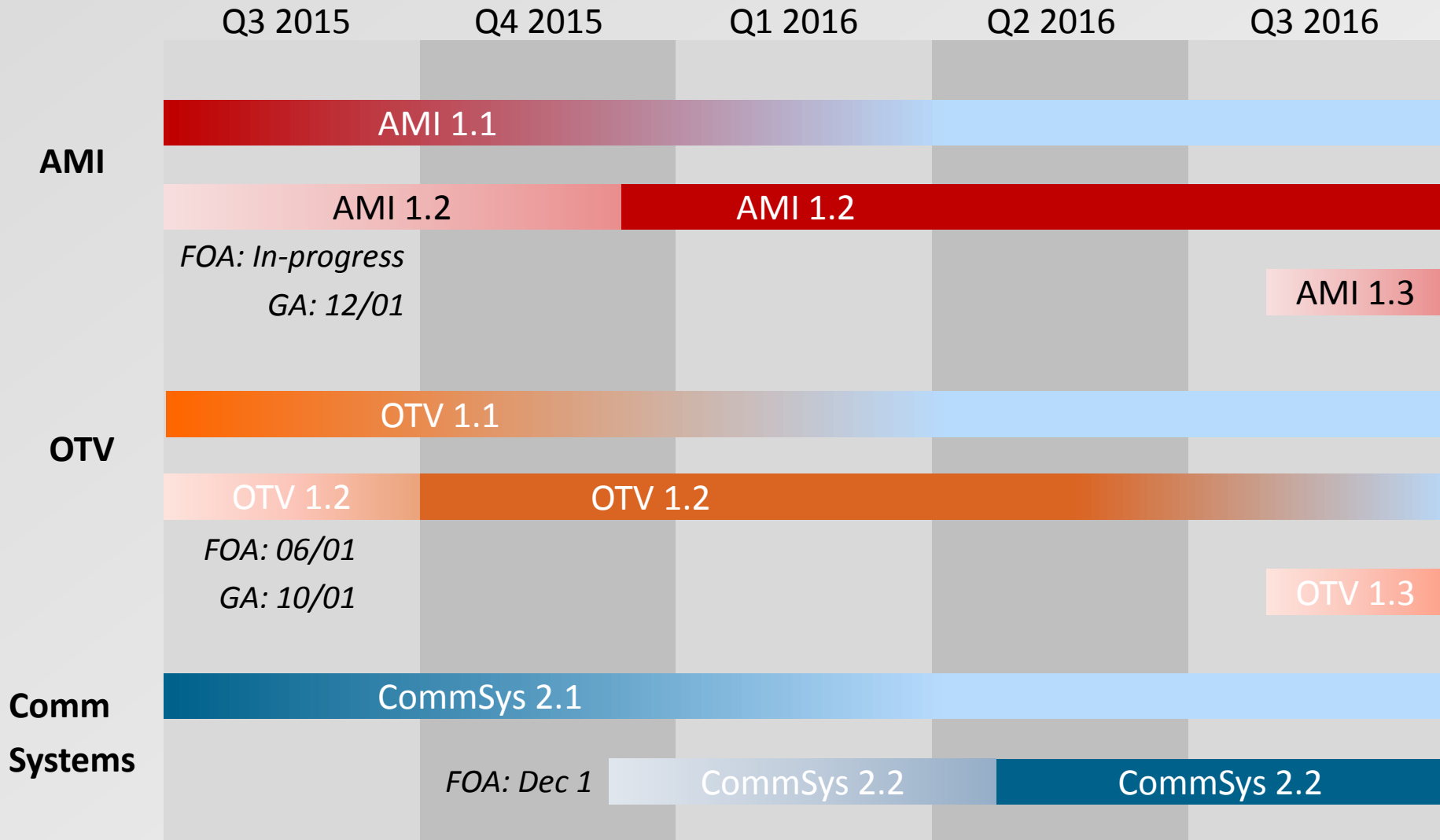
Aug 10, 2015

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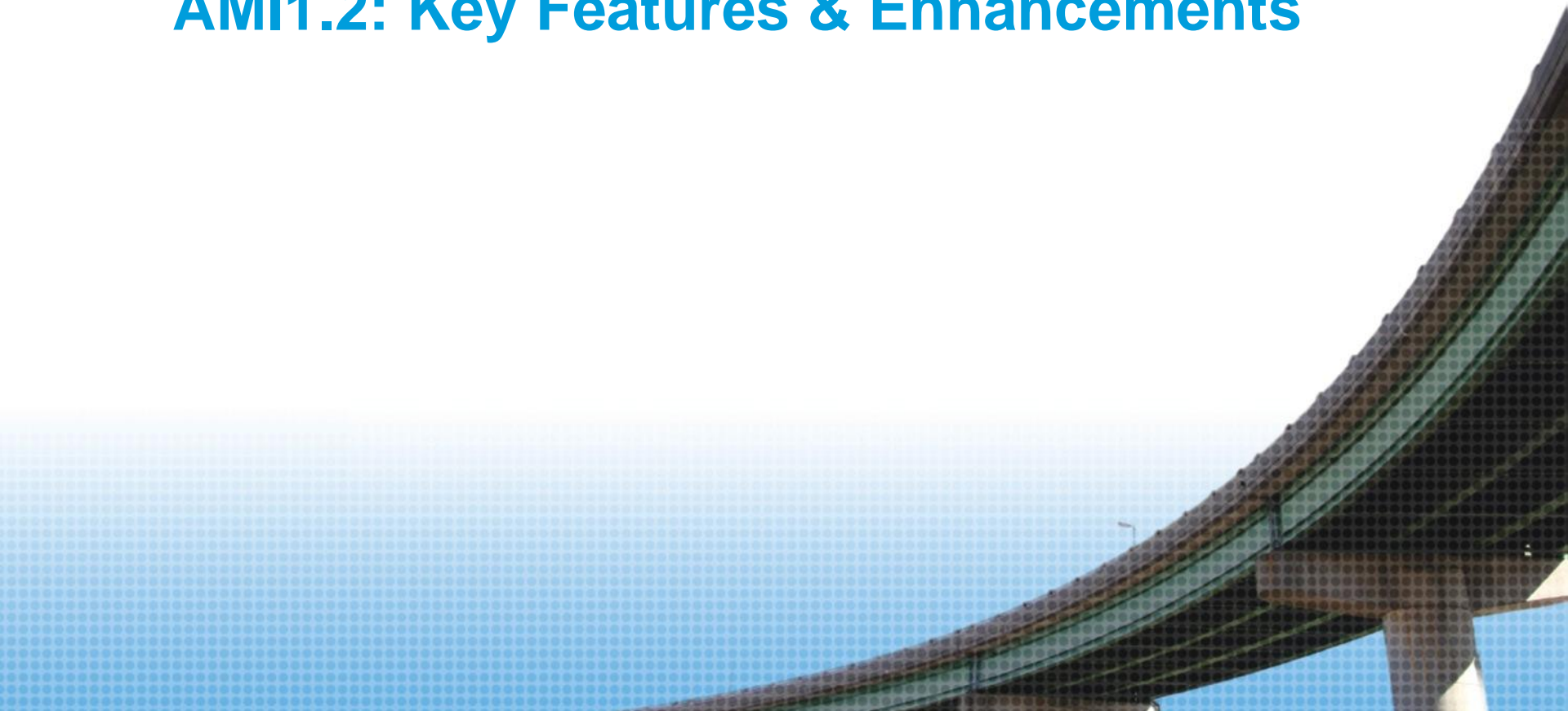
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# ORW Product Roadmap



## AMI1.2: Key Features & Enhancements



# Momentary and Sustained Outage Detection

## Sustained Power Outage

- Total loss of power lasting more than two to five minutes (configurable)
- Email alerts are sent by OTV upon detection of sustained outage
- Reduced power restoration notification latency (as soon as node rejoins)
- Exact power restoration time reported in a new event message

## Momentary Power Outage

- Loss of power for a short duration (less than two to five minutes)
- “Reclosers” on power lines revive power when interference gets cleared
- Momentary outages are logged, which are reported every 15 minutes
- No mass email alerts sent out

