Response to AEMO Issues Paper (February 2022) on the Review of NEM POWER SYSTEM DATA COMMUNICATIONS STANDARD

March 2022

ElectraNet

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1. Background

AEMO seeks to amend the Power System Data Communications Standard for the NEM (Standard) under the National Electricity Rules (NER).

AEMO has prepared this Issues Paper to facilitate informed debate and feedback on the most efficient way to meet the objectives for this Standard in the NER for current conditions and reasonably expected developments in the NEM, having regard to the national electricity objective.

The matters canvassed in this Issues Paper have been informed by preliminary engagement with energy industry participants and other market bodies. AEMO has identified approximately 50 discrete topics for review, which are grouped under 18 separate headings in this Issues Paper.

ElectraNet has reviewed this paper and has developed a response below.

2. General Comment

ElectraNet has two general comments in relation to the Issues Paper

2.1 Data for power system modelling

It is apparent that the future complexity of network and inter-relationships between wider NEM and transmission and distribution networks will require greater level of widespread modelling by all participants. It would be more efficient to minimise duplication of this modelling effort and alignment of assumptions made about device status and ratings.

In this regard, it may make sense for entities to share their models, the device status, ratings, power flow, voltage levels etc.

This communications protocol should factor in that likely future and provide guidance on the technical and governance requirements that would underpin this scenario, including:

- Mechanism of data transfer and format of information
- Speed of reflection of new or changed assets,
- Frequency of status update

It should also contemplate whether that sharing is facilitated directly between participants or whether AEMO has a role to play to provide a centralised repository and access and how that would work through appropriate protocols.

2.2 Timeframes for change

Being clear about which elements are mandated and which are discretionary will be important in framing the outputs of the review as businesses need to be able to fund their implementation. Before the outcomes of this consultation and any changes identified are made final, the impact needs to be understood and where they will result in a material investment for participants these need to be made with suitable transition timeframe, considering time for entities to source the funding through the normal revenue period and the time needed to implement the changes.

Given that timeframe (multiple years) AEMO needs to take a long-term view of what the requirements will be and not just focus on the needs of communications over the next few years.

3. Specific Comments

Table 1: Specific Response to Issues Raised

Section	Issue raised	Questions	Responses
3.1.1	Data to be provided - Standard needs to be more definitive on the range of measurements that need to be provided as there is significant uncertainty as to what will actually be required for new connections.	Does the Standard need to be more specific on the range of data covered by the Standard? If so why and what level of detail is considered necessary?	No comment, ElectraNet is comfortable with the existing mechanisms used in determining the measurements that need to be provided.
3.1.1	Definition of power system data - with the growth of embedded generation and the need for AEMO to monitor power flows in distribution systems which impact on the security of the transmission network, this definition needs to be expanded.	Does the definition of power system data need to be extended? If so why and what would be a more appropriate definition?	In the case that the definition changes and additional data points are to be onboarded the costs for the design and implementation of this need to be considered.
3.1.1	Definition of Control Commands - this definition is inadequate as it does not cover the full range of control commands sent out from AEMO NEM Control Centres.	Does the definition of control commands need to be extended? If so why and what would be a more appropriate definition?	No comment, ElectraNet is comfortable with the current definition.
3.1.1	Definition of RCE and RME - this definition in no longer adequate in context of new technology for data acquisition.	Do the definitions of RCE and RME need to be extended? If so why and what would be a more appropriate definition?	The definition may need to be extended in the instance where differentiation is required for Performance and/or Reliability requirements for different types of RCE/RME. Where requirements are consistent across the RCE/RME space further definition is unnecessary.
3.1.1	Participants in the data communications process - the Standard in Section 1.1 does not include the full range of participants involved in the data communications process.	Other than the changes required to accommodate additional participant categories identified in clause 4.11.1 of the NER, does the Standard need to extend or specify other participants or sub-groups within a category. If so, how and why?	The Standard may need to be extended to include additional categories of data e.g. • Load available on UFLS in a region or sub-region • DER available to shed in a region or sub-region • FFR availability (from BESSs and VPPs) The above parameters assist in the management of Power System Security. There may be additional parameters that may need to be added as the energy transformation progresses.

