Part of Energy Queensland

SEP2 Client Handbook

(CSIP-AUS Utility Interconnection Handbook)

This handbook is made available for the development of software clients for use with Energex and Ergon Energy Network's IEEE 2030.5 server infrastructure.

If this document is a printed version, to ensure compliance, reference must be made to the internet site energex.com.au or ergon.com.au to obtain the latest version.

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Abstract: This handbook is an Application Programming Interface (API) implementation guide to Smart Energy Profile 2.0 (SEP2) and how it is applied in Queensland. It applies to dynamic connections to the Ergon Energy and Energex distribution networks.

Keywords: SEP2, CSIP-AUS, IEEE 2030.5, Utility Server, Dynamic Connection, API

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1 Overview

1.1 Purpose

The implementation of a suitable and common communication standard is a critical building block in enabling dynamic connections for the continued uptake of DER to maximise the utilisation of customer and network assets. Energex and Ergon Energy consulted with industry in 2020 and 2021 and based on this consultation, the IEEE Standard for Smart Energy Profile Application Protocol IEEE 2030.5-2018 [1], also known as SEP2, was chosen as the communication protocol to enable dynamic connections. In Australia, the standard can also be referred to as AS 5385:2023.

In June 2016, the California Public Utilities Commission accepted the recommendation to mandate IEEE 2030.5 as the default standard for communication with smart inverters under California Rule 21. They released the Common Smart Inverter Profile - IEEE 2030.5 Implementation Guide for Smart Inverters [2] or CSIP. CSIP outlines a subset of SEP2 that is required to be considered a "Smart Inverter" in California. CSIP contains various requirements around autonomous functions, which in Australia are already covered by AS/NZS 4777.2 [3] Inverter requirements.

SA HB 218:2023 Common Smart Inverter Profile - Australia with Test Procedures (more commonly referred to as CSIP-AUS) [4] is a smaller subset of CSIP, containing only the functions required by Australia and developed by the Australian DER API Working Group and Standards Australia. The guide also introduces the concept of connection point limits rather than the per-device generation limits used in CSIP.

1.2 Scope

This handbook is an implementation guide to SEP2 and the CSIP-AUS profile, and how it is applied in Queensland. It applies to dynamic connections connected to the Ergon Energy and Energex distribution networks.

This document is intended to assist manufacturers, cloud proxy providers, and installers in ensuring dynamic connections meet the expectations of Energex and Ergon Energy. This handbook is not a connection contract or standard. The applicable standards for a given connection should be used in consultation with this handbook.

For more information on dynamic connections, please refer to our websites:

- https://www.ergon.com.au/dynamic-connections
- https://www.energex.com.au/dynamic-connections

2 References

2.1 Energy Queensland controlled documents

[5]	Energy Queensland Limited, "Enabling Dynamic Customer Connections for DER," 2020. [Online]. Available: https://www.talkingenergy.com.au/dynamicder
[6]	Energy Queensland Limited, "Enabling Dynamic Customer Connections for DER 2," 2021. [Online]. Available: https://www.talkingenergy.com.au/dynamicconnections
[7]	Energy Queensland Limited, "STNW3510 Dynamic Standard for Small IES Connections," 2023.
[8]	Energy Queensland Limited, "STNW3511 Dynamic Standard for LV EG Connections," 2023.

2.2 Other sources

[1]	Standards Australia, "AS 5385:2023 Smart Energy Profile Application Protocol," 2023.
[2]	SunSpec Alliance, "SunSpec Common Smart Inverter Profile (CSIP) Conformance Test Procedures," 2019.
[3]	Standards Australia, "AS/NZS 4777.2:2020 Grid connection of energy systems via inverters," 2020.
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[15]	DER Integration API Technical Working Group, "Common Smart Inverter Profile – Australia – Test Procedures," 2023. [Online]. Available: https://bsgip.com/wp-content/uploads/2023/09/CSIP-AUS-Comms-Client-Test-Procedures-v1.0-final.pdf

3 Definitions and Abbreviations

3.1 Definitions

For the purposes of this handbook, the following definitions apply.

Utility Server	SEP2/IEEE 2030.5 Communications Server
SEP2 Client	The client system (either on device or via gateway device or cloud proxy) that communicates with the Utility Server.
Operating Envelope	The envelope formed between maximum export capacity and maximum import capacity at the customer connection point. This is normally represented as two values.
Compliant Provider	An aggregator or device manufacturer who has been deemed compliant with the Energex and Ergon Energy Utility Server.
EndDevice	A resource representing a Connection Point

3.2 Abbreviations

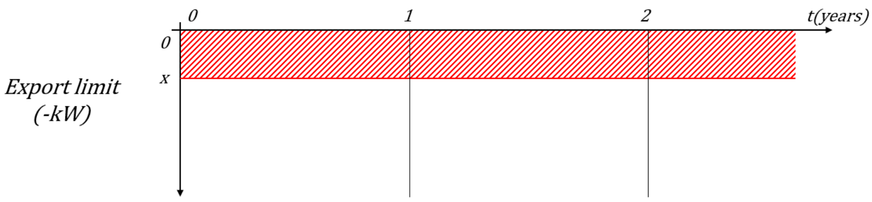
This list does not include well-known unambiguous abbreviations, or abbreviations defined at their first occurrence within the text.

