

# **CQUniversity Network Cabling Specification and Standard**

**January 2022**

**This document must be provided to all cabling sub-contractors  
complete and unabridged**

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Version	Date	Reason	Reviewer
1.0	13/08/13	Issued	A. Martin
1.2	31/03/15	Review and update	PV, JW, MQ, KW, CS, DP
2.0	12/11/15	Review and update	JW
2.1 "March 2016"	04/03/16	Minor edits, proofing and formatting	MS
3.0	23/1/17	2017 edits, new patching and patch panels, fobots	JW
3.0.1	12/06/2017	Rack size correction (Page 25)	MS
4.0	21/3/18	30cm patch leads included Add Powered fibre standard Cat3 voice cabling removed Pit size specified Defunct document control section removed Skirting duct side outlet specified	JW
5.0	22/1/19	2019 version New model numbers for jacks & patch panels Remove requirement to supply patch leads Rack rail position requirement added	JW
5.1	18/02/2019	Minor edits	KP
5.2	24/4/19	Review and various amendments including cable tray detail and part number updates	Scott Whiston (CommScope)
5.3	1/5/19	Final edits	JW
6.0	2/4/20	2020 version – 1 port per user in open plan Added SRA option for PDUs and Racks	JW
7.1	1/2/21	New panel and outlet numbering: Change Fobots to LC	JW
7.2	25/4/21	Corrections SCA to LC in sections 4.2 and 4.3	JW
8.0	6/1/22	PDU change, explicit 2x100mm lead-in conduit, remove voice cabling references, minor edits to terminology	JW

# 1 Introduction

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## 1.1 Overview

The aim of this document is to provide a cabling infrastructure which has high reliability, is easy to maintain and can support the applications and services of today and the future.

The specification has been written to ensure that a cost-effective solution is provided without compromising any standards or safety issues, and that all single points of failure are designed-out by means of route diversity and possible service duplication where appropriate.

This document describes the specification for the design of the network infrastructure including fibre and copper networks for voice, data, and associated services within CQUniversity's (CQU) network.

All cabling work supplied and installed shall be in-line with local, national, and state standards, along with any additional requirements as stipulated by CQU.

It is important to note that all CQUniversity-owned network and communications rooms are for the sole occupancy of CQU and their associated voice and data distribution equipment. It is not permissible for other parties to store or install equipment within these rooms without written consent from CQU.

The product set has been standardised on CommScope. This product set has been selected for its high degree of reliability, quality, and performance. By standardising on this product set, a standard warranty for voice and data has been set for all buildings within the CQU network. To this effect CommScope voice and data products must be selected.

All installation work must be covered by a 25-year system warranty. To ensure that this happens, only approved manufacturer Integrators shall be used.

## 1.2 Specification of Criteria

Two levels of criteria are specified: mandatory and highly desirable. The mandatory requirements are described by the word 'must' and 'shall'; whilst highly desirable are described by the words 'should', 'may' or 'desirable'. Mandatory requirements must be adhered to under all circumstances and may not be changed. Highly desirable requirements are the desired ways of design, implementation and documentation that may be changed depending on individual circumstances.

Where a product has been indicated, the specified product shall be used. No substitution of product is permissible without the written approval of the CQUniversity Digital Services Project Manager.

All parties shall adhere to this specification document. Any deviation from this document can only be enacted upon receiving prior written approval from the CQUniversity Digital Services Project Manager.

## 1.3 Scope of Works

CQUniversity provides tertiary educational services across a variety of Campuses from Cairns in the north to Melbourne in the south. CQU has one of the largest and fastest growing footprints of any university in Australia.

This document provides minimum details on the scope and installation requirements across the network at all Campuses, Study Centres and Hubs owned and/or run by CQU. *It applies to all data and voice cabling, including that used for video and security.*

Any Appendix details shall be adhered to.

## 2 Installer Requirements

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### 2.1 Overview

All the work covered in this specification shall be implemented in strict compliance with the standards and codes issued or endorsed by the Australian Communications & Media Authority and the Standards Association of Australia.

