AusNet

Gas Network

Communications Systems Strategy

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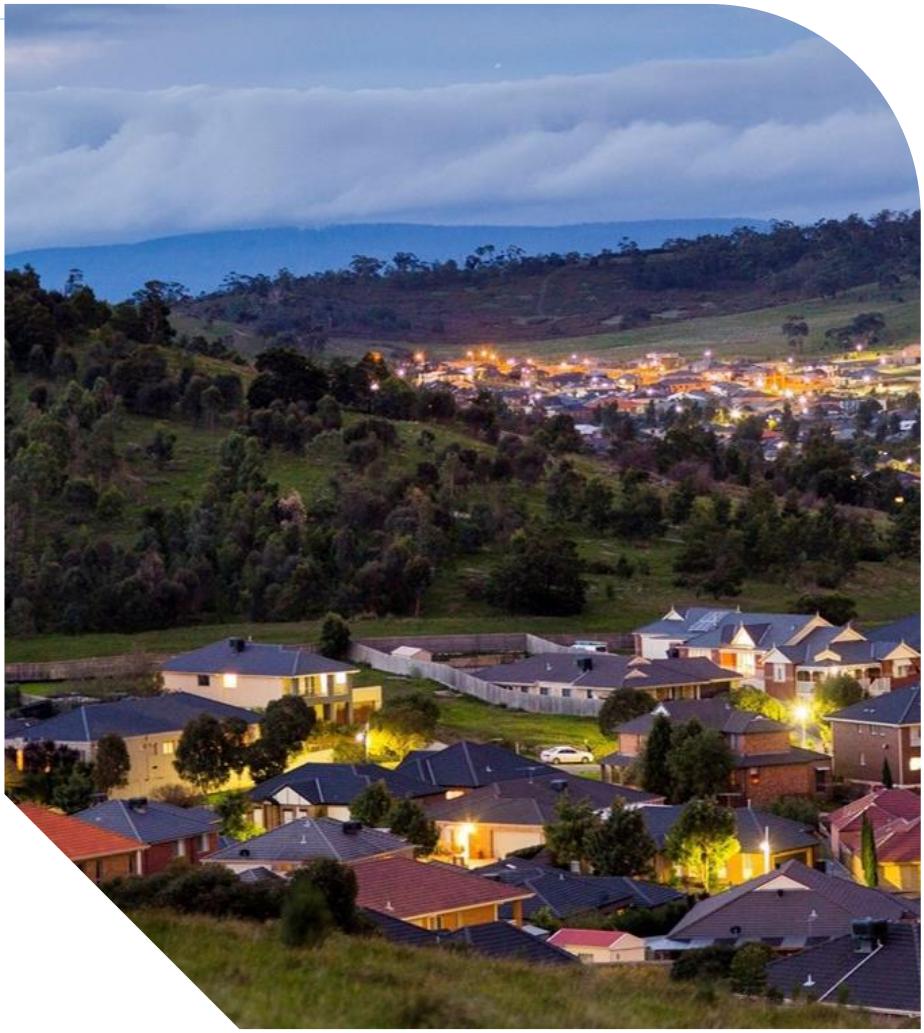

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Executive Summary

This document outlines the strategy to maintain safe and reliable operations of communications assets for the 2024-28 access arrangement period. These assets perform a critical function in delivering gas by enabling the transfer of information between remote gas stations and the CEOT. The strategy provides overview and analysis on asset performance, risks and investment required within the stated period to maintain safe and reliable operation.

AusNet Services operates and maintains a communications system that supports the energy networks including the gas distribution network. The various systems include both AusNet owned and leased services. This strategy covers communications assets that are related to the management and operation of the gas network, primarily related to Supervisory Control and Data Acquisition (SCADA) applications. The main activity in the coming period will be to identify a suitable replacement of the current point-to-multipoint radio which has reached end-of-life.

Further to this, AusNet Services has seven key network objectives to which the gas network is operated. These objectives are:

- Maintain network safety in accordance with the Gas Safety Case;
- Maintain top quartile operating efficiency;
- Undertake prudent and sustainable network investment;
- Delivery of valued services to our customers
- Simplify and remove cost by investing in technology and automation;
- Provide sector leading customer experience by improving systems, processes and communication; and
- Secure future of gas with increased utilisation and renewable gas options.

Error! Reference source not found. below provides an overview of the CAPEX requirement associated with this asset class for the 2024-28 regulatory period.

Table 1: Planned Communications Systems Capex Summary ($2022, $'000)

PROGRAM	2023-24	2024-25	2025-26	2026-27	2027-28	2024-28 TOTAL
		[C.I.C]				

1. Document Overview

1.1. Purpose

This Asset Management Strategy articulates AusNet Services' approach to the management of communications assets associated with the Gas Network. The strategy details the asset performance, risk, and investment requirements to support delivery of safe and reliable gas services.