DOE	Dynamic Operating Envelope
CSIP	Common Smart Inverter Profile
CSIP-AUS	Common Smart Inverter Profile Australia
DER	Distributed Energy Resource or Distinguished Encoding Rules (in the context of a TLS certificates)
DERMS	Distributed Energy Resource Management System
REST	Representational state transfer
API	Application Programming Interface
PV	Solar Photovoltaic
EQL	Energy Queensland
BESS	Battery Energy Storage System
EVSE	Electric Vehicle Supply Equipment
LFDI	Long Form Device Identifier
SFDI	Short Form Device Identifier
SERCA	Smart Energy Root Certificate Authority
SEP2	Smart Energy Profile 2.0 (IEEE 2030.5)
MCA	Manufacturer’s Certificate Authority
MICA	Manufacturing Issuing Certificate Authority
PEN	Private Enterprise Number
PKI	Public Key Infrastructure

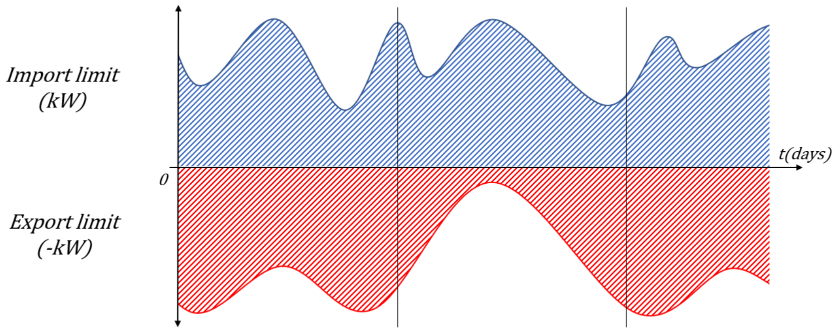
IANA	Internet Assigned Numbers Authority
HEMS	Home Energy Management System
RPEQ	Registered Professional Engineer of Queensland
XML	Extensible Markup Language
URL	Uniform Resource Locator

4 Dynamic Operating Envelopes

Operating envelopes are the limits that an electricity customer can import and export to the electricity grid. These limits are agreed between networks, customers, and regulators as part of the customer connection or regulatory process. Historically, operating envelopes were mostly fixed at conservative levels regardless of the capacity of the network because they are static and need to account for 'worst case scenario' conditions.



Dynamic operating envelopes (DOE) are where import and export limits can vary over time and location. Dynamic rather than fixed export limits can enable higher levels of energy exports from customers' solar and battery systems by allowing higher export limits when there is more hosting capacity on the local network.



For more information on Dynamic Operating Envelopes, please refer to the DEIP Dynamic Operating Envelopes Workstream: Outcomes Report [9].

It is important to consider that Energex and Ergon Energy are primarily concerned with the power flows at the site or connection point level. Installations with dynamic connection agreements must therefore have the necessary equipment to accurately measure and control flows at the connection point in accordance with the dynamic operating envelope for the site.

Energex and Ergon Energy will only provide a single operating envelope to a single SEP2 Client per connection point. It is the responsibility of the vendor and installer to architect and co-ordinate downstream systems in accordance with that envelope. More detail on valid connection pathways and site configurations is provided in Section 10 below.

5 Limits and Control Modes

A brief overview of some of the control modes available in CSIP-AUS are provided below in Figure 1. The use cases in which each mode may apply is covered in Section 7, and not all control modes will apply for all use cases.

