**Manual No. 031**

# *Business Practices Manual*

# *ICCP Data Requirements*

# Disclaimer

This document is prepared for informational purposes only, to support the application of the provisions of the Tariff and the services provided thereunder. MISO may revise or terminate this document at any time at its discretion without notice. While every effort will be made by MISO to update this document and inform its users of changes as soon as practicable, it is the responsibility of the user to ensure use of the most recent version of this document in conjunction with the Tariff and other applicable documents, including, but not limited to, the applicable North American Electric Reliability Corporation (NERC) Standards. Nothing in this document shall be interpreted to contradict, amend, or supersede the Tariff. MISO is not responsible for any reliance on this document by others, or for any errors or omissions or misleading information contained herein. In the event of a conflict between this document, including any definitions, and either the Tariff, NERC Standards, or NERC Glossary, the Tariff, NERC Standards, or NERC Glossary shall prevail. In the event of a conflict between the Tariff and the NERC Standards, or NERC Glossary, the Tariff shall prevail until or unless the Federal Energy Regulatory Commission (FERC) orders otherwise. Any perceived conflicts or questions should be directed to the Legal Department.

# Revision History

| Doc Number | Description | Revised by: | Effective Date |
|---|---|---|---|
| BPM-031-r19 | Annual review completed: minor formatting changes. | J. Phillips | MAY-1-2024 |
| BPM-031-r18 | Annual Review. Completed compliance review. Removed Storage Energy Resources (SER) references with phase out of resource type. Updated MISO Model Manager and modeling contact information. | J. Phillips | JUN-09-2023 |
| BPM-031 -r17 | Add Electric Storage Resource (ESR) requirements and yearly review | K. Mitchell | APR-01-2022 |
| BPM-031 -r16 | Remove DRR1 as ICCP is no longer used for data telemetry. | K. Mitchell | SEP-01-2021 |
| BPM-031-r15 | Annual Review Completed | K. Mitchell | APR-01-2021 |
| BPM-031-r14 | Annual Review Completed | K. Mitchell | APR-01-2020 |
| BPM-031-r13 | Annual Review Completed | K. Mitchell | APR-01-2019 |
| BPM-031-r12 | Annual Review Completed<br>Changed document from RTO-SPEC-005 (Reliability Operarating Procedure) to a BPM. | K. Mitchell | APR-01-2018 |
| RTO-SPEC-005 v11 | Removed IRO-002-4:R1 reference from procedure. Controlled Document Owner approval on file. | K. Mitchell | SEP-15-2017 |
| RTO-SPEC-005 v10 | Updated Compliance References. Controlled Document Owner approval on file. | K. Mitchell | AUG-04-2017 |
| RTO-SPEC-005 v9 | Annual Review. Completed Compliance Review. Controlled Document Owner approval on file. | K. Mitchell | JAN-13-2017 |
| RTO-SPEC-005 v8 | Updated language in Section 3.1.2 regarding manual overrides. Controlled Document Owner approval on file. | K. Mitchell | MAY-13-2017 |
| RTO-SPEC-005 v7 | Annual Review. Completed Compliance Review. Reliability data requirements moved to RTO-SPEC-006. Controlled Document Owner approval on file. | K. Mitchell | JAN-29-2016 |

| | | | |
|---|---|---|---|
| RTO-SPEC-005 v6 | Annual Review. Completed Compliance Review. Updates for the Bi-directional EAR enhancements. Controlled Document Owner approval on file. | K. Mitchell | FEB-06-2015 |
| RTO-SPEC-005 v5 | Updates to DRR2 requirements for DRE modifications which become effective December 1, 2014. Controlled Document Owner approval on file. | K. Mitchell | AUG-15-2014 |
| RTO-SPEC-005 v4 | Annual review. Completed Compliance Review. Added NERC Standard reference endnotes and Compliance Review section at the end of the specification. Controlled Document Owner approval on file. | K. Mitchell | MAY-02-2017 |
| RTO-SPEC-005 v3 | Annual review, include new market measurements, and AMP measurements | K. Mitchell | APR-19-2017 |
| RTO-SPEC-005 v2 | Add use of ISN network, generation status breaker requirement, and removal of market limit measurements | K. Mitchell | NOV-03-2017 |
| RTO-SPEC-005 v1 | Incorporate additional AGC design requirements | K. Mitchell | MAR-26-2017 |

