

WEM RULES

POWER SYSTEM OPERATION PROCEDURE: COMMUNICATIONS AND CONTROL SYSTEMS

PREPARED BY: System Management (WA)
DOCUMENT REF: SO_OP_WA_3802
VERSION: 3.0
EFFECTIVE DATE: 1 July 2019
STATUS: FINAL

Approved for distribution and use by:

APPROVED BY: Cameron Parrotte
TITLE: Executive General Manager – Western Australia

VERSION RELEASE HISTORY

Version	Effective Date	Summary of Changes
1.0	1 September 2006	Power System Operation Procedure (Market Procedure) for Communications and Control Systems
2.0	Balancing Market Commencement Day	Replacement of Procedure resulting from Procedure Change Proposal PPCL0021
3.0	1 July 2019	Update to Procedure resulting from Procedure Change Proposal AEPC_2018_03

CONTENTS

1.	PROCEDURE OVERVIEW	5
1.1.	Relationship with the Wholesale Electricity Market Rules	5
1.2.	Interpretation	5
1.3.	Purpose and application of this Procedure	8
1.4.	Associated documents	8
2.	OPERATIONAL COMMUNICATIONS AND CONTROL SYSTEMS REQUIREMENTS	9
2.1.	General requirements	9
2.2.	Specific requirements – Balancing Facilities	9
2.3.	Specific requirements – Balancing Facilities with special conditions imposed	9
2.4.	Specific requirements – Facilities providing Load Following Ancillary Service	10
2.5.	Specific requirements – Facilities providing Spinning Reserve	10
2.6.	Specific requirements – Facilities providing Load Rejection Reserve	10
2.7.	Specific requirements – Facilities providing Network Control Service, System Restart Service or Dispatch Support Service	10
2.8.	Specific requirements – Demand Side Programmes	10
2.9.	Specific requirements – Network Operator	11
3.	LOSS OF COMMUNICATION SYSTEMS	11
4.	GENERATORS OPERATED BY AEMO	11
4.1.	Application	11
4.2.	Exemption of Facilities under AEMO control from communications requirements	12
4.3.	Automatic execution of Dispatch Instructions and Dispatch Orders through AGC	12
5.	REQUIREMENTS NECESSARY TO REMOTELY MONITOR THE PERFORMANCE OF A NETWORK	12
5.1.	Directions to a Network Operator	12
5.2.	Provision of Market Participant SCADA	13
6.	DATA COMMUNICATIONS	13
6.1.	Data Communications Standard	13
6.2.	SCADA System and EMS Data via ICCP	13
6.3.	Security	14
6.4.	Configuration, Maintenance, Testing, Data management and co-ordination	14
APPENDIX A.	DATA COMMUNICATION STANDARD FOR THE WEM	15
A.1	General	15
A.2	Performance	15
A.3	Reliability	17
A.4	Interfacing	18

TABLES

Table 1 Defined Terms	5
Table 2 Associate Documents	8
Table 3 Resolution required for Analogue Data	16
Table 4 Time intervals for data to be available for transmission to AEMO	17
Table 5 Deadband for analogue data transmission	17
Table 6 Total period of Critical Outages of RME and RCE over a 12-month period	18
Table 7 Total period of Critical Outages of an Intervening Facility over a 12-month period	18

1. PROCEDURE OVERVIEW

1.1. Relationship with the Wholesale Electricity Market Rules

1.1.1. This Power System Operation Procedure (PSOP): Communications and Control Systems (Procedure) has been developed in accordance with clauses 2.35.4 and 2.36A.5 of the Wholesale Electricity Market Rules (WEM Rules).

1.1.2. References to particular WEM Rules within the Procedure in bold and square brackets **[Clause XX]** are included for convenience only and are not part of this Procedure.

