Virtual Power Plant (VPP) Demonstrations Participant Onboarding

May 2020

Important Notice

PURPOSE & AUDIENCE

This document describes the enrolment process and requirements to participate in the VPP demonstrations. The Australian Energy Market Operator (AEMO) provides this information as a service targeting business and IT staff in participant organisations.

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First version of the VPP Demonstrations Participant Onboarding document

DOCUMENTS MADE OBSOLETE

No documents are made obsolete by publication of this document.

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Your feedback is important and helps us improve our services and products. To suggest improvements, please contact AEMO's Support Hub. To contact AEMO's Support Hub use Contact Us on AEMO's website or Phone: 1300 AEMO 00 (1300 236 600) and follow the prompts.

Contents

1. Introduction

The Virtual Power Plant (VPP) Demonstrations Participant on-boarding document provides demonstration participants with an overview of how to enrol in the VPP Demonstrations, data requirements to be met as part of the demonstrations, and how to integrate with VPP APIs to facilitate data exchange between VPPs and Australian Energy Market Operator (AEMO).

This document also provides:

- Pre-requisites to participating in VPP Demonstrations.
- Overview of the certificate signing request (CSR) process and introduce e-Hub VPP APIs.
- Lists details of Rights required to consume the VPP APIs.
- Key Contacts for AEMO's VPP Demonstrations program.

1.1 Audience

AEMO provides this information with intent to provide guidance to successfully enrol in the VPP Demonstrations program. The information provided in the document is relevant to business and technical teams responsible for enrolments into the VPP Demonstrations program and developing applications to participate using AEMO VPP APIs.

- The primary audience are applicants who want to enrol in the VPP Demonstrations.
- The secondary audience is anyone has an interest in gaining an understanding of the VPP Demonstrations and how to participate in the program.

1.2 Assumed reading and context

This document goes through step by step process on how to enrol as a participant in VPP Demonstrations.

These documents, and other reference and background material, can be found on the AEMO website.[1]

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[1] AEMO. *VPP Demonstrations*. Available: https://aemo.com.au/initiatives/major-programs/nem-distributed-energy-resources-der-program/pilots-and-trials/virtual-power-plant-vpp-demonstrations.

2. VPP Demonstrations

2.1 Overview

Virtual Power Plant (VPP) is an emerging concept being trialled across Australia, largely driven by subsidy schemes incentivising the uptake of thousands of residential battery units. AEMO has launched the VPP Demonstrations to test a new specification for distributed energy resources (DER) to deliver Contingency frequency control ancillary services (FCAS), increasing competition for FCAS and allowing VPPs to explore the commercial feasibility of stacking multiple value streams.

One of the key objectives of the VPP Demonstrations is to learn how VPPs should be integrated into the National Electricity Market (NEM). To inform AEMO's learning and facilitate VPP Demonstrations, participants are required to submit a range of data to AEMO.
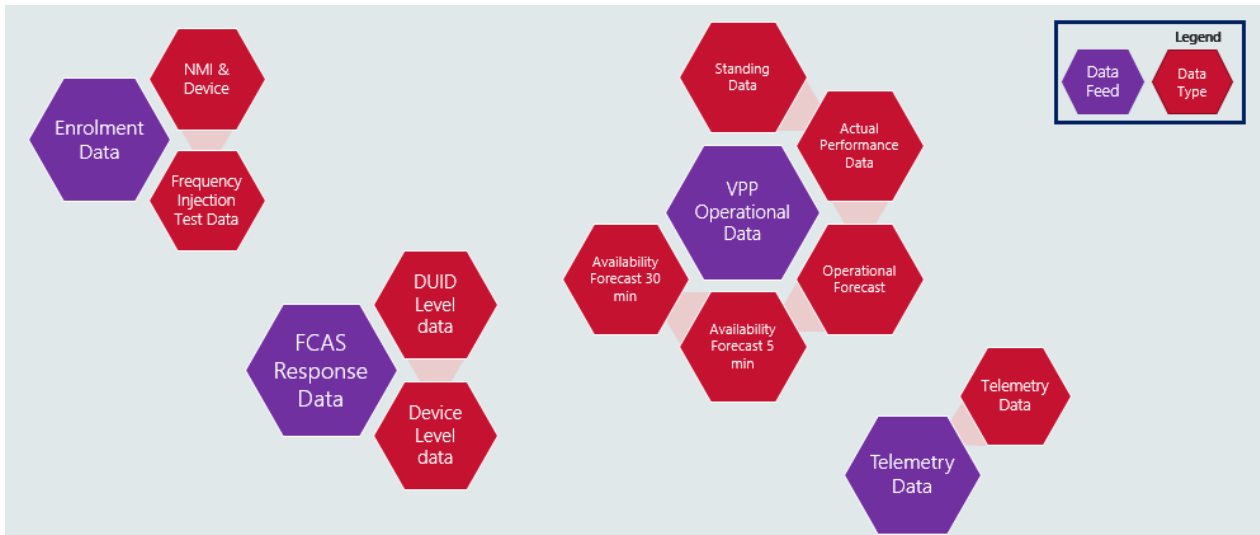
AEMO is also developing its systems to receive Enrolment data (site level information), FCAS Response Data (for Contingency FCAS verification), Aggregated Operational data and Telemetry data from VPPs so as to gain visibility of the DER. This will help AEMO learn how to integrate VPPs into the market at scale, which, will in turn inform appropriate regulatory and operational changes.