### 2.2 Installer Requirements

All cabling works are to be performed under the Australian Communication & Media Authority (ACMA, formerly known as ACA) with the objective being to carry out general premises cabling as specified by the Structured Cabling System manufacturer.

### 2.3 Installer Licence

The communication cabling installation is to be carried out by a specialist Cabling Contractor licensed by the ACMA or registered with an authorised Cabling Registrar. The Cabling Contractor and nominated personnel must all hold current, relevant, and necessary licences/Open Registration, along with appropriate endorsements and must present these prior to commencement of work. A copy of the Contractor's license and Open Registration is to be made available to CQU with their tender submission to deem the tenderer compliant.

### 2.4 Preferred Cabling Contractor

The cabling contractor will be chosen by competitive quotation. Tenderers are advised to submit all relevant details to CQU when responding to requests for quotes.

#### CQU Contact Details

Leader, Network Operations, Digital Services Directorate, CQUniversity  
Phone: (07) 4930 6583  
Email: [network@cqu.edu.au](mailto:network@cqu.edu.au)

### 2.5 Supplier Selection

The manufacturer's components used on any CQU site shall be as follows:

Structured Cabling Components (Copper and Fibre Optic):

- CommScope Netconnect

### 2.6 Supplier Certification & Trained Personnel

The Cabling Contractor must provide their CommScope Netconnect Partner Certificate in electronic format with their tender submission for it to be deemed compliant. The tenderer shall also be posted on CommScope's Partner Locator at the time of tender submission,

<https://cpp.commscope.com/directory/search?f0=Partner+Type&f0v0=Solution+Provider>

The Cabling Contractor (must have adequately trained personnel, to the manufacturer's requirements, for installation of the cabling system. A minimum of 50% of installation staff must hold a current CommScope ACT 1 & ACT 2 for the installation / rough-in of all cabling. 100% of installation staff must hold a current CommScope ACT 1 & ACT 2 for the installation of all connectivity and testing of the site. All training certificates shall be provided in electronic format with the tender submission to deem the tenderer compliant.

The tenderer shall register the project with CommScope prior to any work commencing on any CQUniversity site. The tenderer shall provide written evidence from a CommScope representative that the project has been registered before any work commences.

## 3 Cabling Systems

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### 3.1 Overview

The topology of the cabling systems shall be set out and clearly defined in terms of design and product set. The Structured Cabling system is required to provide a flexible distribution architecture for both voice and data connectivity.

### 3.2 Cabling Practice

All cables shall be run and installed in a workmanlike manner in accordance with ISO/IEC 11801 (all parts), AS/NZS 14763.2, , AS/CA S009 Wiring Rules and CommScope Netconnect installation standards. The recommendations outlined within AS/NZS 3084 Pathways and Spaces should also be followed.

The contractor shall plan the cabling system and routing to:

- ensure adequate segregation from hazardous services,
- ensure system integrity and performance,
- ensure that it does not inhibit maintenance or future access,
- ensure there is no conflict with the operation and maintenance of other systems.

The contractor shall, in their tender submission, provide full details of the type of cables to be used including:

- the type of termination,
- colour scheme,
- identification method,
- method of installation and shielding (if required),
- limitations (if any)
- and any other relevant telecommunications information.

The contractor and/or designer shall seek written approval in writing from the CQUniversity Digital Services Project Manager, providing detailed drawings showing the proposed wiring cable tray/catenary or conduit layout for the entire system with all necessary dimensions and support details clearly indicated, prior to any project going to tender or installation commencing.

All cable trays, catenaries and ductwork required to complete the installation will be the responsibility of the tenderer to supply and install. The installer is to liaise with the CQUniversity Digital Services Project Manager and/or the main contractor when stripping out of existing floors/ buildings commences, to evaluate if any existing cable tray or ducts can be re-used.

All necessary pathway penetrations and access between floors is the responsibility of the tenderer to provide and to ensure all penetrations and access holes at the completion of the installation, are fully sealed to local authority requirements and fire regulations by qualified personnel.

All work shall be installed and comply with the cabling manufacturer's Installation Practices. These Practices are available upon request.