## Contents

# 1. Introduction

This introduction to the Midcontinent Independent System Operator, Inc. (MISO) *Business Practices Manual (BPM) for ICCP Data Requirements* includes basic information about this BPM and the other MISO BPMs. The first section (Section 1.1) of this Introduction provides information about the MISO BPMs. The second section (Section 1.2) is an introduction to this BPM. The third section (Section 1.3) identifies other documents in addition to the BPMs, which can be used by the reader as references when reading this BPM.

## 1.1 Purpose of the MISO Business Practices Manuals

The BPMs developed by MISO provide background information, guidelines, business rules, and processes established by MISO for the operation and administration of the MISO markets, provisions of transmission reliability services, and compliance with the MISO settlements, billing, and accounting requirements. A complete list of MISO BPMs is available for reference through MISO's website.

## 1.2 Business Practices Manual Overview

### 1.2.1 Purpose

The purpose of this document is to document the Inter-Control Center Communications Protocol (ICCP) data exchange specification information for all participants with MISO. The participants can use this document to configure ICCP node data exchange link information. This document describes the data, frequency requirements, and naming conventions for MISO ICCP data exchanged in support of a MISO Local Balancing Authority (LBA) and /or market participant.

### 1.2.2 Scope

Participants familiar with the ICCP standards used commonly throughout the Eastern Interconnection should be able to read and understand this document. Market system background information in this document as it pertains to the policies and procedures of MISO is very limited and people requiring information in these areas should either refer to the Market business rules or the business practice documents.

## 1.3 References

Other reference information related to this BPM includes:

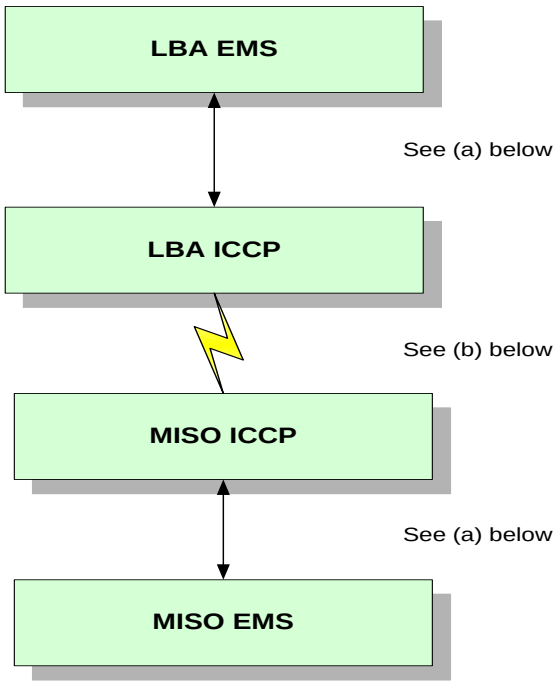
| Name | Date | Author | Description |
|---|---|---|---|
| TASE.2 ICCP Standard | | International Electrotechnical Commission (IEC) | International standard for ICCP protocol |
| | | | |
| RTO-SPEC-006 | | MISO | Defines real-time data requirements |

# 2. Related Procedures

## 2.1 Required Real-Time Data Transfer Rates and Data Integrity

### 2.1.1 Description

To support the Balancing Authority (BA) function at MISO, the data scan rate needs to be at a high periodicity. The following diagram shows the required data transfer rates from MISO to the Local Balancing Authority (LBA)/Market Participant (MP) and vice-versa. These are the scan rates between MISO and the LBA/MP. The actual physical scan rate to the device is defined by the owner of the data.




