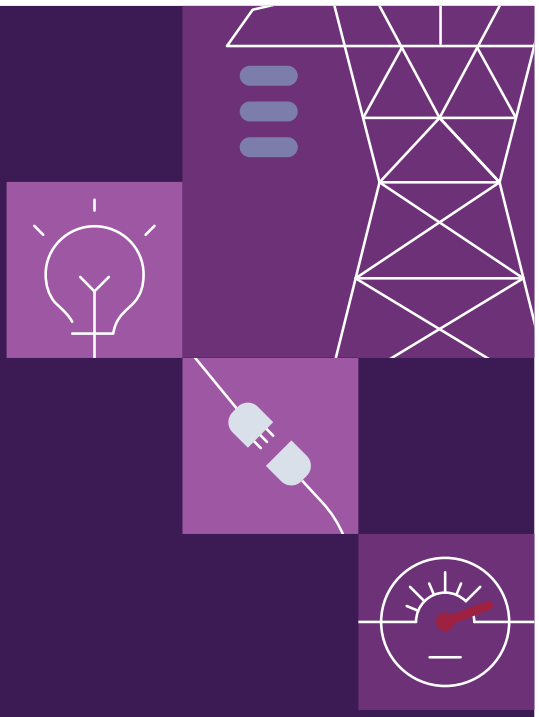
AEMO
AUSTRALIAN ENERGY MARKET OPERATOR



# Connecting with SCADA Lite

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New South Wales | Queensland | South Australia | Victoria | Australian Capital Territory | Tasmania | Western Australia

Australian Energy Market Operator Ltd ABN 94 072 010 327

# Overview

## Purpose

This document outlines the end-to-end process for onboarding, configuring, and maintaining SCADA Lite connections for eligible non-Network Service Provider (non-NSP) participants in the National Electricity Market (NEM). It provides the information required to determine eligibility, understand connectivity options, navigate the application process, and review the associated cost structure and support channels. The purpose is to ensure transparency, consistency, and clarity for participants, project teams, and internal stakeholders involved in the delivery and use of SCADA Lite. By centralising onboarding steps, technical requirements, and financial considerations, this document serves as a single source of truth to support efficient implementation and ongoing management of SCADA Lite connections.

# 1. Project Context

## 1.1. The opportunity

The following Emerging Participants in the NEM, face significant barriers due to the granularity of data required by the existing SCADA systems:

- Small generators
- Demand Response Service Providers (DRSPs)
- Virtual Power Plants (VPPs)
- Voluntary Scheduled Resource Providers (VSRPs)*
- Operators of remote grid-scale assets

These systems are critical to NEM's scheduling framework. However, it is difficult for smaller participants to integrate with, especially when they cannot connect via a Network Service Provider (NSP). This limits their ability to exchange operational data with AEMO and fully participate in the NEM wholesale market.

## 1.2. The solution

SCADA Lite's solution:

- Enables NEM non-NSP Participants to establish a bi-directional connection to exchange operational information (telemetry and control) with AEMO.
- Delivers the requirements defined in both the WDR Guidelines (Version 1.0, Effective Date: 24 June 2021) and Power System Data Communication Standard (Version 3.0, Effective Date: 3 April 2023).
- Supports both cloud-hosted (major Australian cloud providers) and physical infrastructure based non-NSP Participant Intervening Facilities (endpoints).
- Supports protocols such as ICCP, as well as the Secure DNP3.0 protocol (agreed with the industry Participants through the Power System Data Communication Standard Consultation) to establish this connection.
- Uses AEMO's GridNet as the architectural backbone.
- Allows for New Reform initiatives, such as Integrating price-responsive resources into the NEM , which opens new market opportunities for non-NSP Participants, once accessible telemetry exchange channels are available.

## 1.3. Who is the solution for?

The solution is for the following NEM Participants that cannot exchange operational (telemetry and control) information with AEMO via an NSP:

- Demand Response Service Providers (DRSPs)
- Virtual Power Plants (VPPs)
- Small Resource Aggregators (SRAs)

- Operators of remote grid scale assets (e.g., solar and wind farms)
- Voluntary Scheduled Resource Providers (VSRPs) *(starting May 2027 onwards)

# 2. Onboarding Guidelines

## 2.1. Determine Eligibility

SCADA Lite is required when:

- You need to provide telemetry data but are not sending it to your NSP
- You require AGC signals, and your NSP does not support AGC signals

SCADA Lite is **not** required when:

- You do not need to provide telemetry data.
- Your telemetry and AGC needs are already met through your NSP's facilities.

Review the Eligibility Map for more details.

## 2.2. Prepare for connectivity

Review technical and operational specifications for SCADA Lite, including:

- Connection options and reference architecture
- Architectural standards
- Protocol information (for example, DNP3 or ICCP)

Gather relevant documentation for your entity (business number, business structure, etc.), technical specifications of your systems interacting with SCADA Lite, and data on your assets (for example, WDR units, generation assets).