1.1.3. References to particular Technical Rules within this Procedure in bold and curly braces **{Clause XX}** are included for convenience only, and are not part of this Procedure

1.2. Interpretation

1.2.2. In this Procedure:

- (a) terms that are capitalised, but not defined, have the meaning given in the WEM Rules;
- (b) to the extent that this Procedure is inconsistent with the WEM Rules, the WEM Rules prevail to the extent of the inconsistency;
- (c) a reference to the WEM Rules, or Market Procedures, includes any associated forms required or contemplated by the WEM Rules or Market Procedures; and
- (d) words expressed in the singular include the plural and vice versa; and
- (e) unless the context requires otherwise, references to AEMO include AEMO in its System Management capacity.

1.2.3. In addition, the following defined terms have the meaning given in Table 1.

Table 1 Defined Terms

Term	Definition
Analogue Value	Digital representation of a continuous value (for example, a power flow)
Automatic Generation Control (AGC)	Equipment operated by AEMO, which sends signals to generating facilities participating in the AGC scheme to automatically adjust their output so as to maintain frequency or restore frequency within the SWIS Operating Standards.
Control Command	A representation of an instruction to perform a defined action (for example a generation increase).

Term	Definition
Critical Outage	<p>For an RME or RCE: A loss for more than 60 seconds of the ability to transmit Operational Data to AEMO or receive Control Commands from AEMO, but not where the loss arises from a:</p> <ol style="list-style-type: none"> 1. Force Majeure. 2. Failure, or outage, of equipment that does not form part of the DCF. 3. Failure or outage of equipment that affects less than 5% of all Operational Data items of that RME or RCE. 4. Facility that is not available for dispatch. 5. Facility with an approved Planned Outage and suffering a Forced Outage. 6. Outage for work to upgrade DCFs to comply with Appendix A, where the AEMO control centre has been notified in advance. 7. Loss of DCFs of an Intervening Facility. <p>For an Intervening Facility: A loss for more than 3 minutes of the ability to transmit Operational Data to AEMO or receive Control Commands from AEMO, but not where the loss arises from a:</p> <ol style="list-style-type: none"> 1. Force Majeure. 2. Failure, or outage, of equipment that does not form part of the DCF. 3. Loss of less than 10 minutes that does not affect Dispatch Data. 4. Loss of no more than 5 minutes (or as otherwise agreed with AEMO) arising from a test of DCFs at a disaster recovery site, of which AEMO control centre has been given at least 24 hours' notice. 5. Loss of no more than 5 minutes (or as otherwise agreed with AEMO) arising from a test of a major upgrade of an Intervening Facility, of which AEMO control centre has been given at least 24 hours' notice. 6. Loss arising from a loss of DCFs of a Data Concentrator, RME or RCE. 7. Outage of an AEMO DCF.
Data Communication Providers (DCPs)	A provider of Dispatch Data, Power System Data or Other Data to AEMO. A provider may be the Network Operator, or a Market Participant with Registered Facilities that are not under the direct control of AEMO who maintains communication systems.
Data Communications Facility (DCF)	A generic term used to denote any part of equipment used to transmit Operational Data from one site to another, and includes: <ol style="list-style-type: none"> 1. The part of RME and RCE providing analogue to digital conversion functions. 2. The part of RME and RCE providing data communication functions. 3. Telecommunications equipment and media. 4. Any Data Concentrator. 5. Power supply equipment for items 1 to 4 above.
Data Concentrator	A DCF that: <ol style="list-style-type: none"> 1. Communicates with an Intervening Facility. 2. Collects data from multiple RMEs. 3. Relays Control Commands to RCE.
Deadband	A deadband is a region of values where a change in the value of data will not result in activation of data transmission. A deadband is necessary to prevent repeated transmission of data where it has not changed significantly.

