Vector DERMS – OSCP Integration Introduction

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Document references

Document	Description	Location
REF.3	OCPP Specification	OCPP 2.0.1, Protocols, Home - Open Charge Alliance
REF.4	OSCP Specification	OSCP 2.0, Protocols, Home - Open Charge Alliance
REF.5	OpenADR Specification	Home (openadr.org)

Glossary of terms

Term	Description
DERMS	Distributed Energy Resource Management System
API	Application Programming Interface
DERs	Distribution Energy Resources
DOE	Dynamic Operating Envelope
ADMS	Advanced Distribution Management Systems
OSCP	Open Smart Charging Protocol
OCPP	Open Charge Point Protocol
EV	Electric Vehicle
CP	Capacity Provider
CO / FP	Charge Operator / Flexibility Provider
OCA	Open Charge Alliance
OpenADR	Open Automated Demand Response

1. Document overview

1.1 Purpose

The purpose of this document is to describe the requirements for connecting a Charge Management System to Vector's DERMS via OSCP.

1.2 Context

Demand management allows Vector to dynamically control and optimize utilization of network capacity through capacity forecasting and profiling. Capacity profiles are derived based on forecasts, metering, and the grid capacity and constraints etc.
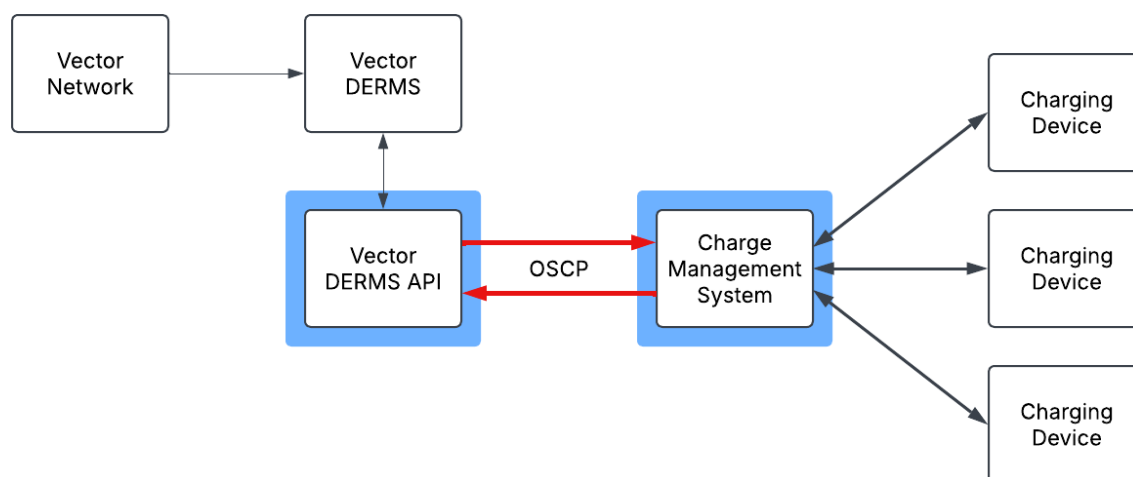
Figure 1: Demand Management Overview

This control enables reduction of peak demand on the Vector network, therefore allowing Vector maintain reliability and minimize costs to its customers.

To enable this, an integration between Charge Management solutions and Vector's DERMS is required to receive Demand Forecast/Actual metering data and notify Charge operators of the permitted Charge Profile/Capacity.

Different standards were considered to implement this interface, and the Open Smart Charging Protocol (OSCP) was selected as the first interface available for connection to Vector's DERMS.

OSCP is a free, open protocol maintained by the Open Charge Alliance (OCA).

2. On Boarding Process
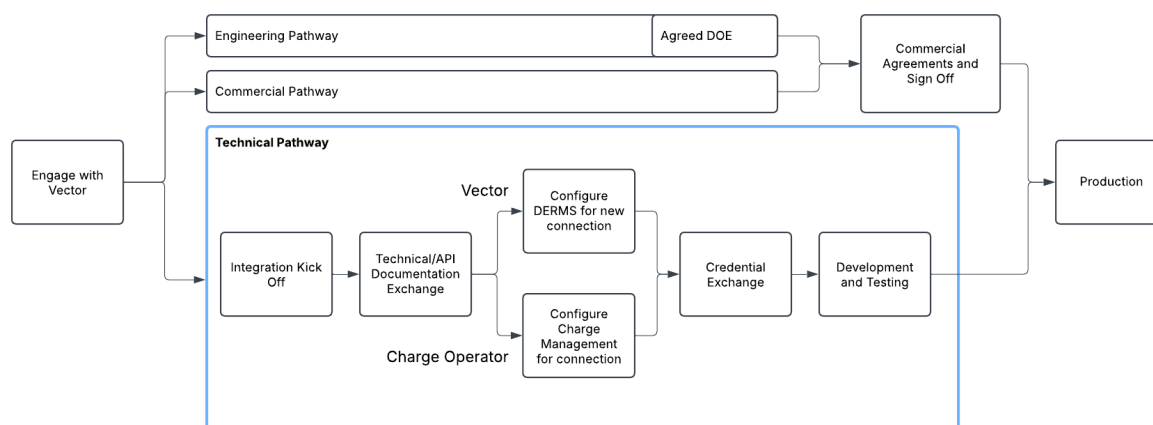
This document is scope for the Technical pathway of the DERMS onboarding process.