## 2.3. Submit Application

For new NEM Participants:

1. Register as a new NEM Participant via AEMO | Registration.
2. Complete and submit the NEM registration application relevant to your participant category.
3. Provide detailed information about your assets, telemetry setup, and operations.
4. Attach all the required documents (operational, technical, and compliance-related).
5. Pay any applicable fees as outlined in the registration guide.

6. Submit your application to AEMO for review.
7. AEMO assesses your eligibility, technical capability to interface with AEMO systems, and compliance with NEM guidelines.

# 3. Onboarding Journey

## 3.1. New Participants

**If you're a new NEM Participant** and you wish to apply for SCADA Lite, please **follow the steps below:**

### 3.1.1. Participants complete NEM Application

- Register as a new NEM Participant via AEMO | Registration.
- Complete and submit the NEM registration application relevant to your participant category.
- Provide detailed information about your assets, telemetry setup, and operations.
- Submit your application to AEMO for review.

### 3.1.2. AEMO team provides updates to the participant

- AEMO will assess your eligibility, technical capability to interface with AEMO systems, and compliance with NEM guidelines
- One-off connectivity invoice
- Eligibility assessment outcomes
- Connectivity contract
- Timeline: 2-4 weeks approx. duration

### 3.1.3. Participant responds to AEMO

- Make invoice payment
- Send necessary information to progress application

### 3.1.4. Finalisation of design in consultation with AEMO

Design key components:

- Data model
- Network model
- Network & comms
- Timeline: Approx. 1 month + procurement lead time

#### 3.1.5. AEMO initiates SCADA Lite configuration

- Review with AEMO teams for the implementation
- Procurement if required
- Timeline: 2-4 weeks approx. duration

#### 3.1.6. AEMO and participant test and establish SCADA Lite connectivity

- Configure SCADA points
- Point to Point and Point type testing
- Validate test results

#### 3.1.7. Periodic Invoices and Payments

- AEMO Accounts team issues invoices annually in July

## 3.2. Existing Participants

**If you're an existing NEM Participant** and you wish to apply for SCADA Lite, please **follow the steps below.**

#### 3.2.1. Send a request via AEMO's support hub email

- Email AEMO's support hub advising of the DUIDs to be connected via SCADA Lite.
- Support Hub raises the request internally

#### 3.2.2. AEMO team provides updates to the participant

- One-off connectivity invoice
- Eligibility assessment outcomes
- Connection contract
- Timeline: 2-4 weeks approx. duration

#### 3.2.3. Participant responds to AEMO

- Make invoice payment
- Send necessary information to progress application

#### 3.2.4. Finalise design in consultation with AEMO

Design key components:

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# 4. Cost Breakdown

In line with other provided services, AEMO recovers service cost of a SCADA Lite connection through direct fees (similar to MarketNet).

The fee represents the direct cost to AEMO of procuring and maintaining the service.

Participants can choose either On-Prem Data Centre or Cloud-Hosted. AEMO collaborates with them to identify the most suitable option based on the situation.

**Note: The FY26 fees and onwards will be published in the AEMO annual budget and fee documentation. Please refer to the Energy Market Fees and Charges for more information.**

### Table 1 FY25 Cost Breakdown

| Customer Data Centre Type | Connection Technology | Key Service Components | Initial Setup Fee | Annual Fee | Decommissioning |
|---|---|---|---|---|---|
| **Virtual End Point (Cloud Hosted)** | Virtual Cross Connect | Initial set up and configuration of network connection<br><br>Virtual Cross Connect services<br><br>Required port connections.<br><br>Maintenance and upkeep of service | The sign-up price is AUD $29,200, covering AEMO labour to establish the service. The commissioning process begins once payment is received and is non-refundable. | The yearly labour maintenance price & Virtual cross connect subscription fees is AUD $36,350, reviewed annually. Invoices are sent each July for services in advance.<br><br>Yearly labour charge invoices are for the previous year. If a participant joins in August, they receive an initial invoice of AUD$29,200. Once they become operational, for example on December 1st, they receive a pro-rata invoice for approx. AUD $14,000 (7/12ths of the full fiscal year). | For **Cloud Hosted**, if decommissioning occurs within 12 months of sign-up, the full annual maintenance cost (not initial sign-up cost) is deducted from the decommissioning invoice.<br><br>For Example, decommissioning on December 1st: The participant receives a credit for approximately AUD $14,000 (7/12ths of the full Labour maintenance charge).<br><br>Direct connectivity hardware costs specific to the participant are cancelled, and costs to AEMO are passed on when supplier invoices are received. |
| **On-Prem Data Centre** | GridNet<br><br>SD-WAN | Supply of hardware<br><br>Initial set up and configuration of network connection<br><br>Maintenance and upkeep of service | The sign-up price is AUD $29,200, covering AEMO labour to establish the service. The commissioning process begins once payment is received and is non-refundable.<br><br>For **On-Prem Data Centres**, network hardware costs, including routers and links, are directly on-charged. These costs depend on Telco carrier estimates and connectivity architecture, determined during the onboarding design phase. | The yearly labour maintenance price is AUD $24,350, reviewed annually. Invoices are sent each July for services in advance.<br><br>For **On-Prem Data Centres**, any network hardware support costs & network link subscriptions that aren't purchased by the Participant, are directly on-charged where ordered by AEMO. Which is based on Telco carrier estimates, supplier prices, and connectivity architecture determined during an | For **On-Prem Data Centres**, if decommissioning occurs within 12 months of sign-up, the full annual maintenance cost (not initial sign-up cost) is deducted from the decommissioning invoice. |

