

CQUniversity Wireless Installation Technology Standard

January 2022

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Version	Issue Date	Nature of Amendment	By
0.5	18/06/13	Initial	DM
1.0	5/11/13	Review and update	MQ
1.1	19/02/14	Review and update	MQ
1.2	24/03/15	Review and update	JW, PV, CS, MQ
1.3	3/3/16	Review and update	JW
1.3	07/03/16	Formatting	MS
1.4	6/9/18	Review and update	NF
1.5	22/10/18	Change AP model	NF
1.6	11/12/19	Change AP model	JW
2.0	11/3/20	Major rewrite	JW
3.0	6/1/22	Expand to include Aruba	JW

1 Overview



CQUniversity requires that all teaching areas, academic, student congregation areas, staff occupied spaces, public reception/waiting areas and all external courtyards and entrance spaces surrounding a building to be provided with wireless coverage to the signal strength required within the performance specification. This standard provides instruction for the installation of wireless access points to meet this requirement to a standard required by the university.



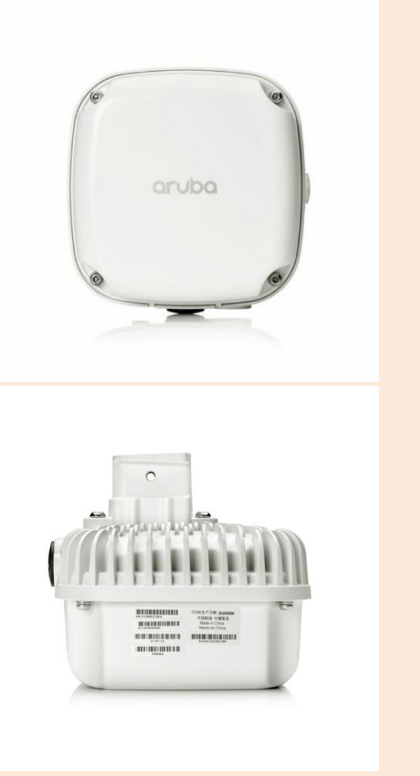
2 Equipment and Supply




2.1 Equipment List



Depending on the site, CQUniversity uses either Cisco or Aruba products as the basis for the University’s wireless network.

The following model numbers are required to be used. Which brand to use must be ascertained by consultation with CQUniversity Digital Services Division’s network staff or project manager.

Use	Brand	Model	Additional Notes	
Indoor	Aruba	AP-535	Suitable for most internal placement and situations.	
External Antenna	Aruba	AP-534	To be used where specialised antenna are required, such as external to building antenna or directional antenna – note that WAP is installed inside. Only the antenna are outside.	
Mounting Bracket	Aruba	AP-MNT-D	also available in packs of 10 AP-MNT-MP10-D	

<p>Motel Style Environment</p>	<p>Aruba</p>	<p>AP-503H</p>	<p>Suitable for motel style residential buildings and apartment projects</p>	
<p>Antenna Indoor Omnidirectional</p>	<p>Aruba</p>	<p>AP-ANT-1W (4 required per AP)</p>	<p>Short omnidirectional antenna for indoor use. Can be angled.</p> <p>Use with AP-534 model WAP</p>	
<p>Outdoor</p>	<p>Aruba</p>	<p>AP-565 (omni directional antenna) AP-567 (directional antenna)</p>	<p>Special use case only, confirm with CQU</p>	

Antenna Directional	Aruba	AP-ANT-45	Directional antenna and adapter cable for outdoor use. Special circumstances only, confirm with CQU. Use with AP-534 model WAP Wall mount preferred.	
Use	Brand	Model	Additional Notes	
Indoor	Cisco	C9120AXI-Z	Suitable for most internal placement and situations.	
External Antenna (for outdoor service)	Cisco	C9120AXE-Z	To be used where specialised antenna are required, such as external to building antenna or directional antenna – note that WAP is installed inside. Only the antenna are outside.	
Motel Style Environment	Cisco	AIR-AP1815W-Z-K9	Suitable for motel style residential buildings and apartment projects	
Antenna Indoor Omnidirectional	Cisco	AIR-ANT2524DW-R/= (4 required per AP)	Short omnidirectional antenna for indoor use. Can be angled. Use with 'E' model WAP	

Antenna Outdoor Omnidirectional	Cisco	AIR-ANT2544V4M-R=	External antenna and adapter cable Use with 'E' model WAP Wall mount	
Antenna Directional	Cisco	AIR-ANT2566P4M-R=	Directional antenna and adapter cable for outdoor use, special circumstances. Use with 'E' model WAP Wall mount preferred.	