Term	Definition
Discrete Value	A digital representation of one of a limited set of values (for example a transformer tap position).
Dispatch Data	Data that represents: <ol style="list-style-type: none"> 1. The dispatch of Registered Facilities, including Dispatch Instructions and reactive power; 2. The status, or the amount, of Ancillary Services; or 3. Other data used in the dispatch process.
Energy Management System (EMS)	A system used to monitor and control elements of the SWIS in real time.
Force Majeure	An event or effect which is neither anticipated, nor controllable, by the affected parties, including acts of nature, governmental interventions and acts of war.
High Resolution Data	Measurements of the following types of data: <ol style="list-style-type: none"> 1. System frequency. 2. Electrical Time (which is a measure of time that can be derived from the frequency of a power system).
Inter-Control Centre Communications Protocol (ICCP)	ICCP IEC60870-6 TASE.2 and its extensions secure ICCP.
Intervening Facility	A DCF that: <ol style="list-style-type: none"> 1. Receives polls from a AEMO control centre; 2. Collects data from RME and relays that data to AEMO control centre; or 3. Relays Control Commands from AEMO control centre to RCE. Does not include any Facility provided by AEMO.
Operational Data	All data, including Dispatch Data, High Resolution Data, Power System Data, and Other Data.
Other Data	Data that represents: <ol style="list-style-type: none"> 1. Status Indications 2. Discrete Values 3. Analogue Value 4. Control Commands; or 5. Any other data which is not Dispatch Data, High Resolution Data or Power System Data.
Poll	An electronic request sent from a AEMO control centre or an Intervening Facility to a Facility or a Network substation to request Status Indications, Discrete Values or Analogue Values.
Power System Data	Data concerning all equipment within, and Registered Facilities directly connected to, a substation containing equipment that operates at a nominal voltage of at least 66kV, unless otherwise agreed by AEMO with regard to specified locations.
Remote control equipment (RCE)	Equipment installed to enable controlling of a facility from a control centre.
Remote monitoring equipment (RME)	Equipment installed to enable monitoring of a Facility from a control centre.
Scale Range	The range of measurements for an Analogue Value that can be represented by a digital value.
Status Indication	The state of a device that has a finite number of discrete states. It includes switching and control indications and alarm conditions.

Term	Definition
Supervisory Control and Data Acquisition (SCADA)	Network Operator systems to acquire data from remote devices. AEMO accesses this information via the EMS, which enables AEMO to supervise and control the power system from a remote location.
Technical Specification for Operational Data Points	The document identified in step 2.1.2.

1.3. Purpose and application of this Procedure

- 1.3.1. The purpose of this Procedure is to document the communications and control system requirements necessary to:
- support the dispatch process [Clause 2.35.4]; and
 - enable AEMO to remotely monitor the performance of a Network [Clause 2.36A.5].
- 1.3.2. The Procedure specifies the main features of the speech, data and control systems that must be in place between AEMO, Data Communication Providers, Network Operators and Market Participants for the purpose of:
- issuing Dispatch Instructions, Dispatch Orders and Operating Instructions (AEMO) and confirming receipt and responding to them (Market Participant);
 - monitoring the MW output and connection status of Facilities; and
 - communicating about other matters relating to the operation of the power system.
- 1.3.3. This Procedure applies to:
- AEMO to ensure that its communications and control systems support the dispatch process and enable it to remotely monitor the performance of a Network; and
 - Market Participants and Network Operators required to comply with this Procedure in respect of communications and control system requirements.

1.4. Associated documents

- 1.4.1. The following documents in Table 2 provide background information to this Procedure:

Table 2 Associate Documents

Reference	Title	Location
	ABC and AGC Interface Requirements	AEMO Website
SO_OP_WA_3805	IMS Interface Market Procedure – Network Operators and AEMO	AEMO Website
	Market Procedure: Balancing Facility Requirements	AEMO Website
SO_OP_WA_3801	PSOP: Commissioning and Testing	AEMO Website
SO_OP_WA_3803	PSOP: Dispatch	AEMO Website
SO_OP_WA_3808	PSOP: Power System Security	AEMO Website
	Technical Specification for Operational Data Points	AEMO Website