2.2 Data Requirements for VPP Demonstration

VPP Demonstration participants are required to submit the following data:

- **Enrolment Data**: This is required to for enrolment into VPP Demonstrations and to classify loads as ancillary services load. Participants are required to submit this data during enrolment process. This consists of NMI & Device data i.e. site level information and Frequency Injection Test Data (FITD) for the dispatchable unit i.e. DUID (Dispatchable unit identifier) and distinct devices in the portfolio.

- **FCAS Response Data**: This refers to the data that must be submitted by VPP Demonstrations participants upon request by AEMO to verify the delivery of FCAS in response to a contingency frequency event. This data request is made post the contingency event.

- **Operational Data**: Operational Data Specification is split into two categories as;

  - **VPP Operational Data** (also referred as DUID level data or aggregated data): this consisting of aggregated actual performance data and aggregated forecasts of anticipated active power flows for each DUID in portfolio.

  - **Telemetry data** (also referred as Device level data): this consists of key DER system metrics/attributes sampled at 5-minute resolution.

Please refer to Data Specification[2] for detailed information on the VPP demonstrations data requirement and obligations that must be met by the participants.

Date Feed	Data Type	Description
Enrolment Data	NMI & Device	List of NMIs and associated device(s) with relevant attribute values.
	Frequency Injection Test Data (FITD)	Results of the lab test for the device and DUID for ancillary services load configuration assessment.
FCAS Response data	DUID Level Data	FCAS Response data for the DUID
	Device Level Data	FCAS Response data for the Device(s)
VPP Operational Data	Standing Data	Aggregated generation capacity, aggregated load capacity, and total energy storage capacity
	Actual Performance Data	Actual delivered aggregated generation or load under control in each VPP portfolio. The values measured must be at Dispatch Interval (DI) time ending i.e. measured at 5 min boundary, E.g. 10.00, 10.05, 10.10 etc. Received no later than 5-minutes after the fact, every 5-minutes.

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[2] VPP Demonstration Data Specification, Available at https://aemo.com.au/-/media/files/electricity/nem/der/2019/vpp-demonstrations/vpp-demonstrations-data-specification.pdf?la=en&hash=E0257A82E020B1F2E05D3C2CAFB314BB

