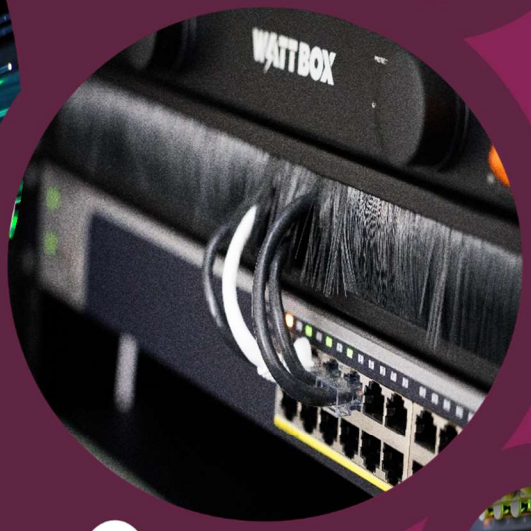

PROCESS, INSTRUMENTATION AND CONTROLS

OPERATIONAL TECHNOLOGY NETWORK SWITCH PROCUREMENT STANDARD

Document No. ESF-500-STD-404

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Watercare

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More information

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DOCUMENT CONTROL

Role Control Systems Manager

Organisation Watercare Services Limited

Version history

Version	Description of revision	Released by	Date
1.0	First release	W Strydom	11/12/2023
1.1	Minor updates to model changes of equipment	W Strydom	15/07/2024

This document takes effect on the date of release and supersedes all prior versions.

Approvers / Reviewers

Role	Name
Control Systems Manager	Anthony Young
Control Systems Team Lead	Jerome Chung
Control Systems Team Lead	Preesen Moodley
Control Systems Architects	Rodney Micallef

Summary of changes

Version	Section	Description of revision
1.1	4	Cisco IE-2000-8TC-G-L model replaced by IE-3100-8T2C-E Cisco IE-2000-16TC-G-L model replaced by IE-3100-18T2C-E
	Appendix II	Cisco IE-2000-8TC-G-L model replaced by IE-3100-8T2C-E Cisco IE-2000-16TC-G-L model replaced by IE-3100-18T2C-E

Table of Contents

1. Purpose

1.1 Background

1.1.1 Objectives

The objectives of this procurement standard are to ensure the following for the WSL Operational Technology (OT) environment (aka Control environment):

- Failed switch hardware can be replaced in a timely manner, minimising service outages for control systems and associated operational processes.
- Enhanced visibility of the operational state of networks at major / critical control sites (i.e. Treatment Plants, T1/T2 Repeaters, etc).
- A minimum set of capabilities are available (whether required or not) for all network switches.
- Network switches are available for project requirements in a timely manner, at a competitive price.
- Provide guidance to project design and procurement decisions to ensure alignment with the above.

1.1.2 Audience

The intended audience of the is standard is WSL staff, contractors or third-party suppliers responsible for specifying and / or procuring network equipment for use within the WSL OT environment.

1.1.3 Scope

This standard relates to the specification of data network switches for use within the WSL OT, including:

- Control network switches.
- PLC (aka Plant, aka IO, aka Field) network switches.

1.1.4 Out of Scope

This standard is not intended to cover any of the following:

- WSL data centre environments.
- Emerson DeltaV ACN switches.
- Any other type of network communications equipment within the WSL OT environment other than network switches.
- The WSL corporate network environment.

1.2 Compliance requirements

Compliance with this standard is required for the purchase and deployment of network equipment within the Operational Technology (OT) environment.

Exceptions to this standard are permitted only in the following circumstances:

- DEV/TEST equipment.
- Vendor owned infrastructure not managed by WSL Digital.

Requests for validation of exceptions are to be forwarded to the Document Owner.

1.3 Supporting documentation

- Watercare Material Supply Standard, Section 13.13.1 (General requirements for all electrical components), “Network switches” table section.