- Outdoor rugged AP models exist and can be used in special circumstances upon receiving CQU approval. Where it is identified that an outdoor WAP is required and the situation cannot be covered by the standard external antenna solution, the building contractor must consult with the CQUniversity Digital Services Project Manager regarding design, models and placement.
- A 0.5cm Cat6a network lead is required to patch the WAP. Longer cables wrapped around the AP or hanging down are not permitted.

2.2 Supply

The University will order and supply equipment unless otherwise specified.

The University will produce coverage maps based on the floor plan and provide install locations.

3 Installation

3.1 WAP Installation

3.1.1 Mounting of equipment

- Brackets are provided with Cisco WAPs.
- Aruba brackets must be ordered separately. CQU use the 'D' type.
- WAPs must be ceiling mounted and must use the supplied propriety brackets.
- Suitable screws and wall fixtures are to be used where the standard mounting screws are not suitable.
- WAPs are not to be installed outdoors unless they are specifically outdoor rated. Where external coverage is required, WAPs are to be installed indoors and an external antenna installed outdoors, connected to the WAP. Outdoor models are only for specialist requirements when specified by Digital Services Directorate.
- WAPs are to be installed on the exposed ceiling surface so that the indicator lamps can easily be viewed.

3.1.2 Location

- The WAP should be ceiling mounted in the locations specified during wireless predictive planning.

- Placement must be as precise as possible as deviation will affect coverage or the functioning of location services.
- WAPs shall not be placed in stairwells, in ceiling spaces, be enclosed or in positions where it will be difficult to access, or cause OHS issues when using a ladder.

3.1.3 Cabling

- Each WAP unit installed shall have a point within 100mm of the unit. The cabling shall be neatly installed and shall not hang or drape down or be wrapped around the WAP unit.
- Cabling to WAP installation point must comply to the current CQU Data Cabling Standard
- The data port must be on the outside and not concealed in the ceiling.

3.1.4 Installation examples



Figure 2.4.2.2

3.2 Licensing

Licensing shall be the responsibility of CQUniversity who will:

- Determine number of WAPs required and if there is a requirement to upgrade or replace existing Wireless Controllers

3.3 WAP Labelling

- Each WAP is to be labelled clearly using white label tape with black writing and be readable from the floor. Labelling shall be according to the CQU naming convention which is

site code + building number + "-" + floor + "." + room number "-" + "ap" + number

For example, WAPs installed in building 1, Cairns, level 1 would be numbered:

- CNS001-1.05-AP1

- CNS001-1.05-AP2
- CNS001-1.10-AP1 etc.

3.4 Documentation

- **Documentation to be delivered:**

- A table of the names with the device MAC address is to be supplied to CQU *as soon as practicable following physical install* so that the information can be used to commission the devices for practical completion of the works. This information must be supplied as a spreadsheet with the following information.

MAC address	Location	Model Installed

- A drawing/map detailing confirmed WAP positioning is also required.

- **Document format:**

- All documents must be in soft copy, in editable format (CAD, Word, Visio, Excel),

- **Document license:**

Upon handover, CQUniversity will be granted a permanent, non-transferable license to re-use and modify the documentation

- **Transmittal instructions:**

All documents are to be sent – to CQUniversity Digital Services Directorate Project Manager

4 Performance Specification

4.1 Indoor Areas

The placement of WAPs shall be designed to ensure;

- Density requirements are met across all areas with special consideration for areas likely to have a high density of users eg lecture theatres.
- WAPs are positioned to provide best coverage
- Where required to provide location services, additional WAPs and design considerations may be required.
- The required signal strengths are achieved.

All wireless designs will be 5GHz spectrum preferred, with 2.4Ghz coverage provided for legacy support. At minimum, all inhabited CQU spaces require signal at -67dBm with a 20dB SNR. AP placement will assume a maximum transmission power level of 10 dBm for 5Ghz and 12dBm for 2.4Ghz. This is to ensure clients will have equal or greater transmission power on the return path to the AP. AP placement will provide 1+1

redundancy. Allowances can be made in order to prevent oversaturation, as approved by CQUniversity. Example locations where this may apply include hallways and corners of buildings.

Where occupancy is known, capacity planning should occur. For every person possible in an area the design should allow for a single active device at 2Mbps and a second device performing background sync. High wireless requirement areas, such as lecture rooms and meeting rooms, should allow one device at 4Mbps and two devices performing background sync. For planning all devices are assumed to use the 5GHz network with a 20Mhz bandwidth, however actual channel width will be determined by the WLC’s RRM algorithm.

