

POWER SYSTEM OPERATION PROCEDURE: COMMUNICATIONS AND CONTROL SYSTEMS

Balancing Market Commencement
Day

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<u>1.0</u>	<u>1 September 2006</u>	<u>Power System Operation Procedure (Market Procedure) for Communications and Control Systems</u>
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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 should be read in conjunction with 2.36A.5 of the Wholesale Electricity Market Rules (Market Rules (WEM Rules)).~~

1.1.2 References to particular ~~Market~~**WEM** Rules within the Procedure in bold and square brackets [**MR**Clause **XX**] are current as of ~~the Balancing Market Commencement Day 27 March 2018.~~ These references are included for convenience only, and are not part of this Procedure.

~~1. This Procedure is subservient to the Market particular Technical Rules. In the event of conflict between within this Procedure in bold and the Market Rules or any other document, the order of precedence is curly braces {Clause XX} are current as set out in the Market Rules [MR of 1.5.2].~~

~~4.1.41.1.3 This Procedure may include explanatory text, including quotations from the Market Rules. Such explanatory text is December 2016. These references are included for information convenience only, does and are not form part of the this Procedure, and is italicised and contained in a rectangular box.~~

1.2 A word or phrase Interpretation

1.2.1 In this Procedure:

- (a) ~~terms that are capitalised but not defined in this Procedure 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 Electricity Industry Act 2004, WEM Rules or Market Procedures includes any associated forms required or contemplated by the WEM Rules or Market Procedures;~~
- (d) ~~unless the context requires otherwise, references to AEMO include AEMO in the Regulations its System Management capacity; and~~
- (e) ~~words expressed in the singular include the plural or Market Rules made under that Act, has the same meaning when used in this Procedure. vice versa.~~

~~4.1.51.2.2 In addition, the following defined terms have the given meaning: given in Table 1 Table 1.~~

- a. ~~Automatic Governor Control (AGC) means equipment operated by System Management, which sends signals to generating facilities participating in the AGC scheme to automatically adjust its output so as to maintain frequency or restore frequency within the Normal Operating Frequency Band.~~

1.1 RELATED DOCUMENTS

1. ~~This document is related to, and should be read in conjunction with, the following documents:~~

- a. ~~PSOP Dispatch~~
- b. ~~PSOP Operational Data Points for Generating Facilities~~
- c. ~~PSOP Commissioning and testing~~
- d. ~~PSOP Power system security~~

Market Table 1 Defined Terms

<u>Term</u>	<u>Definition</u>
<u>Automatic Generation Control (AGC)</u>	<u>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 Standard.</u>
<u>Energy Management System (EMS)</u>	<u>A system used to monitor and control elements of the SWIS in real time.</u>
<u>Inter Control-Centre Communications Protocol (ICCP)</u>	<u>A communications protocol used to send and receive SCADA messages between different EMS installations (typically located within different organisations).</u>
<u>Supervisory Control and Data Acquisition (SCADA)</u>	<u>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.</u>
<u>Technical Specification for Operational Data Points</u>	<u>The document identified in step 2.1.2.</u>

1.2.1.3 Purpose and application of this Procedure — Balancing Facility Requirements

1.2 COMMENCEMENT

1. ~~This~~ The purpose of this Procedure replacement has effect from the Balancing Market Commencement Day.

1 SCOPE

~~4.2.51.3.1~~ This Procedure has been developed in accordance with the Market Rules ~~[MR2.35.4]~~ and documents ~~is to document~~ the communications and control systems required to be in place to enable System Management to dispatch ~~system requirements necessary to:~~

- ~~e. Scheduled Generators, Non-Scheduled Generators, Dispatchable Loads and Demand Side Programmes that are controlled directly by a Market Participant; and~~
- ~~e. Scheduled or Non-Scheduled Generators where System Management, by agreement with the relevant Market Participant, has operational control of that Facility; and~~
- ~~e. Interruptible Loads whose operation may be triggered by a fall in power system frequency.~~

~~(a) support the dispatch process [Clause 2.35.4]; and~~

~~(b) enable AEMO to remotely monitor the performance of a Network [Clause 2.36A.5].~~