3.1.2	The requirements set under the Standard for different classes of data need to take into account the use of the data and its criticality.	Should requirements under the Standard be varied according to how critical the data is? If so, what criteria should be used to determine the requirements particular data needs to meet?	ElectraNet note differentiation of requirements based on different classes of data may introduce unnecessary complication. In this manner it is suggested that any differentiation be done at a high level for instance real time (protection) vs near real time data (control).
3.1.2	The standard is not consistent with more stringent requirements in some areas (e.g. Market Ancillary Service Specification).	Are there examples where AEMO has specified requirements beyond those set in the Standard, and how can any potential inconsistencies best be reconciled?	No comment, ElectraNet do not recall an event as described.
3.1.2	The standard seems to assume that all participants in the data communications process operate data centres.	Are there examples where the Standard has not kept pace with developments in data communications technology?	Refer to response to 3.1.3.
3.1.2	There is an opportunity to design vulnerability out and design security in, as opposed to putting in place processes to manage the emergence of security issues. It might be possible for the Standard to encourage enhancement of resilience through design.	Is there an opportunity for the standard to encourage enhancement of resilience through design? If so, how might this be done?	Yes, it could be reasonable to specify maturity expectations within existing frameworks such as AESCSF or ASD Essential Eight Maturity model. The latter may be more appropriate for a standard document such as the PSDCS as the measures specified are technical controls.
3.1.2	The Standard to be clear on the consequences for a participant failing to meet the requirements of the Standard.	Should the Standard set out the consequences for a participant failing to meet its requirements?	No, consequences are to be outlined in the NER.
3.1.3	The requirements specified for DNSPs may be unclear in a number of areas. Possible examples are: • Current standard does not reflect topology that applies for DNSP (e.g. diagram in Section 1.3 and tables 4 and 5). • Standard needs to state whether or not DNSP can have direct connection with AEMO rather than going through TNSP • Standard needs to account for diversity in comms between TNSP/DNSP to AEMO. • Standard should include situation where there are two intervening facilities and perhaps more.	What changes to the current Standard are required to clarify the requirements for DNSPs?	The diagram and text in section 1.3 should be updated to show the end to end architecture from generating facility through to AEMO control centre. Inclusion of DER, VPP and ancillary services should be illustrated to show interconnection at appropriate layers based on generating capacity.

3.1.3	The current structure is making it difficult for new connections.	Are there specific examples where the current data communications structure is making it difficult for new connections or embedded participants? If so what changes in the Standard would be required to address these issues?	Whilst there are difficulties in the connection process, in ElectraNets experience (i.e. transmission level connections) these are overcome.
3.1.3	It is reported that wholesale demand response providers are finding it very difficult to be connected for data communications under current arrangements.	What difficulties are wholesale demand response providers finding to be connected for data communications under current arrangements?	No comment.
3.1.3	New embedded scheduled and semi- scheduled generators have obligations under the rules and Generator Performance Standards (GPS) to participate in Automatic Generation Control (AGC). However, some stakeholders have indicated that this is not possible through some DNSP SCADA systems.	What difficulties do DNSPs have in communicating AGC control signals?	No Comment.
3.1.4	The current standard specifies ICCP IEC60870-6 TASE.2 and its extensions as a secure ICCP protocol. A stakeholder has questioned whether this can actually be considered as a secure protocol	Is the current ICCP Protocol specified in the current Standard still appropriate?	Secure ICCP is appropriate for securing data in transit and to some degree for authentication. However, adding additional security to this to verify the integrity of the data (signing of some form) is required to make it truly secure. Further, the security architecture should be considered as a whole, rather than protocol specific.
3.1.4	The Standard in Section 5.1 should be more specific on protocols used when AEMO WAN is connected to another party's data Communications Facility	What protocols should apply for connections to AEMO WAM?	ElectraNet find the current Ethernet, TCP/IP and ICCP via section 5.2 sufficient detail for a standard document. If dynamic routing or virtual containers (MPLS/802.1q) are to be used supported protocols could be included as details will need to be sorted during design.
3.1.5	The Standard should provide more clarity on the boundary of both operational and financial responsibility between • Generator and NSP • DNSP and TNSP • AEMO and TNSP	What additional detail is required in the Standard to provide more clarity on boundary of both operational and financial responsibilities?	Focus on coordination of interoperability of RCE & RME and the requirement to maintain reliability aligned with the standard. Should the NSP need to make changes to equipment due to obsolescence or other market pressures a means is required to coordinate this undertaking.

