



# St-04 Wireless Network Standard

Version 2020.1.2 Approved



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# Please Read

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## IMPORTANT COMPLIANCE REQUIREMENTS

*Note: The following instruction applies to all documents in this library.*

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This is a controlled document and is reviewed on an annual basis. The last review was carried out on September 2019. If you are viewing this document after September 2020, you will need to contact the sender to confirm you are working from the latest revision.

It is the responsibility of the contractor/vendor to read and adhere to the procedures, processes and guidelines set out in the following document when quoting for or carrying out work for ACT Health.

If you have questions or require clarification of any of the procedures, processes or guidelines in the following document please contact the sender of the document in writing with your questions so that a formal response can be provided. If any specific requirement is unclear, it is expected that clarification will be sought from the Health DSD - ICT architect(s), rather than a decision made and a design implemented and based on unclarified assumptions.

These standards are applicable to ALL CHS and ACTHD sites or any work funded by ACTHD (e.g. Calvary, ACTHD provided NGO sites) unless specifically exempt.

All Greenfield Health sites are expected to be fully compliant with all appropriate standards.

Brownfield Health sites undergoing refurbishment should be fully compliant unless an exemption is provided by DSD Infrastructure Hub.

In the event of any design non-compliance issues, a Departures document must be completed and submitted to DSD Infrastructure Hub. These issues should be resolved, in consultation with DSD Infrastructure Hub, as soon as possible within the project process and explicitly prior to site handover.

While some test cases have been cited within these documents as examples, the list is not exhaustive, and all appropriate test procedures shall be formulated, approved prior to testing and testing shall be performed by the client system administrators before full acceptance can be signed off by the Director of ICT Infrastructure Hub.

***IMPORTANT:***

*Any departure from the standard, whether intentional or in error shall require a completed Departures Document to be submitted to DSD infrastructure Hub for approval.*

*Any non-compliant designs without a pre-approved Departures Document by completion of the project or a nominated milestone or gateway, will require remediation by the Head Contractor at the Head Contractors cost.*

## Document Review High Level

(to review detailed document updates, [click here](#))

Version	Summary of Changes	Author	Date
2019.1.0	CIO Approval for release	Sandra Cook a/g CIO	09/10/2019
2019.1.1	Updated soft rubber strip usage	Raj Mohan	19/11/2019
2020.1.2	Minor formatting changes	Mark Cahill	14/01/2020

## Document References

Document	Version	Location

## Document Default Review Cycle

(to be reviewed every 12 months from the release date)

Date	Version	Comments
Sept 2019	2019.1.0	Original release date
Sept 2020		(Next review date)

## Document Owner

Name	Location
Senior Director, ICT Infrastructure Hub	DSD, Future Capability & Governance, ACT Health

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# 1. Document purpose

The wireless network is an integral part of the communications provided in a Health Directorate building. A robust and resilient wireless network design is mandatory to meet the Directorate's requirements.

This document outlines the requirements for the wireless network in a building. These requirements include Medical Grade Network (MGN) architecture compliance, Wireless Access Point (WAP) physical installation requirements, connectivity to the network switches and wireless coverage required for a building.

The document is divided into three sections as per the following:

- Wireless services architecture;
- Wireless coverage and redundancy; and
- WAP installation requirements.

## 2. Wireless Services Architecture

### 2.1 Building blocks

The following building blocks are used for the architecture pattern:

- Wireless network infrastructure including WAPs; and
- Site cabling for WAP connectivity.

### 2.2 Standard

The wireless network architecture is intended to be used for the following:

All buildings at The Canberra Hospital (TCH) campus;

The ACT Community Health centres; and

Other non-TCH campus and ACT Health Directorate sites.

The wireless network architecture must comply with the following:

Controller based wireless architecture which provides centralised control and management of WAPs;

The head-end controllers must be provisioned in a Highly Available (HA) configuration;

The architecture must support non-disruptive connectivity for the wireless client devices during the controller failover to the redundant controller;

The WAP location design must provide internal and external coverage configuration for the building;

The WAP location design must provide wireless coverage redundancy;

The wireless network design must adhere to best practice principles;

The wireless access point design must include partial overlapping coverage to facilitate seamless handover between adjacent WAPs while roaming;

The WAPs must connect to the site-based Floor Distributor switches;

Adjacent WAPs must connect to different switches;

The WAPs must support Power over Ethernet Plus (POE+) or Cisco's Universal Power over Ethernet® (UPOE);

The wireless coverage must take into consideration one of the following:

Supports data and voice which also includes location services; or

Supports data, voice and Real Time Location System (RTLS) required for sites such as Mental Health buildings and units;

The wireless network must support robust security services such as authentication based on access requirements.