### 3.3 Conduit / Subduct Systems

#### 3.3.1 General

The tenderer shall obtain all clearances in accordance with CQUniversity Facilities Management Directorate before any work can proceed. The contractor shall follow the "Dial before you Dig" requirements at all times where applicable. All trenches and conduits shall comply with AS/CA S009 and AS/NZS 3084 for depth, location and usage.

All conduits will have a draw wire of 7/0.67 PVC SI Building wire installed. There must be no joins in this draw wire. Galvanised draw wire will not be permitted. Any draw wire used to pull new cabling through the pathway shall be replaced and is deemed part of the installation work.

Before cable is installed and after installation, ensure that the conduit is thoroughly clean of any extraneous material such as cable scraps, dust, dirt, construction debris and moisture. Any cable that has been subjected to immersion in fluid that has not completely dried out within 24 hours of immersion starting, shall have the pathway dried and cleaned and the cable shall be completely replaced with new clean dry cable. Any internal cable that has been subjected to water immersion shall be completely replaced at the installer's expense.

Co-ordinate all conduit and subduct work with other services on site as necessary. Conduits and ducting protruding through a floor shall extend between 50 – 75 mm above estimated finished floor level to act as a bund against fluid spillages.

### **3.3.2 Indoor Conduit / Subduct**

Restrict conduit lengths to no more than 30m of continuous pull inside a building between hauling points. Restrict any cable pull to no more than two (2) x 90-degree bends, in conduits or ducts.

All fibre optic cabling inside conduit systems shall be clearly labelled with warning tape, yellow and black in colour. The pathway system shall otherwise be installed in accordance with the manufacturer's instructions.

### **3.3.3 Underground Conduit / Subduct**

All conduits located in trenches shall be a minimum of 100mm diameter PVC, Class 12, white in colour. A detectable tape identifying that communications services are below shall be placed 150mm above the top of the conduits.

Any change of direction shall be done via cable pit. Any pits that are open at the time of the works shall have approved safety barriers surrounding them at all times. Any newly installed pits shall comply with AS/CA S009.

Any new pit installed in an existing and/or proposed garden bed shall have a communications locating marker installed.

### **3.3.4 Carrier Services**

The contractor is to arrange for the installation of two white UPVC conduit (with draw wire) of 100mm diameter, to house any required carrier and CQU lead-in cabling and install it in a shared trench with the electrical lead-in. If the provision of a shared trench is not practicable, a separate trench shall be provided.

The contractor shall also ensure that cable is installed to the minimum depths and required separation from electrical and other services, as specified in AS/CA S009.

### **3.3.5 Pits**

Pits shall be P6 unless otherwise specified.

## **3.4 Cabling System Structure**

The cabling system can be considered as a series of clearly defined subsystems, each one interconnecting a specific piece of active equipment that may in some cases change the media type.

It can be seen that there are two main components to the cabling systems for any one end to end solution. The basic elements are as follows:

- Backbone Cabling (Fibre Optic)
- Horizontal Cabling (Copper Cabling)

The backbone cabling provides connectivity from the campus distributor (CD) to the building distributor (BD), and the building distributor to the floor distributor (FD)/communication room (CR), if applicable. The CD/BD shall house both lead in carrier cabling termination frames and associated active equipment.

The horizontal cabling is the cabling system that provides telecommunication services from CR to the user outlets (TOs).

## **3.5 Penetrations**

Cables that penetrate fire barriers shall have the penetrations suitably sealed and fire-stopped by qualified



operators as required by local building code regulations/laws.

All cable passing through floor or wall penetrations shall have the penetrations suitably sealed and fire-stopped by qualified operators as required by local building code regulations/laws.

### 3.6 Earthing

Tenderer shall supply and install a complete earthing system for the voice/data system to ACMA, AS/CA S009, ISO/IEC 11801 requirements and CommScope installation guidelines.

At every campus distributor (CD), building distributor (BD), floor distributor (FD)/ communication room (CR), location the tenderer shall supply a Communications Earthing System (CES) as a dual-purpose telecommunication earthing system used for both functional earthing and protective earthing purposes.