| Date Feed	Data Type	Description
Telemetry Data	Operational Forecast	Forecast of aggregated generation or load under control in each VPP portfolio (exclusive of any generation or load being held available for FCAS enablement). Re-forecast every 5-minutes. The values forecasted (calculated) must be at Dispatch Interval (DI) time ending i.e. forecasted at 5 min boundary, E.g. 10.00, 10.05, 10.10 etc
	Availability Forecast 5 min	Available capacity of generation or load in each VPP portfolio. The availability forecast is exclusive of charge and discharge expectations of the storage systems, this only reflects the total online capability. Re-forecast every 5-minutes in the pre-dispatch time period. The values forecasted (calculated) must be at Dispatch Interval (DI) time ending i.e. forecasted at 5 min boundary, E.g. 10.00, 10.05, 10.10 etc.
	Availability Forecast 30 min	Available capacity of generation or load in each VPP portfolio. The availability forecast is exclusive of charge and discharge expectations of the storage systems, this only reflects the total online capability. Re-forecast every 30 minutes in STPASA time period. The values forecasted (calculated) must be at Trading Interval (TI) time ending i.e. forecasted at 30 min boundary, E.g. 10.00, 10.30, 11.00 etc
Telemetry Data	Telemetry Data	Telemetry data for each device under the portfolio. The data is submitted at 5 min resolution, for all the devices under control of the VPP. The instantaneous values must be measured at Dispatch Interval (DI) time ending i.e. measured at 5 min boundary, E.g. 10.00, 10.05, 10.10 etc. The minimum, maximum and mean values must be measured over the Dispatch Interval (DI) i.e. 5 min duration. E.g. Maximum: Customer gross load should be maximum customer gross load within the 5 min interval (i.e. in-between start and end of dispatch interval)

2.3   Prerequisites

Enrolment in the VPP Demonstration program is open to registered market participants that are in the category of Market Customer (MC) or Market Ancillary Service Provider (MASP). All registered market participants are provided with a NEM Participant ID (Participant Identifier or PID) which uniquely identifies registered market participants in

AEMO systems. Participant ID is the key entity in VPP Identity and Access management implementation and framework.

Note: If you are not a registered market participant, then you need to register as MC or MASP, this can be done in parallel with enrolling in the VPP Demonstration. Information on "How to participate in the market and register" is available on AEMO's website via the Registration[3] page.

1. MarketNet access: MarketNet is a secured private data network connection. MarketNet is required to access AEMO system. All registered market participants should have access to MarketNet.

   - MarketNet access is required to access AEMO MSATS (Market Settlement and Transfer Solution) browser and participant folders. Some examples of functionality only available over MarketNet are

     - User administration for participant users.

     - Creation of new user accounts by Participant Administrator (PAs)

     - Submitting bids/offers.

     - Receive FCAS enablement signals

2. Client Certificates: Separate certificates are required for pre-production and production environments
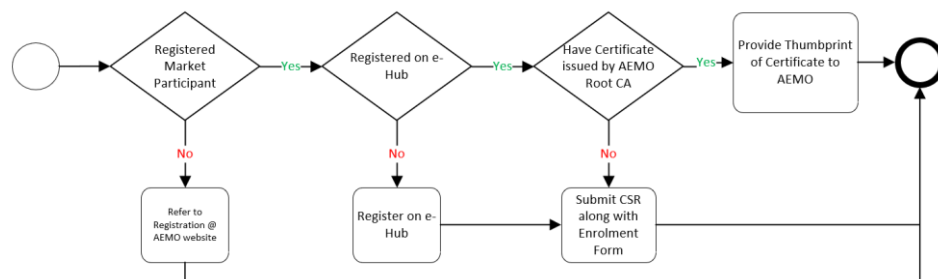
   - If you are an existing market participant (MC or MASP) and are registered for e-Hub and have certificate issued by AEMO Root CA, then you can re-use these existing certificates to access VPP APIs. You will need to provide the Thumbprint of certificate and the Participant ID who will use the certificate along with the enrolment form.

   - If you are an existing market participant (MC or MASP) and are registered for e-Hub, but don't have certificate issued by AEMO Root CA, then you are required to procure new certificates from AEMO. You must submit a Certificate Signing Request (CSR) along with your enrolment form.

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[3] AEMO Registration. Available: https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/participate-in-the-market/registration.

- If you are an existing market participant (MC or MASP) and are not registered for e-Hub, then you will need to register for e-Hub and procure new certificates. You must submit a CSR along with your enrolment form.

Refer to the Section 4.2 in Guide to AEMOs eHub APIs for details on how to create CSR, and obtain new certificate(s) from AEMO. *If you are the Participant Administrator and are not aware of Organisation ID, please contact AEMO Support Hub on 1300 236 600.*

3. MSATS Browser Access: When you become a registered market participant (MC or MASP) you are provided access to MSATS Browser. The Participant Administrator (PA) within your organisation will be able to assign Rights to the user account in order to be able to call VPP APIs. See Section 2.6.3. for details on Rights required to successfully submit the data.