| Customer Data Centre Type | Connection Technology | Key Service Components | Initial Setup Fee | Annual Fee | Decommissioning |
|---|---|---|---|---|---|
| | | | | onboarding design phase. | |

**Table 2 Types of Invoices**

| Purpose | Initial Set up Connectivity Invoice | Hardware Invoice | Annual maintenance invoice |
|---|---|---|---|
| **When is it used?** | Used for a single, non-recurring service (for example, setting up a network connection) | Used only for on-prem data centre solution | Used for recurring services and billing participants on a yearly basis. |
| **What does it cover?** | • Labour to design Network Connectivity for participant<br>• Configuration of SCADA Software for participant<br>• Modelling the SCADA Points | Cost of switches, routers and network connectivity that weren't purchased by the participant. | Activities to be performed include but not limited to:<br>• Network incident management<br>• Monitoring network performance<br>• Security audits<br>• Back-up configurations<br>• Network security audits<br>• Capacity planning<br>• Hardware support cost<br>• Virtual Cross Connect subscription charges (for Cloud connection) |
| **Other Key Information** | The invoice amount depends on whether the solution is cloud-based or premise-based. | Based on invoices received from AEMO supplier. | The ongoing fee is covered in advance through invoices issued on financial year basis.<br>Invoices are calculated as at July 1 every year and the payment terms are 30 days. |

# 5. Support

## 5.1. Frequently Asked Questions

**Question 1: How does SCADA Lite benefit non-NSP Participants?**

**SCADA Lite lowers the barriers to entry for non-NSP participants by enabling them to establish a bi-directional connection with AEMO to exchange operational information (telemetry and control), and access to additional revenue streams.**

**Question 2: Who can register for a SCADA Lite connection?**

**A SCADA Lite connection is available to participants that cannot exchange operational information (telemetry and control) with AEMO via a Network Service Provider (NSP) or to participants whose existing service via NSPs does not support AGC.**

**Question 3: How much does SCADA Lite cost upfront and on an ongoing basis?**

**The upfront cost for SCADA Lite is AUD $29,200, with an ongoing yearly maintenance at AUD $36,350. Additional costs for on-prem hardware and network links are on-charged, based on Telco invoices. Yearly invoices are issued in July, and if a participant joins mid-year, a pro-rata invoice is provided. Please refer to the cost invoicing for more details.**

**Question 4: From registration, how long would it take until my SCADA Lite connection is set up?**

**Each solution varies based on procurement timelines. Most connections take between 3 to 6 months: 3 months for an existing participant with no procurement, and 6 months for a new participant with hardware procurement.**

**Question 5: Where can I find the detailed technical requirements to participate in SCADA Lite?**

**Once you're applied for and been assessed as eligible for SCADA Lite connection, AEMO's team connects with you to share the detailed technical requirements.**

**Question 6: What hardware is needed to connect?**

**During the initial design, a bill of materials will be provided with items to be purchased. Some items may needed to be purchased by AEMO and those will be advised.**

## 5.2. Support Channels

### 5.2.1. Who can I reach out to for support relating to SCADA Lite Services?

AEMO Support for the SCADA Lite Service is provided by AEMO's support hub. Further details for support provided upon registration.