3.1.5	The standard should make clear the obligation of parties to work together to resolve any problems to ensure a requirement is met.	Should an obligation for parties to work together be added to the Standard?	Yes, clear obligations needs to be spelt out, (including operational and financial responsibility). Lack of clear requirements/governance here can cost the consumer. In addition, ElectraNet suggests an escalation framework be set out to provide a means of dispute resolution.
3.1.5	The Standard needs to be clear that connections are required to both AEMO control room sites.	Does the Standard need to clarify that connection is required to both AEMO control room sites?	No comment, this is governed by the reliability requirements and aligns with the need to update/patch systems and test, discussed elsewhere in the issues paper.
3.1.6	The Standard needs a specific requirement that data sent is of good quality. It is possible for a connection to be available and the data to be unusable due to quality.	Should the Standard include a specific requirement that data sent should be of good quality? If so, what would be implications for stakeholders?	No comment.
3.1.6	Some remote metering equipment does not provide quality flags.	Should all data be sent with quality flags? If so, what would be implications for stakeholders?	No comment, ElectraNet acknowledge not all metering communication implementations support the use of quality flags.
3.1.7	The Standard does not have an effective requirement to ensure the accuracy of data in particular to ensure that RME remains calibrated. Monitoring and remediation may be problematic (e.g. kv measurements at some stations can vary by over 10kV).	Should the Standard include a more specific requirement regarding data accuracy? If so, what would be implications for stakeholders?	Where necessary, calibration cycles should be specified, noting this will come at a cost.
3.1.7	All semi-scheduled units being clamped in SCADA (at the AEMO end) such that telemetered MW values could not be negative is undesirable, noting that participants are responsible for providing accurate data and separate metering of auxiliary loads.	How material is the issue regarding clamping of values for semi-scheduled units? If the standard were to be changed as suggested, what would be the implications for participants?	No comment.
3.1.8	The Standard is not clear on requirements for data latency or end-to-end response times. There is current no minimum requirement for data latency.	Should the Standard include a specific requirement regarding data latency? If so, what would be implications for stakeholders?	Latency requirements should be aligned to protocol operation. As with 3.1.9 ElectraNet questions if ICCP continues to be a suitable protocol for near real time operations.