Earthing conductors used for a CES system shall have green/yellow insulation. The size of the earthing conductor shall be a minimum of 6 mm<sup>2</sup> to allow for the installation and operation of overvoltage protection equipment.

All frames, racks and cabinets shall be earthed. All CES conductors from each frame, rack and cabinet shall be connected to a Communications Earthing Terminal (CET) Block located not more than 10m away. The CET shall be in the vicinity of an electrical switchboard and shall be bonded to the electrical protective earth by a Communications Bonding Conductor 6 mm<sup>2</sup> minimum with green/yellow insulation. The tenderer shall supply and install the communications bonding conductor from the CET to the electrical protective earth system. The resistance of the communications bonding conductor shall not exceed 0.5 ohms.

All metallic pathways including but not limited to all communications tray or basket and catenary wire pathways shall be earthed with 2.5mm<sup>2</sup> green/yellow earthing conductor connected to the building and/or the electrical protective earth system.

Each patch panel for the shielded outlets and shielded cables shall be individually earthed to a single earth point on the frame/cabinet or to an earth bar within a cabinet. Daisy-chain earthing of patch panels will only be accepted if the earthing connections are not disconnected if a patch panel is removed. Refer to CommScope installation guidelines for further details of adequate earthing solutions.

All terminations at the electrical protective earth at an electrical switchboard shall be done by a licensed electrical contractor. The tenderer shall supply and install the CES conductors, the CET blocks and all earthing conductors up to the protective earthing point.

No steel cabling enclosure medium will be installed without having continuity to a protective earth.

## 4 Fibre Optic Backbone

### 4.1 Overview

All data backbone services shall be single-mode fibre optic cabling.

Each CR shall be linked via fibre optic cabling.

The distances quoted in the table below are from the source equipment (i.e. switch) to the terminal equipment (i.e. PC). Allowances must therefore be made for vertical drops/rises as well as the horizontal runs.

Technology	Distance for application (m)			
	1G Base T	10G Base T	1000 Base SX	10G Base LR
OS2 Fibre	N/A	N/A	1000	10 000

Table 4.1 – Maximum distances

The distances for the fibre are the absolute maximum and do not take into consideration the number of splices and connectors used. A budget calculation must be done on any fibre channel before the exact distance is known.

## 4.2 Fibre Optic Backbone Cabling to the Building

An OS2 grade single mode (SM) fibre optic cable (underground nylon jacketed, gel filled, sacrificial sheath fibre cable) shall be run from the building distributor in each building back to the main campus communications room (CommScope part number 64624448-24). Optic Fibre core count shall provide a minimum 50% spare capacity, with a minimum of 24 cores.

**There shall be two alternative fibre pathways to each new building, the routes of these shall be approved by the CQUniversity Digital Services Project Manager.**

These fibre optic backbone cables are to terminate within each CR in the communications cabinet. Cabinet size and location is to be at the discretion of the CQUniversity Digital Services Project Manager. Fibre termination unit panels utilising LC type connectors shall be used at both ends of the cabling.

All cabling (whether internal or external) shall be installed with “Warning – Fibre Optic Cable” detectable warning tape. Where fibre optic cabling is run internally, all cable shall be installed within flexible conduit and suitable warning tape to provide easy identification of this service.

Cabling to be run externally, either underground or outdoor, shall utilise outdoor rated loose tube cable. Any cable to be run underground shall pass the “water penetration test” as set out in AS/CA S008. Each loose tube is to be gel filled (thixotropic compound) surrounding a glass reinforced plastic (GRP) central strength member. Tubes are to be wrapped with water swellable tape, sheathed with UV stabilised polyethylene (Black) with a nylon outer jacket (Blue), and a UV resistant thermoplastic sacrificial sheath (Black). Cable shall be CommScope 6462 4 448-24 (for 24 core).