2. OPERATIONAL COMMUNICATIONS AND CONTROL SYSTEMS REQUIREMENTS

2.1. General requirements

- 2.1.1. AEMO must document the communications and control system requirements necessary to support the dispatch process [Clause 2.35.4].
- 2.1.2. For the purposes of this Procedure, AEMO must develop a Technical Specification for Operational Data Points document, detailing the general SCADA data points required.
- 2.1.3. AEMO may specify SCADA points required for each Registered Facility and each Facility that is intended to be registered. These could be in addition to those required by the Network Operator under the Technical Rules and other relevant statutory instruments.
- 2.1.4. The specification in step 2.1.3 must be reasonable and in accordance with the Technical Specification for Operational Data Points.
- 2.1.5. Market Participants and Network Operators must ensure the relevant Facility meets the specification in step 2.1.3 by a reasonable timeframe determined by AEMO.
- 2.1.6. AEMO may, acting reasonably, revise the specification in step 2.1.3 at any time.

2.2. Specific requirements – Balancing Facilities

- 2.2.1. Balancing Facilities that do not have special conditions imposed on them by AEMO under step 2.3.1, and which are not exempted under step 4.2, must comply with the following communications requirements:
 - (a) be able to receive and confirm receipt of Dispatch Instructions, Dispatch Orders and Operating Instructions from AEMO via SCADA or AEMO's nominated IT systems, as described in the ABC and AGC Interface Requirements;
 - (b) have SMS or email capability that is able to receive Dispatch Instructions, Dispatch Orders and Operating Instructions from AEMO at the Facility; and
 - (c) have duplicated telephone services or other voice communications in place for communication with AEMO, which must be available 24 hours a day seven days a week, as a back-up mechanism for AEMO's SCADA system or AEMO's nominated IT systems.

2.3. Specific requirements – Balancing Facilities with special conditions imposed

- 2.3.1. AEMO may determine that a Balancing Facility, with a rated capacity of less than 10 MW, does not meet the relevant specifications of the Balancing Facility Requirements and may impose special conditions on the manner in which the Balancing Facility must participate in the Balancing Market [Clause 7A.1.11].
- 2.3.2. Balancing Facilities that have special conditions imposed on them under step 2.3.1 must comply with the following communications requirements:
 - (a) internet access via AEMO's nominated IT Systems;

- (b) telephone services or other voice communications; and
- (c) communications in place for the receipt of Dispatch Instructions, Dispatch Orders and Operating Instructions, being either:
 - (i) SMS;
 - (ii) e-mail; or
 - (iii) another method agreed by AEMO.

2.3.3. A Facility is not required to comply with step 2.3.2 if:

- (a) it is exempted under step 4.2; or
- (b) the special conditions imposed by AEMO in accordance with step 2.3.1 specifically exempt the requirements of step 2.3.2.

2.4. Specific requirements – Facilities providing Load Following Ancillary Service

2.4.1. All Facilities providing Load Following Ancillary Service must be connected to AEMO's AGC system as per the ABC and AGC Interface Requirements document.

2.5. Specific requirements – Facilities providing Spinning Reserve

2.5.1. All Facilities providing Spinning Reserve must have duplicated voice communications in place for communication with AEMO, which must be monitored 24 hours a day seven days a week, unless alternative arrangements are specified in the Ancillary Service Contract.

2.6. Specific requirements – Facilities providing Load Rejection Reserve

2.6.1. All Facilities providing Load Rejection Reserve must have duplicated voice communications in place for communication with AEMO, which must be monitored 24 hours a day seven days a week, unless alternative arrangements are specified in the Ancillary Service Contract.

2.7. Specific requirements – Facilities providing Network Control Service, System Restart Service or Dispatch Support Service

2.7.1. The communications and control system requirements for Facilities contracted with AEMO to provide System Restart Service or Dispatch Support Service must be in accordance with the Ancillary Service Contract.

2.7.2. Facilities providing Network Control Services must meet the requirements specified in step 2.2, unless alternative arrangements are specified by AEMO.

