CQUniversity Wireless Installation

Standards

October 2018
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1 Technical Specification

1.1 Functional Description

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.

CQUniversity uses Cisco products as the basis for the University’s wireless network including for indoor use the Cisco WAP product code AIR – CAP28021-Z-K9 and for external antenna use the Cisco AIR-CAP2802E-Z-K9.

The building contractor shall ensure;

- Density requirements are met across all areas
- Position WAPs to provide best coverage
- WAPs are installed, connected to the University’s network and configured on the local wireless network
- Provide cabling to WAP installation point as per the CQU Data Cabling Standard
- Ensure the required signal strengths are achieved as per the Performance Specification.
- Determine Licensing requirements and ensure compliance
- Configure and install Wireless LAN Controller as per the manufacturer’s instructions
- Label WAPs according to the CQU naming convention and supply a table of names and mac addresses to CQU.
- All test results and as installed documentation as supplied to CQU
- All training is completed to the CQU satisfaction

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. 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.

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.

1.2 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.
2 Installation

2.1 WAP Installation

- WAPs are to be installed on the exposed ceiling surface so that the indicator lamps can easily be viewed and all wiring shall be concealed.
- The WAP should be ceiling mounted in the locations specified during wireless predictive planning.
- 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.
- WAPs to be ceiling mounted must use the supplied propriety brackets, and the associated wiring must be concealed and comply with the CQU Data Cabling Standard.
- Each WAP unit installed shall have a point within 100mm of the unit. If the connecting wiring cannot be concealed the cabling shall be neatly installed and shall not hang or drape down or be wrapped around the WAP unit.
- Each WAP is to be labelled clearly using white label tape with black writing 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.

A table of the names with the device MAC address is to be supplied to CQU.

- Rack WLC neatly with existing communications equipment.

2.2 Mounting of equipment

- Brackets will be provided with Cisco APs
- Mounting brackets for WLC must be used during installation
- Suitable screws and wall fixtures are to be used where the standard mounting screws are not suitable.
- WAPs are not to be installed outdoors. Where external coverage is required, WAPs are to be installed indoors and an external antenna installed outdoors, connected to the WAP.

2.3 Licensing

- Determine number of WAPs required and if there is a requirement to upgrade or replace existing WLC.
- Large sites generally have the ability to update software licence; otherwise the licensing could be attached to the hardware Wireless LAN Controller and a new controller may be required.
2.4 Images of preferred installations

2.4.1 Heat Map

![Sample Heat Map](image)

Figure 2.4.1.1 – Sample Heat Map
2.4.2 WAP Installation

Figure 2.4.2.1 - Method 1 data point is above ceiling tile and hidden (preferred).

Figure 2.4.2.2 - Method 2 Suitable where solid ceilings are used.
2.5 Equipment List

- Cisco AP – Customer Supplied
  - Use Cisco I models for building installations
  - Use Cisco E models for external installations
- At time of document creation, Cisco 9120AXE-Z is the required model to use for most internal placements and situations.
- The Cisco 9120AXE-Z is to be used where specialised antenna are required, such as external to building antenna or directional antenna.
- The Cisco AIR-AP1815W-Z-K9 are suitable for residential buildings and apartment projects
- Outdoor rugged AP models exist and can be used upon receiving CQU approval.
- WAPs are shipped with mounting brackets, a .5cm Cat6a network lead is required to patch WAP.
- Cisco 5500 WLC solutions are recommended for large sites, or Cisco 3500 WLC solutions for small sites

2.6 Other Applicable Standards or Guidelines

- CQU University Network Cabling Specification and Standard
- CQU University As-Built Documentation Standard
- CQU University Data Patching & Power Management Standards

3 Technical Documentation required

- Documentation to be delivered:
  - manufacturer equipment manuals,
  - a map detailing WAP positioning
  - test results of signal strengths across all areas.
  - all configuration files
  - all username/passwords/access codes for equipment and software if applicable
  - all licence keys for firmware and software
  - equipment list (including serial number, model, description, and location)
- Document format:
  - All documents must be in soft copy, in editable format (CAD, Word, Visio, Excel),
  - Excepting manufacturer manuals, which will be in PDF format
- Document license:
  - Upon handover, CQU University will be granted a permanent, non-transferable license to re-use and modify the documentation
- Transmittal instructions:
  - All documents are to be sent – to CQU University Information Technology Project Manager

3.1 User Documentation

- Documentation to be delivered:
  - Quick Reference Sheets (One hard copy per room, one extra hard copy + and soft copy)
  - Bespoke/Custom User Guides (One hard copy per room, one extra hard copy + and soft copy)
  - Training Handouts (One hard copy per trainee, one extra hard copy + and soft copy)
- Document format:
  - All documents must be in soft copy, in editable format (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 CQU Project Manager.

### 3.2 Addressing and Configuration Information

- CQUniversity will provide the following configuration information to the contractor as required:
  - IP address,
  - hostnames,
  - Server Address, hostname and authentication information.

### 3.3 Final System Configuration

- Once implementation is complete, final system configuration will be performed by the contractor, with the remote assistance of CQUniversity staff. This will include:
  - WLC Connectivity
  - WAPs Connectivity

- Mutually acceptable time/date to be negotiated via CQU Project Manager.

### 3.4 Acceptance Testing

- 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.