3.1.8	Significant timing difference can exist particularly for the RME equipment that uses UTC time and the conversion of this to AEST. There should be greater clarity on the requirements for calibration, testing, validation, and maintenance of the timing stamp quality.	How material is the issue regarding timing differences due to RME? If the standard were to be changed to address this, what would be the implications for participants?	Timing differences across RME may create significant delays in outage restoration. Although it might mean a complete retune of timing devices across the NEM ElectraNet support the standard to be updated to stipulate the use of market time across all in scope equipment.
3.1.8	Monitoring end-to end update times is difficult post commissioning	Should an additional requirement be included in the Standard to allow ongoing monitoring of end-to-end response times? If so, what would be the implications of such a change?	No comment.
3.1.9	AGC is showing performance issues which suggest that a more responsive control loop is needed. With the current 4 second AGC cycle, updates at a minimum of less than 2 seconds may be required. There have been incidents where AGC used to control a battery is stale (20s old) resulting in unwarranted discharge and charge cycles and at times oscillations. This is mainly because the communications delay is more than 97% of the response delay time.	What would the implications be if the specification of maximum delay for control commands was tightened to 2 seconds? What are the implications if control command delays remain at current levels?	As mentioned in 3.1.8 ElectraNet does not believe poll-based communications is appropriate for near real time operations. Reduction in the poll time for ICCP may not be conducive to the problem and furthermore the migration to SICCP will introduce additional delay.
3.1.9	There should be increased use of dispatch signals via SCADA through the NSP as AEMO's Market Portal may be unreliable and any failure to meet dispatch requirement increases system risk.	Is there a material issue associated with reliability of the connection to AEMO's market portal?	No comment.
3.1.9	The specification of maximum delays may not adequately take into account the number of intervening facilities through which the command signal needs to be relayed.	Should the specification of control command delays in the Standard take into account the number of intervening facilities? If so, how should these be accounted for and what would the implications be?	No, the communication of control commands should be reviewed to transition from a queue and dispatch model to one that leverages unsolicited dispatch. This should be done with a view to eliminate the amount of time data spends idle across intervening facilities (in both directions). It is expected that this would require the introduction of significant change but one that will allow the control commands to keep pace with emerging technology and market opportunities.

3.1.10	The current standard is not clear on obligations of the parties to the security of the data (physical, personnel and cyber) and of control protocols at the level required for critical infrastructure.	What specific obligations regarding maintenance of security should be included in the Standard, and what would be the implications of this?	Obligations are already in place as part of the SOCI legislation. Given SOCI is concerned with adherence to frameworks and is not technical in nature, it may be appropriate for AEMO to specify some specific technical obligations where these are required to secure others connected to the network. It should be clear that these only enhance the existing obligations and should not contradict them in any form. Use of (or reference to) the ASD Essential Eight maturity model would provide a concise mechanism for specification of these controls.
3.1.10	Alignment between this data communications standard and these current and proposed regulations requires consideration.	Does the legislation adequately cover security obligations and requirements or is there a need for more detailed obligations in the Standard?	See response to previous question.
3.1.10	The Standard should include an obligation for participants to advise AEMO of any known relevant cyber security issues or when abnormal risks to cyber security arise.	What would be the implications of including a specific obligation to advise on cyber security risks?	It may be appropriate to require some form of reporting in the event of a cyber incident, particularly where this could have a flow on effect to others connected to the network. It needs to be explicitly stated the conditions this would need to be done, the method that needs to be used to report, the allowable time frame for this to be done, and what AEMO or others would be allowed to do with this information. This is needed to provide clarity for incident response plans.
3.1.10	There are questions about ownership and control and rights to data, and when. While not specifically related to the Standard, the standard should nonetheless fully support and enable these requirements.	Should the Standard be enhanced to better identify and support the protection of the confidentiality of data? If so what type of enhancement is required?	No comment.