~~4.2.61.3.2~~ The Procedure specifies the main features of the speech, data and control systems that must be in place between ~~the~~AEMO and a Market Participant ~~and System Management~~ for the purpose of:

- ~~(a) issuing, acknowledging and responding to Dispatch Instructions, Dispatch Orders, and Operating Instructions (AEMO) and directions; and confirming receipt and responding to them (Market Participant);~~
- ~~(b) monitoring the MW output and connection status of Facilities; and~~
 - ~~f. enabling prompt response to directions of System Management; and~~
- ~~(d)(c) communicating ~~on~~about other matters relating to the operation of the power system.~~

~~1.3.3~~ This Procedure applies to:

~~(a) AEMO to ensure that its communications and control systems support the dispatch process~~

~~Note that the processes for implementing Dispatch Instructions are covered in the PSOP: Dispatch.~~

~~and enable it to remotely monitor the performance of a Network; and~~

~~(b) Market Participants and Network Operators in complying with this Procedure in respect of communications and control system requirements.~~

1.4 Associated documents

~~1.4.1~~ The following documents in ~~Table 2~~Table 2 (available via the Market Web Site) provide background information to this Procedure:

Table 2 Background Documents

<u>Reference</u>	<u>Title</u>	<u>Location</u>
	AEMO Power System Data Communication Standard	AEMO Website
	Automatic Balancing Control (ABC) and Automatic Generation Control (AGC) Interface Requirements	AEMO Website
SO_OP_WA_3805	IMS Interface Market Procedure	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, 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 its own regulatory framework.
- 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 the timeframe specified in step **Error! Reference source not found.2.1.5.**
- 2.1.6 AEMO may, acting reasonably, revise the specification in step 2.1.3 at any time. AEMO must specify a reasonable timeframe for a Registered Facility to meet any new or revised specifications made in step 2.1.3.

2.2 Specific requirements – Balancing Facilities

- 2.2.1 ~~The communication requirements for Balancing Facilities that do not having have~~ special conditions imposed by the IMO pursuant to the Market Rules ~~[MR 7A.1.11]~~ on them by AEMO under step 2.3.1, and which are that such Facilities; not exempted under step 2.114.2, must comply with the following communications requirements:
- (a) be able to receive, and ~~acknowledge~~ confirm receipt of Dispatch Instructions, Dispatch Orders and Operating Instructions via System Management’s SCADA system and/or System Management’s secure business-to-business gateway; and from AEMO via SCADA or AEMO’s IT systems as described in the Automatic Balancing Control (ABC) and Automatic Generation Control (AGC) Interface Requirements;

- (b) have SMS ~~and~~/or email capability at the location that is able to receive Dispatch Instructions, Dispatch Orders and Operating Instructions from ~~System Management~~AEMO; and
- ~~—have duplicated 24x7 telephone services (or other voice communications) in place for communication with System Management, including the receipt and acknowledgement of Dispatch Instructions~~AEMO as a backup

~~(d)~~(c) back-up mechanism for System Management's AEMO's SCADA system or System Management's secure business-to-business gateway; IT systems.

~~unless specifically exempted under step 3.2 below.~~

~~0. Until the later of the Trading Day starting on 5 December 2012 or six months after System Management publishes its secure business-to-business gateway specification. System Management will deem internet access via System Management's portal will be deemed as meeting the requirement specified in step 2.1.1(a).~~

2.6.2.3 Specific requirements – Balancing Facilities with special conditions imposed

~~2.3.1 The communication requirements for AEMO may determine that a Balancing Facility which have had Facility does not meet the relevant specifications of the Balancing Facility Requirements, and may impose special conditions imposed by the IMO pursuant to the Market Rules [MR Clause 7A.1.11] are that such Facilities]~~

~~2.6.12.3.2 Balancing Facilities that have special conditions imposed on them under step 2.3.1 must have: comply with the following communications requirements:~~

- ~~(a) internet access via System Management's AEMO's portal or System Management's AEMO's secure business-to-business gateway; and~~
- ~~(b) telephone services (or other voice communications); and~~

~~e. either:~~

~~. SMS; or~~

~~. e-mail,~~

~~(f)(c) communications in place for the receipt of Dispatch Instructions, Dispatch Orders and Operating Instructions, being either:~~

