Branch Manual: Technology Guideline – Places in the Network CEOM7621.01

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1.0 PURPOSE

The purpose of this manual is to outline the Telecommunications Infrastructure requirements for different locations within Essential Energy including subsidiary company Essential Water (EssW).

This document outlines the expected performance parameters for the availability of Telecommunication and Infrastructure services based on the classification of Essential Energy locations.

1.1 Intended Audience

This document is intended to be used by telecommunications architects and specialists to assist with the design and implementation of telecommunications services and systems.

Internal stakeholders should review this document to ensure that they are aware of the service levels and availability targets for Essential Energy sites and systems.

1.2 Outcomes

Adherence with this technology guideline will achieve the following outcomes:

- Ensuring the availability of critical Telecommunications services in support of business requirements
- Providing designers with a common and consistent approach to the delivery of Telecommunications services
- Ensuring that operational expenditure, particularly carrier services, are kept to a minimum whilst delivering agreed service levels

2.0 ACTIONS

To ensure compliance with this guideline the following governance shall be implemented:

- All new corporate locations, e.g. Depots and Corporate offices, will be classified by the Telecommunications or Infrastructure Architects prior to any Architecture or Design being undertaken. Any site that is being moved or relocated but maintains the same functionality does not require reclassification

- All network specific locations, e.g. Zone Sub Stations, will be classified by Engineering Services and Infrastructure Strategy prior to any Architecture or Design work being undertaken

- New WAN service technologies not listed in Table 4 must be evaluated and classified by the Telecommunications Architect prior to them being included in agreed service types

- A waiver may be submitted by the Telecommunications team for approval by the Telecommunications or Infrastructure Architects should there be a justified business case for architecture to be provisioned outside the parameters of this guideline.

2.1 Site Classifications

Alignment with Critical Infrastructure classifications

2.1.1 Core Infrastructure Locations

Core Infrastructure Locations are facilities that provide Company wide services, including to external stakeholders. Interruptions of these services and locations have the potential to impact critical services to large parts of the organisation and external partners.

2.1.1.1 Carrier Neutral Facilities

Carrier Neutral Facilities are locations that provide interconnection and aggregation of data network services. Typically these are commercial facilities with high density connectivity from multiple carriers and service providers. CNFs may be operated by a single carrier however equitable access to multiple providers on an indiscriminate basis is a key attribute of these locations.

CNFs are utilised by Essential Energy as core network locations that aggregate WAN connectivity, provide secure cloud connectivity, internet perimeter services, and connections to partner organisations either through dedicated services or VPN functionality. Some compute services may exist to facilitate connectivity and perimeter protection however it is typically not a location for data at rest.

2.1.1.2 Data Centres

Data centres are locations for provision of Essential Energy compute services, processing of data, and storage of data at rest. Note that data centres may also provide all of the functionality of a Carrier Neutral Facility and have identical requirements for high availability and provision of carrier services.

2.1.2 Offices and Depots

2.1.2.1 Site type 1

No permanent staff or infrastructure.

2.1.2.2 Site type 2

Minor depot, no Operational Technology or Radio Systems.

2.1.2.3 Site type 3
Minor depot and/or supporting type 3 and below Operational technology systems.

Location with more than 25 staff or supporting Operational Technology systems.

2.1.2.4 Site type 4

Major regional depot, large corporate office and/or supporting type 4 or 5 Operational technology systems.

2.1.2.5 Site type 5

Office or depot supporting critical functionality for Network Operations or Customer Contact Centre.

2.1.3 Zone Substations

Zone Substations will be classified by Asset Management & Engineering, Essential Technology, and System Control. The initial methodology used will be based on MVA of current and predicted load, as well as the function the ZS performs in the wider sub-transmission system. Per site classification will then be confirmed or modified by agreement of stakeholders.

2.1.3.1 Site Type 1

Zone Substation without installed SCADA system. May utilise reclosers for control of electrical network.

2.1.3.2 Site Type 2

Small ZS with load less than 5MVA.
(Previously type 4 substation).

2.1.3.3 Site Type 3

Small to medium ZS with load less than 20MVA but greater than 5MVA.

2.1.3.4 Site Type 4

Medium to large ZS with less than 60MVA but greater than 20MVA.
(Previously type 2 substation).

2.1.3.5 Site Type 5

Critical ZS with greater than 60MVA or connecting major generation or performing critical function in electrical network. Any sites with AEMO interest will be classified as a Type 5 ZS.
(Previously type 1 substation).