- To access APIs in VPP pre-production environment, create user account and assign Rights in the pre-production URM (User Rights Management) accessed through pre-production MSATS browser.

   MSATS browser Pre-production: https://msats.preprod.nemnet.net.au

- To access APIs in VPP production environment, create user account and assign Rights in the production URM accessed through production MSATS browser.

   MSATS Browser production: https://msats.prod.nemnet.net.au

4. Access to e-Hub: e-Hub is AEMO's communication platform supporting exchange of information between participants and AEMO. To protect the backend services, e-Hub enforces traffic limits. See section 3.1 for more information.

The e-Hub includes two components:

- An API Developer portal: for supporting messaging using web services. API definition including the swagger files are available via the API developer portal. API definition and swagger files are available publicly. VPPs are not required to register on the API developer portal but are encouraged to register on the API portal using their official email address.
  - API Developer portal (pre-production): https://dev.preprod.aemo.com.au/
  - API Developer portal (production): https://dev.aemo.com.au/
- An API Gateway: to connect to the API gateway, participants need SSL authentication using digital certificates

2.4   Enrolment in VPP Demonstrations

To participate in the VPP demonstrations, Market Participants will need to provide details of their proposed VPP to AEMO for Ancillary Services Load Configuration assessment. Data required for the assessment is expected to be provided via APIs. For assessment to be conducted, the applicant must submit site level information (i.e. NMI

and Device data) for each site, and Frequency Injection Test Data at an aggregated level i.e. for the DUID.

2.5   Enrolment Process Overview

The following diagram highlights the various stages of the enrolment process and key outcomes in each of the stages.
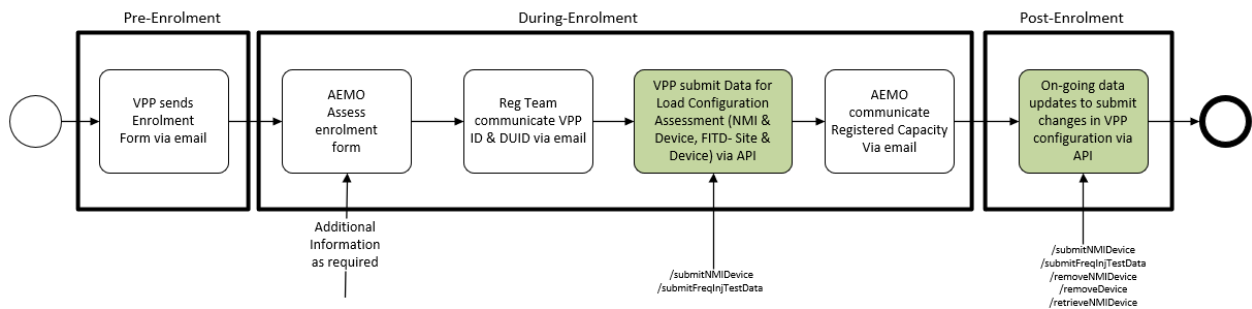
- Pre-Enrolment is the stage when applicant submits enrolment form to AEMO Registration team

- During Enrolment: During this stage various steps and assessments are undertaken by AEMO teams to assess applicant's eligibility to take part in VPP demonstrations.

- Post Enrolment: Applicant is successfully enrolled in the VPP demonstrations and actively participating the Contingency FCAS market and, meeting all its data submission obligations.

Table 1: Enrolment steps and interface type

Enrolment step	Description	Method	Outcome
Pre-enrolment	Applicant to submit • Registration application to be a MC or MASP (if required) • VPP enrolment form • Complete Cyber Security Questionnaire • Certificate Signing Request & Keys (if applicable) • Third-party authority (if applicable)	Email and Post	Application logged

Enrolment step	Description	Method	Outcome

During enrolment	AEMO to
	• Provide Signed certificates
	• Confirm VPP ID and DUID and send data request email to the applicant
	• Confirm registered capacity to VPP
	Applicant to
	• Provide additional information requested by AEMO
	• Submit data for the ancillary service load configuration assessment:
	    a: site level information i.e. NMI and Device data by DUID
	    b: Frequency Injection Test Data (FITD) for distinct Battery types and site (i.e. DUID)
	    c: VPP wide test to demonstrate capability to deliver amount of FCAS being applied for.
		VPP ID and DUID confirmed via email
		