**New features for I-210+c**

AMI1.1 & 1.2 can differentiate momentary outages from sustained outages

# Power Quality Events and Readings

- Support for power quality reporting in I-210+c meters
- Expanded support for reporting of power quality events (kV2c)
  - Momentary outages log reporting
  - Sag/swell log reporting
  - Voltage imbalance and under/over frequency log reporting
- Addition of on-demand and scheduled power quality readings (kV2c)
  - Line side diagnostics: line-to-neutral, line-to-line
  - Instantaneous demand: active, reactive, phasor apparent, etc.
  - Instantaneous distortion: VTHD, ITHD, TDD
- Useful for enabling CVR type applications

**New features for I-210+c, kV2c**

Enhanced power quality readings and event reporting

# Enhanced Meter Reading Choices

- Introduction of **secondary reporting schedule for register/billing data**
  - Scheduled read of only summations (bulk data) from total tier
  - Supports more frequent read schedule
  - Lower latency than reporting entire billing data
  - Readings are not stored and hence have to be reported immediately
- On-demand read of **limited set of UOMs**
  - Summations of all bulk data or only kWh bulk data
  - Lowest latency in reporting of billing reads
- Scheduled read of **all interval data channels** (load profiles)
- On-demand read of interval data

**New features for I-210+, I-210+c, kV2c**

**Complete and faster reporting of register and interval data**

# Expanded Meter Controls

## Demand Reset

- **Back office triggered** demand reset aligned on billing cycle
  - Pre-scheduled or instantaneous execution
  - Only one reset command can be scheduled in advance
- Exact time and schedule for execution is configurable

## Meter Program Update (Over-the-Air)

- **Over-the-air update of meter programs** – multicast to meter groups

## TOU and Season Change

- Easy, flexible and meaningful **back office triggered TOU support**
- Meter triggered season change is unnecessary

**New features for I-210+c and kV2c**



# Expanded Meter Controls

## OTA Management of Load Control Points

- OTA enable/disable load control points in I-210+c meters
- Back office triggered control and management (IEC-CIM commands)

## Daylight Savings Time and Time Zones

- DST support for LP, TOU and demand-only modes: I-210+c and kV2c meters
- DST support for energy-only mode: I-210+ meters

# Under-the-Hood Enhancements

## uStream: Robust Transport Control Protocol

- End-to-end message reliability and flow control
- Large file transfer capability
- QoS: Prioritization for on-demand reads, billing data, etc.

## Improved System Capacity

- Reporting of bulk and interval data is randomized over the reporting period
  - Adds flexibility in supporting various meter configurations
  - Enhanced transmission reliability (fewer retransmissions)
- uStream boosts system capacity and performance

**New features for I-210+c**

uStream adds more robustness and resilience to AMI system

# Feature Releases Summary



# Register and Interval Data Reads

|                            | Features  | AMI1.0         |                |                | AMI1.1         |                | AMI1.2         |                |                | AMI 1.3        |
|----------------------------|---|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                            |   | I210+          | I210+c         | kV2C           | I210+          | kV2C           | I210+          | I210+c         | kV2C           |                |
| Register and Interval Data | Register/Billing data read  |                |                |                |                |                |                |                |                |                |
|                            | – scheduled read of all data from all tiers (bulk, demand and coincident)       |                | ✓              | ✓              |                | ✓              |                | ✓              | ✓              | ✓              |
|                            | – scheduled read of summations from total tier (enables frequent read schedule) | ✓              |                |                | ✓              |                | ✓              | ✓              | ✓              | ✓              |
|                            | – on demand read of all data  | ✓              | ✓              | ✓              | ✓              | ✓              | ✓              | ✓              | ✓              | ✓              |
|                            | – on demand read of limited set of UOMs (reduces latency)                       |                |                |                |                |                | ✓              | ✓              | ✓              | ✓              |
|                            | – back filling of persistently stored data                                      | ✓ <sup>1</sup> | ✓ <sup>2</sup> | ✓ <sup>2</sup> | ✓ <sup>1</sup> | ✓ <sup>2</sup> | ✓ <sup>1</sup> | ✓ <sup>3</sup> | ✓ <sup>3</sup> | ✓ <sup>4</sup> |
|                            | Interval data read  |                |                |                |                |                |                |                |                |                |
|                            | – scheduled read of load profile set of the meter                               |                | ✓              | ✓              |                | ✓              |                | ✓              | ✓              | ✓              |
|                            | – scheduled read of all load profile channels                                   |                | ✓              |                |                | ✓              |                | ✓              | ✓              | ✓              |
|                            | – on demand read of load profile data   |                | ✓              |                |                |                |                | ✓              | ✓              | ✓              |
|                            | – back filling of persistently stored data                                      |                | ✓ <sup>5</sup> | ✓ <sup>5</sup> |                | ✓ <sup>5</sup> |                | ✓ <sup>5</sup> | ✓ <sup>5</sup> | ✓              |