1.2. Scope

The scope for this strategy incorporates the following asset categories:

- AusNet Services Point-to-Multipoint Private Radio
  - Radio base stations
  - Radio remote modems
- Third Party Wireless Mobile Telephone System
  - Remote Modems

1.3. Asset Management Framework

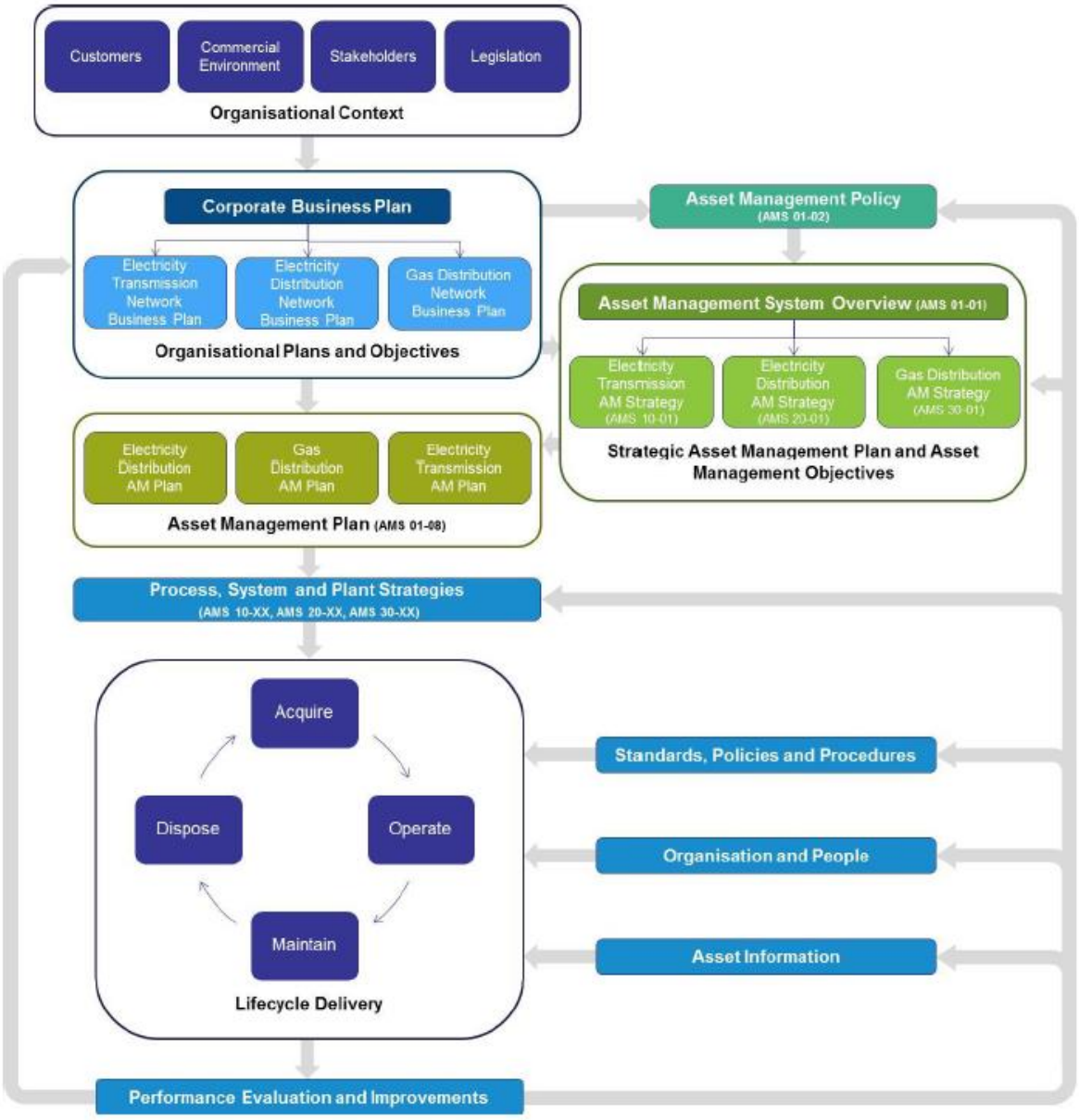

Figure 1 below provides an overview of AusNet Services asset management framework. This framework is centred around the objective to operate the network in top quartile of efficiency benchmarks with an aim to care for customers and strive to make energy more affordable.