~~(1) SMS; or~~

~~(2) e-mail.~~

~~2.6.22.3.3 A Facility is not required to comply with step 2.2.12.3.2 if either:~~

~~(a) it is exempted under step 14.2; or~~

~~a. the conditions imposed by AEMO in accordance with step 3.2 below applies, or~~
~~(b) the Facility has had conditions imposed on it under the Market Rules [MR 7A.1.11] specifically exempting 2.3.1 specifically exempt the requirements of step 2.2.1.2.3.2.~~

Note that the above Facilities are also required to comply with the PSOP: Operational Data Points for Generating Plant

2.8.2.4 Specific requirements – Facilities providing Load Following Ancillary Service

~~2.8.12.4.1 All Facilities providing Load Following Ancillary Service must be connected to System Management's AEMO's Automatic Generation Control (AGC) system with all signals required for handshaking as per System Management's the Automatic Balancing Control (ABC) and~~



Automatic Generation Control (AGC interface signal protocol fully operational.) Interface Requirements.

- ~~1. System Management must publish the AGC signal protocol on the Market Web Site as part of the Operating Protocol template.~~

2.112.5 Specific requirements – Facilities providing Spinning Reserve

2.11.12.5.1 All Facilities providing Spinning Reserve must have duplicated 24x7 monitored voice communications in place for communication with ~~System Management.~~AEMO unless alternative arrangements are specified in the Ancillary Service Contract.

~~0. All Facilities providing Class A Spinning Reserve as defined in the PSOP: Ancillary Services must be connected to System Management's~~

~~Facilities providing Class B and Class C Spinning Reserve may also be connected to System Management's AGC system by agreement between System Management and the Market Participant.~~

~~AGC system.~~

2.142.6 Specific requirements – Facilities providing Load Rejection Reserve

~~2.14.12.6.1 All Facilities providing Load Rejection Reserve must have the duplicated 24x7 monitored voice communications requirements outlined in the PSOP: place for communication with AEMO unless alternative arrangements are specified in the Ancillary Services Service Contract.~~

2.162.7 Specific requirements – Facilities providing Interruptible Load, Network Control Service, System Restart Service or Dispatch Support Service

~~1. The communications and control system requirements for:~~

- ~~— a Facility providing Network Control Service, Facilities contracted with AEMO to provide System Restart Service or Dispatch Support Service; or~~
- ~~— an Interruptible Load;~~

~~2.16.42.7.1 shall must be in accordance with the contract under which the service is provided 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.~~

2.172.8 Specific requirements – Demand Side Programmes

~~2.17.12.8.1 A Market Customer who operates a Demand Side Programme must provide duplicated monitored telephone contacts from 7 am until 7 pm on Business Days that will to allow System Management AEMO to communicate Dispatch Instructions to the Market Customer, during the times specified in Appendix 1(h)(ix) Standing Data.~~

2.9 Specific requirements – Network Operator

~~2.9.1 Western Power must provide AEMO with access to its operational voice communications system {Clause 3.3.4.3}. 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 Western Power's control rooms (primary and back-up) independent of the public switched telephone network; and~~

(b) voice communications to Market Participants, independent of the public switched telephone network (where the list of Market Participants is to be agreed between AEMO and Western Power).¹

2.9.3 Obligations regarding confidentiality and retention of historical records in relation to this step 02-9 are specified in the IMS Interface Market Procedure.

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 transfer 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 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 Facilities.

34 GENERATORS OPERATED BY SYSTEM MANAGEMENT AEMO

3.24.1 Application

~~1. This section 3 applies to Market Participants with Facilities operated by System Management pursuant to the Market Rules [MR 7.8].~~

4.1.1 AEMO may, by agreement with a Market Participant, maintain operational control over aspects of a Registered Facility [Clause 7.8.1].

~~3.2.24.1.2~~ Except for the Verve Energy with respect to the Verve Energy Balancing Portfolio, System Management AEMO may only operate Facilities for which in step 14.1.4 if a formal Operating Protocol operating protocol detailing the mechanism and limitations of control has been executed between System Management AEMO and the relevant Market Participant.