<sup>1</sup>Ninety-six reads

<sup>2</sup>Only one billing data read

<sup>3</sup>Most recent two billing reads

<sup>4</sup>More billing reads with ST26 tables

<sup>5</sup>Upto 16 interval reads (default 4 reads)

# Instantaneous Power Quality Reads

|                                   | Features  | AMI1.0 |        |      | AMI1.1 |      | AMI1.2 |        |      | AMI 1.3 |
|-----------------------------------|---|--------|--------|------|--------|------|--------|--------|------|---------|
|                                   |   | I210+  | I210+c | kV2C | I210+  | kV2C | I210+  | I210+c | kV2C |         |
| Instantaneous Power Quality Reads | Power quality metrics read: scheduled & on-demand | *      |        |      | *      |      | *      |        |      |         |
|                                   | – RMS and average voltage: line-to-neutral        |        |        |      | ✓      | ✓    | ✓      | ✓      | ✓    | ✓       |
|                                   | – RMS and average voltage: line-to-line           |        |        |      |        | ✓    |        |        | ✓    | ✓       |
|                                   | – current: RMS                                    |        |        |      |        | ✓    |        |        | ✓    | ✓       |
|                                   | – Momentary power factor                          |        |        |      |        | ✓    |        | ✓      | ✓    | ✓       |
|                                   | – avg power factor, voltage angle, current angle  |        |        |      |        | ✓    |        |        | ✓    | ✓       |
|                                   | – total harmonic distortion (VTHD, ITHD, TDD)     |        |        |      |        |      |        |        | ✓    | ✓       |
|                                   | – distortion: volt-amp, power factor              |        |        |      |        |      |        |        | ✓    | ✓       |
|                                   | – temperature                                     |        |        |      | ✓      | ✓    | ✓      | ✓      | ✓    | ✓       |
|                                   | – frequency                                       |        |        |      |        | ✓    |        |        | ✓    | ✓       |
|                                   | – power: active                                   |        |        |      |        | ✓    | ✓      |        | ✓    | ✓       |
|                                   | – power: reactive and apparent                    |        |        |      |        | ✓    |        |        | ✓    | ✓       |
|                                   | Configuration of meter read schedules             | P      | P      | P    | ✓      | ✓    | ✓      | ✓      | ✓    | ✓       |

\* – Demand, voltage and temperature reported

P – Supported through program update

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# Quality over Intervals

|                        | Features   | AMI1.0 |        |      | AMI1.1 |      | AMI1.2 |        |      | AMI 1.3 |
|------------------------|--|--------|--------|------|--------|------|--------|--------|------|---------|
|                        |  | I210+  | I210+c | kV2C | I210+  | kV2C | I210+  | I210+c | kV2C |         |
| Quality over Intervals | Quality interval read  |        |        |      |        |      |        |        |      |         |
|                        | – power: active (kW), reactive (kVAr), phasor apparent (kVA) |        |        |      |        | ✓    |        | ✓      | ✓    | ✓       |
|                        | – power: apparent (kVA)                                      |        |        |      |        | ✓    |        |        | ✓    | ✓       |
|                        | – RMS voltage, average voltage                               |        |        |      |        | ✓    |        | ✓      | ✓    | ✓       |
|                        | – current: RMS, power factor (coincident only)               |        |        |      |        | ✓    |        |        | ✓    | ✓       |
|                        | – voltage squared, current squared                           |        |        |      |        | ✓    |        |        | ✓    | ✓       |
|                        | – total harmonic distortion (VTHD, ITHD, TDD)                |        |        |      |        | ✓    |        |        | ✓    | ✓       |
|                        | – distortion (kVA), distortion power factor                  |        |        |      |        | ✓    |        |        | ✓    | ✓       |
|                        | – Vx – Vy (V)  |        |        |      |        |      |        |        |      |         |
|                        | – quality  |        |        |      |        | ✓    |        |        | ✓    | ✓       |
|                        | – frequency  |        |        |      |        | ✓    |        |        | ✓    | ✓       |
|                        | – pulses   |        |        |      |        | X    |        | X      | X    | X       |