2.8. Specific requirements – Demand Side Programmes

2.8.1. A Market Customer who operates a Demand Side Programme must provide duplicated monitored telephone contacts to allow AEMO to communicate Dispatch Instructions to the Market Customer during the times specified in Standing Data at clause 1(h)(ix) of

Appendix 1 of the WEM Rules .

2.9. Specific requirements – Network Operator

- 2.9.1. The Network Operator must make its operational voice communications system available for AEMO's use for the purpose identified in step 2.9.2. This can be either via physical access to a phone turret, or through connection to AEMO's operational voice communication system (via communications links provided by AEMO).
- 2.9.2. The operational voice communications system must provide:
- (a) voice communications to the Network Operator's control rooms (primary and back-up) independent of the public switched telephone network; and
 - (b) voice communications to Market Generators, independent of the public switched telephone network (where the list of Market Participants is to be agreed between AEMO and the Network Operator).¹
- 2.9.3. Obligations regarding confidentiality and retention of historical records in relation to this step 2.9 are specified in the IMS Interface Market Procedure – Network Operators and AEMO.

3. LOSS OF COMMUNICATION SYSTEMS

- 3.1.1. Where a major loss of communications occurs, the electronic data, control systems and some of the voice communication circuits referred to in step 2 may become unavailable. Where a Facility continues to operate after a major loss of communications, the Market Participants and AEMO must revert to speech communications, including the use of back-up voice communications for the delivery of all Dispatch Instructions, Dispatch Orders, Operating Instructions and other operational information.
- 3.1.2. In the event indicated in step 3.1.1, AEMO may use the system referred to in step 2.9.1 to support the dispatch process.
- 3.1.3. Where AEMO's control centre has been evacuated and dispatch services shift to AEMO's emergency control centre, AEMO will issue a Dispatch Advisory with appropriate alternative contact details **[Clause 7.11.5(f)]**.
- 3.1.4. Where a Market Participant can no longer comply with the communications requirements outlined in step 2 due to a major loss of communications, the relevant Market Participant must advise AEMO as soon as practicable, and by whatever means, that the emergency contact details are to be used for the purposes of communicating with the relevant Facility or Facilities.

4. GENERATORS OPERATED BY AEMO

4.1. Application

- 4.1.1. AEMO may, by agreement with a Market Participant, maintain operational control over

¹ The Technical Rules **{Clauses 3.3 and 3.6.9(d)}** currently only require back-up voice communications for generators with a capacity of 10MW or greater and generators above 1MVA that have been deemed to require this.

aspects of a Registered Facility [**Clause 7.8.1**].

- 4.1.2. Except for the Balancing Portfolio, AEMO may only operate Facilities in step 4.1.1 if a formal operating protocol detailing the mechanism and limitations of control has been executed between AEMO and the relevant Market Participant.
- 4.1.3. The operating protocol referred to in step 4.1.2 must include a definition of the protocols and electronic interfaces to be used by AEMO in carrying out the remote operation and control functions (SCADA technical specification).

4.2. Exemption of Facilities under AEMO control from communications requirements

- 4.2.1. If a Facility is operated by AEMO under step 4.1.2, AEMO may exempt a Balancing Facility from meeting one or more of the requirements of steps 2.2.1 or 2.3.2.

4.3. Automatic execution of Dispatch Instructions and Dispatch Orders through AGC

- 4.3.1. If so permitted under the operating protocol referred to in step 4.1.2, AEMO may convey one or more Dispatch Instructions or Dispatch Orders relating to that Facility through AGC.