The fibre cables shall meet the following transmission specification: -

<b>9/125 µm Fibre</b>	<b>OS2 Specification</b>
a) Max fibre attenuation:	0.4 dB/km at 139 nm 0.4 dB/km at 1373 nm 0.3 dB/km at 1550 nm
b) Sheath Colour:	Yellow (indoor)/ Black (Sac Sheath)
c) Cabled cut off nm:	<1170nm

## 4.3 Fibre Optic Backbone Cabling Within the Building

Internal installations require, as a minimum, 12 core single mode fibre optic cable. Fibre is to be run from the main communication room within the building to every floor distributor and/or communication room.

All fibre optic cabling shall be run on communications trays and segregated from regular network cabling by way of separated bundling.

The multi-core optical fibre cable shall consist of SM fibre. Each fibre shall be tight buffered with colour-coded PVC (or LSZH) for easy identification of multi-core fibre optic cable. Cable shall be CommScope part number 760004267 (12 core).

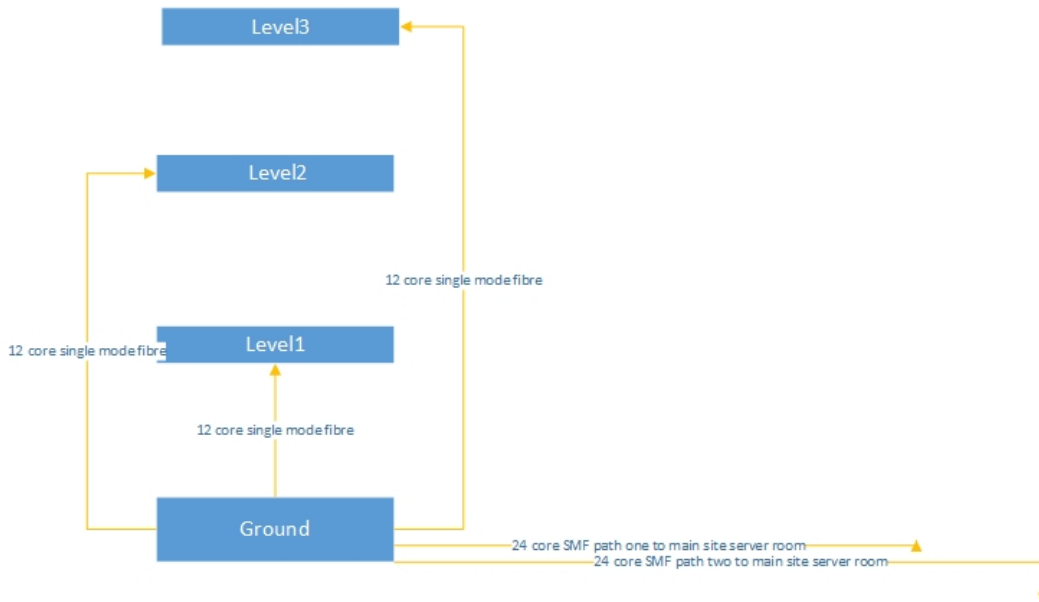
The fibre cables shall meet the following transmission specifications: -

<b>9/125 µm Fibre</b>	<b>OS2 Specification</b>
a) Max fibre attenuation:	0.4 dB/km at 139 nm 0.4 dB/km at 1373 nm 0.3 dB/km at 1550 nm
b) Sheath Colour:	Yellow