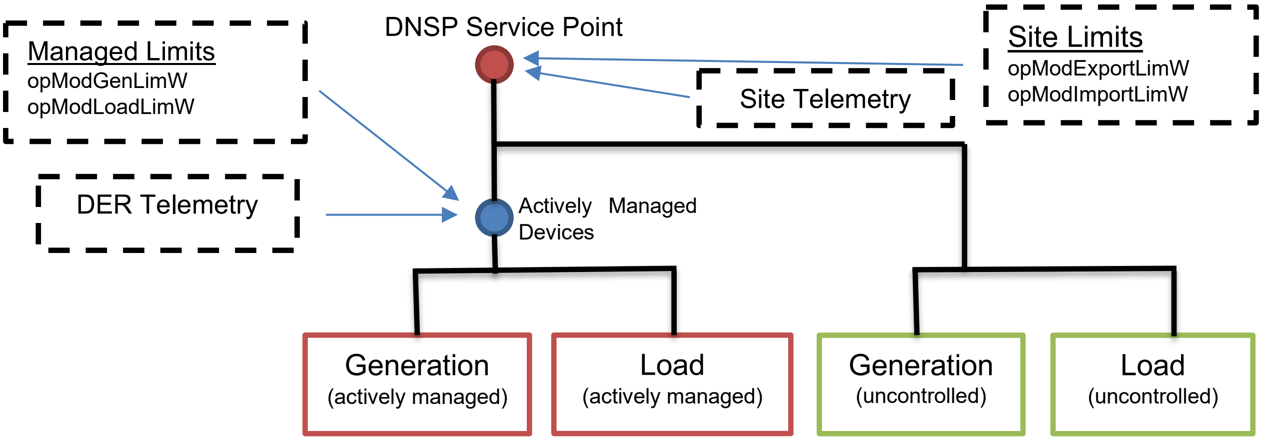


Figure 1: Summary of topological location of controls and telemetry

5.1 Site Export Limit

An export limit represents the maximum amount of power that can be exported to the grid. It is measured at the connection point, and so always allows customers to self-consume their own generation.

This limit is communicated with the *csipaus:opModExpLimW* control mode and is specified in Watts.

5.2 Site Import Limit (Conditional)

For actively managed loads, dynamic site import limits also apply. Dynamic import limits provide a more granular way for flexible loads like home batteries and electric vehicles to slow or stop charging at times of network constraints. As with export limits, site import limits always allow managed loads to self-consume when offset by their own generation.

This limit is considered conditional as it can be breached by unmanaged loads. While unmanaged loads such as lighting or cooking equipment may still exceed a sites dynamic import limit, loads under a dynamic connection agreement may only consume while the site import limit is not being exceeded.

This limit is communicated with the *csipaus:opModImpLimW* control mode and is specified in Watts.

5.3 Generation Limit

For managed generation covered under a dynamic connection agreement, a generation limit can also be specified to limit the amount of behind-the-meter generation by managed DER.

This limit is communicated with the *csipaus:opModGenLimW* control mode and is specified in Watts.

5.4 Load Limit

For managed loads covered under a dynamic connection agreement, a load limit can also be specified to limit the amount of behind-the-meter load by managed DER. This limit does not apply to loads that aren't managed by the dynamic connection agreement.

This limit is communicated with the *csipaus:opModLoadLimW* control mode and is specified in Watts.

5.5 Disconnection Signal

A signal can be sent to dis-connect or de-energize all managed generation and loads. As it applies to energy flows in both directions, it would generally be better achieved with either a Generation or Load Limit and so is likely to have very limited use cases.

This signal is communicated with the *opModConnect* and opModEnergize control modes and specified as True or False.

5.6 Target Output Power

A signal can be sent to specify the desired output power for a site. A positive value would indicate a desire to import from the grid at that amount, whilst a negative value would indicate a desire to export to the grid by that amount. It is considered optional in CSIP-AUS as many sites may not be able to maintain a target setting.

This limit is communicated with the *opModTargetW* control mode and is specified in Watts.

6 Telemetry

Energex and Ergon Energy require devices to report telemetry as per Section 8 of SA HB 218. The standard requires that Real and Reactive Power is reported both for the site and for the aggregation point of all actively managed devices (refer to Figure 1). Voltage is required to be reported for at least one of these measurement locations.

7 Use Cases

This section outlines the current use cases that make use of a SEP2 Connection. The list is not intended to be exhaustive but give implementers an idea of the types of real-world operation they might expect from systems on our network. It is expected that these use cases may change over time as the energy transition progresses.

7.1 Dynamic EG Connection

A dynamic connection for an Embedded Generator (EG) is expected to respond to both Import and Export Limits communicated to the site. As part of the connection contract, the site will receive a minimum and maximum value for which these limits can be determined within. The minimum value will generally dictate the default control the site receives after a prolonged loss of communication.

7.1.1 Dynamic EVSE

When connecting a Vehicle-To-Grid (V2G) Electric Vehicle Supply Equipment (EVSE) to the network, this is considered an EG and would be captured under a Dynamic EG Connection. However, where the EV charger is not capable of exporting, the EG connection process does not apply, and a different connection process applies. Whilst the connection process may vary, this use case is essentially the same as for a Dynamic EG Connection.

7.2 Isolated Dynamic PV Connection

In isolated communities, the challenges of managing renewable energy integration into our networks are different when compared with our national grid connected networks. In isolated networks, the challenges are related to energy load displacement and the intermittent nature of renewable resources, which results in the need to implement power station management strategies.