		Certificate provided via email
		
		APIs (for data submission)
			• VPP ID & DUID confirmed
			• Determination of Load Configuration and Capacity to deliver Contingency FCAS.
			• Determination of enrolment in VPP demonstrations

Post-enrolment	On-going data submission by the participant to update VPP portfolio information and fleet configuration • Sites getting added or taken off from fleet • FCAS response verification data • VPP Operational data (including Aggregated and Telemetry data)	APIs	Manage VPP's fleet capacity and configuration

Pre-Enrolment

2.5.1   Submit Complete Enrolment form

VPP Demonstrations applicants should submit VPP enrolment form via Email (complete application together with all required attachments) to VPPEnrolment@aemo.com.au

Applicants are also required to submit original hand signed copy of the VPP enrolment form by post to:

Australian Energy Market Operator Ltd.,

Attention: Onboarding team,

Level 2, 20 Bond Street, Sydney NSW 2000

2.5.2   Third-party Authority (if applicable)

Applicants must provide a letter of authority if they require AEMO to liaise with a third party at any stage of enrolment process and for on-going data submission during the life of the VPP Demonstrations. This authority will allow AEMO to engage with your nominated third-party.

In case the applicant wants a third-party to engage with AEMO for integrating with the VPP APIs then in addition to VPP enrolment form, applicant to submit:

- Certificate Signing Request (if applicable, for details please refer to section 2.4.1)
- Letter of Authority from CEO/ Director of <participants> to AEMO stating that <3rd Party> are acting on behalf of <Participant> for VPP demonstrations purposes, and therefore AEMO can communicate directly with <3rd parties> with respect to VPP matters.

Any 3rd party data provider details must be provided in the enrolment form. Please refer to letter-of-authority-template.docx available on AEMO website.

2.5.3   AEMO confirm receipt of Enrolment Application

Upon receipt of the completed application and Letter of Authority (if applicable), AEMO Registration team will lodge the application and confirm receipt of application to the applicant via email.

During Enrolment

2.5.4   AEMO Assess VPP Enrolment Form

Upon lodgement of the application, AEMO will assess the application. AEMO Registration team may request additional information or clarification of the information contained in the Application within 5 business days (clause 2.3.5(c) of the *Rules*). If such a request is made, applicant must supply the additional information or clarification within 15 business days of AEMO's request (clause 2.3.5(d) of the Rules).

Besides requesting additional information or clarification of the information contained in the Application, Registration team will also confirm below system configuration information with the applicant.

- VPP ID and VPP Name
- DUID and DUID Name

2.5.5   Acknowledgement on VPP Configuration & Data Request Email

Once the system configuration information is confirmed, Registration team will send a request to the applicant to submit site level information (NMI & Device data) and FITD data for the DUID via APIs. The applicant must submit completed lists of data and satisfy

AEMO that the applicant will be capable of meeting or exceeding the relevant performance standards and specifications. This data will be assessed prior to the enrolment application being approved.

2.5.6   Signed Certificates

AEMO Integration Competency Centre (ICC) will provide the signed certificates via email to the applicant.

Post Enrolment

2.5.7   On-going data submission

Post VPP enrolment, VPP participants (i.e. enrolled applicants) are required to consume the Enrolment, FCAS and Operational and Telemetry data APIs to continually keep their portfolio information updated and provide data as specified in Data Specification and requirements of the VPP demonstration.

2.6 Participant on-boarding on API GW & MSATS for VPP APIs

2.6.1 Submit CSR and get new certificates

VPP APIs connections use two-way SSL (mTLS) certificates to secure the transport layer between participant and AEMO's systems. AEMO issues the two-way SSL (mTLS) certificates to participants on request. Distinct Certificates are required for Pre-Production and Production environments.

If applicable, VPP Demonstration applicant should submit CSR as part of the enrolment application to VPP Demonstrations (see section 2.3, #3).

Please refer to section 4.2 'Obtain a new certificate' (p25+) of the documentation available on the AEMO website: Guide to AEMO's eHub APIs

2.6.2 User Account

AEMO's MSATS system is central to the authentication process that occurs when VPP APIs are called. Participant can use an existing user account or create a new user account. Participant Administrators (PAs) in your organisation can create and manage user accounts. PAs also assigns Rights to the user account.