2.1.4 Radio Sites

2.1.4.1 Site type 1

Not applicable.

2.1.4.2 Site type 2

Voice repeater site with no data or SCADA services.

2.1.4.3 Site type 3

Intermediate voice site or SCADA communications location.

2.1.4.4 Site type 4

Voice hub site, data or SCADA hub site.

2.1.4.5 Site type 5

Critical radio site supporting teleprotection services or MPLS WAN to critical locations.

2.1.5 Pumping Station/ Water Treatment Plant

Pumping Stations (PS) and water treatment plants (WTP) are critical in the safe supply of water for the greater Broken Hill Area (Menindee, Sunset Strip and Silverton). Communications to these sites allows EssW system controller to see and remotely adjust chemical dosing, pressure, flow and water levels. These sites will be classified by Water Treatment Plants and Pumping Stations department in conjunction with the Telecommunications Architect.

2.1.5.1 Site type 1

Very small pumping or monitoring stations that are operated manually or in a closed network with a sensor.

2.1.5.2 Site type 2

Small pumping stations or water treatment plants serving a small population.

2.1.5.3 Site type 3

Critical sites servicing majority of a town.

2.1.5.4 Site type 4

Critical sites servicing all the Broken Hill water network.

2.1.5.5 Site type 5

Not applicable

2.1.6 Field locations and miscellaneous network infrastructure

Field locations consist of electrical and water network infrastructure outside of depots, zone substations and other Essential Energy controlled locations.

2.1.6.1 Reclosers

Reclosers perform line tripping, control and isolation functions for distribution feeders. Reclosers perform safety functions automatically however are remotely controlled during scheduled switching.

2.1.6.2 Critical reclosers

Reclosers may be designated as performing a critical role due to the electrical network topology, mitigation of hazards, or frequency of remote use.

2.1.6.3 Switching Equipment

Switching equipment, usually SF6 Gas Switches, may be operated remotely for segmentation and isolation of feeders.

2.1.6.4 Voltage Regulation Equipment

Not applicable.

2.1.6.5 Metering

Bulk metering and statistical metering is typically located within Zone Substations. Communications may be integrated with the Zone Substation or segregated.

2.1.6.6 Line Fault Indicators

Line fault indicators are installed on sub-transmission lines and distribution feeders to provide remote indication of fault conditions affecting the line.

2.1.6.7 Power Quality Metering

Power quality metering equipment monitors power conditions on distribution and transmission systems. It does not perform remote operation actions on the electrical network.

2.1.6.8 Distribution substations and low voltage monitoring

Instrumentation on distribution substations and low voltage infrastructure provides remote monitoring of conditions on distribution substations, typically pad-mount and chamber substations, as well as conditions on low voltage infrastructure.

2.1.6.9 Smart street lighting

Smart street lighting provides remote control and operation of street lighting. Typically street lights are connected in a mesh network, with a local gateway providing further connection into Essential Energy infrastructure or third party providers.

2.1.6.10 Stand-Alone Power Systems

Stand-alone Power Systems (SAPS/SPS) are off-grid systems that operate independently from the main electrical grid and supply electricity to a small number of customers in rural areas. Each SAPS consists of a renewable energy supply such as solar panels, battery, and backup generator. SAPS are evolving within Essential Energy and so will the telecommunications requirements.

2.1.6.11 Water Booster station

Water booster stations are used to increase the water pressure along a pipeline. These are normally seen along the Wentworth to BH and BH to Menindee pipelines. The system controller at Mica Street has the need to make remote controls to these sites.

2.1.6.12 Water remote sensors/analysers

Water sensors are used extensively throughout the EssW SCADA network. They are used to measure water levels, chemical dosing, flows and pressure levels. These sensors allow for manual or automation of pumps to turn off/on, adjust chemical doing and acquire data accordingly.

3.0 ARCHITECTURAL REQUIREMENTS

3.1.1 General

Minimum bandwidth should be based on 2Mb/s per permanent staff member located at the office or depot.

Interconnected sites should provide sufficient availability and bandwidth for the largest or most critical site in the interconnected system.

3.1.2 Core Infrastructure Locations

Facilities
The facilities housing infrastructure must meet the Uptime Institute rating of Tier III as a minimum. This provides for an average SLA resulting in system availability of 99.98% (1.6 hours per annum unavailable). The facility must have fire detection and suppression capability that does not risk damage to installed equipment.

