Counties Energy

Counties Energy Utility Server (Gridex)

Interconnection Handbook

Implementation guidance for integrating with the

Gridex CSIP-AUS / IEEE 2030.5 Utility Server

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2. Glossary

Term	Description
CSIP-AUS	Common Smart Inverter Profile – Australia v1.2. Companion profile to CSIP for IEEE 2030.5. Gridex targets CSIP-AUS v1.2 compliance while operating in the New Zealand context.
IEEE 2030.5:2018	Smart Energy Profile 2.0 (SEP 2.0) — the underlying communication standard between the Utility Server and clients.
DER	Distributed Energy Resource — rooftop solar, home batteries, EVs, and similar small-scale resources.
Utility Server	An IEEE 2030.5 / CSIP-AUS compatible server.
Gridex	Counties Energy's DER aggregation platform that includes a utility server.
Aggregator	Cloud system representing multiple downstream DER; acts as the client for those DER.
Direct Device	A client hosted for an individual DER, connecting directly to the Utility Server.
Gateway	On-site hardware providing communications and control to DER, acting as a Direct Device.
OEM	Original Equipment Manufacturer.
ICP	Installation Control Point — the New Zealand grid connection point identifier. Gridex uses the ICP in the CSIP-AUS ConnectionPoint field in place of the Australian NMI.
LFDI / SFDI	Long / Short Form Device Identifier (IEEE 2030.5 device identity).
PEN	IANA Private Enterprise Number.
DOE	Dynamic Operating Envelope.
HEMS	Home Energy Management System.
TSO	Transmission System Operator; in New Zealand, this is Transpower.
DSO	Distribution System Operator.

3. Background

Counties Energy is evolving to support the increasing connection of distributed energy resources (DERs), including solar PV systems, battery energy storage systems (BESS) and electric vehicle (EV) chargers. Recent regulatory and industry direction and developments have enabled electricity distribution businesses (EDBs) to adopt more dynamic approaches to managing DER exports and demand, supporting greater utilisation of the existing distribution network while maintaining network security and reliability.

This document aims to provide supplemental information to technology providers, including DER aggregators, original equipment manufacturers (OEMs) and other solution providers, that have or are developing technologies compatible with IEEE 2030.5:2018 using the CSIP-AUS v1.2 profile. Counties Energy's Utility Server, Gridex, provides a standards-based interface for integrating DERs and delivering Flexible Export and other network flexibility services.

This document will be reviewed regularly and amended as required to reflect changes in standards, the application of new technologies, changes to procedures and field experience.

4. Scope and Purpose

This document is the interconnection handbook for the Gridex Utility Server. It provides Gridex-specific implementation guidance for technology providers — aggregators, OEMs, and direct-device integrators — building IEEE 2030.5 clients that connect to Gridex.

It should be read in conjunction with:

- **IEEE 2030.5:2018** (the base standard)
- **CSIP-AUS v1.2** (the profile Gridex targets)
- The **Gridex Utility Server API reference**

5. Integration and Testing Process

Gridex supports multiple types of client:

- **Cloud aggregators**, where a single client is responsible for managing the connection to multiple DER.
- **Direct device connections**, where a device communicates directly with the Gridex utility server.

Devices may also use a gateway device to reach Gridex; however, Gridex does not distinguish such setups from the above scenarios. It is the responsibility of device owners to validate communication from any IEEE 2030.5 client or aggregator to the physical device.

5.1 Process outline

The end-to-end onboarding and testing flow:

1. **Onboarding and credential request** — The prospective client requests access, and Gridex issues credentials for our staging environment.
2. **Development** — The client develops against the Gridex **staging** environment, which is available for continuous integration and testing.
3. **Registration and metering self-test** — The client validates the **registration** and **metering** flows in staging and captures the results.
4. **Gridex evaluation** — Gridex reviews the results and validates that the required registration and metering details were submitted correctly.
5. **Control testing** — Depending on the device type, Gridex will send relevant test control signals and monitor the results.
6. **Sign-off and production** — On successful completion, Gridex issues **production** credentials and the client transitions to the production environment.

5.2 Getting started

To begin the process of integrating with the Gridex platform, please contact the Counties Energy DSO team at **[dso@countiesenergy.co.nz]**.

6. Registration Specification

Registration makes a new client — representing a site or fleet — known to the Gridex Utility Server. It is a prerequisite for metering and control.