The Gas asset management strategy plays a key role in ensuring alignment between asset management objectives, corporate objectives, and stakeholder requirement. This document is one of the strategies providing visibility on network performance, issues, risks, and investment required to support delivery of safe and reliable service and achieve the long-term objectives of the gas distribution network.

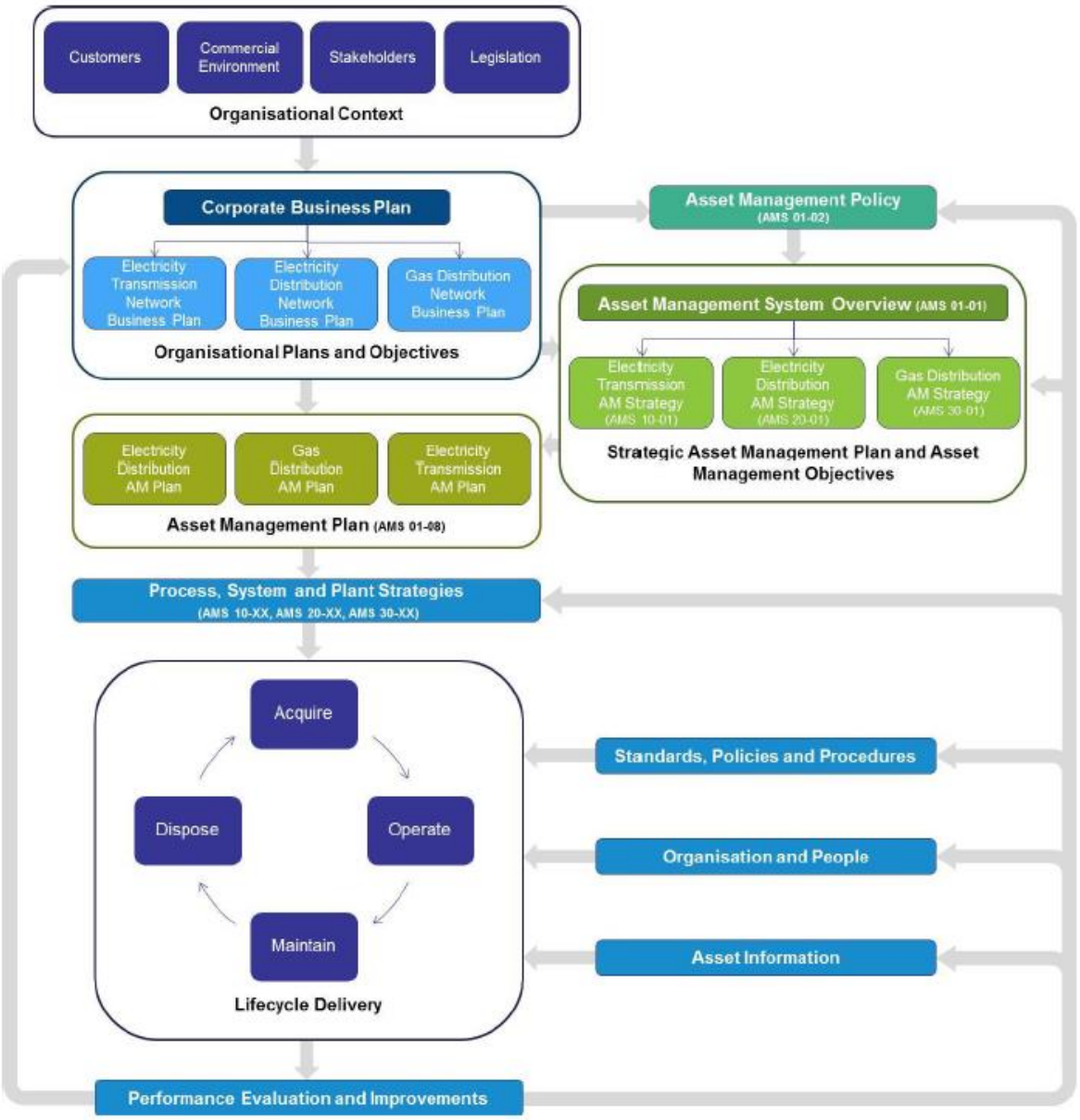

Figure 1: Ausnet Services Asset Management Framework

1.4. References

The following regulations and requirements are applicable to and influenced the design, operation, and maintenance of the communications asset class:

- AMS 30-01 Gas Network Strategy
- AMS 30-57 SCADA Strategy
- AMS 20-14 Infrastructure Security

2. Alignment with Drivers

AusNet Services' purpose statement is "Connecting communities with energy and to accelerate a sustainable future". This statement places the customer (as individuals and communities) at the forefront as a business driver and acknowledges the critical relationship with their energy supply and usage. The following diagrams shows that Customers are a key theme linking the Corporate Business Strategy with the Gas Network Vision and Gas Network Objectives, which influence the key plant strategies forming the basis of the regulatory submission.