Security
Locations must meet requirements for Critical Infrastructure including multiple layers of logged electronic access control, electronic intrusion alarm system, and closed circuit television systems with recording capability.

Telecommunications
Requires a fully diverse path through access, distribution, and WAN layers, including carrier services, routers, switches, etc. Access to Essential Energy Wide Area Network must via dual, high grade services at a minimum of 1Gbps per service. Physical delivery of carrier services should utilise multiple independent building entry points and delivered on services that are resistant to natural disasters and civil disturbances.

Power Supply
Fully redundant A/B power systems are required, including distribution infrastructure. Uninterruptible power systems may operate with N-1 redundancy, however dual distribution boards and busses are required to allow for de-energisation of either A or B supply without interrupting facility operation.

Standby power systems (generators) must be capable of minimum 48 hours runtime on full facility load, including cooling systems and general light and power for worker safety.

Cooling
Facility cooling systems must provide N-1 redundancy. Cooling systems must be capable of running from standby power supply (generators).

3.1.2.1 Carrier Neutral Facilities

Access to multiple carriers and service providers at bandwidths exceeding 10Gbps.

3.1.2.2 Data Centre

Provision of minimum two racks with each rack providing at least 5kW power and cooling capacity. Compute racks must provide fully redundant communications through either top of rack switching or adjacent communications racks. All compute switching must utilise separated, redundant control planes to allow for software upgrades and switch reboots. A single switch stack with multiple stack members is not sufficient.

Data centre racks should be individually locked with provision of keys or access recorded for each use. For commercial data centres, a separated cage should be provided with electronic access control that records individual access.

In addition to general requirements for core infrastructure locations, data centres should utilise hot/cold aisle containment to maintain adequate cooling. All unused rack units should be blanked out to maintain cooling efficiency.

3.1.3 Offices and Depots

Facilities
All communications equipment, including cabling patch panels, must be enclosed in a locked 19" equipment rack. Locks should be operated by an Essential Energy master locking system.
As a minimum, racks should be floor mounted with at least 20 rack units of vertical capacity and a depth of 800mm. Wall mounted racks should not be used.

3.1.3.1 Site type 1

No permanent installation is typically provided at these sites. Where communications is provided, a single device providing a wireless network hotspot and single Grade C WAN path may be provisioned.

3.1.3.2 Site type 2

Single power distribution with uninterruptible power supply capable of carrying load for 30 minutes. Two communications paths of Grade C/C. WAN and switching layer may be consolidated in a single device.

3.1.3.3 Site type 3

Dual power distribution with uninterruptible power supply to at least one power rail capable of carrying load for four hours. Provision for rapid connection of backup generation by local staff in case of extended power outage.

Two independent communications paths of Grade B/C. WAN and switching layer should be separated.

3.1.3.4 Site type 4

Dual power distribution with uninterruptible power supply to both power rails capable of carrying load for 60 minutes. Permanent backup generation capable of 48 hours of continuous operation with automated start and transfer switching.

Two independent communications paths of Grade A/A. Dual WAN layer via independent routers and dual switching layer via independent switching. Where multiple buildings or working locations exist, independent core and/or distribution layer should be provided.

3.1.3.5 Site type 5

Dual power distribution with uninterruptible power supply to both power rails capable of carrying load for 60 minutes. Permanent backup generation capable of unlimited continuous operation with automated start and transfer switching.

Two independent communications paths of Grade A/A. Dual WAN layer via independent routers and dual switching layer via independent switching. Where multiple buildings or working locations exist, independent core and/or distribution layer should be provided.

Edge switching for control rooms and customer contact workspaces must provide two separated logical switches to allow for continued operation of part of the room during switch upgrades and reboots.

3.1.4 Zone Substations

Facilities
All communications equipment, including cabling patch panels, must be enclosed in a locked 19” equipment rack either as a freestanding installation or integrated with tunnel boards or control panels. Racks must be dedicated to communications and SCADA equipment only Where communications and SCADA exist in the same cabinet, it is preferable for the communications equipment to be located above the SCADA equipment. Locks should be operated by an Essential Energy master locking system. Wall mounted racks should not be used unless no alternative exists.

For Zone Substations without a secure control room, communications equipment must be in a fully lockable enclosure that provides adequate protection against malicious damage, weather conditions and vermin entry.