6.1 Connection point — ICP

Gridex operates in the New Zealand context. The CSIP-AUS ConnectionPoint field, which carries the NMI under CSIP-AUS, is used by Gridex to carry the ICP (Installation Control Point) identifier for the site.

6.2 Registration methods

Gridex supports both in-band and out-of-band registration. For in-band registration the client device posts information about the DER to the Gridex Utility Server upon connection. Out-of-band registration involves communicating details about the device to the Gridex team prior to onboarding, where they will be pre-configured on the utility server.

The preference is for all clients to support in-band registration, with exceptions for out-of-band registration made by discussion with the Gridex team.

A. In-band registration — The client registers programmatically:

1. Create an EndDevice.
2. Discover the auto-created DER and its sub-resource links.
3. Submit DER capabilities and maximum ratings.
4. Submit current DER settings and configured ratings (optional if identical to DER Capability).
5. Submit current DER status (see §8.1).
6. Provide the ICP of the site as CSIP-AUS Connection Point.

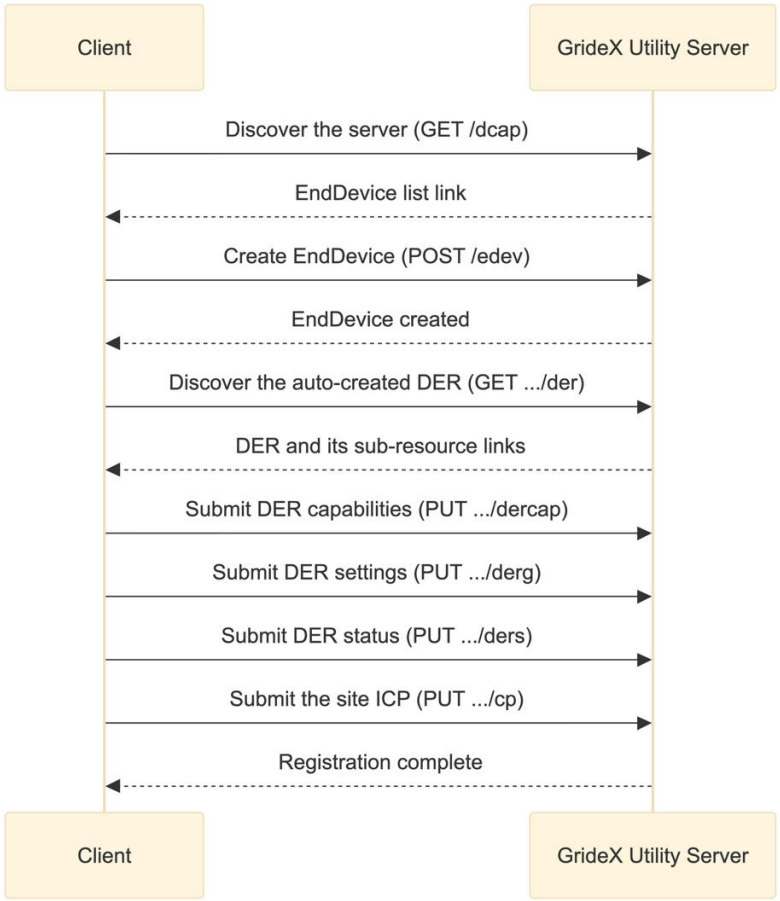


Figure 1. In-band registration flow

B. Out-of-band registration — The provider supplies device details to Gridex, where they are pre-configured on the utility server. The client then discovers the existing EndDevices and reports its status/metering.