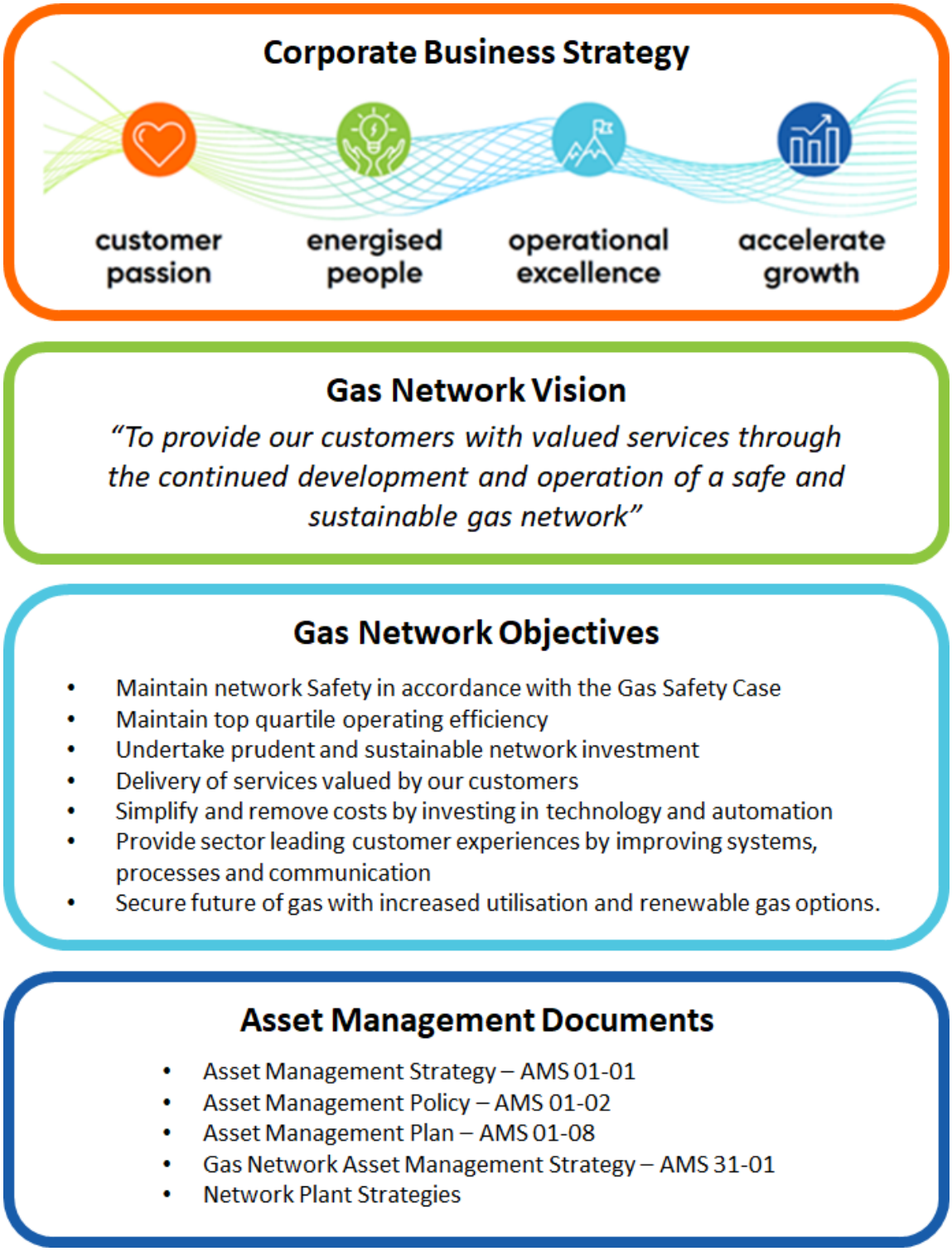

Figure 2: The Business Strategy, Network Vision and Objectives all centre around our customers

The Gas Network Objectives align with the four Corporate Business Objectives as shown below:

Maintain network Safety in accordance with the Gas Safety Case.

Maintaining network safety supports our commitment to "Mission Zero", ensuring our people go home safety at the end of the day. This is one of the strategic priorities of the "energised people" corporate objective.

Maintain top quartile operating efficiency.

AusNet Services aspires to operate all three of its core networks in the top quartile of efficiency benchmarks. This aligns with the "operational excellence" corporate objective.

Undertake prudent and sustainable network investment.

This network objective supports AusNet Services' obligation to undertake prudent and sustainable network investment, as defined in the National Gas Rules and Gas Distribution System Code. This in turn aligns with the "operational excellence" corporate objective.