For more information on creation and management of User Accounts refer to Guide to User Rights Management

2.6.3 Required Rights for the user account

PAs must assign the rights to the correct user account in order to be able to call VPP APIs. This is required for both pre-production and production environments.

See below the Rights for each data feed type. For;

- Registration (Enrolment) APIs use and assign "MMS_VPP_REGISTRATION"
- FCAS Response Data APIs use and assign "MMS_VPP_FCAS"
- VPP Operational Data use and assign "MMS_VPP_OPS"
- Telemetry Data use and assign "MMS_VPP_TELEMETRY"

Data Feed Type	API End Point	Resource Name	Method	MSATS Entity Name	MSATS Entity Description
Registration (Enrolment)	/NEMWholesale/DER/vpp/registration/v1/	submitNMIDevices	POST	MMS_VPP_REGISTRATION	VPP Registration API access
		removeNMIDevices	POST		
		removeDevices	POST		
		getNMIDevices	GET		
		submitFreqInjTestData	POST		
FCAS Response Data	/NEMWholesale/DER/fcas/assessment/v1/	submitDuidResponse	POST	MMS_VPP_FCAS	VPP FCAS Entity
		submitDeviceResponse	POST		
VPP Operational Data	/NEMWholesale/DER/vpp/opsdata/v1/	submitStandingData	POST	MMS_VPP_OPS	VPP Ops Data
		submitActualPerfData	POST		
		submitOpsForecast	POST		
		submitAvailForecast5Min	POST		
		submitAvailForecast30Min	POST		
Telemetry Data	/NEMWholesale/DER/vpp/telemetrydata/v1/	submitTelemetryData	POST	MMS_VPP_TELEMETRY	VPP Telemetry Data rights

2.7   Accessing AEMO's VPP API's

2.7.1   API Developer Portal

AEMO's VPP APIs are exposed through public internet and are hosted in AEMO e-Hub. These APIs are not accessible through MarketNet.

API Portal	URL
Pre-Production	https://dev.preprod.aemo.com.au/
Production	https://dev.aemo.com.au/

API details, including Swagger files, are available via AEMO's API Portal. At present the API definition is publicly accessible. VPPs are not required to sign up on the API developer portal.

To begin using VPP APIs

- Access API Portal

- View documentation on APIs and access swagger files

- Use certificate issued by AEMO

2.7.2   Documentation for VPP API's

Participants can access API documentation using the following URLs. The Guide to VPP Demonstration APIs[4] published on AEMO website provides detailed information on all the APIs. The information provided in the guide covers payload structure, message codes, and any business and data validation rules implemented in APIs.

Information Set	URLs
Enrolment Data	https://dev.aemo.com.au/docs/aemo-vpp-enrolment-api/1/overview
FCAS Response Data	https://dev.aemo.com.au/docs/aemo-vpp-fcas-api/1/overview
VPP Operational Data	https://dev.aemo.com.au/docs/aemo-vpp-operations-forecast-data-api/1/overview
Telemetry Data	https:// dev.aemo.com.au/docs/vpp-telemetry-data-api/1/overview

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[4] Web link to be updated

2.7.3 API authentication and authorisation

API connections use two way SSL(mTLS) certificates to secure the transport layer between participant and AEMO's systems. AEMO will provide the signed certificates to the participant via email.

All API calls are authenticated and authorised via Basic HTTP authentication using a username and password assigned by the company's Participant Administrator. The Participant Administrator (PA) will provide the username and password to the API development team.

Please note: Password expires every 90 days, due to current system constraint AEMO does not send out password expiry notification

2.7.4 VPP API URLs/end point

Participants can access APIs via following URLs.

Environment	URLs	Connection
Pre-production	https://partner.api.preprod.aemo.com.au/{proxy}	mTLS
Production	https://partner.api.aemo.com.au/{proxy}	mTLS

2.8 Support process when API's unavailable

In the event when participants are facing issues with submitting data via APIs, they must raise a ticket with AEMO Support Hub by calling 1300 236 600. VPP support is available during normal business hours.