Power
Telecommunications equipment should utilise existing 48v and 110v standby power provided for substation control and protection. Telecommunications Specialists must confirm with Zone Substation engineers that existing standby power has sufficient capacity and standby duration to meet requirements. Consideration should be taken for 1+1 DC-DC power modules for type 3 and above operational technology systems.

3.1.4.1 Site Type 1

Single Grade C communications path if required.

Example:
Single LTE router
Single digital radio

3.1.4.2 Site Type 2

(Previously type 4 substation).
Single Grade C communications path as minimum. Dual Grade C or higher is preferable and may be provided with dual SIM solution. Combined WAN and access layer permitted.
The Zone Sub Station should have a desktop IP *or* cellular phone *or* cellular booster, and a Two Way radio.

Example:
Single LTE router with dual SIM (active/standby.
Single LTE router with digital radio.

3.1.4.3 Site Type 3

Grade B and Grade C required. Single WAN and access layer permitted. Grade B service must meet minimum bandwidth for critical services and support multiple security zones (MPLS or VRF-lite capable).

Uninterruptible power supply.
Backup power requirement of 6 hours.
The Zone Sub Station must have a desktop IP or cellular telephone and a Two Way radio.

Example:
Single LTE router with 4G and fibre connection.
Single LTE router with 4G and digital radio point to point connection.
Single Router with fibre and digital radio multipoint connection.

3.1.4.4 Site Type 4

(Previously type 2 substation).
Dual Grade B required. Diverse WAN layer and diverse LAN layer required. Grade A and Grade C will be considered as alternative. Both Grade B paths must meet minimum bandwidth requirements for critical services and support multiple security zones (MPLS or VRF-lite capable).
The Zone Sub Station must have a desktop IP telephone and a Two Way radio.
Redundant, uninterruptible power (e.g. single UPS/battery and diverse auxiliary supply).
Backup power requirement of 12 hours.

Example:
Dual router or NextG routers. Diverse fibre or fibre and microwave or microwave and digital radio point to point connection.
Dual switching layer, as either modules within routers or separate switches.

3.1.4.5 Site Type 5

(Previously type 1 substation).
Dual Grade A required. Diverse WAN layer and diverse LAN layer required.
Maximum diversity of backhaul should be provided, e.g. fully diverse fibre routing. Both Grade A paths must support multiple security zones using MPLS.
Dual redundant, uninterruptible power (dual UPS/battery source).
Backup power requirement of 24 hours.
The Zone Sub Station must have a desktop IP telephone and a Two Way radio.

Example:
Dual router as WAN layer. Diverse fibre connections or fibre and microwave or fully diverse microwave (no shared uWave components).
Dual, separated switching layer such as Cisco Switches.

3.1.5 Pumping Station/ Water Treatment Plant

3.1.5.1 Site Type 1

Normally these sites are manually operated or are in a small, closed network with a sensor.
If sensor information is needed back to system control a single Grade C communications path if required.

Example:

Single Analogue radio OR Single LTE radio (utilizing Essential Water APN)

3.1.5.2 Site Type 2

Dual Grade C or higher is preferable and may be provided with dual SIM solution. Combined WAN and access layer permitted.

Example:
Single LTE radio with dual sim (Preferred)
Single LTE radio and analogue radio as backup (Preferred)
Single LTE radio
Single Analogue radio

3.1.5.3 Site Type 3

Grade B and Grade C required. Single WAN and access layer permitted. Grade B service must meet minimum bandwidth for critical services and support multiple security zones (MPLS or VRF-lite capable).

These sites also require an IP phone to be present along with the CORP network.

Example:
Single LTE radio with 4G and digital radio point to point connection.
Single LTE radio with 4G and microwave point to point connection.
Cisco ruggedized switch may be added if more PORTs are needed.

3.1.5.4 Site Type 4

Dual Grade B required. Diverse WAN layer and diverse LAN layer required. Grade A and Grade C will be considered as alternative. Both Grade B paths must meet minimum bandwidth requirements for critical services and support multiple security zones (MPLS or VRF-lite capable).
Some sites may be physically joint into office/control room, which will allow EssW SCADA to utilise shared CORP telecommunications infrastructure with network segmentation.
Redundant, uninterruptible power (e.g. single UPS/battery and diverse auxiliary supply).
Backup power requirement of 12 hours.