Delivery of valued services to our customers.

AusNet Services strives to better understand our customers (their needs and behaviours) in order to deliver the services they value. This aligns with the "customer passion" corporate objective.

Simplify and remove costs by investing in technology and automation.

By working more efficiently, AusNet Services improves its "operational excellence" and provides better value for customers.

Provide sector leading customer experiences by improving systems, process and communication.

Similarly, improving how we work increases efficiency, thereby improving "operational excellence".

Secure future of gas with increased utilisation and renewable gas options.

Exploration of renewable gas options and the role gas will play in the energy ecosystem of the future will support the "accelerate growth" corporate objective.

3. Gas Network Overview

3.1. Asset Locations

The AusNet Services Gas network communications assets cover parts of western Victoria. The assets at approximately 238 geographical locations, include RTU locations, radio sites, and data centres as shown in Table 2.

Table 1: Gas Communications Asset Locations

COMMUNICATIONS ASSET LOCATIONS	QUANTITY
Radio Sites	9
Data / Control Centres	2
RTU Locations	227
Total	238

3.2. Network Architecture Overview

Figure 3 shows linkages of the communications assets used for the operation of the gas network.

- Radio Access Network (RAN)

  Provides the connection from the field devices to the radio base station. Consists of radio modems and the point-to-multipoint radios.

- Backhaul Network

  Connects the RAN to the data centres. The backhaul network consists of optical fibre and point-to-point radio links.

- Leased Services

  Provides the connection from field devices to the data centres in areas where the AusNet Services private radio is not accessible. This includes AusNet Services owned 3G/4G modems, third party 3G/4G networks, and leased backhaul links.