### 5.2.2. What about support during the onboarding process?

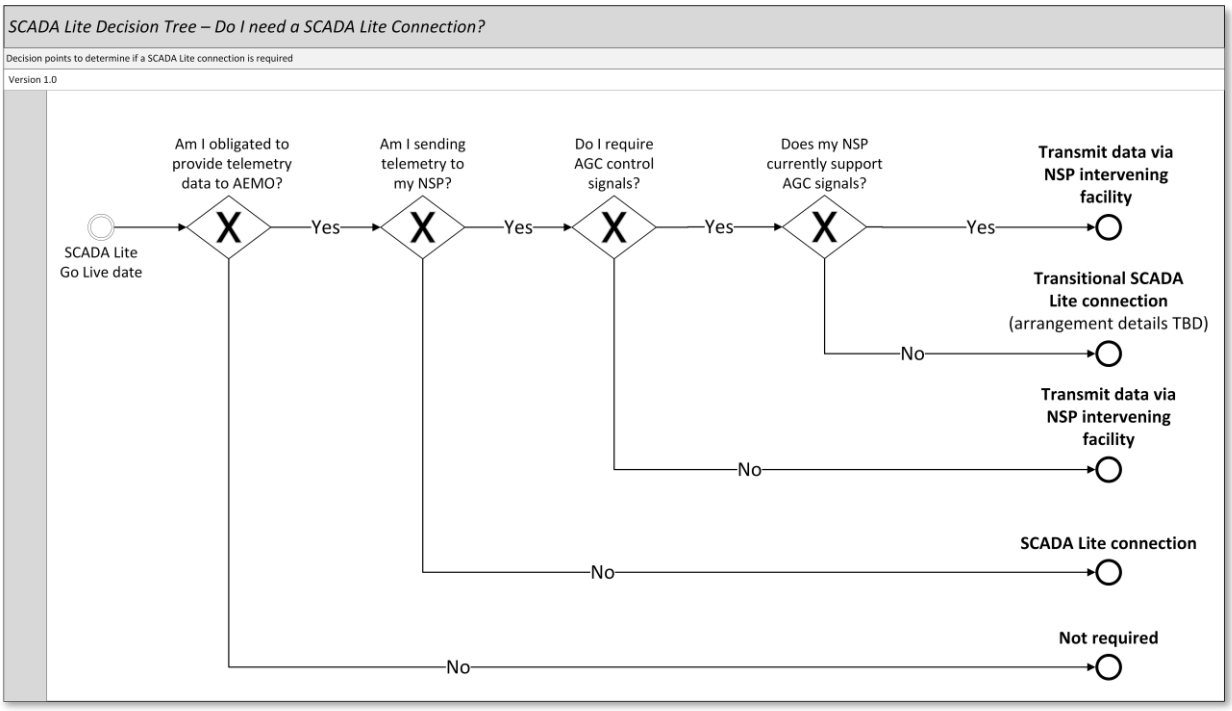
Support during the onboarding process is provided directly by the assigned AEMO employees.

## 5.3. Glossary

| Terms | Definitions |
|---|---|
| **AEMO** | Australian Energy Market Operator |
| **AGC** | Automatic Generation Control |
| **DRSPs** | Demand Response Service Providers |
| **DNP3.0** | Distributed Network Protocol 3.0 |
| **ICCP** | Inter-control Centre Communications Protocol |
| **NEM** | National Electricity Market |
| **NSP** | Network Service Provider |
| **SCADA** | Supervisory Control and Data Acquisition equipment |
| **SRAs** | Small Resource Aggregators |
| **VPPs** | Virtual Power Plants |
| **VSRPs** | Voluntary Scheduled Resource Providers |
| **WDR** | Wholesale Demand Response |