Isolated systems will therefore receive Generation Limits rather than Export Limits, with values updated as frequently as every 30 seconds. Forecasts will be sent for a much shorter duration, tapering down to default controls within minutes of a loss of communication.

7.3 Emergency Backstop (Minimum System Load)

Whilst not currently used in Queensland for this purpose, CSIP-AUS could be used in future for use cases such as emergency backstop under a Minimum System Load (MSL) direction from AEMO.

7.4 Emergency Load Shedding (Lack of Reserve)

Whilst not currently used in Queensland for this purpose, CSIP-AUS could be used in future for use cases such as emergency load shedding under a Lack of Reserve (LOR) direction from AEMO.

7.5 DER Services

Whilst not currently used in Queensland for this purpose, CSIP-AUS could be used in future for demand response use cases. This use case would most likely make use of the Target Output Power signal to request a battery to charge or discharge at a particular time of day.

DER Services are considered as a separate function to dynamic connections, and so customers would need to opt-in to any such future program.

8 Programs

Each SEP2 Client may be enrolled in multiple programs. Programs may have conflicting control events, and it’s the responsibility of the client to resolve conflicts as per the rules outlined in the SEP2 standard. Whilst enrolment may differ for each site, some indicative programs are provided in Table 1 to give implementers an idea of the enrolments they could typically expect.

Table 1: Indicative program enrolments (examples only)

Program Type	Primacy	Poll Rate
System Emergency	1	900s (15 min)
Isolated Generation	3	60 s (1 min)
DOE	5	300 s (5 min)
DER Services	7	900s (15 min)

9 Event Forecasts and Updates

Due to the way the communication protocol is implemented, all signals are inherently implemented as future scheduled events with a defined start and end time. As the start time gets closer to the current time, the forecast network state may become more accurate and previous scheduled events may be cancelled and new replacement events issued in their place.

Energex and Ergon Energy Network will make best endeavours to not cancel events that have already started or are scheduled to start within 30 seconds. In addition, best endeavours will be made to not create new events with a start time that is less than 30 seconds in the future.

9.1 Near Real Time Site Limits

Where Near Real Time (NRT) visibility of the grid is available, sites will receive limits at 5-minute durations for up to 60 minutes into the future. Where these are available, these will supersede forecast limits. Events may be cancelled and re-issued by the server as network conditions change.

9.2 Forecast Site Limits

Sites will receive forecast scheduled limits at 30-minute durations assuming worst-case forecasts for up to 24 hours in the future. Forecast limits may taper or decay from the actual expected limit such that they trend towards the default control at the end of the forecast period.

Forecast events scheduled to start within the next 60 minutes may be split into equivalent 5-minute events to simplify cancellations and conflict resolution for clients with NRT limits.

9.3 Isolated Dynamic PV Limits

For isolated communities, events with 30 second durations (polled at 60 seconds) will be issued, for up to 10 minutes into the future. As with forecast site limits, these limits may taper towards the default control.

10 Site Configurations

A Home Energy Management System (HEMS) is a technology platform through which a household can monitor their energy generation and consumption in real-time. It should be able to control and coordinate managed energy resources from multiple manufacturers (such as a battery, Solar PV, or EV charger). Advanced HEMS should additionally be able respond to external control and price signals; providing additional value to households.

The SEP2 Client or End Device can be considered a HEMS, as it is required to manage all DER at a connection point. A valid SEP2 client can be a physical device or a virtual representation of downstream devices through a single client. The HEMS may be software built into the inverter itself, a physical hardware device, or exist completely in software running in the cloud.