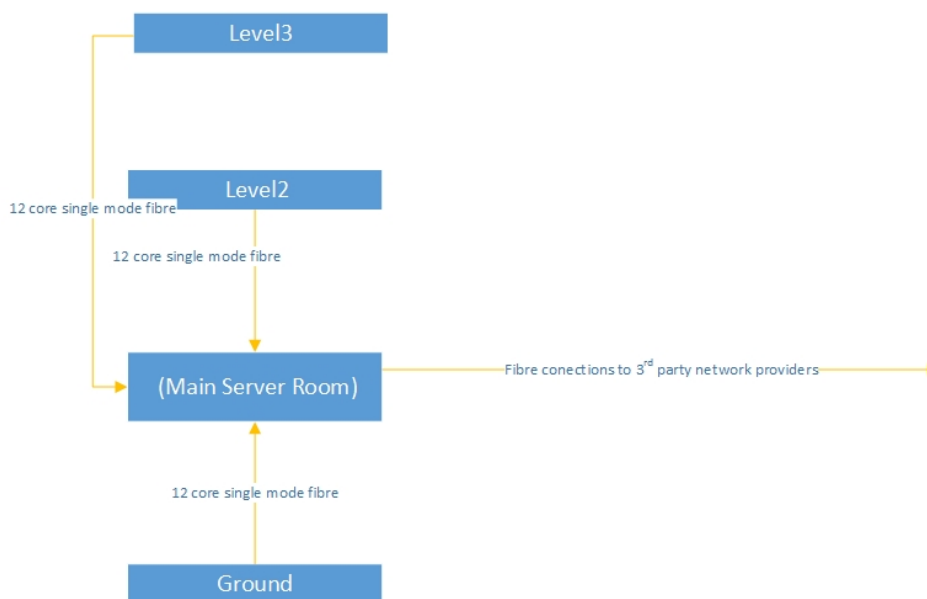
- c) Cabled cut off nm: <1170nm

This cabling is also to be terminated using LC and LC Simplex through adapters at both ends. The cable shall be labelled at each end with the name of the installer and the date of install.

**Figure 4.3.1 – Example: Fibre Optic Backbone Within a Multi-Floor Building**



**Figure 4.3.2 – Example Fibre Optic Backbone within a Multi-Floor Site where a Server Room exists**



## 4.4 Fibre Termination

### 4.4.1 Fibre Termination Unit – RTCG Series

The termination unit shall be CommScope RTCG series 19” rack mountable fibre tray providing cross-connect and interconnect or splicing capabilities. The RTCG series fibre tray shall be supplied fully kitted to terminate 24 fibres with LC connections.

Part Number 3-1154182-3	RTC1G-LCD-24-FS- A24-P24-Z-SM	RTCG 1RU STATIC SLIDING TRAY, 24 CORE OS2, LC DUPLEX, C/W PLATES-ADAPTORS-PIGTAILS- SPLICE PROTECTORS & TRAYS
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The RTCG Series 19” rack mountable fibre tray shall consist of a frame mountable housing for terminating and/or splicing fibre optic cables and allow for organization of the fibre optic interconnects. The fibre tray shall contain the following features

- Slide-out termination drawer with fixed cable rear entry ports.
- External cables are transported onto sliding drawer via a bend controlled convoluted flex tube (sleeve).
- Splice trays are pre-assembled and fibre management system includes fibre guides and tie downs for loose tube, buffered fibre cables and pigtail fibres.
- Capable of presenting 24 Simplex LC Fibre Connections in 1RU
- Angled adaptor plates with the left hand side angled to the left and right hand side angled to the right

#### **4.4.2 Cabinets**

Fibre optic cabling shall be terminated within the CR cabinet into the RTCG Series Fibre Tray. The final location of this cabinet shall be approved in writing by CQUniversity Digital Services Project Manager prior to any work commencing.

### **4.5 Powered Fibre**

External devices that require POE network but are not in or attached to a building – eg security cameras on poles, may be connected by powered fibre using POE extender technology. In all cases the design of these installs must be confirmed with CQU’s Communications section of the Digital Services Directorate. Where such services are deemed suitable, the following shall be used. Commscope POE extender PFU-P-C-O-060-02 for a 2 port device. The Powered Fibre Cable type shall be a 4 minimum of a 4 core 12 AWG underground rated cable PFC-S04O12 .

## **5 Voice Backbone**

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### **5.1 Overview**

All general telephones shall be VOIP type, administered by CQU and run via the 4 pair balanced cable of the structured cabling system.

CQU no longer supports Voice grade cabling .

Any work pertaining to the connection or disconnection of voice services shall be co-ordinated and completed by CQU’s Communications section of the Digital Services Directorate.

(see also section 3.3.4 Carrier Services)

## **6 Horizontal Distribution**

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### **6.1 Overview**

The horizontal distribution listed is for the purposes of data and voice connectivity. Cabling shall extend from the CR and shall be terminated onto Category 6<sub>A</sub> shielded outlets. Cables reticulating to the CR shall be terminated onto Category 6<sub>A</sub> 24 port shielded Patch Panels.