3. Performance Metrics

3.1 Environment Details and API GW Configuration

Environment	URLs	API GW Spiking Limit (per participant)	API GW Throttling Limit (per participant)
Pre-production base URL	https://partner.api.preprod.aemo.com.au/{proxy}		
Production base URL	https://partner.api.aemo.com.au/{proxy}		
Enrolment Data Proxy path	/NEMWholesale/DER/vpp/registration/v1/	1,200 requests per minute	1,000 requests per minute
FCAS Response Data Proxy path	/NEMWholesale/DER/fcas/assessment/v1/	1,200 requests per minute	1,000 requests per minute
VPP Operational data Proxy path	/NEMWholesale/DER/vpp/opsdata/v1/	1,200 requests per minute	1,000 requests per minute
Telemetry Data endpoints Proxy path	/NEMWholesale/DER/vpp/telemetrydata/v1/	1,200 requests per minute	1,000 requests per minute

3.2 Baseline performance metrics

Data Feed Type	Resource Name	Payload Size (MB)	Max number of records/ payload	Bundling Allowed
Registration (Enrolment)	submitNMIDevices	2	~3,200	N
	removeNMIDevices	2	~3,200	N
	removeDevices	2	~3,200	N
	getNMIDevices	n.a.	n.a.	N
	submitFreqInjTestData	2	~8,300	N

Data Feed Type	Resource Name	Payload Size (MB)	Max number of records/ payload	Bundling Allowed
FCAS Response data	submitDuidResponse	2	~9,200	N
	submitDeviceResponse	2	~9,200	N
VPP Operational Data	submitStandingData	< 1	1	N
	submitActualPerfData	< 1	1	N
	submitOpsForecast	< 1	576	N
	submitAvailForecast5Min	< 1	576	N
	submitAvailForecast30Min	< 1	384	N
Telemetry Data	submitTelemetryData	2	~ 2000	N

4. Glossary

Term	Explanation
API	Application Programming Interface
VPP	Virtual Power Plant
AEMO	Australian Energy Market Operator
AEST	Australian Eastern Standard Time
DER	Distributed Energy Resources
DNPS	Distribution Network Service Provider
API GW	API Gateway
EMMS	Electricity Market Management System; software, hardware, network and related processes to implement the wholesale energy market
MSATS	Market Settlement and Transfer Solution for Retail
NEM	National Electricity Market, also referred as market in this document
NER	National Electricity Rules
NMI	National Metering Identifier for electricity meters
DUID	Dispatchable unit identifier
CSR	Certificate Signing Request
MC	Market Customer (aka Retailer), who purchases electricity from the spot market.
MASP	Market Ancillary Service Provider, is a market participant which provide Frequency Control Ancillary Services (FCAS)
NEM Time	Also referred as Market Time. This is the AEST time.
Participant ID (PID)	Unique identifier for a Participant.
Participant Administrator (PA)	Participant Account having administrative privileges for the participant
MarketNet	A virtual private network to access AEMO's Market System. All market participants require access to MarketNet

Term	Explanation
APIGEE	AEMO API Management Platform i.e. API GW
CSR	Certificate Signing Request
URM	User Rights Management
Swagger File	This file describes the structure of the API, It specifies the format (URL, method, and representation) to describe RESTful web services.
HTTP	Hyper Text Transfer Protocol
mTLS	Mutual TLS (Transport Layer Security)
SSL	Secure Sockets Layer

5. **Appendix**

5.1   Key Contacts in VPP

Contact Name	When to contact	Email
VPP Enrolment Email	For any Registration and enrolment related queries	VPPEnrolment@aemo.com.au
VPP Support Email	VPP Support team email	VPP_support@aemo.com.au
DER Program	General VPP enquiries and related DER Program queries	DERProgram@aemo.com.au