(a) Analog transfer rate from EMS to ICCP node: 2 seconds or less
(a) Status transfer rate from EMS to ICCP node: RBE or 2 seconds

(b) Ancillary analog transfer rate to/from LBA to MISO: 2 seconds or less
(b) Ancillary status transfer rate to/from LBA to MISO: RBE or 2 seconds

### 2.1.2 Data Integrity

Any MISO members who are unable to supply the requested data at the specified scan rates must work with MISO to establish an agreeable data definition and transfer rate. Each MISO member

is responsible for determining data quality indicators for all data transmitted to MISO. Both failed individual values and any value calculated using a failed point must be flagged. At times, state estimated values may suffice for an interim period but this transition must be quality coded. However, when a point fails for an extended period, a manual update/override of the point's value is necessary to keep the data as accurate as possible or when requested by MISO operations for reliable monitoring of the MISO system. Per SO-P-AOP-00-216 ICCP Data Failure, overridden Energy Management System (EMS) source data has specific requirements for updating the MISO Reliability Coordinator (RC) to ensure the integrity of the Bulk Electric System (BES).

### 2.1.3 Reliability Data requirements

The MISO reliability data requirements are defined in the MISO Reliability Data Specification RTO-SPEC-006. The modeling standards defined in this specification apply to these measurements as well.

## 2.2 Notification Requirements

### 2.2.1 Description

For each of the data definition sections defined below, the physical network model modifications and associated parameters must be sent to the MISO modeling team at least six (6) months prior to energization. The associated ICCP measurements for the modifications must be sent to the MISO modeling team at least one (1) month prior to energization. Data definitions with a Point Type of Analog are Real32 with Quality and those with a Point Type of Status are State with Quality. MISO Model Manager (MMM) is designated as the tool of record and data submitters will utilize Model Change Requests (MCRs) to submit accurate data modeling representation to MISO.

## 2.3 Real-time Ancillary Service Market Output Data

### 2.3.1 Description

MISO is responsible for sending appropriate data that is required for the Ancillary Service Market System. This data is described below and includes the required periodicity. These measurements are sent for all market resources of at least 5 MW.

### 2.3.2 Purpose

This output information is required for real-time ancillary service market operation of the MISO region. The XXXX in the table below refers to the LBA name (if not four (4) characters, padded with underscores. The YYYY refers to the individual generator where the LBA needs to have the appropriate mapping table which is provided by MISO. The YYYY mapping is consistent across multiple measurement types. MISO defines the XXXX and YYYY mappings. The table also indicates which Market Participants (MPs) receive the listed measurement:

- LBA - Local Balancing Authority
- TO - Transmission Operator
- ORP - Operating Reserve Provider
- DRR2 - Type II DRR provider
- EAR - External Asynchronous Provider
- DIR - Dispatchable Intermittent Resource
- ESR – Electric Storage Resource

### 2.3.3 Communications Network

The measurements defined in this section are received using the ICCP protocol over the MISO Wide Area Network (WAN).

### 2.3.4 Communications Protocol

The ICCP protocol being used for this transfer is TASE.2 ICCP Block1 and Block2.

### 2.3.5 Validation

MISO uses a Bilateral table modeling to confirm the ICCP connection.

### 2.3.6 Error Handling

Refer to TASE.2 ICCP manuals for the standard error codes with the protocol.

### 2.3.7 Data Format

| Point Name | Measurement Available to: | MISO Object Name | Point Type STATE/ ANALOG | Periodicity (secs) | Description |
|---|---|---|---|---|---|
| UDS Solve Date | LBA, ORP, DRR2, EAR, DIR, ESR | MISO_APPROVED_UDS_DATE | Analog | 4 | Indicates the target date for the current approved UDS case. Date format is year, month, day as real32 (eg: 06/13/2003 is 0030613.00). Time Zone is EST. |
| UDS Solve Time | LBA, ORP, DRR2, EAR, DIR, ESR | MISO_APPROVED_UDS_TIME | Analog | 4 | Indicates the target time for the current approved UDS case. Time format is hour, minute, second as real32 (eg: 7:33:00am is 73300.00 and 3:16:00pm is 151600.00). Time Zone is EST. |
| Dispatch Target Energy[1] | LBA, ORP, DRR2, DIR, ESR | MISO_XXXX_DISPATCH_TARGET_YYYY | Analog | 4 | Indicates the desired resource or Type II DRR dispatch target for energy |
| | EAR | MISO_XXXX_TARGET_EAR | Analog | 4 | Indicates the desired EAR dispatch target for energy.. The desired target can be negative when exporting out of MISO. |
| Hourly Integrated Export Dispatch Target Instruction | EAR | MISO_XXXX_EAR_EXP_DSPH_HR_INTG | Analog | 4 | Current hourly integrated exports value of EAR dispatch instruction |
| Hourly Integrated Import Dispatch Target Instruction | EAR | MISO_XXXX_EAR_IMP_DSPH_HR_INTG | Analog | 4 | Current hourly integrated imports value of EAR dispatch instruction |