2.1 Integration Kick Off Meeting

To start the process there will be an integration kick off meeting. This is an opportunity for individuals from both parties to meet and discuss the upcoming integration and ensure that everyone is aware of the process going forward.

2.2 Technical/API Documentation Exchange

Vector will provide documentation for the Charge Operator to connect to the API, including an OpenAPI specification and Postman collection as examples of how the connections work.

The Charge Operator should also provide documentation to Vector for their OSCP API/endpoints if such is available at this point.

2.3 Configuration and Credential Exchange

To allow the connection to be established, Vector will configure the DERMS system with details of the new Charge Operator, including generating credentials for connections to Vector and storing credentials for Vector to connect to the Charge Operator.

Note at time of writing Vector only supports OAuth Client Credentials for inbound and outbound connections.

As part of this configuration, the following information should be exchanged:

Provided by Charge Operator to Vector

Item Provided	Description
OSCP API URL	Base URL used by Vector to communicate with Charge Operator, providing the following OSCP endpoints: • `/oscp/fp/2.0/handshake` • `/oscp/fp/2.0/update_group_capacity_forecast` • `/oscp/fp/2.0/heartbeat`
OAuth Token URL	URL used by Vector to fetch an access token (using OAuth client_credentials grant) to use the OSCP API
OAuth Client Credentials ID and Secret	OAuth credentials for Vector to generate access tokens
Required HTTP Headers	Any static HTTP headers required by the Charge Operator OSCP API, such as API key etc.
Site Asset ID(s)	Each managed DER site needs an Asset ID that is included in the OSCP payloads sent from the Charge Operator to VTS. *Note the current Vector OSCP implementation assumes that there will be a one-to-one mapping of Asset and Group ID, so both should relate to the site being managed with this connection.*
Site Group ID(s)	Each managed DER site needs a Group ID that is agreed between Vector and the Charge Operator, and will be used in OSCP payloads from both parties to identify which site each message relates to. Group IDs should be alphanumeric strings with no spaces. Some reasonable examples would be: • `BUS_AUK_1` • `ALBANY_123` • `FP_NZ_AKL_01`

Provided by Vector to Charge Operator

Item Provided	Description
OSCP API URL	Base URL of the Vector API providing the OSCP endpoints. • Production: https://evbus.api.vector.co.nz • Test: https://evbus.test.api.vector.co.nz
OAuth Token URL	URL used by Charge Operator to fetch an access token (using OAuth `client_credentials` grant) to use the OSCP API. • Production: https://evbus.api.vector.co.nz/token • Test: https://evbus.test.api.vector.co.nz/token

OAuth Client Credentials ID and Secret	OAuth credentials for Charge Operator to generate access tokens
Required HTTP Headers	Static HTTP headers required to call Vector OSCP endpoints. • `fp-id: <flexibility-provider-id>` • `apikey: <api-key>` • `x-request-id: <new-uuid-per-request>` For test only: • `x-access-token: <test-access-token>`

2.4 Development and Testing

Once the connection details are provided, Vector and the Charge Operator will complete any necessary development and testing of their respective OSCP APIs.

During this process Vector technical staff will work with the Charge Operator to help with any issues that arise.

When the development is completed, the OSCP connection between Vector DERMS and the Charge Management System should be running without issues in the non-production environment.

2.5 Production

On completion of the integration process, and the commercial agreement between Vector and the Charge Operator is signed, Vector will configure the production DERMS instance.

This includes applying the contractually agreed limitations and base DOE/charging profile for the connection.

Connection details and credentials will need be provided again by both parties.

3. API Messaging Flows

3.1 24 Hour Forecasted / Flexibility Execution

This is a high-level sequence diagram that depicts communication flows between Charge Operators and Vector's DERMS.

3.2 Update Group Forecasts

Vector will periodically forecast consumption on the network and calculate appropriate DOEs for Charge Operators in line with the contractual agreements for the connection.

Under normal operating conditions, updated group forecast messages are sent every 15 minutes and contain a DOE/charging profile for the next 24 hours.

Charge Operators are expected to apply the charging limitations as soon as possible, and no more than 2 minutes, after receiving new group forecasts.