3.1.11	There is a need for greater clarity in Section 3.1 of the Standard regarding the specification of reliability requirements. In particular: • In table 4 standard term RCE needs to be better defined • Tables 4 and 5 are not clear. For instance does the 6 hour requirement apply to a single site or all sites? • Possible inconsistency between table 4 and 5 • Difficulty in seeing how tables 4 and 5 apply to DNSPs • Need to better define what is meant by a critical outage in Section 3.1 - i.e. does it refer to total loss of data or simply loss of redundant path?	What changes would be required to clarify reliability requirements in the Standard?	The standard needs to be explicit and unambiguous (e.g. if redundancy is required, it needs to be stated) in order to justify the cost of implementation.
3.1.11	The Standard should set expectations on the level of monitoring and reporting of reliability required. For instance, this might include a comprehensive heartbeat facility.	Does the Standard need to set enhanced expectations regarding monitoring and reporting of availability and why? What would be reasonable expectations to set? What changes would be required to data communications systems to achieve enhanced monitoring and reporting of availability?	Yes. Heartbeat facility already exists between ElectraNet and AEMO, an provides useful quality feedback. This should be mandated based the criticality of the connection.
3.1.11	Frequent and rapid applications of software patches is becoming an increasing requirement for maintaining cyber security. One stakeholder has queried whether new or additional redundancy may be needed at DCFs to allow rapid application of patches without disrupting operations.	Does any lack of redundancy currently restrict the ability of participants to apply software security patches in a timely manner?	This should be implicit from availability and reliability requirements. The redundancy (and therefore availability) requirements of different types of NSPs needs to be clarified to answer this question. E.g. at multiple comms nodes / firewalls/ RTUs required at all sites to allow for software updates.
3.1.12	Section 2.2 of the current Standard states that "DCPs must notify AEMO of their sign convention when applying to AEMO for registration as a Registered Participant. To change the sign convention, DCPs must give 60 business days' notice to AEMO". It is not clear whether this requirement applies to small scale changes to correct individual sign conventions or only to a major change following a change in policy.	What change to Section 2.2 of the Standard would be required to clarify the requirement for adequate notice?	No comment.

3.1.13	The Standard has no specific requirements for the times required to return to service following forced outages and in practice failed data can take a long time to rectify. Tables 4 and 5 of the current Standard refer to a reliability requirement rather than a specific response time.	What issues have arisen that would justify including in the Standard a specific requirement regarding response time to forced outages? If so, what would reasonable expectations be?	No comment, upon failure, restoration is already of the highest priority to meet reliability requirements as far as practically possible.
3.1.14	The current testing scope does not include testing of whether the data is correct, but only that data is being communicated. The scope of testing specified under the Standard could also include testing for cyber security; and robust RCE and RME testing, calibration and validation.	What issues have arisen that would justify expanding the scope of testing specified in the Standard? If so, what increases in scope are required? What would be the implications of a change in testing scope?	No specific issues identified, but as a matter of principal, ElectraNet support more comprehensive testing of data correctness as well as comms path open.
3.1.14	The level of testing required for new generators is onerous.	What are examples of testing requirements that are considered too onerous for new generators? Are there opportunities to make these requirements less onerous without materially reducing the effectiveness of the testing programme in demonstrating the necessary capabilities?	No comment.
3.1.14	Section 6.4 of the current Standard is not clear on what constitutes an "upgrade".	What changes to the definition of an "upgrade" is required? What implications would such a change have?	No comment. ElectraNet are comfortable with the current wording.
3.1.14	The requirement under Section 6.4(c) of the current Standard is unclear and that for the sake of efficiency it should encourage the use of standard test procedures.	Should section 6.4(c) of the current Standard be amended to encourage use of standard test procedures?	Internal standard test processes are used. Having common understanding of good practice through industry common standards makes sense.
3.1.14	Due to the changing nature of the power system the requirements for advice on augmentations under the Standard need to be increased.	What issues have arisen that would justify expanding the scope of augmentations required to be advised under the Standard?	With an increasing complexity of power system requiring more complex understanding of integration between participants, the need for timely information on changes is becoming more critical – see overarching comment in section 2.1 of the report.
3.1.14	The Standard needs to require the provision of an appropriate testing environment for data links.	What issues have arisen that would justify the Standard specifying the provision of testing environments for data links? What implications for stakeholders would such a new requirement have?	AEMO needs to have a test environment to allow full testing of systems and changes. Lack of testing environment has created difficulties in adequate and timely testing of EMS implementation at ElectraNet.