2. Overarching Principles

2.1 Hardware Replacement

All network switches in the WSL OT environment must use one of the following approaches:

1) A vendor support agreement is in place which includes hardware replacement (with a minimum SLA of next business day on site) for failed or faulty components.
    a. The project or initiative procuring a switch is responsible for funding the first 12 months of the support agreement for that switch. Beyond the first 12 months support will the funded via a WSL Digital operational budget.
    b. This support agreement must be maintained for the operational life of the switch.
    c. This agreement must align with current WSL Digital practices for maintaining support for a given vendor’s equipment.
2) Spares are held and managed by the WSL stores at Mangere (see “**Error! Reference source not found.**” for a current device list).
3) Spares are held and managed by the WSL Control Systems Team at Remuera Road (see “**Error! Reference source not found.**” for a current device list).

2.2 Operational State Visibility

Control Domain and PLC Domain network switches in the WSL OT environment must support **all** of the following:

- Remote management (i.e. SSH CLI or HTTPS WebUI).

- Remote monitoring (i.e. ICMP and SNMP).

2.3 Switch Standardisation

In order to support a common minimum set of capabilities and ensure alignment with WSL spares (where used), a limited set of network switches will be used within the WSL OT environment.

- These are defined in Section 4: OT Network Switch Procurement Standard of this standard.
- This information is made available to external parties via the Watercare Engineering Standards Framework. Please refer to the latest version of the Watercare Material Supply Standard, Section 13.13.1.

2.4 Equipment Availability / Price

Where possible, this standard includes multiple options for OT switches to reduce the impact of supply chain issues and ensure competitive pricing.

3. Architectural Context

This standard covers the following network items:

- Control Domain Switch
- PLC Domain Switch
- PLC Access Switch

The “Minor Treatment Plant Network Architecture” (see **Error! Reference source not found.**) has been included in this document to provide further explanation of the distinction between these component

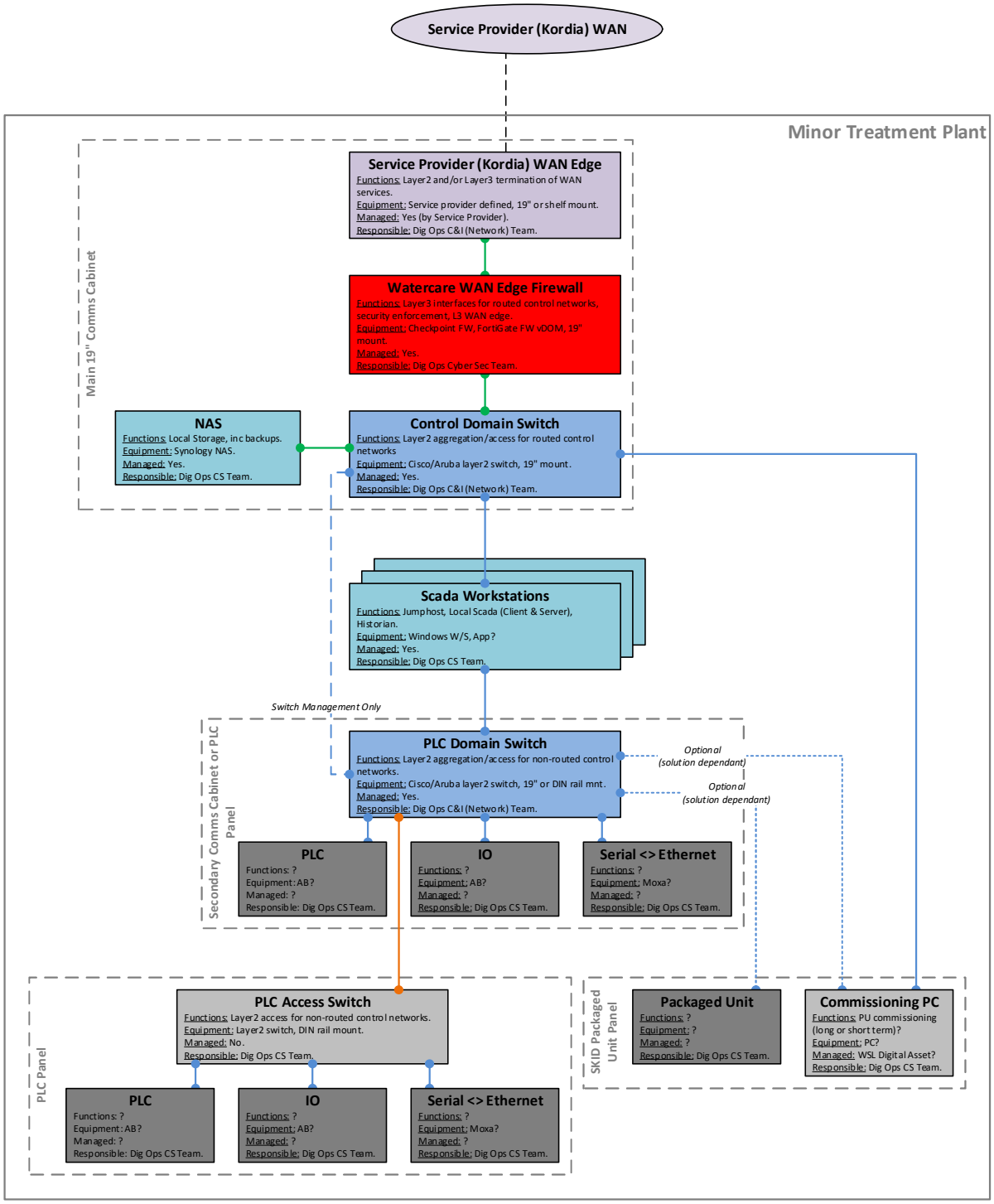
4. OT Network Switch Procurement Standard