An inhabited space is defined as an area where it is reasonable to assume CQU staff, students, or guests would require wireless coverage to perform work. Elevators, toilets, and plant rooms are not considered inhabited unless specifically required by the project.

2.4GHz radios will be disabled on AP’s where required to prevent co-channel interference. Care is to be taken to ensure sufficient 2.4GHz network coverage.

4.2 Outdoor Areas

Refers to external areas such as courtyards, external entrance foyers, and transient areas between. These require a service offering of no less than -70dBm signal strength.

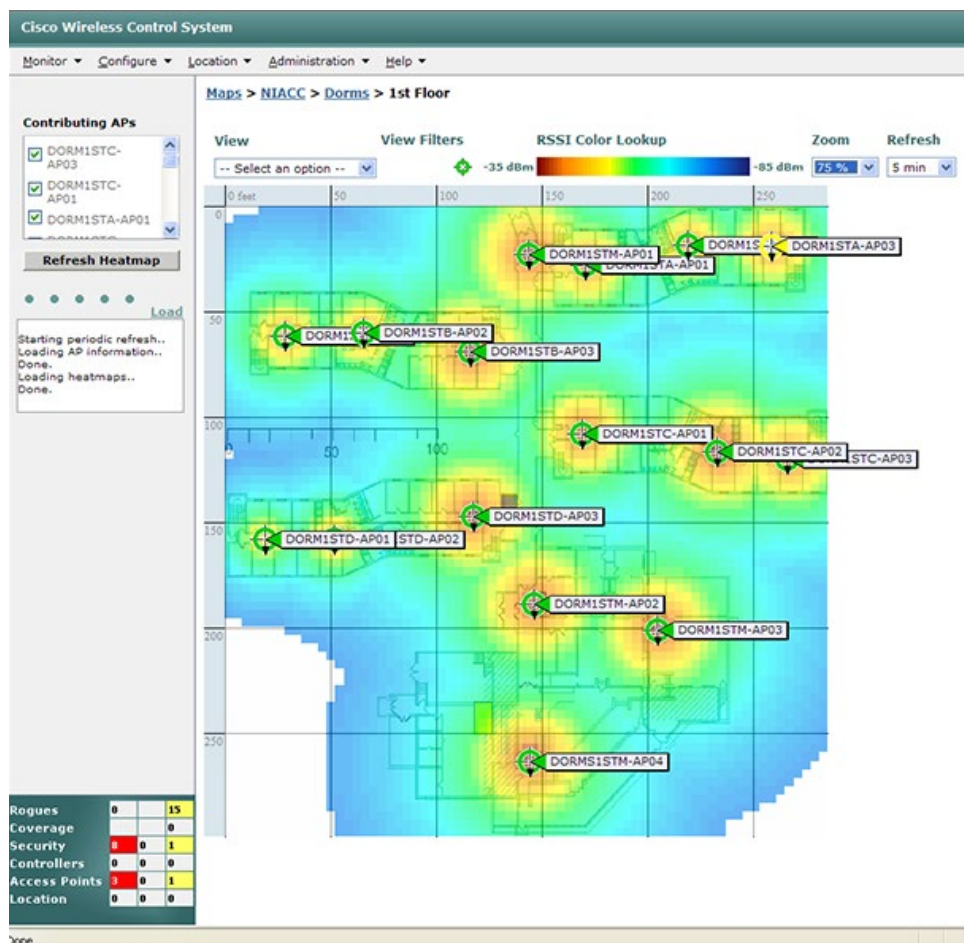


figure 2.4.1.1 – Sample Heat Map

4.3 Other Applicable Standards or Guidelines

- CQUniversity Network Cabling Specification and Standard

5 Acceptance

5.1 Final System Configuration

- Once implementation is complete, final system configuration will be performed by CQUniversity staff. This will include:
 - WLC Connectivity
 - WAP Connectivity

5.2 Acceptance Testing

The Install will not be accepted until the required documentation has been delivered and all WAPs are commissioned.

- Contractor + CQU Project Manager to be present.
- Mutually acceptable time/date to be negotiated via CQU Project Manager.
- Quality standard check & signoff as per applicable CQUniversity Quality Standard.
- CQU Project manager to review supplied contractor's scope and quality of work, review signal strengths test report and issue a defect list if required.
- Contractor to ensure defect list is completed to the CQU Project Managers satisfaction as soon as possible. No longer than seven days.
- Commissioning Test Checklist completed.
- Sign-Off section: CQU Project Manager + Contractor Rep.