# Appendix A. Eligibility Map

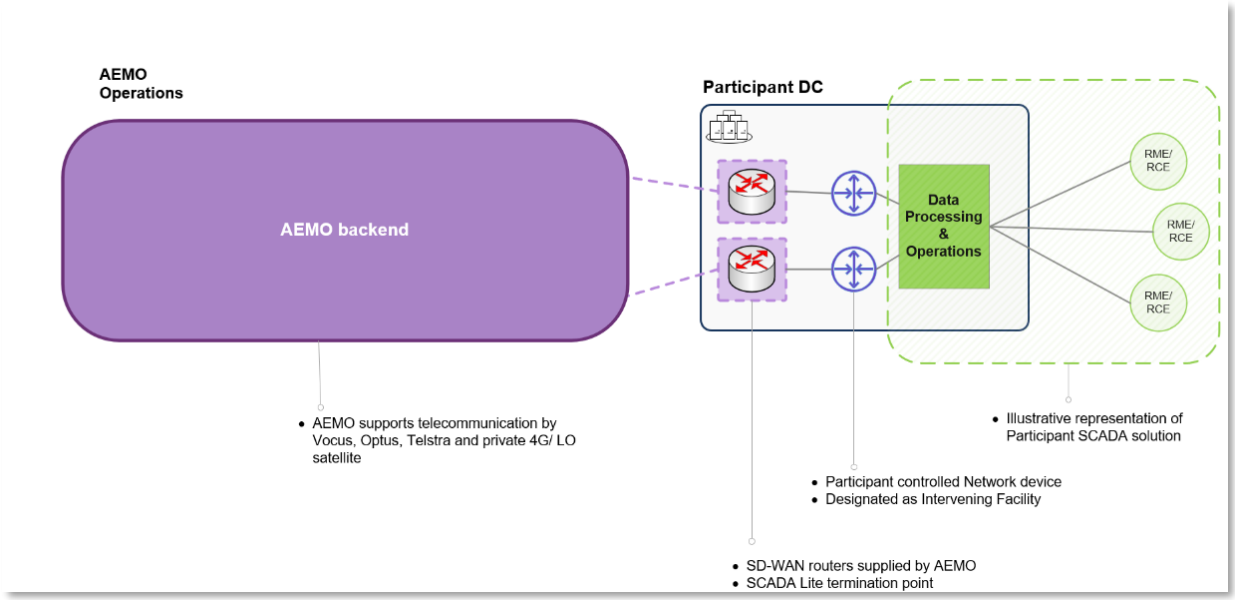
**Figure 1 Eligibility Map**



# Appendix B. Connection Options & Reference Architecture

## B.1 On Prem Architecture option

**Figure 2 SCADA Lite – Use Case 1**

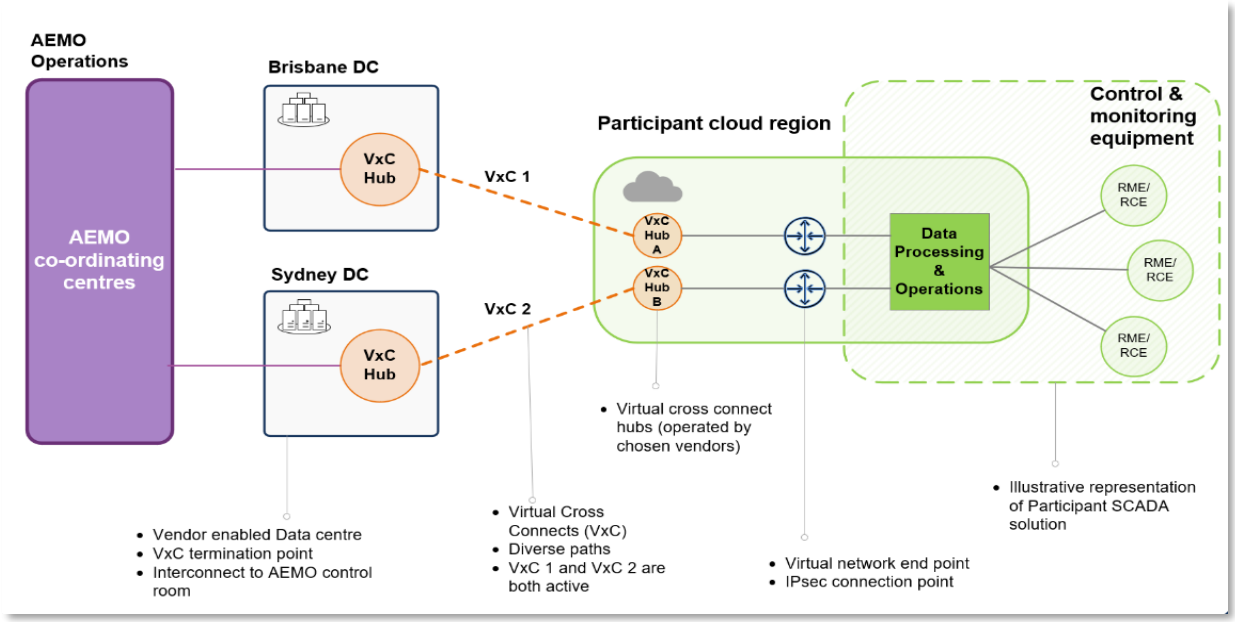



- Dual Cisco SD-WAN routers installed in secure location inside data Centre
- AEMO SD-WAN extended to site facility
- AEMO SD-WAN supported by multiple carriers
- AEMO System is designed as a High Availability (HA) network with no single source of failure
- Authentication and certificate exchange managed by AEMO

Note: RME – Remote Monitoring Equipment, RCE – Remote Control Equipment

## B.2 Cloud Architecture option

**Figure 3 SCADA Lite – Use Case 2**




- The service initially supports the three major cloud providers:
    - Amazon Web Services
    - Microsoft Azure
    - Google Cloud
- Cloud tenancy must be hosted in an Australia based data Centre
- IPsec encryption is utilised over the link to secure traffic within the network tunnels
- VxC (Virtual Cross Connect) links are procured by AEMO
- Minimum requirement: A single region in AWS, in a major Australian data centre. AEMO presence is in Sydney and Brisbane, Australia.
- Connectivity Design between AEMO DCs and Pilot Participant AWS VPCs shall involve both:
    - Underlay network using AWS Direct Connect
    - Overlay IPSEC VPN network.
- The overlay IPSec tunnels are terminated within the AWS (or other cloud provider) VPC and use private addressing.