## 2.3 Rationale

The wireless network architecture intends to achieve the following:

Provide consistent architecture for all the Health Directorate buildings;

Facilitate better planning, reliability, and timeliness of configuration and installation through a single architecture approach;

Implement higher availability for the wireless network by leveraging established and tested configurations that are well understood by the technical teams; and

Improve problem resolution timeframes due to the consistent network topology and implementation.

## 2.4 Implication and Issues

WAPs do not consume any space in the data cabinet, but they do require network switch ports which increases the number of switches required for the site;

An RTLS survey must be conducted for sites that have specific location requirements such as Mental health units; and

There is a requirement to purchase WAP licenses.

## 2.5 Benefits

The key benefits are:

Reduces operational complexity by using centralised wireless LAN controllers that are used for device configuration and management;

A reliable wireless network that provides versatility for device connectivity;

Provides wireless network connectivity to various systems at the hospital such as Duress and Nurse Call;

Provides hospital patient and visitors access to Internet;

Supports RTLS for the sites;

Scalable for various systems that require wireless network connectivity;

Configurable to share the wireless spectrum with other clinical systems;

Applicable to brownfield and green field sites;

Meets the wireless network high availability requirements for the Health Directorate mission critical systems;

Implements wireless network security by using authentication and encryption;

High bandwidth capacity to meet current and expected Health Directorate requirements over medium term (3 – 5 years); and

Reduces costs by leveraging head-end wireless services block infrastructure which includes wireless LAN controllers and switches installed in a HA configuration.



## 3. Wireless Connectivity and Redundancy

### 3.1 Standard

Following are the requirements for the wireless coverage and redundancy:

WAPs will be connected to the ACT Government floor distributor network switches over structured CAT6<sub>A</sub> cabling;

Adjacent WAPs will be cabled to separate communications rooms on the same floor, where practical, with consideration to the CAT6<sub>A</sub> cable length limitations. If there is only one communications room or it is not practical to connect adjacent WAPs to separate communications room, WAPs will be patched to separate switch stacks within the same communications room;

In the event there is only one switch stack in the communications room, adjacent WAPs should be patched to different member switches in a switch stack;

The wireless network will be designed to provide overlapping coverage as per Figure 1 - Wireless network coverage overlap principles. The diagram shows two communications rooms FD-A and FD-B, however the same principles for overlapping coverage are applicable when one communications room is used at the site; and

Utilise Cisco's CleanAir technology to provide a self-healing wireless network. In the event of a WAP failure, adjacent WAPs will take appropriate action to manage wireless spectrum. This is illustrated in the diagram, Figure 1 - Wireless network coverage overlap principles.

### 3.2 Rationale

The wireless network connectivity achieves the following;

Provide wireless coverage that will meet the requirements, ensuring that WAPs are connected to the appropriate network switches to provide high levels of resiliency and availability; and

Redundancy will be provided by physical connectivity of the WAPs and logical configurations to create a self-healing and optimising wireless network.

### 3.3 Implication and Issues

Wireless access point location design will be required to install WAPs in appropriate locations.

### 3.4 Benefits

The wireless connectivity will provide the following benefits:

Minimises the impact of a WAP failure;

Provides consistent approach for the physical WAP connectivity to the network switches;  
and

Provides required network bandwidth for the wireless users.