3.1.15	Any increased requirements in the Standard need to be transitioned to accommodate additional funding requirements to meet such increased requirements.	In what circumstances would transitional provisions be justified for increased requirements in the Standard? If justified, what form of provisions would be needed and for how long?	Refer to section 2.2 of this document.
3.2.1	AEMO NEM Control Centres currently use limited real time data from PMUs. In the near future the level of this real time data from PMUs and High-Speed Monitors (HSMs) will greatly increase and requirements for the communication of these data types may need to be included within the Standard.	Does the Standard need to cover to cover PMU and HSM data? If so why and on what basis should the requirements be set (i.e. appropriate standards on which the requirements could be based)?	Yes, the standard should document phasor measurement unit specification for use in the NEM. This sets a baseline for PMU and HSM across the network. This could be based on the specification provided to ElectraNet by AEMO for "South Australia Phasor Measurement Unit Specification".
3.2.1	Some stakeholders have noted that the Integrating Energy Storage Systems rule change will enable Small Generation Aggregators (SGAs) to provide FCAS and that the Standard may need to accommodate this change	Does the Standard need to cover SGAs? If so why and on what basis should the requirements be set?	No comment.
3.2.1	The Scheduled Lite Visibility Model to provide visibility to AEMO of the output in the form of five-minute data may be required by mid-2022 and this may need to be accommodated in the Standard.	Are changes to Standard required now to accommodate the first stage of the Scheduled Lite Project? If so, what changes are required?	No comment.
3.2.1	The Scheduled Lite Dispatchability Model is expected in 2024-25 to enable distribution connected aggregated DER to participate in central dispatch.	What future changes to the Standard are likely to be required to accommodate the second stage of the Scheduled Lite Project?	No comment.
3.2.1	In the future there may be a requirement for AEMO to also provide real time data to participants.	Is it likely that future changes to the Standard will be required to also cover provision of real time data from AEMO to participants?	Refer to comment below.

3.2.1	Whilst provision of real time to NSPs from Generators and others is not within the scope of the Standard, it remains part of the overall data communications process in the NEM. For instance even if, say, a generator was to provide real time data directly to AEMO, there may still be a requirement for the generator to provide data separately to its NSP.	Regardless of provision of data to AEMO, does the Standard need to incorporate or reference requirements for generators and others to provide real time power system data to their NSPs?	Yes, data is required in order for TNSP to perform its function in ensuring system stability. It is unlikely that the latency of receiving this data via AEMO will be adequate for real time power system management needs.
3.2.1	Enhancements to the Standard will bring benefits but also may result in increased costs to the industry and ultimately consumers. It is possible that costs may be disproportionate in the case of enhanced requirements for smaller participants, however the necessity for those requirements may increase as the relative numbers of smaller participants increase.	Are there any specific factors AEMO should take into account in assessing the costs and benefits of a proposed enhancement to the requirements of the Standard?	No comment. – This is a big topic and would need further consultation based on the options being proposed.
3.2.2	In the near future, a growing number of embedded battery generation, aggregated DER and VPP connections will need to be accommodated. Some stakeholders believe that this will mean that the current data communications structure will be no longer fit for purpose.	What changes to the current NEM power system data communications structure are likely to be required? Are there different options for such changes?	Not necessarily changes to structure – consider broadening the definition to include where to connect the DER e.g. to DNSP or TNSP or AEMO. This should be based on size. TNSP still require the data from the generators – if a generator connects direct to AEMO, the standard should ensure that data is still delivered to the TNSP.
3.2.3	Under the current architecture as described in Section 3.2.2, the only communication protocol support for connection to AEMO is the ICCP protocol. If a change in the data communications structure is required, then it may be necessary for the Standard to accommodate alternative protocols for connection to AEMO. The ICCP protocol is designed for data communication between control centres and would not be suitable if a generating unit were to communicate directly with AEMO.	If generators and other participants were permitted to communicate directly with AEMO, then what types of data protocols would be preferred? If for cyber security and other reasons, only a single protocol can be accommodated in addition to secure ICCP, what criteria should AEMO use to determine the most suitable protocol?	Direct communication with AEMO from a TNSP for control commands using an unsolicited dispatch lends itself to DNP3v5 and Routed GOOSE.

City West Substation

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