Note: RME – Remote Monitoring Equipment, RCE – Remote Control Equipment

**Figure 4 Reference Architecture - Cloud**

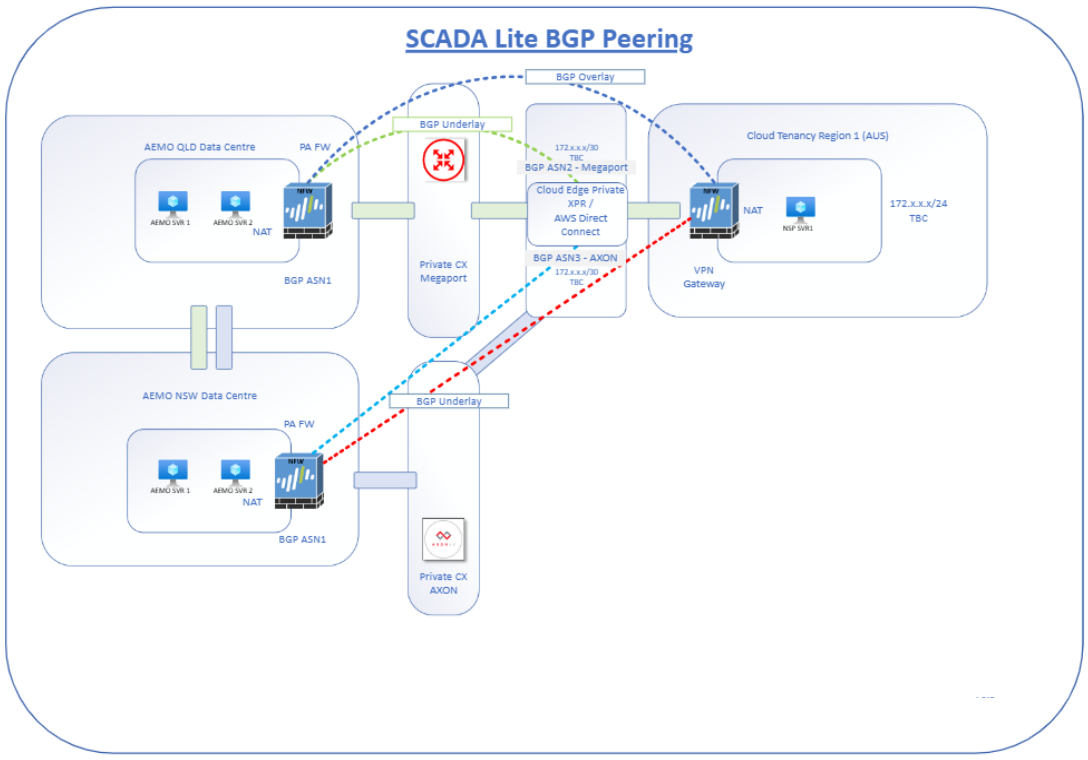



**Figure 5 Intended (reference) architecture for