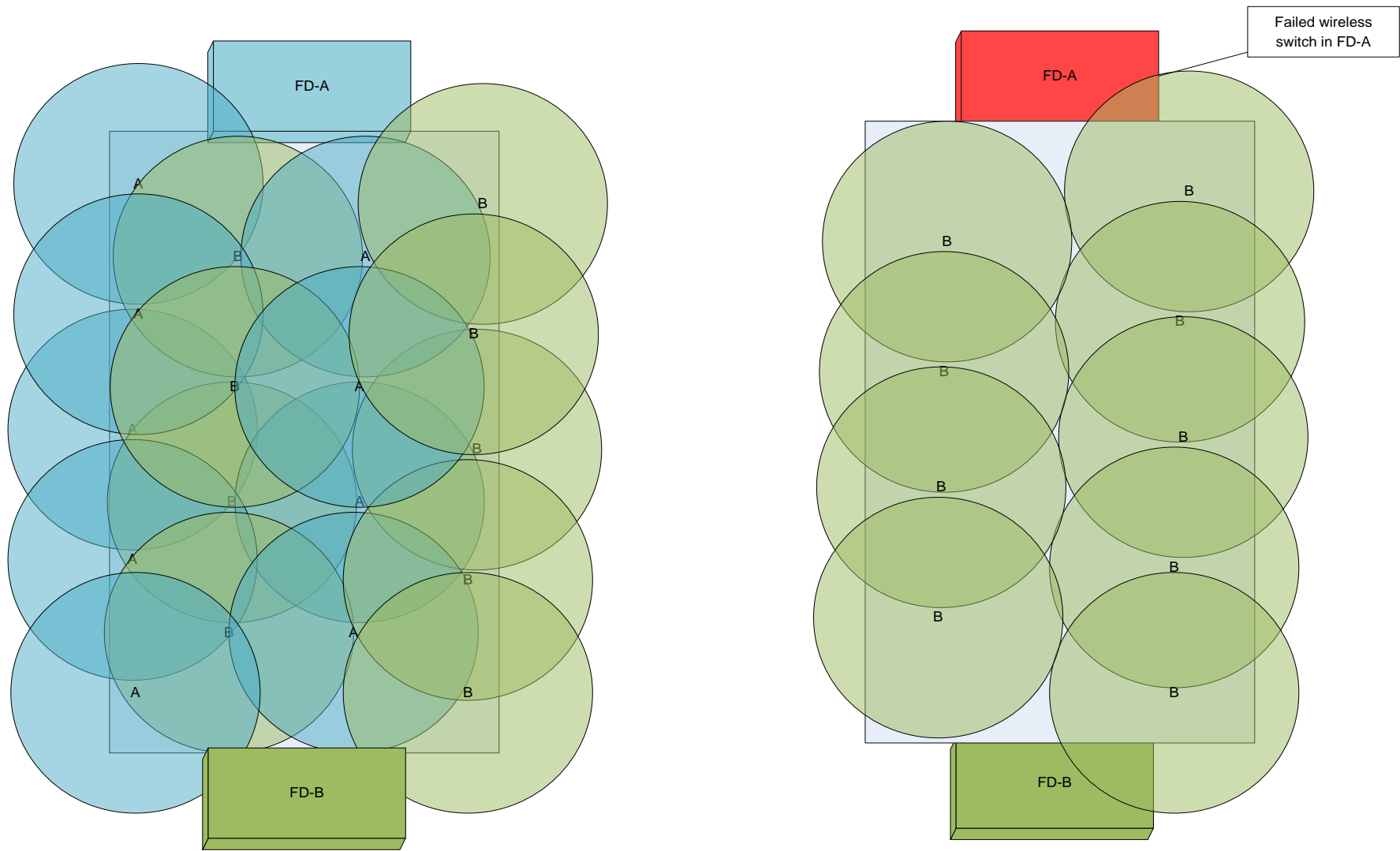


Figure 1 - Wireless network coverage overlap principles

## 4. WAP Installation Requirements

### 4.1 Introduction

Currently Cisco Aironet 4800 WAP is being installed in the Health Directorate buildings. This WAP model is a high-performance device with increased security and enhanced detailed analytics capability, including location information, beaconing and Bluetooth services. These access points are for the internal use only.

As the Cisco Aironet 4800s are larger and heavier this document provides installation standard for the installers that will comply with the WH&S and clinical requirements.

Note: These requirements are specific to the Cisco Aironet 4800 WAPs. In the event a different WAP model is used, requirements specific to that model must be used. DSD infrastructure solutions architects must be consulted for installation requirements.

### 4.1 Scope

Provide a physical installation standard for mounting of the Cisco Aironet 4800 WAPs which includes:

- Installation on various ceiling types;
- Ceiling cut-out requirements;
- Safety cable attachment;
- Data outlet mounting and connection port;
- Data port and WAP labelling.

### 4.2 Physical Specification

The physical WAP is illustrated in the following drawings Figure 2 - Cisco 4800 Front View and Figure 3 - Cisco 4800 Rear View.



Figure 2 - Cisco 4800 Front View



Figure 3 - Cisco 4800 Rear View

## Installation Interfaces

- Patch lead connects to POE/mGig port, as illustrated in Figure 3 - Cisco 4800 Rear View, which supports POE and 100/1000/2500/5000 Multigigabit Ethernet (RJ-45) – IEEE 802.3bz.

## Indicators

- Status LED indicates boot loader status, association status, operating status, boot loader warnings, boot loader errors.

## Dimensions (W x L X H)

- Access point dimensions without mounting brackets are 8.68 x 9.9 x 2.9 in. (22 x 25 x 7.35 cm).

## Weight

- 5.6 lb (2.5 kg).

## Input power requirements

- 802.3at PoE+, Cisco Universal Power over Ethernet (Cisco UPOE<sup>®</sup>);
- 802.3at power injector (AIR-PWRINJ6=); and
- 50W power supply (AIR-PWR-50=).

## Power draw

- 30W at the Power Source Equipment (PSE) with all features enabled except Multigigabit, AUX Ethernet, and USB support; and
- 31W at the PSE with full functionality.