10.1 Connection Pathways

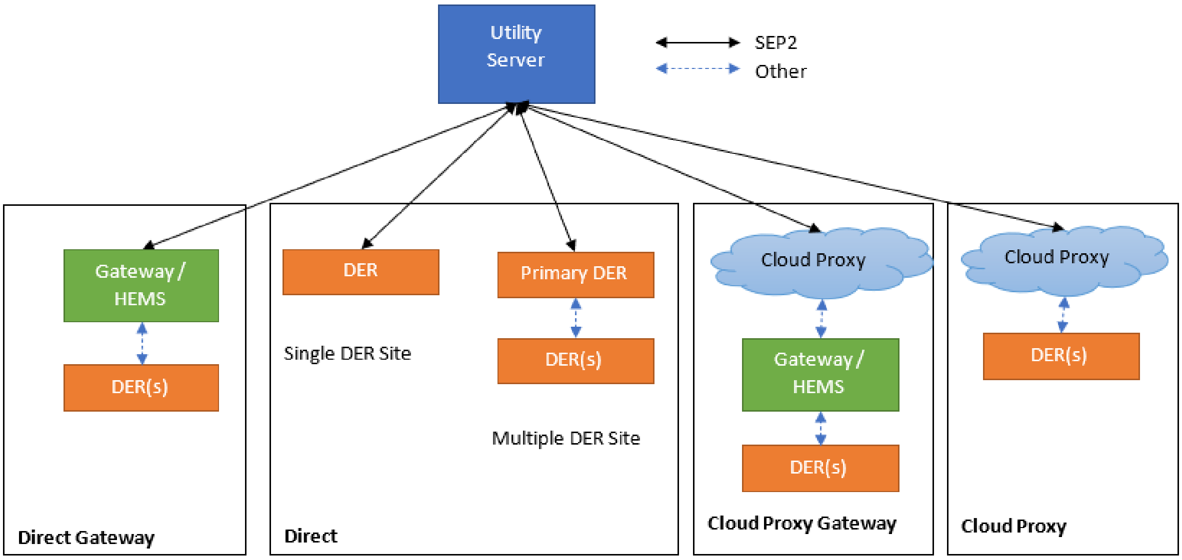


Figure 2: Connection pathways for site to Utility Server

10.1.1 Direct Connection via DER

If a DER supports SEP2 natively and has the necessary measurement equipment at the site connection point, it may be able to connect directly to the Utility Server. If a site has multiple DERs, this ‘master’ DER will need to be additionally capable of coordinating the remaining DERs at the site. For example, a compliant BESS may manage site power flows and in turn control PV generation for maximum customer benefit.

10.1.2 Direct Connection via Gateway Device

A gateway device such as a HEMS that natively supports SEP2 communications can be used to interface directly with the Utility Server and coordinate downstream DER(s) for a site. This option may allow for retrofitting existing DER that do not yet support SEP2. It also provides a central point of coordination for sites with multiple DER.

10.1.3 Cloud Proxy / Aggregator

A third-party cloud proxy or aggregator can offer a cloud or centralised service that can be used as a 'virtual' gateway device to control DER at a site in accordance with the provided envelope. In principle this pathway works similarity to the other pathways but allows for new or existing gateway devices to support vendor specified protocols at a site level, rather than SEP2.

10.1.4 Cloud Proxy / Aggregator via Gateway Device

The final pathway is the same as a cloud proxy but requires additional physical hardware (such as a gateway or HEMS) at the site in addition to the DER.

10.2 Multiple DER

For a connection point with multiple DER, the SEP2 Client is required to manage all the DER at the site. Only one EndDevice for receiving CSIP-AUS communications is permitted per connection point.

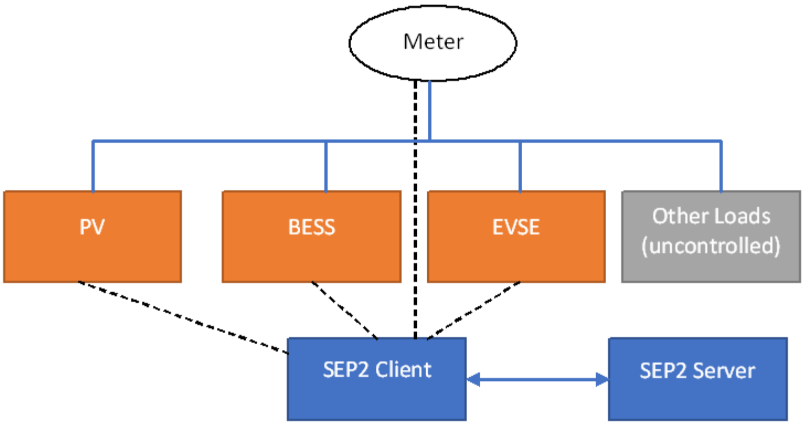


Figure 3: A SEP2 Client should control all DER at a connection point.

The mechanism that the SEP2 Client uses to communicate with subordinate DER is outside of the scope of CSIP-AUS and this document, but some possible behind-the-meter communication methods could include:

- SEP2 (IEEE 2030.5)
- SunSpec Modbus (IEEE 1547)
- Open Charge Point Protocol (OCPP)
- Demand Response Enabling Devices (DRED / AS4755)
- Open Automated Demand Response (OpenADR)
- Proprietary APIs

Ideally, the SEP2 Client that is installed should be able to communicate directly with all DER at a site. However, in circumstances where customers have DER installed that are unsupported by the SEP2 Client, the site may be brought into compliance by setting the unsupported DER to a non-export and non-import configuration. Telemetry for these DER still needs to be included in the DER aggregation of power flows reported by the SEP2 Client.