The table below provides a mapping between required capabilities and the WSL approved equipment models.

Requirements			Equipment Options	
Deployment Scenarios	**Power, Mounting, Environment & Manageability**	**Interfaces**	**Vendor Part Number (Description)**	**Hardware Replacement**
Control Domain Switch	**Power:** 230V AC **Mounting:** 19-inch **Environment:** Server / Communications Room (climate controlled, dust free) **Monitored / Managed:** Yes	24 x 10/100/1000BaseT 4 x 1000BaseX SFP	Cisco **C9200L-24T-4G-A** (Catalyst 9200L 24-port Data 4x1G uplink Switch) Aruba **JL724A** (6200F 24G 4SFP+ Switch)	Vendor support agreement
		48 x 10/100/1000BaseT 4 x 1000BaseX SFP	Cisco **C9200L-48T-4G-A** (Catalyst 9200L 48-port Data 4x1G uplink Switch) Aruba **JL726A** (6200F 48G 4SFP+ Switch)	
	Power: 230V AC **Mounting:** Shelf (or 19-inch) **Environment:** Free Standing Communications Panel (internal or external) **Monitored / Managed:** Yes	12 x 10/100/1000BaseT 2 x 1000BaseX SFP	Cisco **C9200CX-12T-2X2G-A** (Catalyst 9200CX 12-port 1G, 2x10G and 3x1G, data, Network Essentials, Fanless) Aruba **R8N89A** (6000 12G Class4 PoE 2G/2SFP 139W Switch, Fanless)	
	Power: 24V DC **Mounting:** Shelf (or 19-inch) **Environment:** MCC Room Cabinet **Monitored / Managed:** Yes	24 x 10/100/1000BaseT 4 x 1000BaseX SFP	Cisco **IE-4010-4S24P + PWR-RGD-LOW-DC-H** (IE4010 with 24GE Copper PoE+ ports and 4GE SFP uplink ports + DC 24-60V/10A P/S)	
	Power: 24V DC **Mounting:** DIN Rail **Environment:** Ruggedized / Industrial **Monitored / Managed:** Yes	7 x 10/100BaseT 2 x 1000BaseX SFP	Cisco IE-3100-8T2C-E (IE3100 w/8GE Copper, 2GE Combo, Fixed sys, Network Essentials)	
		16 x 10/100BaseT 2 x 1000BaseX SFP 2 x 100BaseX SFP	Cisco IE-3100-18T2C-E (IE3100 w/18GE Copper, 2GE Combo, Fixed sys, Network Essentials)	
PLC Domain Switch	**Power:** 24V DC **Mounting:** DIN Rail **Environment:** Ruggedized / Industrial **Monitored / Managed:** Yes	7 x 10/100BaseT 2 x 1000BaseX SFP	Cisco IE-3100-8T2C-E (IE3100 w/8GE Copper, 2GE Combo, Fixed sys, Network Essentials)	Mangere Stores managed spares
			Moxa **EDS-510E-3GTXSFP** (Managed Gigabit Ethernet switch with 7 10/100BaseT(X) ports, 3 10/100/1000BaseT(X) or 100/1000BaseSFP ports)	
		16 x 10/100BaseT 2 x 1000BaseX SFP 2 x 100BaseX SFP	Cisco IE-3100-18T2C-E (IE3100 w/18GE Copper, 2GE Combo, Fixed sys, Network Essentials)	