5. REQUIREMENTS NECESSARY TO REMOTELY MONITOR THE PERFORMANCE OF A NETWORK

5.1. Directions to a Network Operator

- 5.1.1. Where AEMO determines that it is reasonably necessary to issue a direction to a Network Operator under clause 2.36A.3 of the WEM Rules, AEMO must:
 - (a) identify the required changes (consulting with the Network Operator and other Market Participants where appropriate);
 - (b) document the required changes in a direction; and
 - (c) issue the direction to the Network Operator.
- 5.1.2. The Network Operator must respond within 10 Business Days with a proposed implementation timeframe.
- 5.1.3. Where AEMO agrees with the proposed implementation timeframe, the Network Operator must implement the changes within that timeframe [**Clause 2.36A.4(a)**].
- 5.1.4. Where an implementation timeframe cannot be agreed, senior managers from AEMO and the Network Operator must meet to agree a timeframe.
- 5.1.5. Where an implementation timeframe cannot be agreed by senior managers from AEMO and the Network Operator, AEMO, acting reasonably, will determine and specify the implementation timeframe and the Network Operator must comply with this timeframe [**Clause 2.36A.4(a)**].

5.2. Provision of Market Participant SCADA

- 5.2.1. Where the Network Operator is the SCADA service provider for a Market Participant, the Network Operator must act reasonably to implement the relevant specification determined in step 2.1.3 by the timeframe determined in step 2.1.5. This implementation must include any change to the Network Operator's EMS and the ICCP, as detailed in the IMS Interface Market Procedure – Network Operators and AEMO.
- 5.2.2. AEMO may issue a direction under step 5.1.1 to meet the requirements of step 5.2.1.
- 5.2.3. A Network Operator must consult with AEMO to determine any specific SCADA requirements for new or modified Market Participant Facilities to be implemented within the Network Operator's EMS {Clauses 3.3.4 and 3.4.10}.

6. DATA COMMUNICATIONS

6.1. Data Communications Standard

- 6.1.1. AEMO's communication and performance requirements indicating the data communications standard for information provided by the Network Operator or other Data Communication Providers necessary to support the dispatch process documented in accordance with clause 2.35.4 of the WEM Rules is detailed in Appendix A of this Procedure.
- 6.1.2. Where a Network Operator or Data Communication Provider is required to modify equipment to meet the standard in step 6.1.1, AEMO may agree on a reasonable timeframe for implementation with the Network Operator or Data Communication Provider.

6.2. SCADA System and EMS Data via ICCP

- 6.2.1. The requirements for the ICCP link between AEMO and Network Operators for the provision of data are detailed in Appendix A.
- 6.2.2. AEMO must specify the data to be sent via the ICCP link, which may include controls and indications.
- 6.2.3. The configuration of the ICCP link to enable the data to be sent will be based on an agreement between AEMO and the Network Operator. Each party will be responsible for its infrastructure implementation and maintenance costs.
- 6.2.4. Where a Network Operator is required to modify equipment to meet the standard in step 6.2.1 or the requirements in step 6.2.2, AEMO may agree on a reasonable timeframe for implementation with the Network Operator.

6.3. Security

- 6.3.1. All installations must adhere to the relevant Data Communications Providers' cyber security policies.
- 6.3.2. Where cyber security policies between AEMO and Data Communications Providers conflict materially, AEMO must, acting reasonably, determine the appropriate security policy with which the Data Communications Providers must comply.

6.4. Configuration, Maintenance, Testing, Data management and co-ordination

- 6.4.1. AEMO must agree an operating protocol with Data Communication Providers to cover configuration, maintenance, testing, data management and co-ordination of DCFs.
- 6.4.2. Where an operating protocol in step 6.4.1 cannot be agreed with all Data Communication Providers, AEMO must, acting reasonably, determine the operating protocol with which Data Communication Providers must comply.
- 6.4.3. AEMO and those Data Communication Providers must adhere to that operating protocol.

APPENDIX A. DATA COMMUNICATION STANDARD FOR THE WEM

The purpose of this appendix is to set out the standards with which DCPs must comply when transmitting data to and from AEMO.

DCPs must apply this Data Communication Standard (Standard) when providing and maintaining communications facilities and back-up facilities that transmit data to and from AEMO.