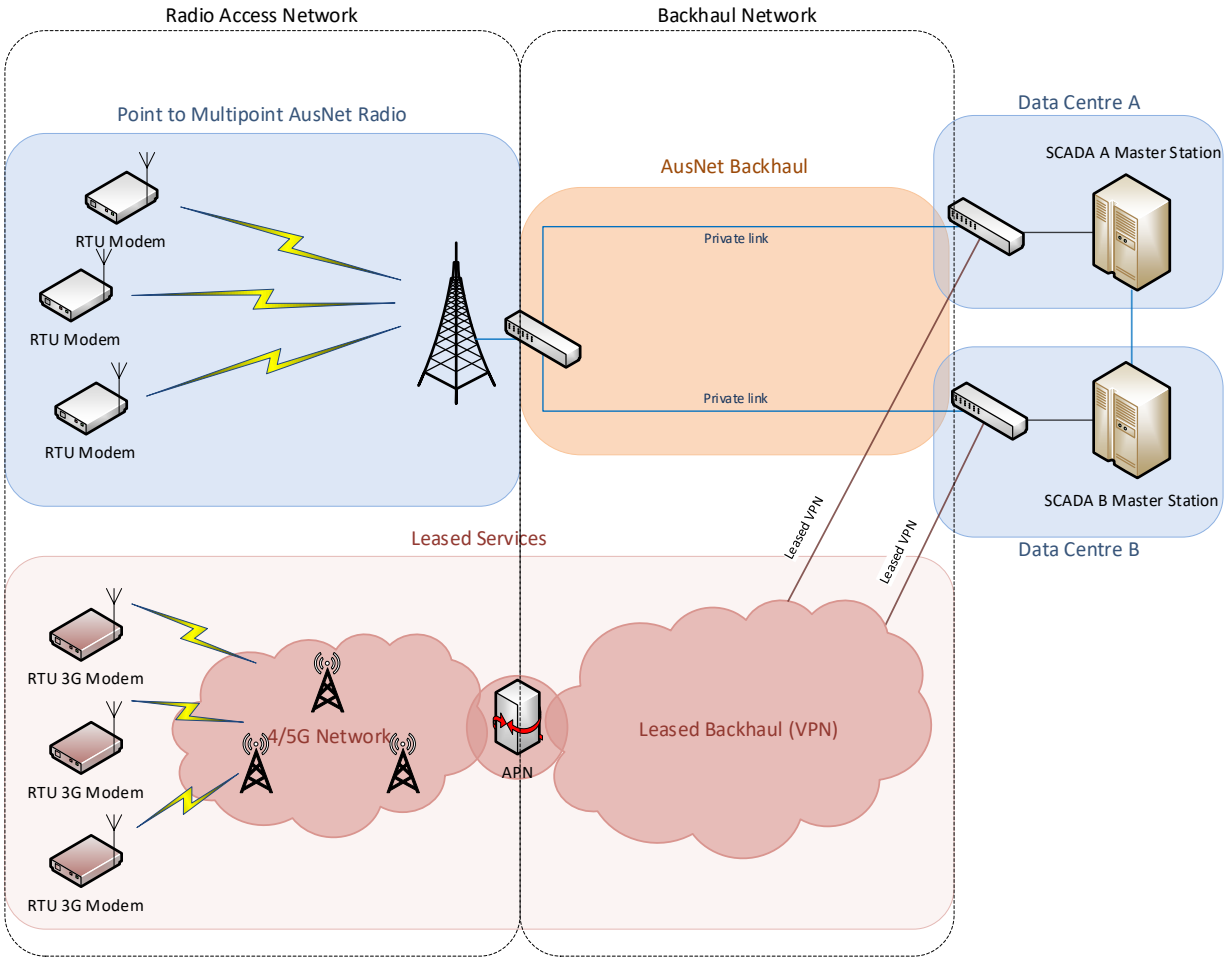

Figure 3 Communications Network Architecture

4. Asset Overview

4.1. Introduction

The SCADA network infrastructure provides real-time data such as pressure, temperature, and flow, from field operating assets to the Customer and Energy Operations Team (CEOT). This data is used for real-time monitoring of the network as well as provide long-term trending information. This can be employed for long-term evaluation of gas demand and for network modelling to improve network capacity and system performance. SCADA is an integral tool for controllers and engineers, assisting in effective responses during emergencies and real-time operational management of the network.

The Gas SCADA network infrastructure can be separated into three main categories:

- Master Station: Controller interface at CEOT
- Remote Assets: Control, monitoring and auxiliary equipment on site
- Communications: Remote modems, radio base stations, and backhaul networks

4.2. Asset Summary

Table 2 provides a summary of AusNet Services' Gas Communication assets (as of June 2021).

Table 2: AusNet Services' Communications Assets

ASSET TYPE	QUANTITY	CONDITION SCORE
	[C.I.C]	

4.3. Master Station

Refer to *AMS 30-57 SCADA Strategy*

4.4. Remote Assets

Refer to *AMS 30-57 SCADA Strategy*

4.5. Communications Assets

Communications assets are an integral part of the SCADA network and ensure that information from and to the gas network can be transported to and from the master station. AusNet Services utilises two types of technologies to provide services for the gas network:

- AusNet Services Point-to-MultiPoint (P2MP) Private Radio
- Third-party Leased Wireless Mobile Telephone Services

These are both shown in Figure 3 above.

4.5.1. AusNet Services P2MP Private Radio

The network includes eight P2MP radio base-stations and 149 remote devices as shown in Table 4.

Table 3: Base Station Locations

BASE STATION	SITE NAME	COVERAGE	RTU'S
Arthur's Seat	Arthur's Seat	South / Southwest Melbourne	3
Bayview	Gnarwarre	Geelong	16
Brooklyn	Altona North	West Melbourne	21
Dunn's Hill	Ferny Creek	West / Southwest Melbourne	11
One Tree Hill	Bendigo	Bendigo	5
SYTS "A"	Sydenham	West Melbourne	37
SYTS "B"	Sydenham	West Melbourne	41
Warrenheip	Warrenheip	Ballarat	15
Total RTUs			149

The P2MP radio backhaul leverages the communications infrastructure of the electricity network. However, there are three point-to-point radio links used solely by the gas network.

- Bayview – MLTS (1 link)
- Arthurs Seat – BLTS (2 links)

4.5.2. Third-party Leased Services

There are 78 leased 3G/4G services for the gas network. Leased services provide coverage where the AusNet Services private radio network is not economically feasible.

In addition to the remote access service, AusNet leases IPMAN/WAN services to provide backhaul for the remote services.

4.6. Condition Profile

Remote modems are replaced on asset failure or due to technological upgrades as dictated by the base radios or third-party service providers. They are not pro-actively replaced based on expected life.

The point-to-multipoint base radios and point-to-point radios are assigned a condition score using an internal AusNet Services methodology. Each asset's condition score dictates the required maintenance.

4.6.1. Asset Condition Scores

One of the methods used by AusNet Services to monitor asset life is a five-level rating scale called the condition score; C1 to C5. The score is a result of parameters computed into a numerical value and then converted to the rating scale. The parameters used to calculate the aggregate score are shown in Table 4. The interpretation of the scores is provided in Table 5.