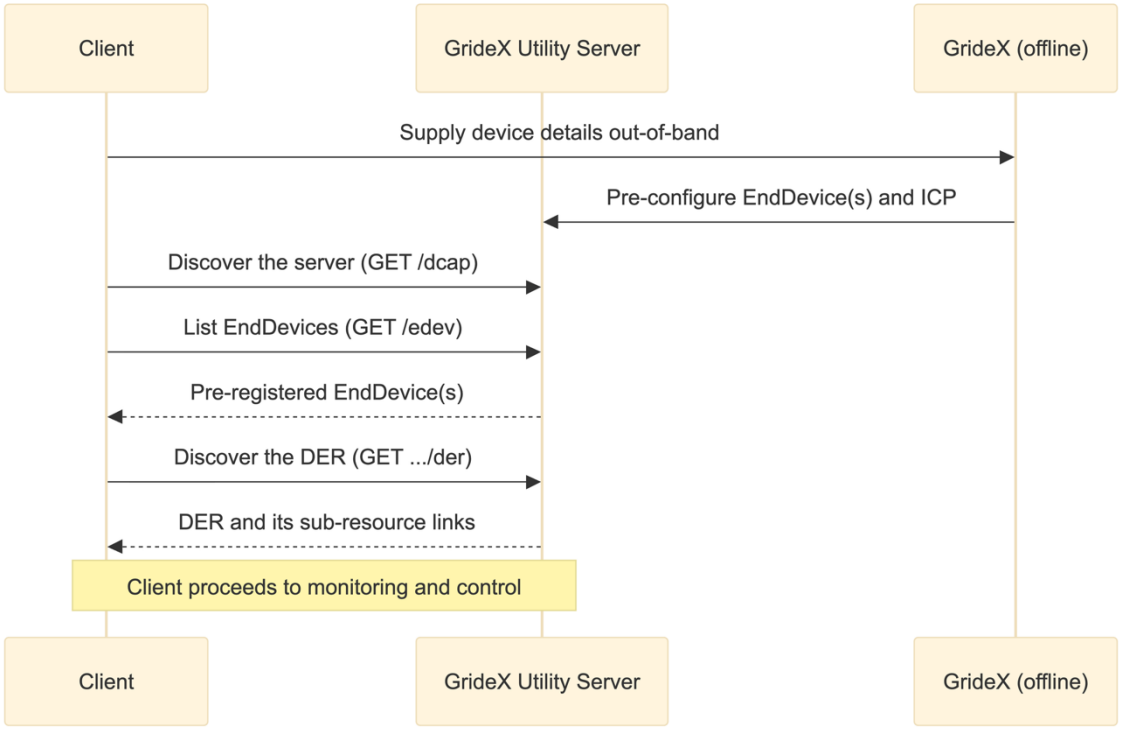


Figure 2. Out-of-band registration flow

6.3 Registration requirements

Gridex requires all of the following information to be supplied during registration (whether in-band or out-of-band):

Information	Resource	Notes
Device identity	EndDevice	Long/short form device identifiers — see §6.4.
Device category	EndDevice	The device class (e.g. photovoltaic system, EVSE, storage).
DER capabilities and ratings	DERCapability	The device's physical/maximum ratings and the control modes it supports (§8.2).
Current DER settings	DERSettings	The device's current operating configuration. Optional where identical to its capabilities.
Current DER status	DERStatus	Required objects vary by device type — see §8.1.
Connection point	ConnectionPoint	The site ICP (§6.1).

6.4 Device identity — LFDI generation

Clients should generate a unique LFDI when submitting a new EndDevice to the Gridex platform.

- **LFDI** — a 40-character hex string. The left 32 hex digits are generated at the client's discretion, provided they are unique per aggregator. The right 8 hex digits are the provider's **IANA PEN**. This follows the CSIP-AUS convention and lets a provider guarantee uniqueness within its own device pool without clashing with other aggregators.

  ← 32 hex digits (unique per aggregator) →← 8 hex digits (IANA PEN) →
  0F3078CFDDAEE28DC20B95635DC116CC 2A6D877F

If your organisation does not have a PEN, one can be requested from IANA (the process is free).

7. Monitoring and Metering Specification

7.1 Required readings

Measurements are reported over clock-aligned 5-minute intervals. Each reading should be the average of samples taken across the interval, rather than an instantaneous value at the interval boundary.

Gridex recommends sampling frequently enough to produce a representative average, typically at least every few seconds. A specific minimum sampling rate is not currently mandated.

Clients post readings at the postRate advertised on the MirrorUsagePoint rather than at the end of every interval, batching the intervening intervals into a single submission where the client supports it. For most clients Gridex sets a postRate of several minutes; the value returned by the server is authoritative.

The following readings are required or preferred:

Reading	Requirement
DER Real Power	Required — all devices.
Site Real Power	Preferred — supply where the client can measure at the connection point.
Reactive Power	Supply where available.
Voltage	Supply where available.

Additional channels beyond those above may be posted where the client supports them. DER measurements and site measurements should be declared under separate MirrorUsagePoints.

7.2 Metering setup

Metering channels are declared via a **MirrorUsagePoint (MUP)**:

1. POST /mup — Declare the metering channels and their reading types.
2. POST /mup/{mupId} — Post periodic readings to the declared channels.