A physical breaker may still be required for sites that are required to respond to generation, load or disconnect controls. The requirements of the connection standard relevant to the connection point must be considered when determining the appropriate site configuration and control mechanisms for an individual site.

11 Server Details

Energex and Ergon Energy's SEP2 Utility Servers can be connected to via the following URLs.

Table 2: Energex and Ergon Energy SEP2 Server Details

Instance	URL
Testing	https://sep2-test.energyq.com.au/api/v2/dcap
Production	https://sep2.energyq.com.au/api/v2/dcap

NOTE

These endpoints are geo-blocked and are only accessible from Australian based IP addresses.

Assuming full chain, enrolled, certificates are correctly provided during connection, this endpoint will then provide the relative URIs of additional API endpoints as per the SEP2 standard. The LFDI of the client certificate is used to identify the connection request and return the associated *EndDeviceList*. Note direct connection devices or gateways will only be able to see itself in the end device list, representing the connection point to the electrical network. Cloud proxies will be able to see all end devices associated with that cloud proxy.

11.1 Queensland Test Server

The Energex and Ergon Energy test server is not an interactive testing tool or test harness, but a test environment matching the implementation of the production instance.

A rolling set of *DERControls* will be published to the Utility Server for test devices. There will also be periods where no *DERControls* have been published, so that fallback to the *DefaultDERControl* can be tested at these times. These *DERControls* should be used to validate that the inverter(s) are operating correctly.

The following *DERControls* will be published as part of the random rolling schedule:

- Connect/Disconnect: opModConnect
- Energize/De-energize: opModEnergize
- Site Export Limit (in Watts): csipaus:opModExpLimW
- Site Import Limit (in Watts): csipaus:opModImpLimW
- Max generation limit (in Watts): csipaus:opModGenLimW
- Max load limit (in Watts): csipaus:opModLoadLimW

12 Test Procedures

Testing should be performed as per the national CSIP-AUS Test Procedures [15].

Energex and Ergon consider the testing of a SEP2 client and integration with associated inverter hardware to be a professional engineering service under the Professional Engineers Act (2002 (Qld)) [11]. Please note that under this Act, it is an offence for individuals who are not a Registered Professional Engineer of Queensland (RPEQ) to carry out unsupervised professional engineering services in Queensland, or to claim to be a RPEQ when they are not.

Until such time as a national testing authority is established[1], compliance with these test procedures must be assessed by an RPEQ (or otherwise permitted under Section 12.4). Evidence of testing by the providers responsible RPEQ should be provided to Energex and Ergon Energy.

Testing of compliance can be completed against any SEP2 Utility Server or Test Harness – however the communications software client MUST additionally establish a connection with the Energex and Ergon Utility Server as part of the testing process to ensure there are no compatibility issues. Energex and Ergon Energy will ensure that data received by the utility server matches expectations as part of the approval process.

12.1 Test Scope

Testing should be performed in such a way that it adequately represents a typical customer installation. It is recommended full end-to-end testing is undertaken; however, the scope of testing verification for CSIP-AUS is the communication client and not the physical response of the inverter[2].

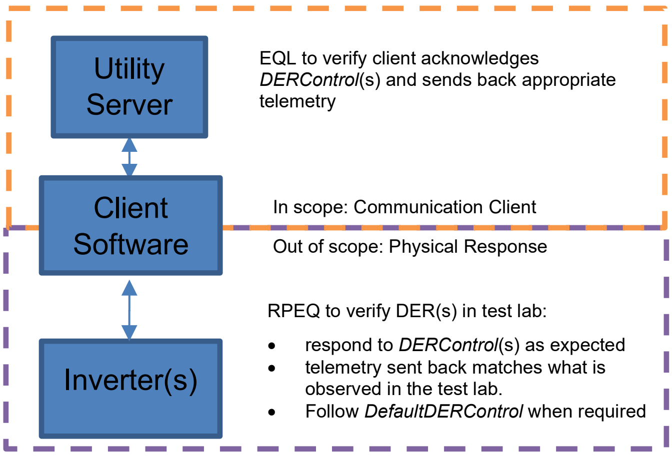


Figure 4: Communication vs Physical Response Scope

[1] Energex and Ergon Energy Network are actively working with other DNSPs through Energy Networks Australia (ENA) to establish a national listing authority and PKI authority

[2] Note that an upcoming update to the CSIP-AUS test procedures will include tests for the physical response of the inverter.

12.2 Test Conformance

When submitting evidence of test conformance, the supported functions of the SEP2 Client should also be clearly indicated, as per the test designations in Table 3 of the national CSIP-AUS Test Procedures [15].