Table 4: Parameters for Calculating Condition Scores

CATEGORY	ELEMENT	DESCRIPTION
Establishment	Working Environment	Buildings, air conditioning, cable trays, cable ducts, cubicles
Obsolescence	Maintainability	Tools used, resourcing skills, upgrades
	Spares	Spares required to maintain the asset
	Asset Function	What the asset is expected to do
	Technology	Efficiency of the technology
Economic Life	Planned Maintenance	Comparison of recommended planned maintenance frequency to actual planned maintenance frequency
	Repair Rate	Comparison of expected constant failure rate to actual failure rate
Safety and Environment	Safety Ecological legislation impact	Compliance with safety, state and federal laws, industry regulations
Degradation	Utilisation	Design capacity of the asset being utilised
	Maintenance and Inspection	Measurable condition after maintenance or inspection

Table 5 Description of Condition Score

CONDITION SCORE	CONDITION	DESCRIPTION	REMAINING SERVICE POTENTIAL
C1	Very Good	- Some aging or minor deterioration of a limited number of components - Normal maintenance	95%
C2	Good	- No trends of deterioration in condition or performance recorded - Normal maintenance	70%
C3	Average	- Asset showing signs of deterioration in performance - Manufacturer support is becoming limited - Asset typically requires increased maintenance and monitoring	45%
C4	Poor	- Serious deterioration of asset performance - Manufacturer support and spares is typically not available - Start planning process to replace considering risk and consequences of failure	25%
C5	Very Poor	- Extensive serious deterioration of asset performance - Manufacturer support not available - Depleted stocks of spares - Lack of experience and skills required to maintain asset - Immediately assess risk and replace based on assessment	15%

4.6.2. P2MP Private Radio

The P2MP radio equipment is manufactured by [C.I.C] . The base stations are [C.I.C] , and the remote modems are the [C.I.C] model.

The [C.I.C] are in condition C4 (poor) which means no manufacturer support for the model.

4.6.3. Leased Services

The condition score of leased service devices is largely dependent upon the third-party network. Currently, 3G enabled modems have a condition score of C4 because of the impending shutdown of the 3G network.

4.6.4. Point-to-Point Radio Backhaul

The Point-to-Point backhaul links utilise similar [C.I.C] as the remote modems from [C.I.C] .

These radios have a condition score of C4 as shown in Table 3.

5. Risk

Failure of SCADA equipment can result in catastrophic failure of gas equipment in the field. The CEOT would have no visibility of current operating characteristics such as pressure, temperature and set points. It would prevent the CEOT from both proactively anticipating faults, and reactively responding once a fault has occurred.

Constant visibility of data points at sites ensures that gas controllers can make informed decisions based on real-time data. It also mitigates the risk of public harm by ensuring that failure of high consequence equipment results in prompt CEOT and field response, and therefore rectification. Public safety risk arises from the possibility of explosion if equipment design limits are breached and not immediately identified.

6. Communications Asset Strategies

6.1. Technology issues and drivers

6.1.1. Technology/Service Lifecycle

Lifecycle management of the communications assets depends on the provision of the service. The AusNet Services private radio is dependent on asset condition whereas the leased services is governed by the providers' roadmaps.

The asset condition of most communications assets is heavily influenced by obsolescence. Diminishing manufacturer support and the lack of spares parts are key contributors. The [C.I.C] devices are in condition C4.

The Third-party leased 3G network is due for decommissioning at the end of December 2023 and is being replaced with 4G/5G networks. Based on earlier mobile network lifecycles trends, it is estimated that the 4G network will be in service at least until 2028, and 5G will be in service well beyond 2030.

Telecommunication companies are rolling out a new standard and protocol called the Internet of Things (IoT) in anticipation of a growth in machine-to-machine applications. Benefits of this standard from a gas network perspective include increased coverage, lower cost, and lower remote device power requirements. Therefore, as gas systems become "smarter", communications devices will be available at reasonable cost to expand the monitoring and control functions available today.

It is also anticipated that IoT will mitigate some of the technology lifecycles (4G to 5G) considerations, enabling devices to operate across multiple carrier technologies.

6.1.2. Coverage

The dispersed nature of remote devices over a wide geographical area presents coverage challenges for reliable wireless communications. This is a particular challenge if network intelligence begins to extend to areas of the gas network where wireless network coverage is not as accessible.

While the AusNet Services P2MP private radio can provide a means to economically establish network coverage to devices over a relatively large geographical area (up to 40km in radius), environmental factors and obstructions do impact coverage and performance within a given area.

Third-party wireless mobile networks 3G, 4G, and 5G provide an alternative where the private radio is not economical. It is anticipated the newer 5G network will substantially increase the current coverage of wireless mobile networks.

Satellite services can provide coverage in areas where both the private radio and wireless mobile networks are not practical. However, the high cost of the service limits its viability for application in the gas network.

6.1.3. Cyber Security

Security including Cyber security is a key regulatory requirement for critical infrastructure. Details of infrastructure security strategies are covered in AMS 20-14 and the CS 10-05 Cyber Security Framework.