Clients post at the postRate advertised on the MirrorUsagePoint (see §7.1). Each MUP is tied to the EndDevice it reports for.

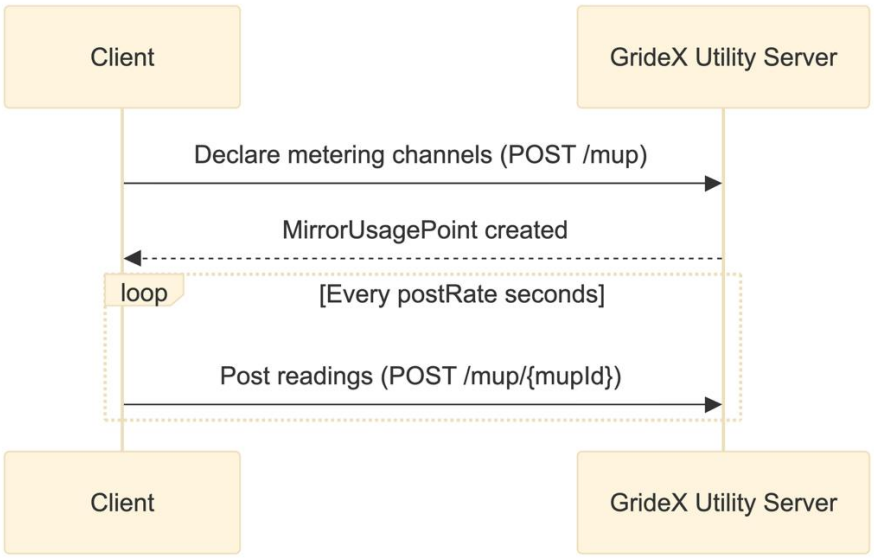


Figure 3. Metering flow

See the Gridex Utility Server API documentation for guide on defining Usage Points and Meter Readings.

8. Implementation Addendum

Gridex-specific guidance for areas that may be optional in the base CSIP-AUS or IEEE 2030.5 specifications.

8.1 Application of DERStatus

All devices should update DERStatus whenever there is a change, and periodically at the device's postRate. The following objects are expected:

DERStatus object	Gridex requirement
operationalModeStatus	Required for all devices.
genConnectStatus	Required for generation devices.
inverterStatus	Optional.
storConnectStatus	Preferred for all storage devices.
stateOfChargeStatus	Required for all storage devices, preferred for EVSE devices.
alarmStatus	Optional.

8.2 Control Modes

Gridex supports the following control modes from both the IEEE 2030.5 and CSIP-AUS specifications. The server inspects the modes advertised in DERCapability (modesSupported, csipaus:doeModesSupported) and DERSettings (modesEnabled, csipaus:doeModesEnabled, if present) to determine which controls it can send the device. This may affect which control programs the device is enrolled in.

Mode	Description
opModExpLimW	Maximum export power limit.
opModImpLimW	Maximum import power limit.
opModGenLimW	Maximum generation limit.
opModLoadLimW	Maximum load (consumption) limit.
opModEnergize	De-energise / energise DER.
opModConnect	Disconnect / connect DER.
opModFixedW	Charge / discharge set point.

8.3 Control response requirements

All clients should support sending responses to the controls they receive. At a minimum, a client must be able to send the following responses:

Response	IEEE 2030.5 Value
Event received	1
Event started	2
Event completed	3
Event cancelled	6
Event superseded	7

Clients may also choose to support the following response codes.

Response	IEEE 2030.5 Value
Opt-out	4
Any Rejected response	252-254

Gridex *may* choose to respect a user opt-out of a given control and re-issue controls accordingly. Where a device supports opt-outs, it should not opt out of any control whose primacy indicates it is TSO-controlled. See §8.4 for more information on primacy.

8.4 Primacy

Gridex uses the DERControl primacy field to indicate the control source:

- 65–74 — TSO Controlled or Emergency Event.
- 75–94 — DSO Load Management.
- 95+ — Other control sources.

The specific meaning of these ranges is subject to change; however, in all cases lower primacy values take priority over other controls. Any changes to these values will be communicated in advance to all parties.

9. Control Interaction Model

9.1 Control discovery

The polling flow to discover and apply controls. Clients should recheck each discovered resource according to the poll rate from latest request for each resource type:

1. Get FunctionSetAssignments for the device.
2. Get DER Programs assigned to the devices Function Set Assginments.
3. For each program:
    - Get DefaultDERControl fallback setpoints
    - Get all scheduled
4. Post response and acknowledge controls (see §8.3 for required response codes).