# Notifications & Reporting

|                           | Features   | AMI1.0 |        |      | AMI1.1 |      | AMI1.2 |        |      | AMI 1.3 |
|---------------------------|--|--------|--------|------|--------|------|--------|--------|------|---------|
|                           |  | I210+  | I210+c | kV2C | I210+  | kV2C | I210+  | I210+c | kV2C |         |
| Notifications & Reporting | Momentary detection and logging  |        |        |      | ✓      | ✓    | ✓      | ✓      | ✓    | ✓       |
|                           | LastGasp: outage reporting   | ✓      | ✓      | ✓    | ✓      | ✓    | ✓      | ✓      | ✓    | ✓       |
|                           | Power quality events   |        |        |      |        |      |        |        |      |         |
|                           | – sag/swell log reporting  | ✓      |        |      | ✓      | ✓    | ✓      | ✓      | ✓    | ✓       |
|                           | – voltage imbalance, over/under frequency log reporting                          |        |        |      |        |      |        |        |      |         |
|                           | – under and over-voltage alerts at poll time                                     |        |        |      |        | ✓    |        | ✓      | ✓    | ✓       |
|                           | – voltage imbalance and distortion alerts at poll time                           |        |        |      |        | ✓    |        |        | ✓    | ✓       |
|                           | Relay state changes notification – main & auxiliary                              | ✓      | ✓      |      | ✓      |      | ✓      | ✓      |      | ✓       |
|                           | Load control event notification – prepayment (paid at meter), load shedding etc. |        |        |      |        |      |        | ✓      |      | ✓       |
|                           | Configurable monitoring periods for event notifications                          | ✓      | ✓      | ✓    | ✓      | ✓    | ✓      | ✓      | ✓    | ✓       |

# End Device Controls

|                     | Features   | AMI1.0 |                |                | AMI1.1 |                | AMI1.2 |                |                | AMI 1.3        |
|---------------------|--|--------|----------------|----------------|--------|----------------|--------|----------------|----------------|----------------|
|                     |  | I210+  | I210+c         | kV2C           | I210+  | kV2C           | I210+  | I210+c         | kV2C           |                |
| End Device Controls | Demand reset: daily reset & calendar scheduled   |        |                |                |        |                | ✓      | ✓              | ✓              | ✓              |
|                     | OTA remote connect/disconnect of relays          |        |                |                |        |                |        |                |                |                |
|                     | – Main relay                                     | ✓      | ✓              |                | ✓      |                | ✓      | ✓              |                | ✓              |
|                     | – Auxiliary relay                                |        |                |                |        |                |        |                |                |                |
|                     | – Arm-to-Connect                                 |        |                |                |        |                |        |                |                |                |
|                     | OTA enabling/disabling of load control points    |        |                |                |        |                |        | ✓ <sup>1</sup> |                | ✓ <sup>1</sup> |
|                     | TOU and season change triggered by enterprise SW |        |                |                |        |                |        | ✓              | ✓              | ✓              |
|                     | Daylight savings time support: LP & TOU modes    |        | ✓ <sup>2</sup> | ✓ <sup>2</sup> |        | ✓ <sup>2</sup> |        | ✓ <sup>3</sup> | ✓ <sup>3</sup> | ✓              |
|                     | Daylight savings time support: Demand only mode  |        |                |                |        |                |        | ✓              | ✓              | ✓              |
|                     | Daylight savings time support: Energy only mode  |        |                |                |        |                | ✓      |                |                | ✓              |
|                     | OTA meter program (configuration) update         |        |                |                |        |                |        | ✓              | ✓              | ✓              |
|                     | OTA meter firmware update                        |        |                |                |        |                |        |                |                | ✓              |

<sup>1</sup> Via IEC-CIM commands

<sup>2</sup> Not supported in southern hemisphere and non-recurring DST

<sup>3</sup> Not supported for non-recurring DST & more than 2 DST changes per year





# Thank You!

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