6.2. New Remote Device Implementation

- New remote devices will be of the following, in order of preference:
    - 4G/5G Modems
    - Latest generation of private radio modems

6.3. Radio Access Network Strategy

- Evaluate the remaining number of private radio modems
- Transfer private radio modems to the third-party leased services where wireless mobile coverage is available
- Identify and replace existing E-Series radio base stations with latest generation alternative
- Replace failed remote radio modems with the following, in order of preference:
    - 4G/5G modems
    - [C.I.C]
    - [C.I.C]

6.4. Backhaul Network Strategy

- Replace TRIO E-Series Point-to-point radios with latest generation private radio technology

6.5. Third-party Leased Network Strategy

- Complete the replacement of 3G modems with 4G/5G enabled devices
- Develop IoT service technologies to leverage next generation wireless capability and coverage

7. Alignment with Network Objectives

This section provides an overview of the alignment of the program proposed in the Communication Systems Strategy with the gas network objectives which govern how the network is operated and maintained. See Section **Error! Reference source not found.** for detail on AusNet Services' gas network objectives.

Gas Network Objectives
Maintain network safety in accordance with the Gas Safety Case; • The proactive replacement of C4 and C5 equipment reduces the possibility of asset failure, reducing the risk from a potentially unsafe environment. Maintain top quartile operating efficiency; • Replacing existing condition C4 point-to-point radios will ensure a reliable communications network which provides controllers with accurate and timely information to make informed decisions. Undertake prudent and sustainable network investment; • C4 and C5 replacement eliminates assets that are expensive and difficult to maintain. • The implementation of safety related programs are considered prudent investment to the network Deliver valued services to customers; • A reliable communications system enables visibility of RTUs and allows the controller to detect and act to avoid excessive pressure drops, which can impact on supply reliability to the customer. Simplify and remove costs by investing in technology and automation; • This strategy promotes investment in the latest available technology. Provide sector leading customer experiences by improving systems, process and communication; • A strong communications network will enable better reliability for customers. Secure future of gas with increased utilisation and renewable gas options. • As various blends of renewable gasses are introduced to the network, there will be increased requirements to collect and transmit data on parameters such as gas composition and flow rates.

8. Detailed Capital Expenditure Requirements

8.1. Phasing and Financial Disclosure

All programs are defined in Australian financial years, aligning to regulatory years from July until June of the ensuing year.

All financial figures quoted within this document, including all historic and forecasted expenditure - unless otherwise specifically stated – have the following characteristics:

- Real Expenditure / Cost (reference year = 2022);
- Direct Expenditure only (i.e. excludes overheads and corporate finance costs); and
- In units of $1,000 (i.e. '000).

8.2. Replacement of Point-to-MultiPoint Radio

Table 7: Planned Communications Systems Capex Summary ($2022, $'000)

PROGRAM	2023-24	2024-25	2025-26	2026-27	2027-28	2024-28 TOTAL
		[C.I.C]				

This program of works addresses replacement of the private radio base stations and radio remote modems. Assessment of the communication network assets identified that, in general, the assets are in good health, considering the short expected lifespan of communications assets. Most assets fall in the C4 condition which means a remaining life of 3-5 years. It is proposed to initiate the replacement program at the beginning of the 2024-28 regulatory period.

To maintain the current level of network availability this program proposes to replace the following group of assets:

PTMP Radios

- 8 base radios installed on the communication network
- 100% (8) are in condition C4

[C.I.C] modems

- 149 modems installed. Estimate 74 will be transferred to 4G/5G service
- 75 modems considered to be in condition C4 (because of the base radios)

PTP Radios

- 6 point-to-point radios installed on the communication network
- 100% (6) are in condition C4

8.3. Scopes of Work

The works will include:

Equipment design, installation, and commissioning

Transfer of services

Update asset management systems with new asset data as part of completion of works

8.3.1. PTMP Radios

Replace radios at sites shown in Table 9 A

- 8 new radios
- Decommission and remove old equipment

8.3.2. [C.I.C] modems

[C.I.C] sites as shown in Table 9 A

- 75 new modems
- Decommission and remove old equipment

8.3.3. PTP Radios

Replace radios at sites shown in Table 9 A

- 6 new radios
- Decommission and remove old equipment

8.4. Project Budget

Table 8: Project Budget ($2022, $'000)

PROGRAM	QUANTITY	UNIT COST	AMOUNT
	[C.I.C]		

A. Remote Sites

Table 9 Remote Site Locations

NAME	FUNCTION LOCATION	MODEM	LOCATION	SUBURB	BASE STATION / SERVICES
			[C.I.C]		

[C.I.C]

[C.I.C]

[C.I.C]

[C.I.C]

[C.I.C]

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