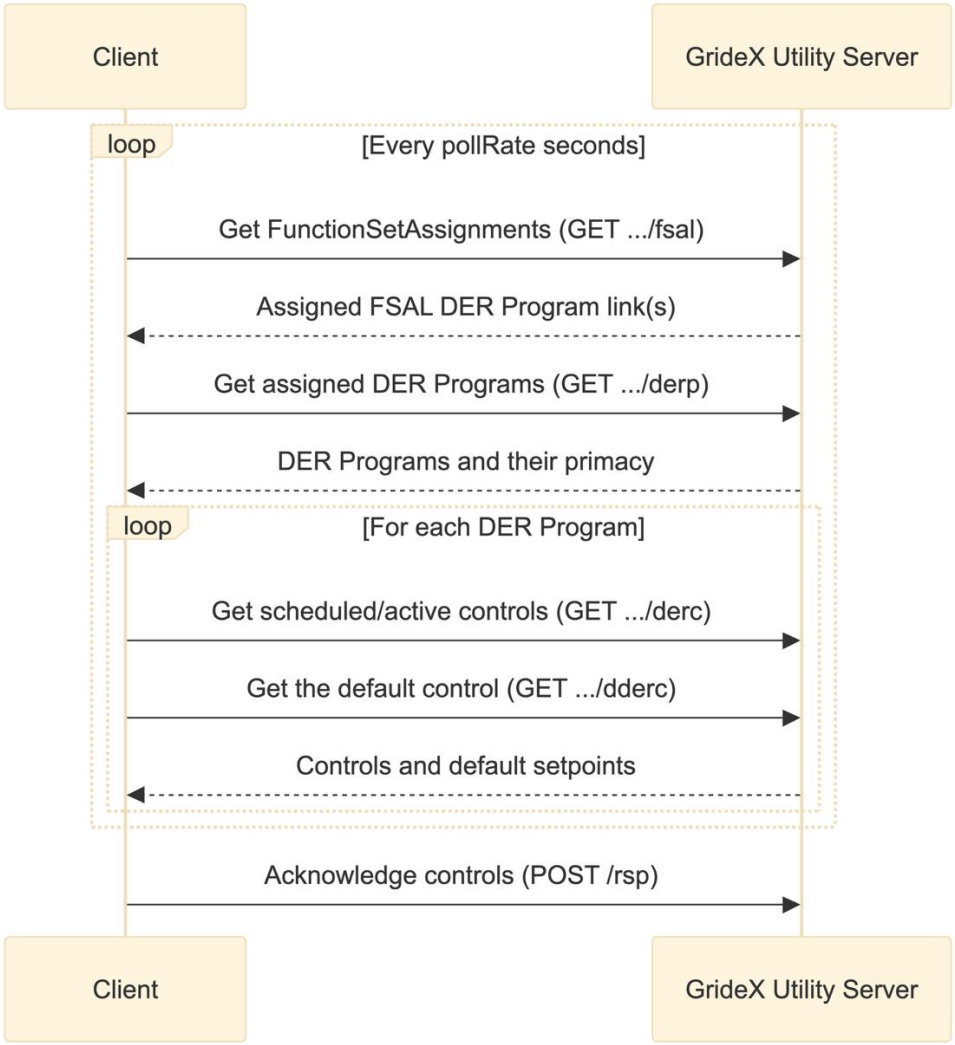


Figure 4. Polling control flow

Controls are scheduled against server time, so clients should keep their clock synchronised with the server (via GET /tm) to apply and report controls at the correct time. Where a control carries randomisation fields (randomizeStart / randomizeDuration), clients should honour them by offsetting the control's start and duration accordingly.

9.2 Subscription / Notification

Aggregators may use push notifications in place of polling. A client subscribes to a resource, and Gridex then posts the updated resource to the client's notification endpoint whenever it changes. Clients can currently subscribe to the following:

Resource	What is pushed
EndDevice list	When new devices are registered.
FunctionSetAssignments list	When new FunctionSetAssignments lists are added.
DER Program list	When programs are assigned to or removed from a device.
DER Control list	When controls are created, updated, or cancelled.
Default DER Control	When the default setpoints change.