5.2   Quick references

Description	Location/Link
AEMO Website - VPP Details	Virtual Power Plant (VPP) Demonstrations
AEMO's media statement on VPP Demonstration	https://energylive.aemo.com.au/News/AEMO-VPP-trial-open-for-enrolments
VPP Demonstration Design Document	NEM-VPP-Demonstrations_Final-Design.pdf
VPP Demonstration Enrolment Form	VPP-Demonstrations-Enrolment-Form.docx
Technical Guide to VPP APIs	DRAFT Guide to VPP Demonstrations APIs
VPP Demonstration Data Specification	VPP-Demonstrations-Data-Specification.pdf
VPP Demonstration Cyber Security Questionnaire	VPP-Demonstrations-Cyber-Security-Questionnaire
AEMO API Developer Portal	https://dev.aemo.com.au/
AEMO API Gateway URLs (Pre-production)	https://partner.api.aemo.com.au /{proxy-path}
AEMO API Gateway URLs (Production)	https://partner.api.preprod.aemo.com.au/{proxy-path}
How to obtain new certificates	Please refer to Section 4.2 in Guide-to-AEMOs-eHub-APIs
Connecting to AEMO Electricity IT Systems	https://www.aemo.com.au/-/media/Files/Electricity/NEM/IT-Systems-and-Change/2016/Connecting-to-AEMOs-Electricity-IT-Systems.pdf

5.3   FAQs

Question	Response
Is there an order or sequence of data submission	1st : Enrolment Data covering - Site level information (NMI & Device) - Frequency Injection test data (DUID and Device) Followed by Telemetry Data or VPP Operational Data, - Telemetry data: *Note: Telemetry data is validated against enrolment data; thus must be submitted after successfully submitting enrolment data* - VPP Operational Data *Note: VPP Standing data must be submitted before submitting any other VPP Operational datasets. Actual Performance data, Operational & Availability forecasts are validated against VPP Standing Data.* - FCAS Response Data *Note: this data is submitted only on request.*
Which data type are to be submitted for enrolment	- Site level information i.e. NMI & Device - Frequency Injection test data for DUID and device
Which data sets are to be submitted on on-going basis	- NMI & Device data as & when it changes (i.e. change in portfolio resulting from additional sites or loss of sites) - VPP Operational Standing Data – initially and whenever the VPP fleet configuration changes *Note: Only submit VPP Standing Data when there is a change in VPP portfolio otherwise do no submit standing data.* - Actual performance data every 5 mins. - Operational forecast every 5 mins - Availability forecast every 5 mins and 30 mins.
Can data be provided in the local time zone	No, all data submitted to AEMO must be in NEM time. NEM time is also referred as Market Time. NEM time is defined as AEST (+10:00) time. AEMO will reject any data submitted not in Market time.
What is Dispatch Interval (DI)	Dispatch Interval or DI is the trading period of time for which the electricity price is set in the market. It is of 5-minute duration. There are 288 5-minute DI in a 24-hour period. E.g. for DI 10.00 DI start time would be 9.55 and DI end time would be 10.00

Question	Response
What is Trading Interval (TI)	A period of time prescribed in the National Electricity Rules for the wholesale exchange. It is of 30-minute duration. There are 48 30-minute TI in a 24-hour period. E.g. for TI 10.00 TI start time would be 9.30 and TI end time would be 10.00

Do data measurements or forecasts needs to align to DI/TI Start time or DI/TI End time	Yes, all measurements must be aligned to DI/TI end time.
	• Actual Performance Data must be at DI time ending i.e. measured at 5 min boundary. g. E.g. 10.00, 10.05 etc
	• Operational Forecast must be at DI time ending i.e. forecasted at 5 min boundary. g. E.g. 10.00, 10.05 etc
	• Availability Forecast (5 min) must be at DI time ending i.e. forecasted at 5 min boundary. g. E.g. 10.00, 10.05 etc
	• Availability Forecast (30 min) must be at TI time ending i.e. forecasted at 30 min boundary. g. E.g. 10.00, 10.30 etc
	• Telemetry Data:
	    o Instantaneous values must be at DI time ending i.e. measured at 5 min boundary, E.g. 10.00, 10.05 etc.
	    o The minimum, maximum and mean values must be measured over the DI i.e. 5 min duration. E.g. Maximum: Customer gross load should be maximum customer gross load within the 5 min interval (i.e. in-between start and end of dispatch interval)

Which data sets are to be submitted on request	• FCAS Response data
Which signature algorithm to use for Certificates & CSR	SHA1
Can existing certificates be used to access VPP APIs	Yes, provided existing certificate is issued by AEMO Root CA. In case VPP wants to use such certificate, then they must provide the certificate thumbprint to AEMO.
How long does the registration takes	Registration process can take minimum of 20 business days for a complete application. If AEMO requires additional information, additional time will be required to finalise the application.