[1] This measurement is available via an XML payload to use as a backup measurement for unit dispatch in the event that ICCP communications are lost. Dispatching entity is to not switch to using XML unless directed by the MISO Control Room. It is recommended that the Dispatching entity implement the XML listener using the Internet and MISO WAN but if only one is implemented, then use the Internet option.

| Point Name | Measurement Available to: | MISO Object Name | Point Type STATE/ ANALOG | Periodicity (secs) | Description |
|---|---|---|---|---|---|
| Dispatch status for the resource from the last UDS solution | LBA, ORP, DRR2, DIR, ESR | MISO_XXXX_UNIT_STATUS_YYYY | Analog | 4 | Indicates the control mode of the unit or Type II DRR from the current approved UDS solution:<br>0 – offline<br>{indicates resource not available to the market}<br>1 – online, not regulating<br>{indicates resource is available for dispatch target for energy and/or contingency reserves)<br>2 – online, regulating<br>{indicates resource is available for regulation, dispatch target for energy, and contingency reserves)<br>3 – off control<br>{indicates resource is online but off control – setpoint is an echo of the current MW reading) |
| Cleared spinning reserves | LBA, ORP, DRR2, ESR | MISO_XXXX_CLR_SPIN_RSV_GN_YYYY | Analog | 4 | The amount of spinning reserves cleared for this unit or Type II DRR from the current approved UDS solution. |
| | EAR | MISO_XXXX_CLR_SPIN_RSV_EAR | Analog | 4 | The amount of spinning reserves cleared for this EAR from the current approved UDS solution. |
| Cleared supplemental reserves | LBA, ORP, DRR2, ESR | MISO_XXXX_CLR_SUPP_RSV_GN_YYYY | Analog | 4 | The amount of supplemental reserves cleared for this unit or Type II DRR from the current approved UDS solution. |

| Point Name | Measurement Available to: | MISO Object Name | Point Type STATE/ ANALOG | Periodicity (secs) | Description |
|---|---|---|---|---|---|
| | EAR | MISO_XXXX_CLR_SUPP_RSV_EAR | Analog | 4 | The amount of supplemental reserves cleared for this EAR from the current approved UDS solution. |
| Cleared Regulation | LBA, ORP, DRR2, ESR | MISO_XXXX_CLR_GN_REG_YYYY | Analog | 4 | The amount of regulation cleared for this unit or Type II DRR from the current approved UDS solution. This is a bi-directional value. |
| | EAR | MISO_XXXX_CLR_EAR_REG | Analog | 4 | The amount of regulation cleared for this EAR from the current approved UDS solution. This is a bi-directional value. |
| Deployed Spinning Reserves | LBA, ORP, DRR2, ESR | MISO_XXXX_DPL_SPIN_RSV_GN_YYYY | Analog | 4 | The amount of deployed spinning reserves included in the unit or Type II DRR setpoint signal from the last MISO AGC cycle. |
| | EAR | MISO_XXXX_DPL_SPIN_RSV_EAR | Analog | 4 | The amount of deployed spinning reserves included in the EAR setpoint signal from the last MISO AGC cycle. |
| Deployed online Supplemental Reserves | LBA, ORP, DRR2, ESR | MISO_XXXX_DPL_OLSUP_RSV_GN_YYYY | Analog | 4 | The amount of deployed online supplemental reserves included in the resource or Type II DRR setpoint signal from the last MISO AGC cycle. |
| | EAR | MISO_XXXX_DPL_OLSUP_RSV_EAR | Analog | 4 | The amount of deployed online supplemental reserves included in the EAR setpoint signal from the last MISO AGC cycle. |