In event of network issues, Vector may send a DOE/capacity profile that consists entirely of zero-value charge allowances. These payloads are intended to protect the network, and Charge Operators are expected to stop all charging operations on the site as quickly as possible.

Once the network returns to a normal state, updated DOEs will be sent indicating that charging may be resumed.

API-EP.01: Notify DOE / Charge Profile

Endpoint	/oscp/fp/2.0/update_group_capacity_forecast
HTTP Method	POST
Direction	Vector -> Charge Operator
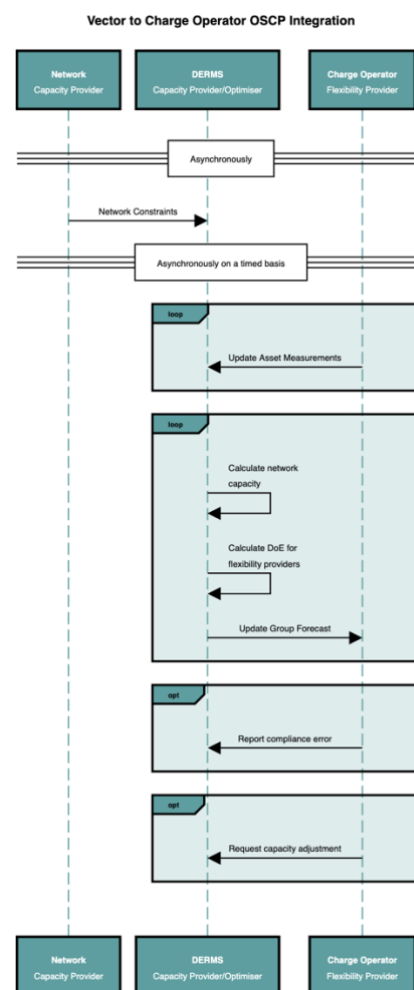
3.3 Update Assets Measurements

The Charge Operator should provide updated measurements of actual consumption at 15-minute intervals (aligned with the hour, so at 12:00, 12:15, 12:30 etc.). Two measurements are included in this payload – Energy Measurements and Instantaneous Measurements.

Energy measurements are the total consumption for each 15-minute period, measured in kWH or WH.

Instantaneous measurements indicate the **maximum** point load during the 15-minute period, measured in KW or W.

Note: The OSCP specification also allows A, KWH or WH for instantaneous measurements, but Vector does not currently support these units.

API-EP.02: To receive Actuals / Metering data – Group consumptions

| Endpoint	/oscp/cp/2.0/update_asset_measurements
HTTP Method	POST
Direction	Charge Operator -> Vector

Vector does not currently support the OSCP update_group_measurements endpoint. Since we treat each group as containing a single asset, there is no benefit from providing both calls as the update_asset_measurement endpoint allows for all the information to be provided.

As such, all charging activity for a group must be aggregated into a single "asset" value prior to sending to Vector.

3.4   Request Capacity Adjustment

In case the demands of a Charge Operators are not met by the capacity limits provided by Vector in the DOE, and adjustment of the capacity can be requested.

Making such a request does not guarantee an update to the DOE from Vector. If such an update is provided, it will be delivered through the Update Group Capacity endpoint as usual.
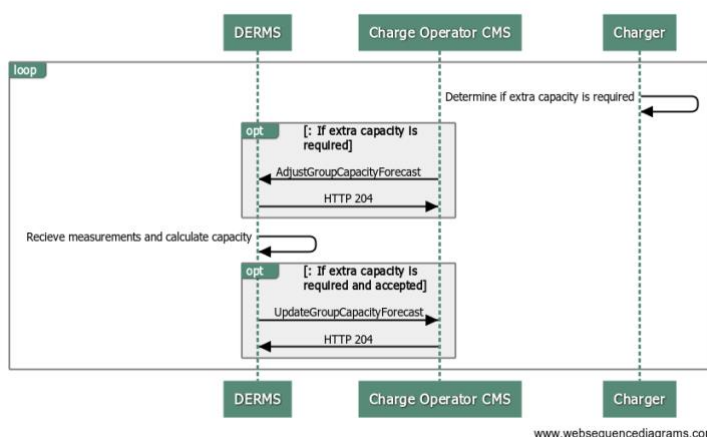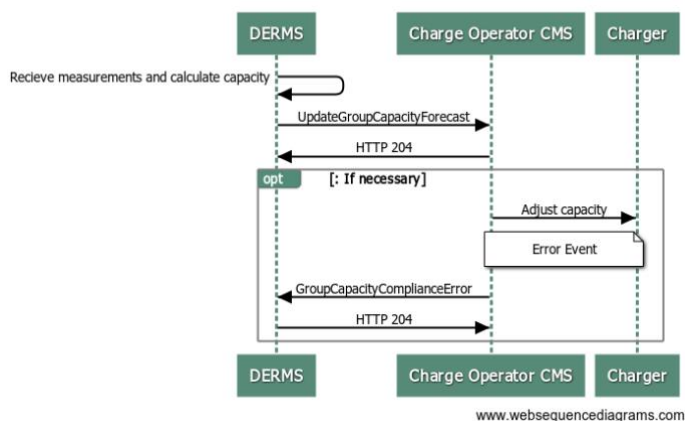