Example:
Dual routers. Diverse fibre or fibre and microwave or microwave and digital radio point to point connection.
Dual switching layer, as either modules within routers or separate ISR/IE switches.

3.1.5.5 Site Type 5

Not applicable.

3.1.6 Tele-Protection, Special Protection Schemes, and Inter-Tripping Schemes

Tele-Protection schemes, including special protection schemes and inter-tripping schemes, require a customised design to meet the unique requirements of the electrical network protection scheme being planned and/or utilised.

All locations that form a part of the protection scheme must share the same site classification, usually meeting the requirements of a Type 5 Zone Substation. For radio sites that form part of the scheme, some requirements may be relaxed (e.g. dual redundant power) if it is not feasible to

deliver the requirements fully **and** failure of that individual site or bearer path will not result in a failure of the protection scheme.

Protection schemes involving third parties such as generators or TNSPs will need to be designed in consultation with that third party. In these instances, a preference for open communications standards (e.g. E1, G.703, C37.94) may dictate equipment and bearer type.

Protection schemes are safety critical systems and require a very high degree of confidence. Commensurate with this, cyber security controls must be robust with the protection scheme contained within the highest possible level of trust and security. Communication faults including individual bearer failure should be automatically indicated to System Control.

The use of IP and MPLS to deliver tele-protection schemes is an emerging technology at the time of writing. The deployment of these schemes will require careful design, testing, and implementation to ensure that the resulting system operates in a consistent and deterministic manner to ensure that fault clearance times are met in every case.

3.1.7 Radio Sites

Facilities
All communications equipment must be in a secured radio hut, building, or weather rated cabinet. The hut, building, or cabinet should be enclosed within a secure fence where feasible, with a sufficient perimeter to mitigate against malicious attack and natural threats. Detailed site security and safety design considerations are outside the scope of this document and further advice should be sought from Commercial Infrastructure (TelBU) and Property stakeholders.

For shared sites, either as a landlord or tenant, Essential Energy data systems should be secured from other parties through either a cage, locked rack, or locked compartments. This requirement may be relaxed for sites that provide analogue voice repeater functions only.

Power
Telecommunications equipment should utilise 48v and 12v battery systems as appropriate. Where multiple supply voltages are required for equipment, a single voltage battery bank and DC-DC conversion should be utilised. Battery capacity must be sufficient to carry full site load for the time required to support critical services. Sites must support a minimum of 24 hours backup power, however this may be varied in consultation with Transmission Services to take account of time needed to supply a generator to site. Critical hub and Tele-Protection sites should consider 36 hours backup supply as a minimum and the use of auto-start diesel generation or solar PV arrays is encouraged.

Monitoring
Equipment at radio sites must support remote monitoring. For sites without IP data networks, this may be performed through in-band systems such as Bitlab. Monitoring systems must report on radio link performance, power supply status & events, abnormal environmental conditions, and door/room/cabinet alarms.

3.1.8 Site & Category Performance Characteristics

The percentage availability service level is measured as a two stage process.

1. Each individual site is categorised into a site type as shown in Table 2. The site availability percentage as detailed in Table 1 is the service level target for each individual site in that site type.
2. The second component in the service level measurement is the site type availability. This percentage determines the target for the number of sites within each site type that meets the site availability SLA.

Service Level	Site Avail %	Site Type Avail. %	Downtime (month)	SLA coverage 24 X 7/10 X 5				Backup Power			
				Corporate	ZSS	Radio	PS/WTP	Corporate	ZSS	Radio Site	PS/WTP
Critical	99.95	100	22 minutes	24 X 7	24 X 7	24 X 7	N/A	Continuous*	24 Hours	36 Hours	N/A
High	99.9	97	43 minutes	24 X 7	24 X 7	24 X 7	24 X 7	48 Hours*	12 Hours	24 Hours	12 Hours
Medium	99.5	94	3.65 hours	10 X 5	24 X 7	24 X 7	10 X 5	1 Hour	6 Hours	24 Hours	6 Hours
Low	95	94	36.5 hours	10 X 5	10 X 5	10 X 5	10 X 5	<1 Hour	<1 Hour	24 Hours	<1 hour
Best Effort	90	94	73 hours	10 X 5	10 X 5	N/A	10 X 5	N/A	Nil	N/A	Nil

Table 1: Service Level parameters

*Extended backup power provided by on-site generator with automatic start and load transfer.