~~3.2.34.1.3~~ The Operating Protocol operating protocol referred to in step 3.1.24.1.2 must include a definition of the protocols and electronic interfaces to be used by System Management AEMO in carrying out the remote operation and control functions (SCADA technical specification-).

~~0. System Management must publish an Operating Protocol template on the Market Web site.~~

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.

3.4.4.2 Exemption of Facilities under System Management AEMO control from communications requirements

~~3.4.14.2.1~~ ~~System Management~~ 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, ~~as applicable, step 2.4 steps 2.2.12.2.2~~ or ~~step 2.2~~ if that Facility is operated by System Management pursuant to the Market Rules ~~[MR 7.8]-2.3.2~~.

3.6.4.3 Automatic execution of Dispatch Instructions and Dispatch Orders through AGC

~~3.6.14.3.1~~ If so permitted under the ~~Operating Protocol~~ operating protocol referred to in step 3.4.2, ~~System Management~~ 4.1.2, AEMO may execute one or more Dispatch Instructions or Dispatch Orders relating to that Facility through AGC ~~---~~.

2—LOSS OF COMMUNICATION FACILITIES

- ~~1.—Where a major loss of communications occurs, the electronic data/control systems and some of the voice communication circuits referred to in Section 2 of this Procedure may become unavailable. Where a Facility continues to operate after major loss of communications, the Market Participants and System Management must revert to speech communications, including the use of back-up voice communications for the transfer of all Dispatch Instructions, Dispatch Orders and other operational information.~~
- ~~2.—Where System Management's Control Centre has been evacuated and dispatch services shift to System Management's emergency control centre, telephone contact with System Management must be made via a series of emergency telephone numbers ("the emergency contact list").~~

Under such circumstances, an Emergency Operating State is likely to exist.

- ~~3.—System Management must provide Market Participants with the emergency contact list, and advise Market Participants as soon as, and by whatever means, practicable when the emergency contact list is to be used.~~
- ~~4.—Market Participants must provide System Management with emergency telephone contact details.~~
- ~~5.—Where a Market Participant can no longer adhere to the communications requirements outlined in section 2 of this Procedure due to a major loss of communications as outlined in step 5.1, the relevant Market Participant must advise System Management as soon as, and by whatever means, practicable~~

It is the Market Participant's responsibility at all times to maintain the integrity of its communications facilities. A communications failure does not relieve the Market Participant's obligation to follow all Dispatch Instructions and other directions from System Management. Note that the provisions under step 4.5 are only intended to apply as a short term measure (i.e. hours rather than days).



~~that the emergency contact details are to be used for the purposes of communicating with the relevant Facilities.~~

Due to the higher volume of Dispatch Instructions required in a competitive balancing environment, any loss of communications that resulted in System Management relying on voice communications would be likely to result in the system being placed in a High Risk Operating State.

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; 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 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 2.1.1 by the timeframe determined in **Error! Reference source not found.2.1.5**. This implementation must include any change to the Network Operator's Energy Management System (EMS) and the Inter Control-Centre Communications Protocol (ICCP) as detailed in the IMS Interface Market Procedure.

5.2.2 AEMO may issue a direction under step ~~5.1.15.2.4~~ to meet the requirements of step ~~5.2.15.3.4~~.

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}**.

5.3 Data Communications Standard

5.3.1 AEMO's communication and performance requirements indicating the data communications standard for information provided by the Network Operator are detailed in the AEMO Power System Data Communication Standard, which is available on the Market Web Site.

5.3.2 Where a Network Operator is required to modify equipment to meet the standard in step 5.3.1, AEMO may agree with the Network Operator on a reasonable timeframe for implementation.

5.4 SCADA System and EMS Data via ICCP

5.4.1 The requirements for the ICCP link between AEMO and Network Operators for the provision of data are detailed in the standard indicated in step 5.3.1.

5.4.2 AEMO must specify the data to be sent via the ICCP link, which may include controls and indications.

5.4.3 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.

5.4.4 Where a Network Operator is required to modify equipment to meet the standard in step 5.4.1 or the requirements in step 5.4.2, AEMO may agree with the Network Operator on a reasonable timeframe for implementation.