DCP's DCFs, which are used to enable AEMO to maintain Power System Security and Power System Reliability must be maintained to this Standard (other DCFs at DCP sites, not used to maintain Power System Security and Power System Reliability, are not captured by this Standard).

A.1 General

A.1.1 General structure of DCFs

A.1.1.1 Figure 1 illustrates the relationships between:

- (a) AEMO control centres;
- (b) Intervening Facilities;
- (c) Data Concentrators; and
- (d) RME/ RCE.

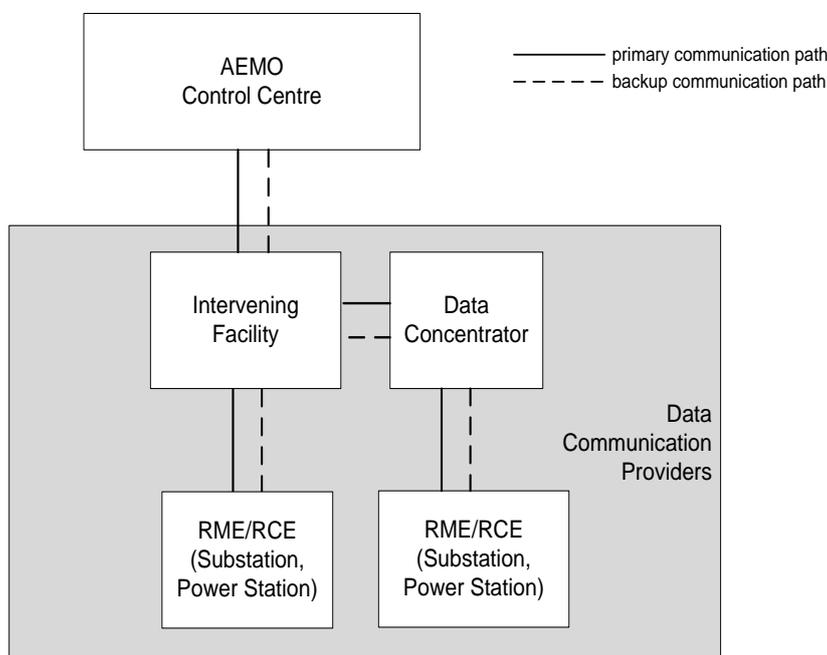


Figure 1 Relationships between AEMO and Intervening Facilities

A.2 Performance

A.2.1 Quantity of data

A.2.1.1 DCFs must be capable of transmitting all Operational Data required by AEMO and includes data that:

- (a) was in use at the time this Standard came into effect;
- (b) has been requested in writing by AEMO; and
- (c) has not been subsequently rejected in writing by AEMO.

A.2.1.2 The transmission of additional Operational Data beyond that required by AEMO under the WEM Rules, or any agreement between AEMO and a DCP, does not diminish the obligations of the DCP to comply with this Standard.

A.2.2 Representation of data

A.2.2.1 DCFs must transmit Operational Data to and from AEMO in accordance with this section A.2.2.

A.2.2.2 Analogue Data must be transmitted:

- (a) with the sign convention nominated by the DCP from which the data originates; and
- (b) with the resolutions specified in Table 3.

Table 3 Resolution required for Analogue Data

Category of Analogue Data	Resolution (Max % of Scale Range)
Dispatch Data	0.1
Power System Data	0.2
Other Data	1.0

A.2.2.3 Analogue Values, Status Indications and Discrete Values must be transmitted with a data quality in accordance with the ICCP.

A.2.2.4 Control Commands must be transmitted in accordance with the ICCP.

A.2.2.5 Quality of data indicators must indicate:

- (a) whether there is a sustained communication failure between an Intervening Facility and RME (including failure of a relevant Data Concentrator); and
- (b) whether a value has been overridden at any RME, Data Concentrator or Intervening Facility.

A.2.2.6 A sustained communications failure is a failure lasting 30 seconds or more. A transient communication failure is one that lasts less than 30 seconds.