Site Type	Service Level	Access Path	Access Layer (Hardware)	Minimum WAN Path	WAN Layer (Hardware)	Combined WAN/Access
Corporate						
Data Centre / CNF	Critical	Diverse	Diverse	Diverse A/A	Diverse	Not Permitted
Office/Depot Site type 1	Best Effort		Single	Single C	Single	Permitted
Office/Depot Site type 2	Low	Single	Single	Diverse C/C	Single	Permitted
Office/Depot Site type 3	High	Single	Single	Diverse B/C	Single	Not Permitted
Office/Depot Site type 4	High	Diverse	Diverse	Diverse A/A	Diverse	Not Permitted
Office/Depot Site type 5	Critical	Diverse	Diverse	Diverse A/A	Diverse	Not Permitted
Zone Substation						
Zone Substation type 1	Best Effort	Single	Single	Single C	Single	Permitted
Zone Substation type 2	Low	Single	Single	Single C	Single	Permitted
Zone Substation type 3	Medium	Single	Single	Diverse B/C	Single	Permitted
Zone Substation type 4	High	Diverse	Diverse	Diverse B/B	Diverse	Not Permitted
Zone Substation type 5	Critical	Diverse	Diverse	Diverse A/A	Diverse	Not Permitted
Pumping Station/ Water Treatment Plant						
Pumping Station/ WTP Type 1	Best Effort	Single	Single	Single C	Single	Permitted
Pumping Station/ WTP Type 2	Low	Single	Single	Single C	Single	Permitted
Pumping Station/ WTP Type 3	Medium	Single	Single	Diverse B/C	Single	Permitted
Pumping Station/ WTP Type 4	High	Diverse	Diverse	Diverse B/B	Diverse	Not Permitted
Radio Site*						
Hub Radio Site	High	N/A	N/A	N/A	N/A	
Voice Radio Site End Point	Medium	N/A	N/A	N/A	N/A	

Table 2: Site service levels

*Radio site criticality will be determined by services supported, e.g. tele-protection radio sites will be classed as critical

3.1.9 Telecommunication Services – Availability

The table below outlines supported Telecommunication services and Service Levels for each.

IT/OT	Service	Service Component	Availability %	SLA
IT	Telephony	Core Telephony	99.95	
		Contact Centre features – Call queuing, routing, avalanche management, etc.	99.95	
		Call Recording	99.9	
		Individual handsets	Best Effort	
		Site functionality	Ref Table 2	
	Corporate Data Network	Wired LAN - site	Ref Table 2	
		Wired LAN - Individual	Best Effort	
		Wireless LAN - core	99.95	
		Wireless LAN – individual access point	99	
		WAN access	Ref Table 2	
		Core Systems – Data Centre	99.95	
OT	Protection	Unit	99	
		Scheme	99.9	
	SCADA	Server / FEP	99.95	
		RTU	Ref Table 2	
Perimeter	Remote Worker VPN		99.95	
	Internet Access		99.95	
	Public Web Presence		99.95	
	Cloud Service		99.95	
	Business to Business VPN		99.9	

3.1.10 WAN performance characteristics

The table below provides detail of the technical performance parameters used to discriminate between a grade A or B transmission service. This table is a guide only and all new transmission services not listed in Table 5: Existing WAN technology examples, must be classified by the Telecommunications Architect.

ServiceType	Symmetrical	Latency	Jitter	Quality of Service	SLA	Contention	WAN Path	Zoning
Grade A	Yes	<80ms	<40ms	Minimum 6 Levels	>99.5%	Zero	1Mbps – 10Gbps	MPLS
Grade B	Not required	<150ms	<80ms	Not required	>98%	Max 3 endpoints	120k minimum	MPLS/VRF-lite
Grade C	Not required	<750ms	Not specified	Not required	>90% desirable	Allowed	80k minimum	Not required