| Point Name | Measurement Available to: | MISO Object Name | Point Type STATE/ ANALOG | Periodicity (secs) | Description |
|---|---|---|---|---|---|
| Deployed offline Supplemental Reserves | LBA, ORP, DRR2, ESR | MISO_XXXX_DPL_OFSUP_RSV_GN_YYYY | Analog | 4 | The amount of deployed offline supplemental reserves included in the unit or Type II DRR setpoint signal from the last MISO AGC cycle. The signal to start this unit is when the deployed value exceeds zero(0). It is recommended that a deadband of 0.5mw be used for the indication. |
| Deployed Regulation | LBA, ORP, DRR2, ESR | MISO_XXXX_DPL_GN_REG_YYYY | Analog | 4 | The amount of deployed regulation included in the resource or Type II DRR setpoint signal from the last MISO AGC cycle. This is a bi-directional value. |
| | EAR | MISO_XXXX_DPL_EAR_REG | Analog | 4 | The amount of deployed regulation included in the EAR setpoint signal from the last MISO AGC cycle. This is a bi-directional value. |
| Ramped Regulation Mileage Metric | LBA, ORP, DRR2, EAR, ESR | MISO_XXXX_REGMILAGE_METRIC_YYYY | Analog | 4 | Ramped Regulation Mileage calculation which determines if requested regulation is provided.<br><br>NOTE: This is for settlements only |
| On regulation test flag | LBA, ORP, DRR2, EAR, ESR | MISO_XXXX_ON_REG_TEST_YYYY | Status | RBE | Indicates if MISO is going to be grading this resource for this period<br>0 – not being graded<br>1 – being graded |

| Point Name | Measurement Available to: | MISO Object Name | Point Type STATE/ ANALOG | Periodicity (secs) | Description |
|---|---|---|---|---|---|
| Real-time control setpoint | LBA, ORP, DRR2, DIR, ESR | MISO_XXXX_RT_SIG_GN_YYYY | Analog | 4 | The real-time control setpoint for this resource or Type II DRR which includes the dispatch target for energy, spinning reserves, supplemental reserves, and regulation. |
| | EAR | MISO_XXXX_RT_SIG_EAR | Analog | 4 | The real-time control setpoint for this EAR which includes the dispatch target for energy, spinning reserves, supplemental reserves, and regulation. |
| Permissive blocking up | LBA, ORP, DRR2, DIR, ESR | MISO_XXXX_PERM_BLK_UP_YYYY | Status | RBE | Status indicates that this resource/Type II DRR is currently being blocked in the positive direction by the MISO AGC. |
| | EAR | MISO_XXXX_PERM_BLK_UP_EAR | Status | RBE | Status indicates that this External Asynchronous Resource (EAR) is currently being blocked in the positive direction by the MISO AGC. |
| Permissive blocking down | LBA, ORP, DRR2, DIR, ESR | MISO_XXXX_PERM_BLK_DOWN_YYYY | Status | RBE with a 10 minute integrity scan | Status indicates that this resource/Type II DRR is currently being blocked in the negative direction by the MISO AGC. |
| | EAR | MISO_XXXX_PERM_BLK_DOWN_EAR | Status | RBE with a 10 minute integrity scan | Status indicates that this External Asynchronous Resource (EAR) is currently being blocked in the negative direction by the MISO AGC. |