Requirements			Equipment Options	
Deployment Scenarios	**Power, Mounting, Environment & Manageability**	**Interfaces**	**Vendor Part Number (Description)**	**Hardware Replacement**
PLC Access Switch	**Power:** 24V DC **Mounting:** DIN Rail **Environment:** Ruggedized / Industrial **Monitored / Managed:** No	5 x 100BaseT	Allen-Bradley **1783-US5T** (Stratix 2000 5 Port Unmanaged Switch)	Control Systems Team managed spares
		8 x 100BaseT	Allen-Bradley **1783-US8T** (Stratix 2000 Switch, Unmanaged, 8 Copper Ports)	
		4 x 10/100BaseT 1 x 100BaseFX (Multimode)	Allen-Bradley **1783-US4T1F** (Stratix 2000 Unmanaged switch, 4 copper 10/100 ports, 1 Multimode 100 meg preinstalled fiber SFP module)	
		7 x 10/100BaseT 1 x 100BaseFX (Multimode)	Allen-Bradley **1783-US7T1F** (Stratix 2000 Unmanaged switch, 7 copper 10/100 ports, 1 Multimode 100 meg preinstalled fiber SFP module)	
			Moxa **EDS-510E-3GTXSFP** (Managed Gigabit Ethernet switch with 7 10/100BaseT(X) ports, 3 10/100/1000BaseT(X) or 100/1000BaseSFP ports)	Mangere Stores managed spares
			Cisco IE-3100-8T2C-E (IE3100 w/8GE Copper, 2GE Combo, Fixed sys, Network Essentials)	
		16 x 10/100BaseT 2 x 1000BaseX SFP 2 x 100BaseX SFP	Cisco IE-3100-18T2C-E (IE3100 w/18GE Copper, 2GE Combo, Fixed sys, Network Essentials)	

Appendix I: Minor Treatment Plant Network Architecture



Appendix II: Spares held by Mangere Stores

Vendor	Part Number	Description	Inventory Item #
Moxa	EDS-510A-3SFP	Managed Gigabit Ethernet switch with 7 10/100BaseT(X) ports, 3 SFP slots for adding SFP-1G Series Gigabit Ethernet modules	#104574
Moxa	EDS-510E-3GTXSFP	Managed Gigabit Ethernet switch with 7 10/100BaseT(X) ports, 3 10/100/1000BaseT(X) or 100/1000BaseSFP ports	#105525
Moxa	SFP-1FELLC-T	SFP with 100Base single-mode LC for 80 km transmission extended temp	#105526
Moxa	SFP-1FESLC-T	SFP with 100Base single-mode LC for 40 km transmission extended temp	#105527
Cisco	IE-3100-8T2C-E	IE3100 w/8GE Copper, 2GE Combo, Fixed sys, Network Essentials	#105515
Cisco	IE-3100-18T2C-E	IE3100 w/18GE Copper, 2GE Combo, Fixed sys, Network Essentials	#105516
Cisco	GLC-LX-SM-RGD	Cisco 1000BASE-LX/LH Industrial Rugged SFP module, for Multimode(550m) or Singlemode(10km) Fiber	#105517
Cisco	GLC-ZX-SM-RGD	Cisco 1000BASE-ZX "Extended Distance" Up To 70km Singlemode Fiber Rugged SFP Module	#105518

Appendix III: Spares held by Control Systems Team

Vendor	Part Number	Description
Allen-Bradley	1783-US5T	Stratix 2000 5 Port Unmanaged Switch
Allen-Bradley	1783-US8T	Stratix 2000 Switch, Unmanaged, 8 Copper Ports
Allen-Bradley	1783-US4T1F	Stratix 2000 Unmanaged switch, 4 copper 10/100 ports, 1 Multimode 100 meg preinstalled fiber SFP module