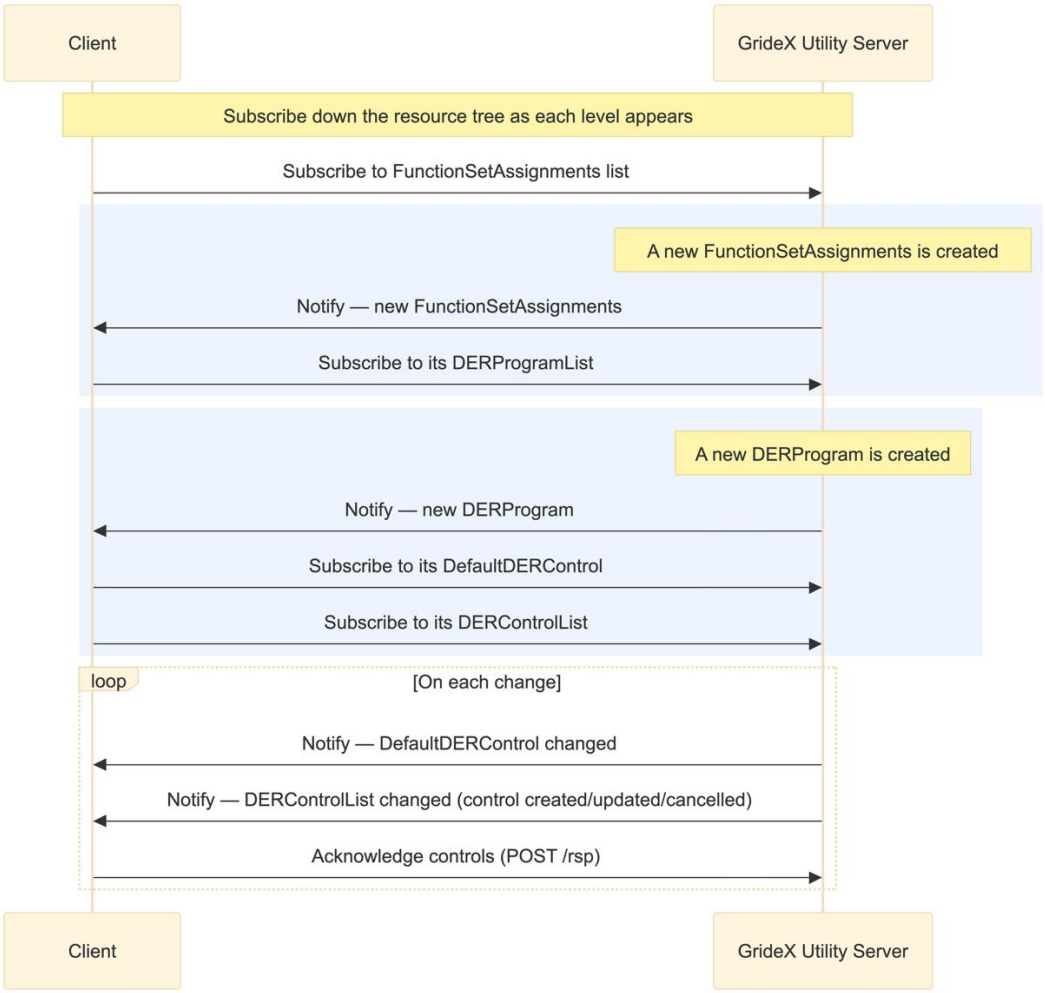


Figure 5. Subscription/Notification control flow

9.3 Fallback and communications loss

During communications loss, all devices are expected to continue actioning any controls they have already received, for as long as those controls remain within their scheduled window. Once an active control expires — or if there are no active controls — the device should fall back to the setpoints defined in the last DefaultDERControl it received, ramping to those setpoints at its configured ramp rate rather than stepping to them immediately. A device that has never received a DefaultDERControl should operate within its own configured DER settings limits.

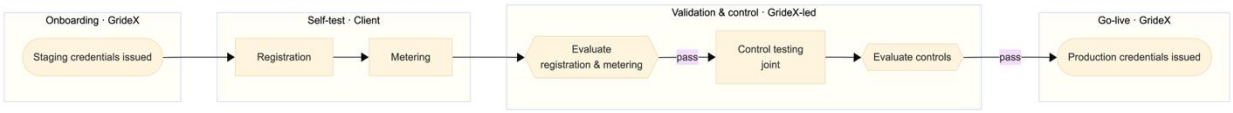
The last DefaultDERControl should persist across a device restart or grid reconnection, so that a site returning from an outage remains appropriately constrained. On restoration of communications, the client resumes normal polling (or subscription handling) and ramps gracefully to any newly active controls; devices should not jump to unconstrained operation on reconnection.