Table 3: WAN performance characteristics

3.1.11 Application performance requirements

Application / Traffic Type	Bandwidth	Latency	Security	Critical/Non critical	Virtualisation (VPN name)
Protection	<64Kbits	<100ms total	Very high	Critical	N/A
SCADA	<64Kbits	<150ms	Very High	Critical	SCADA
Mobile workforce	<1Mbit	<500ms	High	Non-Critical	Corporate
Smart Metering Access - Core Network	>1Mbit	<150ms	High	Non-Critical	TBD
Smart Metering Access - WAN	<1Mbit	<500ms	High	Non-Critical	TBD
Smart Metering Access - Last Mile	<256Kbits	>500ms	Medium	Non-critical	TBD
Operations / Engineering data	<256Kbits	<500ms	High	Non-critical	TBD
Smart Grid Access - Core Network	>1Mbit	<150ms	Very high	Critical	DA (Recloser)
Smart Grid Access - WAN	<1Mbit	<150ms	Very high	Critical	DA (Recloser)
Smart Grid Access - Last Mile	<256Kbits	<500ms	Medium	Non-critical	DA (Recloser)
Video surveillance	<1Mbit	<500ms	High	Non-critical	Corporate
Enterprise (corporate) data	<1Mbit	<500ms	Medium	Non-critical	Corporate
Enterprise (corporate) voice	<256Kbits	<150ms	Very high	Non-critical	Corporate

Table 4: Application performance requirements

Note: Bandwidth, latency, and security levels provided above are indicative only and may well change on a case by case basis. Designers will need to be very aware of any business requirements and design accordingly.

3.2 WAN Technology Types

Technology	Service Type	Status	Note
Carrier Layer 3 Services			
- Carrier Fibre	A	Baseline	
- Carrier uWave	A*	Baseline	Confirm full circuit availability and resiliency
- NBN FTTP	A	Baseline	
- NBN FTTN/Wireless	B	Baseline	Insufficient power resiliency offered on these services
Carrier Layer 2 Services			
- Carrier Fibre	A	Baseline	
- Carrier uWave	A*	Baseline	Confirm full circuit availability and resiliency
- NBN FTTP	A	Baseline	
- NBN FTTN/Wireless	B	Baseline	Insufficient power resiliency offered on these services
Essential Energy Fibre	A	Baseline	
Microwave	A	Baseline	
ADSL/ADSL 2 +	B	Retirement	Only available in fringe NBN areas. Avoid use.
4G/5G	B	Baseline	Classified as grade B service as no SLA is offered and insufficient power resiliency
4G/5G CatM1	B	Emerging	Classified as grade B service as no SLA is offered and insufficient power resiliency
4G/5G NBIoT	C	Emerging	Classified as grade C as service is low bandwidth
Medium bandwidth digital radio (120k to 2Mb) multipoint	B	Baseline	Meets all grade B parameters, however multipoint solutions are not to exceed 2 end sites and 1 hub site.
Medium bandwidth digital radio (120k to 2Mb) multipoint > 3 sites	C	Baseline	Multipoint solution maximum 5 end sites.
Narrowband radio (< 80kb)	C	Baseline	Must meet minimum 64kb bandwidth. Medium bandwidth service is preferable. Trio radios and services less than 64k must be phased out.
Satellite			
- Telstra iTerra	A	Baseline	Based on Telstra offering. Currently 512Kbps shared between end points, high latency (> 300ms RTT)
- LEO Internet	A	Emerging	Based on expected performance characteristics of Starlink (25+ Mbps, < 50ms RTT)
- NBN Skymuster	B	Baseline	High latency (> 300ms RTT)
900 Mhz Radio Mesh	C	Emerging	High latency, low bandwidth, no QoS

Table 5: Existing WAN technology examples

4.0 AUTHORITIES AND RESPONSIBILITIES

Position / Title	Responsibility
Head of Digital Operations	• Approve this document.
Telecommunications Architect	• Review and update this document. • Ensure telecommunications solutions adhere to these requirements.
Telecommunications Team	• Follow these requirements when designing and installing telecommunications systems.

5.0 DEFINITIONS

Intermediate voice site
A radio site that is used to extend the backhaul from edge sites back to the local depot.

6.0 REFERENCES

Internal
Nil entry

External
Nil entry

7.0 RECORDKEEPING

The table below identifies the types of records relating to the process, their storage location and retention period.

Type of Record	Storage Location	Retention Period
Design Work pack	Telecommunications SharePoint Site	Retain minimum of 7 years after system is superseded, either through upgrade or major modification, and any data supported is migrated or destroyed, then destroy GA28 20.4.1

* The following retention periods are subject to change eg if the records are required for legal matters or legislative changes. Before disposal, retention periods should be checked and authorised by the 'Records Management Team'.

8.0 REVISIONS

Issue No.	Section	Details of changes in this revision	Change Risk Impact?
2	All	Annual review and update	Low
3	All	Annual review and update	Low