| Point Name | Measurement Available to: | MISO Object Name | Point Type STATE/ ANALOG | Periodicity (secs) | Description |
|---|---|---|---|---|---|
| Regulation Maximum limit | LBA, ORP, DRR2, ESR | MISO_XXXX_REG_MAX_LIM_YYYY | Analog | 4 | The regulation maximum limit used by the current approved UDS solution for this resource or Type II DRR. |
| | EAR | MISO_XXXX_EAR_REG_MAX_LIM | Analog | 4 | The regulation maximum limit used by the current approved UDS solution for this EAR. |
| Regulation Minimum limit | LBA, ORP, DRR2, ESR | MISO_XXXX_REG_MIN_LIM_YYYY | Analog | 4 | The regulation minimum limit used by the current approved UDS solution for this resource or Type II DRR. |
| | EAR | MISO_XXXX_EAR_REG_MIN_LIM | Analog | 4 | The regulation minimum limit used by the current approved UDS solution for this EAR. This limit can be negative for export capability. |
| Economic Maximum limit | LBA, ORP, DRR2, DIR, ESR | MISO_XXXX_ECO_MAX_LIM_YYYY | Analog | 4 | The economic maximum limit used by the current approved UDS solution for this resource or Type II DRR. |
| | EAR | MISO_XXXX_EAR_ECO_MAX_LIM | Analog | 4 | The economic maximum limit used by the current approved UDS solution for this EAR. |
| Economic Minimum limit | LBA, ORP, DRR2, DIR, ESR | MISO_XXXX_ECO_MIN_LIM_YYYY | Analog | 4 | The economic minimum limit used by the current approved UDS solution for this resource or Type II DRR. |
| | EAR | MISO_XXXX_EAR_ECO_MIN_LIM | Analog | 4 | The economic minimum limit used by the current approved UDS solution for this EAR. This limit can be less than or equal to zero(0) for export capability. |

| Point Name | Measurement Available to: | MISO Object Name | Point Type STATE/ ANALOG | Periodicity (secs) | Description |
|---|---|---|---|---|---|
| MISO ACE | LBA, TO | MISO_ACE | Analog | 4 | The MISO ACE as of the last AGC cycle. |
| MISO Load | LBA, TO | MISO_LOAD | Analog | 4 | The total MISO Load as of the last AGC cycle. |
| MISO Total WIND | LBA, TO | MISO_TOTAL_WIND_GEN | Analog | 4 | The total MISO wind generation |
| Echo of resource output | LBA, ORP, DRR2, DIR, ESR | MISO_XXXX_ECHO_GN_YYYY | Analog | 4 | The last received resource measurement for each resource or Type II DRR as processed by the MISO AGC. The participant can monitor that MISO has received the last supplied signal as a health check. |
| Echo of resource output<br>Echo of meter error correction value | EAR | MISO_XXXX_ECHO_EAR | Analog | 4 | The last received external asynchronous resource (EAR) measurement as processed by the MISO AGC. The participant can monitor that MISO has received the last supplied signal as a health check. |
| | LBA | MISO_XXXX_METER_ERR_CORR | Analog | 4 | The last received meter error correction measurement as processed by the MISO AGC. The participant can monitor that MISO has received the last supplied signal as a health check. |

## 2.4 Real-time Market Input Data

### 2.4.1 Description

The MISO is responsible for receiving appropriate data that is required for the Ancillary Service Market System. This data is described below and includes the required periodicity. The table also indicates which MPs need to supply the stated measurement:

- LBA - Local Balancing Authority
- ORP - Operating Reserve Provider
- DRR2 - Type II DRR provider
- EAR - External Asynchronous Provider
- DIR - Dispatchable Intermittent Resource
- ESR – Electric Storage Resource

From the LBA perspective, internal is within the MISO market footprint and external is outside the MISO market footprint where indicated. Positive values indicate LBA exports. Negative values indicate LBA imports. All market resources at least 5 MW or greater must provide this information via ICCP.

### 2.4.2 Purpose

These input measurements are required for real time market operation of the MISO market footprint.

### 2.4.3 Communications Network

The measurements defined in this section are transmitted using the ICCP protocol over the MISO WAN.

### 2.4.4 Communications Protocol

The ICCP protocol being used for this transfer is TASE.2 ICCP Block1 and Block2.

### 2.4.5 Validation

MISO uses a Bilateral table modeling to confirm the ICCP connection.

### 2.4.6 Error Handling

Refer to TASE.2 ICCP manuals for the standard error codes with the protocol.