## Environmental

- Nonoperating (storage) temperature: -22° to 158°F (-30° to 70°C)
- Nonoperating (storage) altitude test: 25°C, 15,000 ft
- Operating temperature: 32° to 104°F (0° to 40°C)
- Operating humidity: 10% to 90% percent (noncondensing)
- Operating altitude test: 40°C, 9843 ft. (noncondensing)

## 4.3 Installation

### General

The WAP weighs 2.5kg which is higher than its predecessors. Hence, the installation of the WAPs must adhere to the WH&S and IMM requirements.

NOTE: 4800 WAPs installed at TCH are to be orientated with the arrow, as illustrated in Figure 2 - Cisco 4800 Front View, pointed east unless specified on the design. Mounting requirements must be confirmed with DSD's Infrastructure architecture team.

## Installation on set ceiling

The installation requirements for the 'set' ceiling are as follows:

The WAP installation kit includes 2 brackets, 1 - Ceiling mounting bracket and 2 – WAP mounting bracket.

Step 1: Fitment of the ceiling mounting bracket. Using a Wallmate shown in *Figure 4 - Wallmate*. The Wallmate enables the ceiling mounting bracket screws "A" to be fastened on to the set ceiling (marked in blue on *Figure 5 - WAP and Ceiling Mounting Brackets*);

Note: in case of a plywood above the set ceiling the Ceiling mounting bracket screws "A" can be directly screwed without the use of wall mate screws;

Step 2: The channel slot is a bracket between the WAP mounting bracket and Ceiling mounting bracket, it uses screws to help it fasten it once a central position is attained on the ceiling mounting bracket channel as illustrated in *Figure 6 - Ceiling Mounting Bracket Channel & Figure 7 - Channel Slot Mounting*);

Step 3: Fitment of WAP mounting bracket, use the holes marked B (marked in green on *Figure 5 - WAP and Ceiling Mounting Brackets*);

Step 4: Two 5mm snap hook, a wire grip and a steel safety chain are used to secure the WAP to the ceiling (*Figure 8 - Wire Grip and Figure 9 - Steel Safety Chain*);

Step 5: The first snap hook is used to loop the ceiling support; Safety chain is clipped to a suitable support in the cement slab above the ceiling with the snap hook (*Figure 8 - Wire Grip*);

Step 6: A wire grip is used to hold the snap hook at a suitable height. This will allow the clamp to adjust at different positions on the wire ropes and therefore reduce any slack in the wire; and

Step 7: The other end of the wire with the snap hook is hooked on to the WAP as shown in *Figure 9 - Steel Safety Chain*.

Step 8: Soft Rubber Strip (similar to weather seal strip) fills in the opening in the frame as shown in *Figure-9 and 10* (that is required by design of the bracket) when the WAP cover is placed over the WAP it forms a complete seal.

## Wallmate - Metal



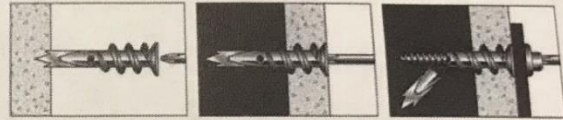
### Function

Self drilling plasterboard anchor for walls with cavities.  
Material: Zinc die cast.

### Product Advantages

- Self drilling.
- All metal body.
- Screw can be removed without losing anchor.
- Will not shrink or degrade due to UV exposure.
- Wall thickness: 5-10mm
- Screw size: 8g

### Installation



1. Place on the end of your phillips head screwdriver and then lightly pierce the plaster-board face paper where the anchor is to be fixed.
2. Only light pressure is required. Simply screw the Wallmate into the plasterboard.
3. Now using an 8 gauge screw through fixture, screw into wallmate.