A.2.3 Age of data

A.2.3.1 Operational Data must be available for transmission to AEMO at all times, unless otherwise agreed by AEMO for specified locations, in response to a poll within the time intervals specified in Table 4. The time interval is calculated from the instant the data first gets converted to digital form.

Table 4 Time intervals for data to be available for transmission to AEMO

Category	Data Type	Time Interval (seconds)	Time Interval via Data Concentrator (seconds)
High Resolution Data	Analogue Value	2	2
Dispatch Data	Status Indication	6	7
	Analogue Value	6	7
	Discrete Value	6	7
Power System Data	Status Indication	8	9
	Analogue Value	14	15
	Discrete Value	14	15
Other Data	Status Indication	12	13
	Analogue Value	22	23
	Discrete Value	22	23

A.2.3.2 A Status Indication is considered converted to digital form when the digital signal representing it is carried by circuits that are not used solely for that Status Indication.

A.2.3.3 Status Indications and Discrete Values do not have to be re-transmitted for up to five minutes if the relevant data has not changed since the last transmission.

A.2.3.4 Analogue Values do not have to be re-transmitted for up to five minutes if the relevant data has not changed by the relevant deadband amount shown in Table 5.

Table 5 Deadband for analogue data transmission

Category of Analogue Data	Deadband (% of Scale Range)
Dispatch Data	0.2
Power System Data	0.5
Other Data	0.5

A.2.3.5 An Intervening Facility must respond to polls once per second with the relevant data.

A.2.4 Control command delay

A.2.4.1 DCPs must relay Control Commands to the relevant RCE within three seconds of receiving a Control Command from AEMO or within four seconds if transmitted via a Data Concentrator.

A.3 Reliability

A.3.1 Reliability requirements

- A.3.1.1 The total period of Critical Outages for a RME and RCE in a rolling 12-month assessment period must be no greater than those indicated in Table 6, unless otherwise agreed by AEMO in relation to specified locations.
- A.3.1.2 The total period of Critical Outages of an Intervening Facility over a rolling 12-month assessment period must be no greater than those indicated in Table 7. AEMO will actively monitor the Intervening Facility performance.
- A.3.1.3 If, in any rolling 12-month assessment period, the total period of Critical Outages exceeds the periods indicated in Table 6 and Table 7, the responsible DCPs must jointly take reasonable corrective action, as determined between AEMO and the relevant Network Operator or Market Participant, to bring the total period within the limits required by step A.3.1.1 or A.3.1.2, as applicable.

Table 6 Total period of Critical Outages of RME and RCE over a 12-month period

Category of RME and RCE	Total period of Critical Outages
Dispatch Data where there is no agreed substitute data	6 hours
Dispatch Data where there is agreed substitute data	12 hours
RCE	24 hours

Table 7 Total period of Critical Outages of an Intervening Facility over a 12-month period

Category of Intervening Facility	Period per Critical Outage	Total Period of Critical Outages
Dispatch Data	30 minutes	2 hours
Power System Data and Other Data	1 hour	6 hours

A.3.2 Redundant elements

- A.3.2.1 DCFs must have sufficient redundant elements to reasonably satisfy the reliability requirements set out in section 3.1, taking into account:
- the likely failure rate of their elements;
 - the likely time to repair of their elements; and
 - the likely need for planned outages of their elements.

A.4 Interfacing

A.4.1 Physical and logical interfaces

- A.4.1.1 Where AEMO agrees to extend its WAN to DCP's DCFs, each relevant DCP must establish a physical connection to an AEMO-designated port on an AEMO router and it must use Ethernet and TCP/IP protocols.
- A.4.1.2 Where AEMO agrees that a DCP may establish a logical connection to AEMO's WAN, the DCP must develop a digital communications service between the DCP's DCFs and an AEMO-designated network access facility.

A.4.2 Data communications protocols

A.4.2.1 Any communication of Operational Data through a physical or logical interface with AEMO must use the secure ICCP TASE.2 protocol.