### 2.4.7 Data Format

| Point Name | Measurement Required from: | Market Participant's Object Name | Point Type STATE/ ANALOG | Periodicity (secs) | Description |
|---|---|---|---|---|---|
| Unit Control Mode | LBA, ORP, DRR2, DIR, ESR | Per resource | Analog | 2 | Indicates the current control mode of the unit or Type II DRR :<br>0 – offline<br>{indicates resource not available to the market}<br>1 – online, not regulating<br>{indicates resource is available for dispatch target for energy and/or contingency reserves)<br>2 – online, regulating<br>{indicates resource is available for regulation, dispatch target for energy, and contingency reserves – does not apply to DIRs}<br>3 – off control<br>{indicates resource is online but off control) |
| Resource metered output – MW | LBA, ORP, EAR, DIR, ESR | Per resource | Analog | 2 | The metered MW output for the resource which can be net or gross. |

| Point Name | Measurement Required from: | Market Participant's Object Name | Point Type STATE/ ANALOG | Periodicity (secs) | Description |
|---|---|---|---|---|---|
| Resource metered output – MVar | LBA, ORP, EAR, DIR, ESR | Per resource | Analog | 2 | The metered MVar output for the resource which can be net or gross. |
| Resource generator breaker | LBA, ORP, EAR, DIR, ESR | Per resource | Status | RBE | Generator breaker status for resource |
| Type II DRR actual net load | DRR2 | Per resource | Analog | 2 | The actual net metering for the Type II DRR load which is expected to be a negative value. |
| Type II DRR Daily Net CR Deployment | DRR2 | Per resource | Analog | 2 | Amount of contingency reserve deployed by the Type II DRR in MWh for the current market day. Must reset to zero(0) at midnight EST. |
| Type II DRR Daily Net Reg Deployment | DRR2 | Per resource | Analog | 2 | Amount of net regulating reserve deployed by the Type II DRR in MWh for the current market day. Value can be positive or negative. Must rest to zero(0) at midnight EST. |
| Battery Storage Level | ESR | Per Resource | Analog | 2 | The remaining storage level (State of Charge/SOC) in MWhrs |

| Point Name | Measurement Required from: | Market Participant's Object Name | Point Type STATE/ ANALOG | Periodicity (secs) | Description |
|---|---|---|---|---|---|
| Current Filtered Area Non-Conforming Load | LBA | | Analog | 2 | LBA's current filtered non-conforming load. |
| Area Load Forecast for 15-minute ahead (non-conforming) | LBA | | Analog | 2 | LBA's 15-minute short-term load forecast which is a MW value averaged over a 5-minute period. |
| Instantaneous EAR instruction that participant is supplying to it's ACE control | EAR | | Analog | 2 | Current instantaneous value of real-time EAR setpoint instruction that participant is using for its AREA control (only applies to EAR transactions) |
| Aggregated instantaneous Net Dynamic Schedules by interface | LBA | Single measurement by interface | Analog | 2 | The summation of all instantaneous dynamic schedules by interface (both internal and external) for the LBA. |
| Aggregated dynamic schedules for 15-minutes ahead | LBA | | Analog | 2 | LBA's 15-minutes ahead dynamic schedule forecast |

| Point Name | Measurement Required from: | Market Participant's Object Name | Point Type STATE/ ANALOG | Periodicity (secs) | Description |
|---|---|---|---|---|---|
| Aggregated Net External Hourly Tie-line meter error correction | LBA | | Analog | hourly | The summation of all net tie line meter error correction values for the LBA that are external to the MISO market footprint. This measurement is used as an input to the IME portion of the ACE equation. |
| Aggregated metered Tie-line totals by interface | LBA | Single measurement by interface | Analog | 2 | The summation of all metered tie lines by interface (both internal and external) for the LBA. |
| Aggregated unmetered Tie line totals by interface | LBA | Single measurement by interface | Analog | 2 | The summation of all unmetered tie lines by interface (both internal and external) for the LBA. |
| Hourly tie-line accumulator | LBA | Single measurement by external tie line | Analog | Hourly | The hourly accumulator measurement for each external tie line. LBA to define the hourly accumulator offset when each of these measurements are available. |
| Echo resource setpoint measurement | LBA, ORP, DRR2, DIR, ESR | Per resource | Analog | 2 | Echo the received setpoint for each resource which allows MISO to verify that the setpoint was received. |

## 3. Contacts

Questions regarding the contents of this document should be directed to the Model Engineering team by email to ModelEngineering@misoenergy.org

Any required application documents must be mailed to the following address:

MISO
Attention: Model Engineering
720 City Center Drive
Carmel, IN 46032