Figure 4 - Wallmate



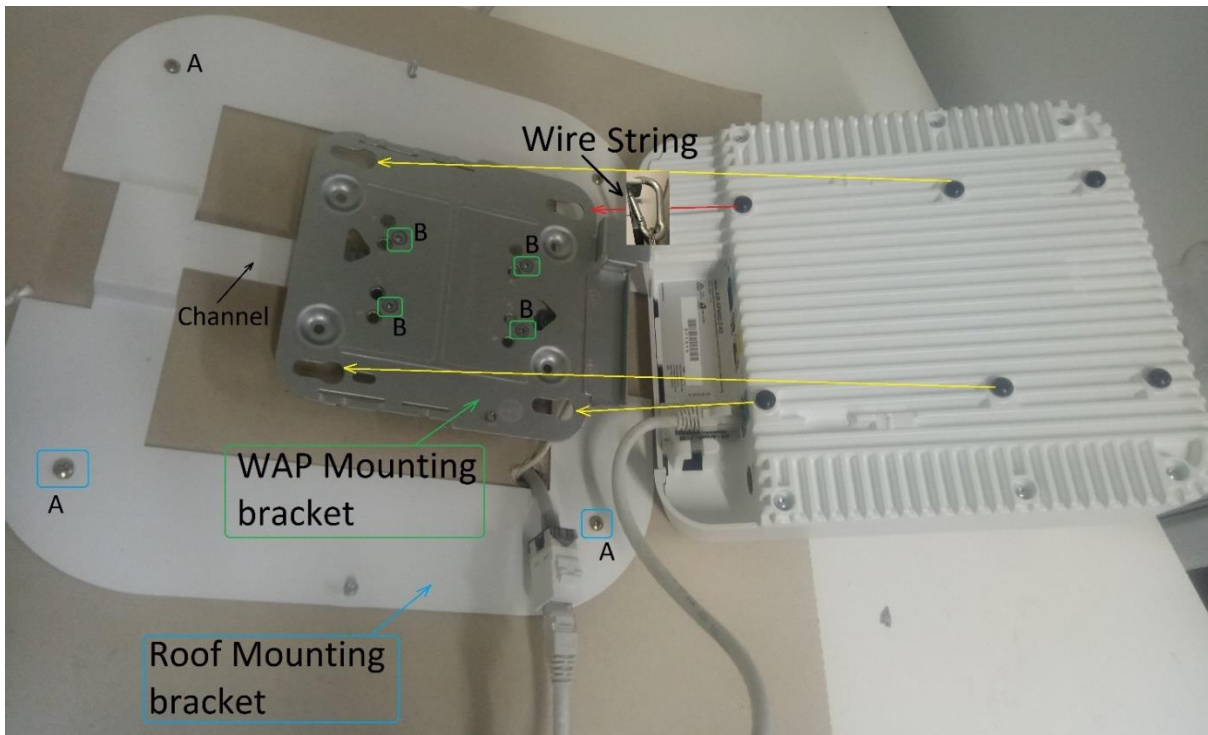


Figure 5 - WAP and Ceiling Mounting Brackets

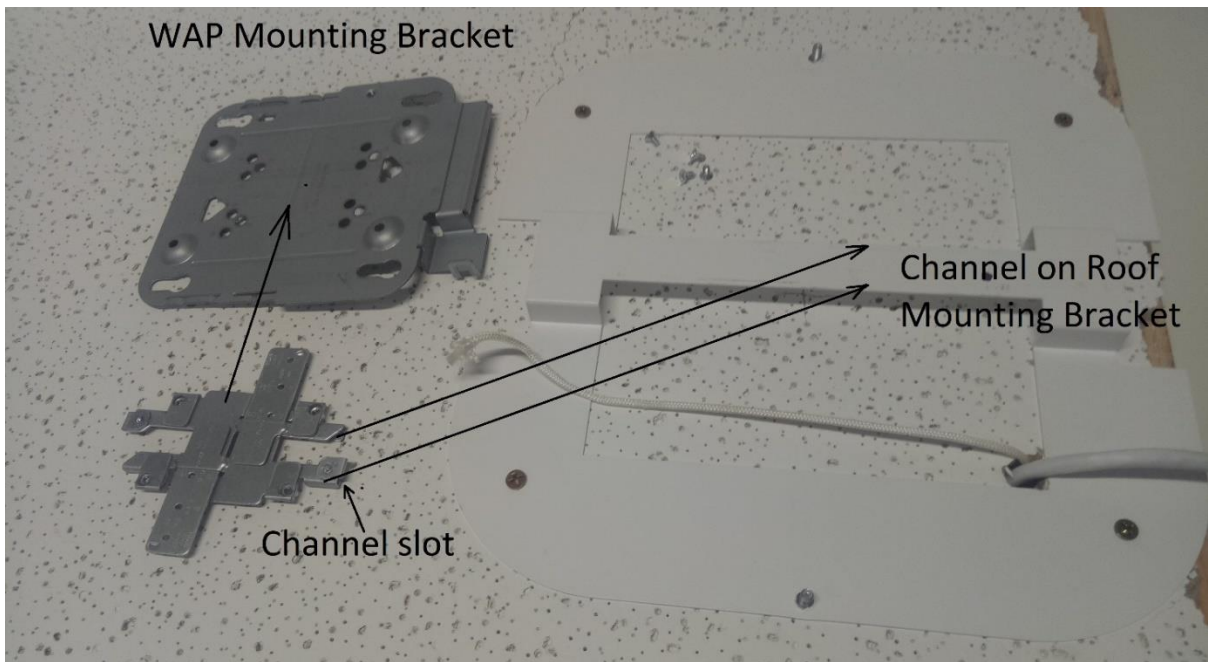


Figure 6 - Ceiling Mounting Bracket Channel

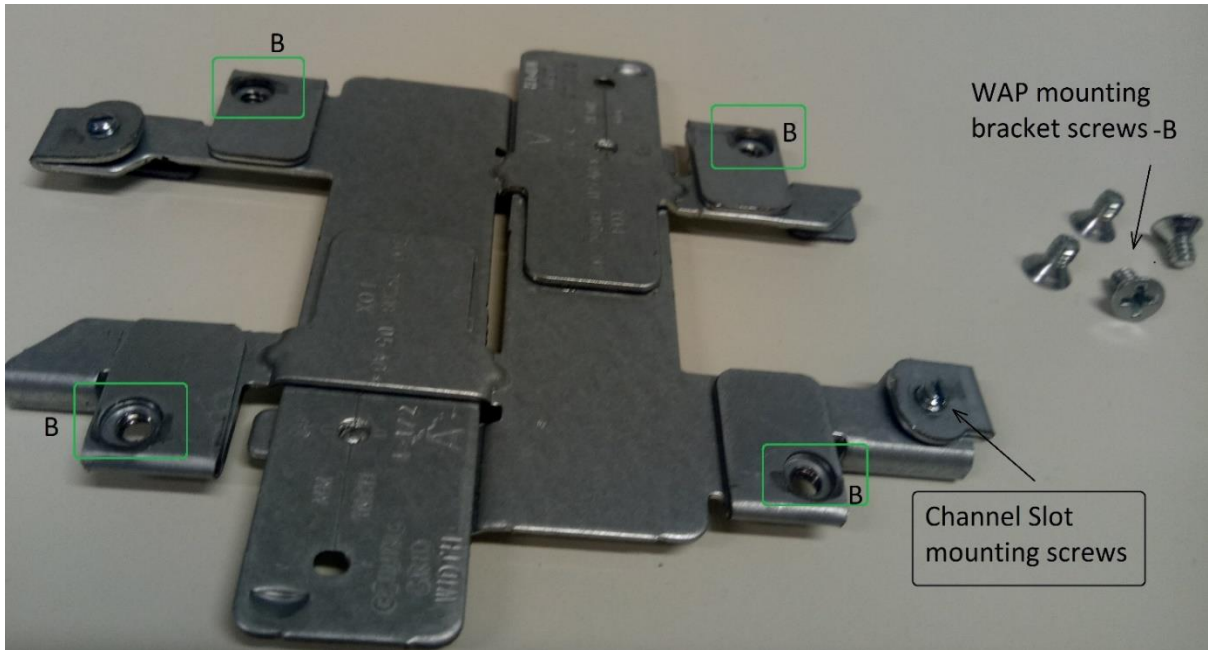


Figure 7 - Channel Slot Mounting



Figure 8 - Wire Grip

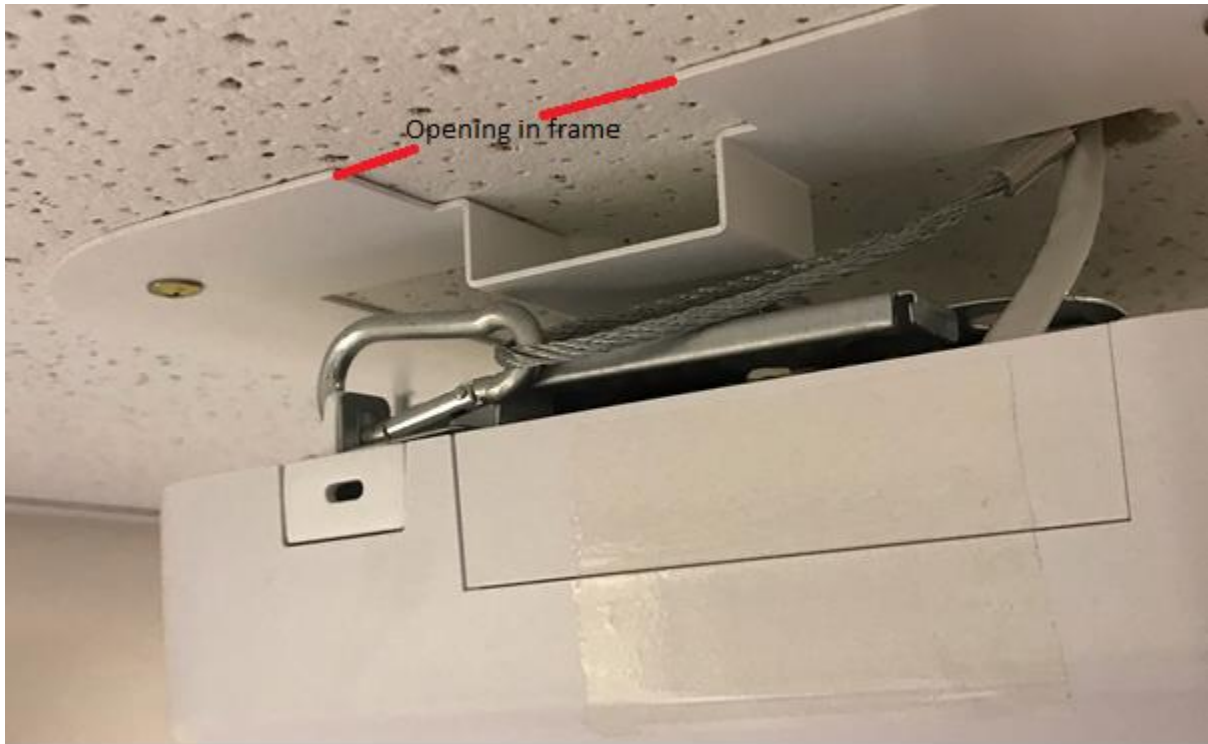


Figure 9 - Steel Safety Chain

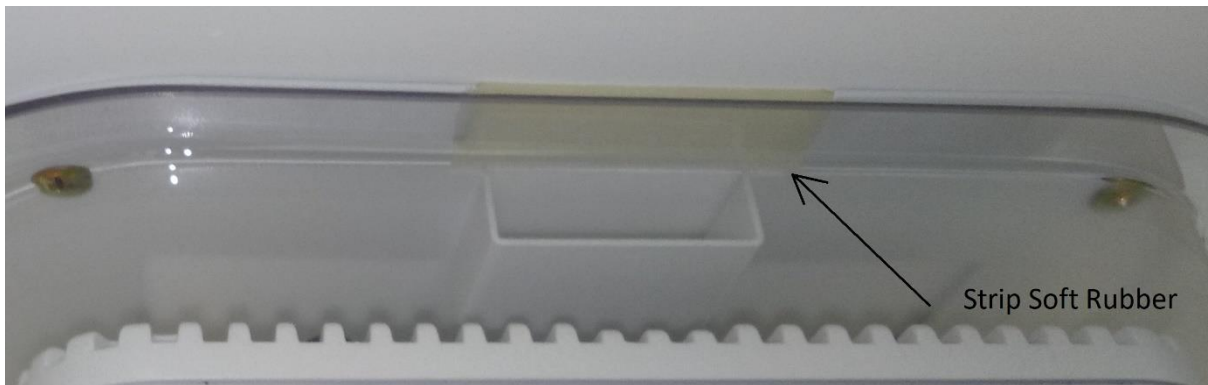


Figure 10 - Fo

## Installation on tiled ceiling

The WAP installation kit includes 2 brackets, 1- Ceiling mounting bracket and 2 – WAP mounting bracket

The difference between the set ceiling and tiled ceiling fitting is the use of wood studs on top of the tile to distribute the weight of the WAP