SCADA Lite (A)**

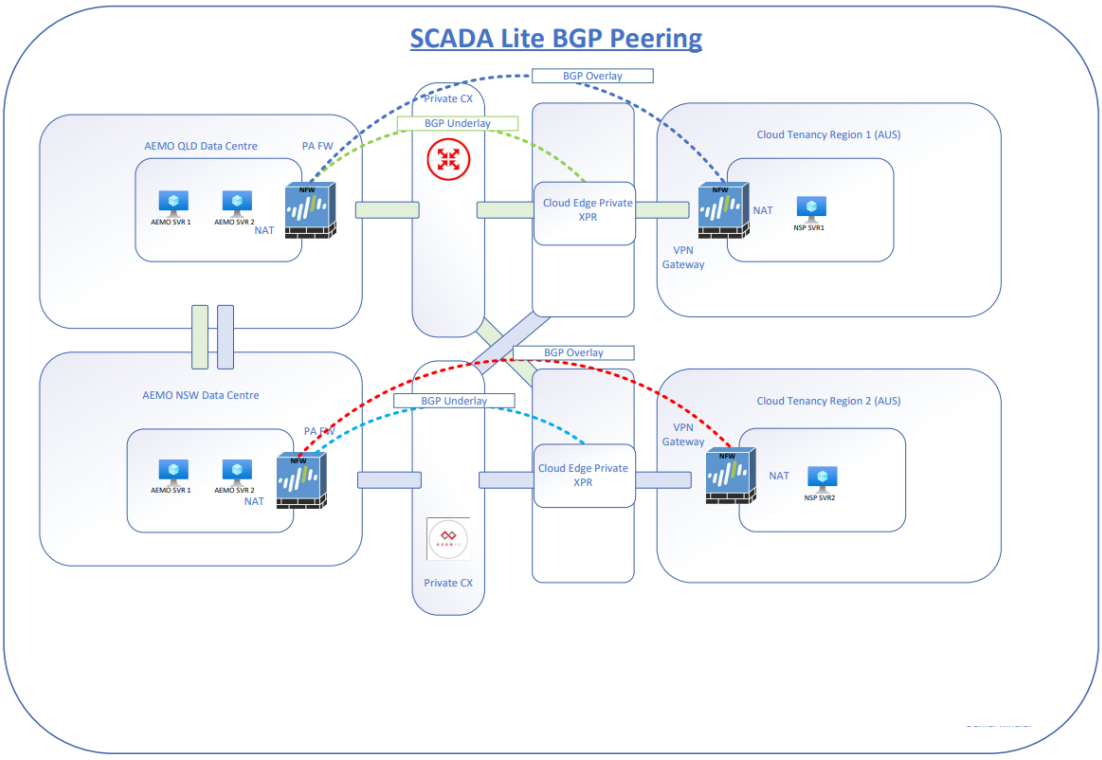


**Figure 6 Cloud reference architecture for SCADA Lite (B)**

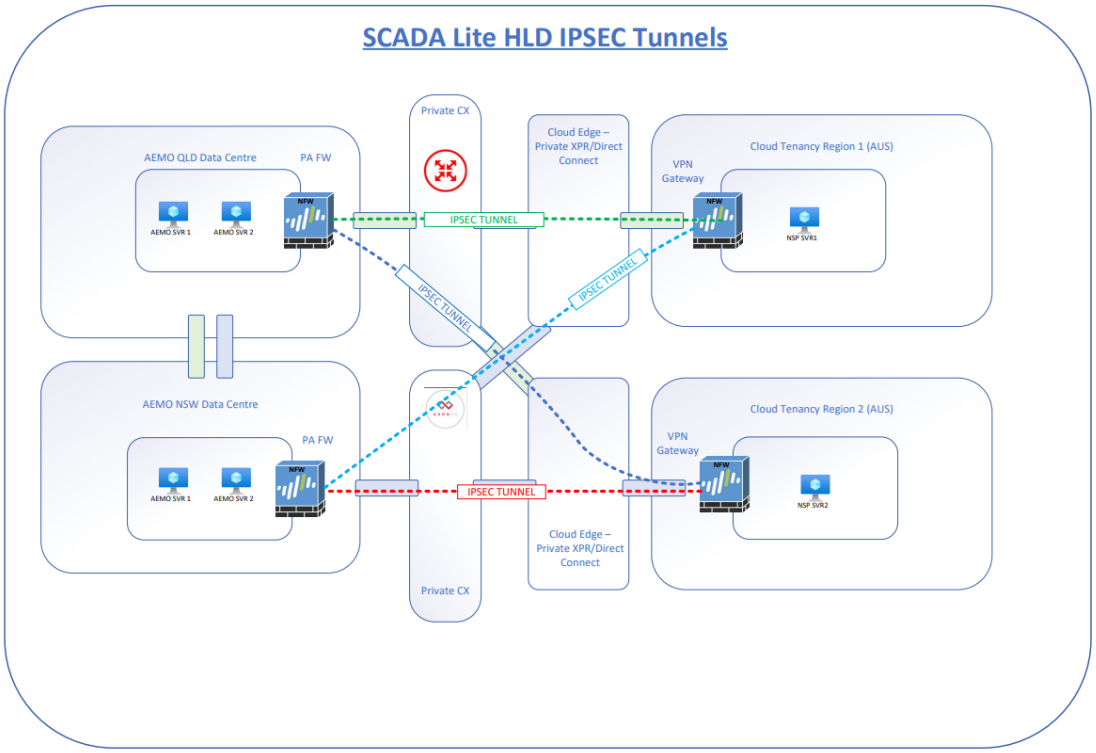
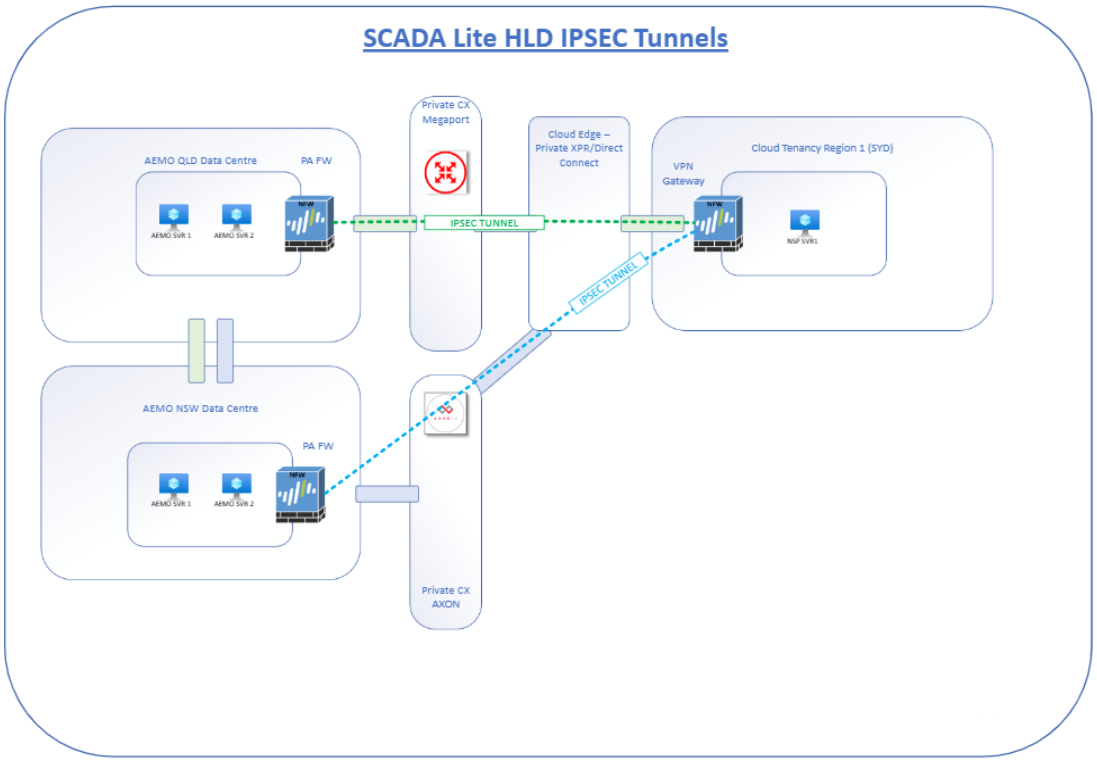