10. Test Procedures

Registration and metering are self-tested by the client in the staging environment and reviewed by Gridex. Control functionality is then exercised jointly by Gridex and the client.

10.1 Test environment

The Gridex utility server offers a staging environment for any partners looking to test their integration. The Gridex team can provide certificates upon request. Once a client has had its communication validated, credentials can be issued for the production environment.



10.2 Self-service tests (registration)

Once authenticated with the platform, clients can test registration by posting EndDevice, DERCapability, DERSettings, and DERStatus information to the utility server, and setting the connection point. The Gridex team will then validate that all of the following information has been correctly supplied:

1. ☐ Device category
2. ☐ All applicable DER capability ratings
3. ☐ Control modes supported (§8.2)
4. ☐ Current DER status (objects required for the device type, per 8.1)
5. ☐ Device ICP number

10.3 Self-service tests (metering)

After registration is complete, clients can create MirrorUsagePoints and submit readings to the Gridex platform. Once readings are flowing, the Gridex team will evaluate the metering data to ensure it meets the requirements for the device type. Validation covers:

1. ☐ All required reading channels for the device type are present
2. ☐ Readings are posted at the MirrorUsagePoint postRate
3. ☐ Readings are averaged over clock-aligned 5-minute intervals
4. ☐ Reading values are correctly scaled and use the correct units
5. ☐ The MirrorUsagePoint is associated with the correct registered device

10.4 Control tests

Control functionality is exercised jointly by Gridex and the client. Gridex issues test controls against the staging environment and monitors the client's responses and metering. A client is expected to demonstrate that it:

1. ☐ Receives its FunctionSetAssignments

2. ☐ Discovers its assigned DER Programs
3. ☐ Receives the Default DER Control
4. ☐ Receives scheduled and active DER Controls
5. ☐ Posts control responses — received, started, completed, cancelled, superseded
6. ☐ Reflects the applied controls in its metering data (e.g. export/generation reduced to the commanded limit)
7. ☐ Falls back to the Default DER Control when active controls are cancelled or communications are lost

The above test conditions apply to both polling clients and those that support subscription/notification flows. For subscriptions, clients are expected to maintain subscriptions on each device's FunctionSetAssignments list and subscribe to any discovered DER Program lists and DER Control lists as they are created (subject to the subscription support confirmed in §9.2).

11. Appendix A — API Endpoint Reference

Authoritative detail is in the Gridex API reference; a summary follows. All links can be discovered as part of the normal IEEE 2030.5 link discovery flow.

More details on all the endpoints are available in our hosted API documentation: https://csipaus.docs.Gridex.co.nz/

Group	Method	Path	Purpose
Connection	GET	/dcap	Device Capability (discovery root)
Connection	GET	/tm	Server time / clock sync
Registration	GET	/edev	List EndDevices (paginated: s, l, a)
Registration	POST	/edev	Create EndDevice (auto-creates DER)
Registration	GET	/edev/{edevId}	Get EndDevice and sub-resource links
Registration	GET	/edev/{edevId}/der	List DERs
Registration	PUT / GET	/edev/{edevId}/der/{derId}/dercap	DER Capability
Registration	PUT / GET	/edev/{edevId}/der/{derId}/derg	DER Settings
Registration	PUT / GET	/edev/{edevId}/cp	Connection Point (**ICP**)
Monitoring	PUT / GET	/edev/{edevId}/der/{derId}/ders	DER Status
Monitoring	GET / POST	/mup	List / create MirrorUsagePoint
Monitoring	GET	/mup/{mupId}	Get MirrorUsagePoint
Monitoring	POST	/mup/{mupId}	Post Mirror Meter Readings
Control	GET	/edev/{edevId}/fsal	FunctionSetAssignments
Control	GET	/edev/{edevId}/fsal/{fsalId}/derp	Assigned DER Programs
Control	GET	/derp/{derpId}/dderc	Default DER Control
Control	GET	/derp/{derpId}/derc	DER Controls (scheduled)
Control	GET	/derp/{derpId}/actderc	Active DER Controls
Control	POST	/rsp	DERControlResponse
Control	POST	/edev/{edevId}/sub	Create Subscription