across aluminium support T-sections. The WAP bracket is screwed into the wooden studs as illustrated in Figure 11 - Wooden Studs for WAP attachment.

Step 1: Fitment of the ceiling mounting bracket on tile ceiling Screw marked “A” is directly screwed into the stud marked in blue on Figure 5 - WAP and Ceiling Mounting Brackets;



Step 2: The channel slot is an adjustable medium between the WAP mounting bracket and tile ceiling mounting bracket as per Figure 6 - Ceiling Mounting Bracket Channel;

Step 3: Fitment of WAP mounting bracket using screws marked “B” in green on Figure 5 - WAP and Ceiling Mounting Brackets and Figure 7 - Channel Slot Mounting;

Step 4: Two 5mm snap hook, a wire grip and a steel safety chain are used to secure the WAP to the ceiling as illustrated in Figure 7 - Channel Slot Mounting and Figure 8 - Wire Grip;

Step 5: The first snap hook is used to loop the ceiling support, Safety chain is clipped to a suitable support in the cement slab above the ceiling with the snap hook as illustrated in Figure 7 - Channel Slot Mounting;

Step 6: A wire grip is used to hold the snap hook at a suitable height. This will allow the clamp to adjust at different positions on the wire ropes and therefore reduce any slack in the wire illustrated in Figure 7 - Channel Slot Mounting; and

Step 7: The other end of the wire with the snap hook looped is hooked on to the WAP as illustrated in Figure 8 - Wire Grip.