**Figure 7 Cloud Reference Architecture – On prem data centre**



# Appendix C. Supporting Technical Information

## C.1 Reference documentation

- Solution Based on Power System Data and Communication Standard (Version 3.0, 03 April 2023):

## C.2 Non-Functional information

- Peak bandwidth estimate: 50Mb/s.
- Performance target: 2 second acknowledge response.
- Availability: For reference, AEMO's solution availability is 99.9%.
- Monitoring: Each solution component has monitoring established to allow for triage and diagnosis.

## C.3 Power System Data Communication Standard v3.0

SCADA Lite functional and non-functional requirements are developed in line with the published Standard.

Some key clauses that are relevant to a SCADA Lite connection include:

| Item | Description |
|---|---|
| **Protocol Definitions** | All data to be transmitted in either:<br>• Secure ICCP or<br>• Secure DNP3 SAv5.0 (or later version) |
| **Connections** | All intervening facilities must maintain simultaneous active data communications with both AEMO coordinating centers. |
| **Risk Management Plan** | All DCPs must have in place a risk management program that identifies and manages material security risks. |
| **Reliability Requirements** | • Maximum outage times aggregated over 12-month period<br>• Redundant assets<br>• Back-up power supplies for communication infrastructure |
| **Performance Benchmarks** | • End-to-End transmission times<br>• Data resolution |
| **SOCI** | The standard may: |

| Item | Description |
|---|---|
| | i. Extend requirements corresponding with the SOCI Act to DCPs that are not responsible entities or otherwise subject to SOCI Act or;<br>ii. Apply additional requirements to responsible entities in relation to security risks relating to the transmission of Operational Data |

## C.4 Cyber information

Cyber Security Requirements: For cloud-based SCADA Lite connections, the Network connectivity and services that AEMO has designed for, intends to meet the cyber security requirements as per SOCI Act, 2018

Data:

- AEMO considers the data sensitivity to be highly restricted on that day. The next day onward, this data is considered public.
- AEMO has not identified any Personally Identifiably Data in this solution.

# Appendix D. Inter-control Centre Communications Protocol (ICCP)

ICCP versions: 1996-08 and 2000-08 – either version supported.

Secure ICCP: AEMO's secure ICCP implementation uses X.509 certificates.

Supported ICCP blocks are as follows:

| Block No. | Block | Supported | Restrictions |
|---|---|---|---|
| 1 | Basic Services | Yes | N/A |
| 2 | Extended Conditions | Yes | Data sets triggered by external events are not supported |
| 3 | Blocked Transfers | No | |
| 4 | Information Message | Yes | |
| 5 | SBO Device Control | Yes | Get tag and set tag are not supported. |
| 6 | Programs | Yes | |
| 7 | Events | Yes | |
| 8 | Accounts | Yes | |
| 9 | Time Services | No | Only accounts, profile objects, and account requests are supported when ICCP version is 1996-08. ICCP version 2000-08 does not support Block 8 at all. |

Note: Blocks 1, 2, 4 and 5 are required for integrations

# Appendix E. DNP3 configuration

- Secure DNP3 SAV5 encryption is required.