API-EP.03: Adjust Capacity Forecast

Endpoint	/oscp/cp/2.0/adjust_group_capacity_forecast
HTTP Method	POST
Direction	Charge Operator -> Vector

3.5   Compliance Error

In the event a Charge Operator cannot comply with and/or knowingly exceeds a DOE provided by Vector, the breach must be reported via a Group Compliance Error call.

API-EP.04: Group Compliance Error

| Endpoint	/oscp/cp/2.0/group_capacity_compliance_error
HTTP Method	POST
Direction	Charge Operator -> Vector

3.6 Handshakes and Heartbeats

OSCP connections must be initiated with a Handshake request. This can be sent by either party and is acknowledged by a HandshakeAcknowledge message sent in the opposite direction.

Both messages MUST be replied to with a HTTP 204, which should be sent prior to sending the acknowledge message.

Under the OSCP Specification, no messages can be sent when the connection is offline, and if a message is received while offline it should not be accepted.

*Handshakes must be performed prior to any other messages if/when the connection is offline.*
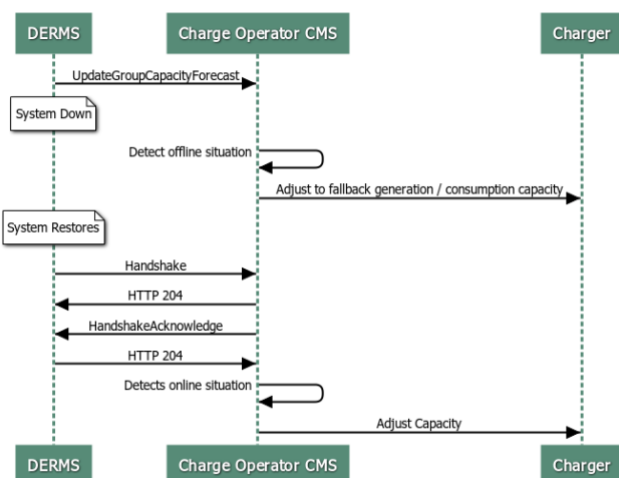
The purpose of the Heartbeat message is to periodically confirm to both parties that the remote API is still available. The frequency in which a heartbeat is expected is provided in the Heartbeat message itself, though it is recommended that the expiry date is at least twice as long as the standard heartbeat interval, allowing for small network glitches without taking the connection offline.

Heartbeats must be sent by both parties regularly.

API-EP.05: Invoke Handshake API

Endpoint	/oscp/fp/2.0/handshake
HTTP Method	POST
Direction	Vector -> Charge Operator

Endpoint	/oscp/cp/2.0/handshake
HTTP Method	POST
Direction	Charge Operator -> Vector
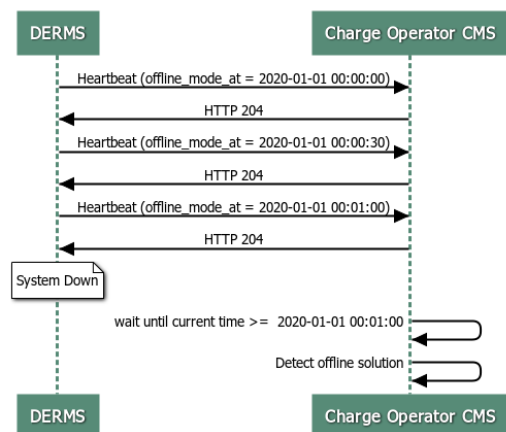
API-EP.06: To Receive Handshake Acknowledgement

Endpoint	/oscp/cp/2.0/handshake_acknowledge
HTTP Method	POST
Direction	Charge Operator -> Vector

Endpoint	/oscp/fp/2.0/handshake_acknowledge
HTTP Method	POST
Direction	Vector -> Charge Operator

API-EP.07: Invoke Heartbeat API

Endpoint	/oscp/fp/2.0/heartbeat
HTTP Method	POST
Direction	Vector -> Charge Operator

Endpoint	/oscp/cp/2.0/heartbeat
HTTP Method	POST
Direction	Charge Operator -> Vector

4.   More Details

For more details about Vectors implementation of the OSCP API, including OAuth details for authenticating with the APIs will be provided in an OpenAPI specification and Postman collection.