The most relevant test designations are:

G: Generation **L:** Load **C:** In-Band Registration **S:** Subscription Notifications

For example:

- A SEP2 Client that supports export (but not import) would be [G]
- A SEP2 Client that supports import (but not export) would be [L]
- A SEP2 Client that supports both import and export, as well as optional extensions and subscriptions, would be [GLCS]

12.3 Test Harness

Testing of compliance can be completed against any SEP2 Utility Server or CSIP-AUS Test Harness.

The Energex and Ergon Energy test server instance is not considered a CSIP-AUS Test Harness. Until a nationally endorsed test harness is available, the test server may be used as a substitute for a test harness for most tests, noting that the test procedures will not be able be performed exactly as prescribed.

12.4 Mutual Recognition

Notwithstanding the requirement in section 12.1 that test procedures must be assessed by a RPEQ, where the compliance testing has been performed outside of Queensland and in accordance with either section 12.4.1 or 12.4.2 (with supporting evidence of such to be provided to Energex or Ergon Energy's satisfaction), Energex and Ergon Energy will waive the requirement for assessment by an RPEQ. For the avoidance of doubt, this waiver does not extend to any changes or modifications to the SEP2 client that need to be made to meet the Queensland context, which will still require assessment by a RPEQ.

The SEP2 Client will also be required to send telemetry to the test instance of the Queensland Server and make use of a Queensland PKI Certificate (until such time as a national PKI is available).

12.4.1 South Australia

Where the SEP2 Utility Server has been tested, and complied with, the SA Power Networks (SAPN) Dynamic Export Test Procedures this will be accepted as suitable evidence of test conformance (with compliance category of G). Please note that these test procedures are not considered evidence of import compliance, which is required for BESS and EVSE.

12.4.2 Victoria

Where the SEP2 Utility Server has been tested and complied with the national CSIP-AUS Test Procedures, as carried out in Victoria by a suitably registered electrical engineer (being a Registered Professional Engineer of Victoria (RPEV)), will be accepted as suitable evidence of test conformance.

13 Compliance Process

This section details the process by which a third-party provider can apply to Energex and Ergon Energy to develop and connect a compliant SEP2 client to the Utility Server Certification Process.

For a DER device to be compliant with dynamic connections in Queensland it must have been certified via one of the below certification paths and provided with the necessary certificates to authenticate.

- Energex and Ergon Energy Compliant Provider
- National CSIP-AUS Certification (future entity currently being established)

13.1 Energex and Ergon Energy Compliant Provider

The process for becoming a 'Compliant Provider' is the same for both aggregators and device manufacturers, with the only difference being the type of certificate issued on completion.

Compliance testing is for the SEP2 software client only, and so ensuring compatibility with subsequent inverters to an existing compliant SEP2 client will be the responsibility of the vendor or installer.

13.1.1 Application

a) Provider may apply for a test client certificate by emailing dynamic.connections@energyq.com.au.

b) Mandatory application information is detailed in Annex B

13.1.2 Approval

a) Following application approval, Energex and Ergon Energy will issue a test certificate via email and generate corresponding endpoints on the test Utility Server instance.

13.1.3 Testing

a) The test Utility Server instance will provide a number of test *EndDevices* for the vendor to develop their client against.

b) Each *EndDevice* is enrolled in a program that exercises one or more test cases on a repeating cycle where possible.

13.1.4 Compliance

a) Provider supplies evidence of communication client testing to dynamic.connections@energyq.com.au.

b) Energex and Ergon Energy will correlate reported testing with Utility Server logs and upon approval, issue a production certificate.

c) Provider applies for a production client certificate

13.1.5 Listing

a) Provider is listed on Energex and Ergon Energy public websites as compliant aggregator or device provider.

13.2 Ongoing Compliance

In addition to the initial compliance checks, Energex and Ergon Energy will run continuous audits on telemetry and billing data to ensure that sites are operating in accordance with their applicable customer connection contract.

This may include periodically invoking test programs or controls to validate responses. These are anticipated to be executed with as little impact on customers as possible however any significant planned testing will incorporate the notification of compliant providers.

13.3 Server Updates

It is recommended that providers maintain test clients connected to the test environment in an ongoing manner. Notifications will be issued for server updates and upgrades that may impact clients. Following successful deployment, updates will be pushed to production within 60 days depending on criticality. It is the responsibility of the provider to ensure during this period that clients are compatible with any changes.

14 Registration Process

A key requirement of dynamic connection agreements is the need for a clear registration process. The purpose of registration is to associate a SEP2 Long Form Device Identifier (LFDI) to a particular National Metering Identifier (NMI). Only one client and therefore provider is allowed to be registered for each connection point / NMI.

The connection pathway chosen impacts how the LFDI is determined due to the way that clients are identified to the Utility Server. The rules for LFDI creation are the same regardless of whether the in-band registration or out-of-band registration process is used and detailed in more detail in Section 14.4.