Figure 11 - Wooden Studs for WAP attachment

## For concrete ceiling

The WAP installation kit includes 2 brackets, 1- Ceiling mounting bracket and 2 – WAP mounting bracket.

There is no requirement of studs for concrete ceiling fitting (figure 3.1)

Step 1: Fitment of the ceiling mounting bracket is directly mounted on the concrete slab marked in blue on Figure 5 - WAP and Ceiling Mounting Brackets;

Step 2: The channel slot is an adjustable medium between the WAP mounting bracket and tile ceiling mounting bracket Figure 6 - Ceiling Mounting Bracket Channel;

Step 3: Fitment of WAP mounting bracket using screws marked “B” in green on Figure 5 - WAP and Ceiling Mounting Brackets and Figure 7 - Channel Slot Mounting;

Step 4: Two 5mm snap hook, a wire grip and a steel safety chain are used to secure the WAP to the ceiling as illustrated in Figure 7 - Channel Slot Mounting and Figure 8 - Wire Grip;

Step 5: The first snap hook is used to loop the ceiling support, Safety chain is clipped to a suitable support in the cement slab above the ceiling with the snap hook as illustrated in Figure 7 - Channel Slot Mounting;

Step 6: A wire grip is used to hold the snap hook at a suitable height. This will allow the clamp to adjust at different positions on the wire ropes and therefore reduce any slack in the wire. (Figure 7 - Channel Slot Mounting)

Step 7: The other end of the wire with the snap hook looped is hooked on to the WAP as shown in Figure 8 - Wire Grip.



Figure 12 - Concrete Ceiling Fitting



Figure 13 - Concrete Ceiling Mounted WAP

## For vertical mounting bracket

For rooms with no ceilings or where the ceiling is high and there are significant obstructions below such as pipes and conduits, the vertical mount bracket must be used. This bracket is a “Right-angle AP Mount with Universal T-bar Bracket and Cover”. The following diagram, Figure 14 – WAP on a mounting bracket, illustrates the type of bracket that is proposed to be used under these situations.

An exemption from infection control is required as these brackets cannot support the WAP cover.



Figure 14 – WAP on a mounting bracket

## 4.4 Patching

A standard CommScope Cat 6A white **fly** lead will connect the WAP to the data port.

A CommScope Cat 6A black “Mino” **patch** lead shall be used at the patch panel end.

The data port needs to be installed in the ceiling space within 1 metre distance and must be a properly mounted mech in a fixed wall box.

## 4.5 Labelling

A Traffolyte data port label must be installed on the ceiling data outlet, as per the SSICT structure cabling standard.

The data port number label must be affixed adjacent to the WAP or if a WAP cover is installed adjacent to the WAP cover.

## 4.6 WAP Cover

A WAP cover will be installed for each CHS WAP, using an acorn nut fastened to the bolts that are mounted on the ceiling mounting bracket as illustrated in Figure 14 - Acorn nuts.

Note: Specific endorsed WAP covers are used for the WAPs installed in the Health Directorate buildings. Consult with the DSD infrastructure architects for further information on the WAP covers, if required.



Figure 15 - Acorn nuts



## Appendix A. Document Details

### Abbreviated terms and definitions

Acronym	Term	Definition
ICT	Information Communication Technology	Information Communication Technology
LAN	Local Area Network	Provides network connectivity within a building
MGN	Medical Grade Network	Provides a highly resilient enterprise network architecture for the Health buildings
POE+	Power Over Ethernet Plus	Preliminary Building Plan
PSE	Power Supply Equipment	
RTLS	Real Time Location System	A solution that is used to track assets and objects within a building. This can be used in Mental Health wards and buildings as well.
SSICT	Shared Services ICT	
TCH	The Canberra Hospital	The Canberra Hospital
UPOE®	Universal Power over Ethernet	A Cisco proprietary technology that has the capability to provide 60W of power over standard Ethernet structured cabling.
WAP	Wireless Access Point	A device that allows connectivity to the wireless network
WH&S	Workplace Health and Safety	Required for protecting the health and safety of staff

### Amendment history

Version	Summary of Changes	Author	Date
2019.0.1	Initial Draft	David Richards	20/01/2015
2019.0.2	DSD template update	Raj Mohan	16/05/2018
2019.0.3	ACT Health DSD template update	Raj Mohan	12/11/2018
2019.0.5	Migrate to the new DSD template. Review and update several sections. Combine previous ST-04A, 04B and 04C into the current standard.	Nitin Saxena	19/09/2019
2019.1.0	CIO Approval for release	Sandra Cook a/g CIO	09/10/2019
2019.1.1	Updated soft rubber strip usage	Raj Mohan	19/11/2019
2020.1.2	Minor formatting changes	Mark Cahill	14/01/2020