14.1 Out-of-band Registration

Once the installer is aware of the LFDI, they should register this via the appropriate web form. (Instructions will be provided as part of the connection application).

For direct connections, the LFDI is determined by the device certificate. As this is generated by the OEM – this LFDI will need to be provided by the OEM and may not be known in advance.

For cloud proxy connections, the LFDI does not need to be provided by the installer, as it is calculated based on the NMI. The installer does still need to nominate the cloud provider being used. Once a provider has been nominated, the appropriate end device will be registered in the server.

14.2 In-band Registration

It is preferred that installers nominate the cloud provider out-of-band as part of the connection application. However, in cases where this registration has not been completed, it can alternatively be achieved by automatically submitting this association of an LFDI to an NMI to the server in-band as part of the commissioning process.

In-band registration of direct connections is not currently supported. The cyber security implications of allowing this are being considered, and this option may be made available in the future.

In-band registration for cloud proxy connections can be enabled on a per-provider basis upon request by the cloud provider. The LFDI must still be calculated as per Section 14.4.2.

Only NMIs for which an approved connection application exists, but for which the provider or LFDI has not been provided, will be accepted. Once this in-band registration has occurred, we will update our backend records as if the registration had been submitted out-of-band. Changing or porting of existing registrations is not possible in-band.

14.3 Porting Registrations

If the installer would like to modify the provider or LFDI that was previously registered to a customer, they should resubmit the registration application via the appropriate web form. (Instructions will be provided as part of the connection application).

Changing of registration details for a site must be done out-of-band.

Some reasons why registration details may need to be updated could include:

- A change in the provider used at the site
- A change to the cybersecurity certificate (for direct connected devices)

14.4 Determining the LFDI

14.4.1 Direct Connections

Where a device connects to the utility server directly, the LFDI is determined by the cybersecurity certificate of that device as per the SEP2 Standard.

14.4.2 Cloud Proxy Connections

Cloud Proxy Providers generating LFDIs shall use the technology provider's Private Enterprise Number (PEN) as the last 8 hex digits with leading zeros. This ensures the technology provider can manage global uniqueness without concern of clashing with other aggregators. If a provider does not already have a PEN allocated, they may request one from the IANA for free.

To simplify the connection process for cloud proxy mediated clients, it is preferable that cloud proxy generated LFDI's are deterministically calculable from the information provided at the time of dynamic connection application. This removes the need in most cases for cloud proxies to notify Energex and Ergon Energy of the site identification and allows improved automation of the overall registration process.

When generating virtual LFDIs, the preferred method is as follows. The first 32 hex digits should be a truncated SHA256 hash of the 10-digit NMI. The last 8 hex digits shall be the provider's Private Enterprise Number (PEN) with leading zeros. Alternative methods for virtual LFDI generation may be permitted by mutual agreement (such as using 11-digit NMIs). Regardless of the calculation method, the last 8 hex digits must be the provider's PEN.

A 10-digit NMI is preferred over a 11-digit NMI, as not all customers know their checksum digit.

Annex A: Request for access to test server

Informative

An example of required information to be provided to receive access to the test instance of the SEP2 Utility Server. These should be emailed to Dynamic.Connections@energyq.com.au.

Entity Name	ENERGY QUEENSLAND LIMITED
Australian Business Number (ABN)	96 612 535 583
IANA Private Enterprise Number (PEN)	57269
Address	26 Reddacliff Street Newstead QLD 4006
Client Product Name	Product Name
Client Type	Cloud / Direct
Equipment Type	Gateway / Inverter
Targeted Inverter Products	Inverter Series A Inverter Series B
Technical Contact Name (for communications and outage notifications)	First Last
Technical Contact Email	first.last@providerexample.com
Technical Contact Number	0412 345 678
Certificate Signing Request (CSR)	-----BEGIN CERTIFICATE REQUEST----- MIG5MGICAQAwADBZMBMGByqGSM49AgEGCCqGSM49AwEHA0IABAGh2Qzty1LPAq8U I6IXVl3158K3fKSWZJCiOJBKBs1MvNb5dYJokWWpOXPZy3fFtGAYRpJ+dN194gQW cSK6FTagADAKBggqhkjOPQQDAgNHADBEAiALzRxp5b1Or0rk76mYO8lVPGFxcCf0 p+7Un5xS8GnmaAIgDYAkQw726KdAuAsrS8ynqEHBd5mmu2HqwtNofa9T9Dk= -----END CERTIFICATE REQUEST-----
Reviewed and accepted server access agreement?	*To be sent to the below signatory* *via Adobe Sign*
Name of authorised signatory	Authorised Name
Title of authorised signatory	General Manager
Email of authorised signatory	general.manager@providerexample.com