All user Cat 6<sub>A</sub> shielded outlets shall be fed from the nearest CR to ensure cabling lengths comply with ISO/IEC 11801. Cable lengths of the permanent link must be less than 90 metres.

All connections that require connection to an active device must be terminated onto a patch panel.

## 6.2 Cable Capacity

Planning of cable capacity must be co-ordinated with all parties involved in the planning, design and implementation of the IT network. The capacity of cables must cater for requirements that will be implemented from day one and all known requirements that will follow in the future plus additional capacity for unknown future expansion.

Designs must take into account, and provide for, ease of future cabling works and repairs. It is critical that the horizontal distribution is designed correctly with consideration given to:

- Layouts
- Routing
- Ceiling void
- Access
- Cable management

## 6.3 Channel Design Rules

The maximum channel distances and connectors permissible for Category 6<sub>A</sub> are detailed in figure 6.3.1 below.

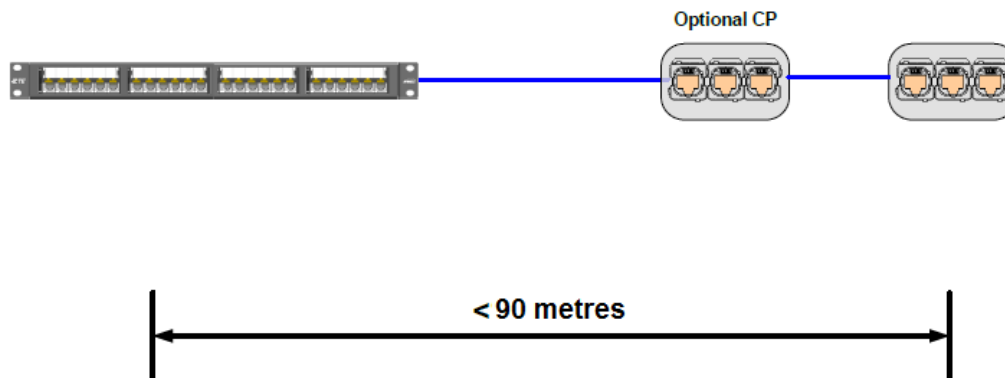


Figure 6.3.1 Maximum Permanent Link Design

**The total length of the horizontal cable (solid conductor) must not exceed 90m and the total length of the patch cordage (stranded cable) must not exceed 10m. The total combined end-to-end length must not exceed 100m.**

## 6.4 Cable Management

Cable management is split between continuous (tray) and non-continuous pathways. This is primarily to cater for the differing requirements for capacity and future expansion requirements.

## 6.5 Cable Pathways – Trays / Baskets & Catenary Wires

Trays or baskets must be either an overhead in-ceiling mounted solution or an under-floor mounted solution, depending on the overall building design and construction.

Cable trays or baskets must be installed in the following instances,

- All cable pathways into equipment racks within a CD, BD, CR & FD Rooms
- All pathways between the communications room to the building distributor.
- Where more than 10 x Cat 6<sub>A</sub> Shielded Cables are run in a parallel pathway

The use of cable tray or basket shall be designed to improve the addition of cabling for future adds, moves and changes. Multiple catenary wires shall not be installed within close proximity, in this instance a cable tray system shall be used.

Where Cat 6<sub>A</sub> shielded cables are grouped into a bundle there shall be no more than 24 cables per bundle.

There shall be separate trays for power and telecommunication services. Where the trays cross they must be bridged and cross at 90° with a minimum of 100mm separation from LV electrical pathways. Where tray / basket pathways run in parallel there shall be a minimum of 300mm separation from LV electrical pathways. Horizontal and building backbone cables must be dressed to enter either the top or the bottom of the designated Communication Racks / cabinets via a cable tray / basket pathway.

Cable tray sizing shall conform to AS/NZS 3084, and CommScope Installation Specifications. No “whale bone” type trays will be accepted. Any pathways installed shall have 50% spare capacity to be used for future cabling installations. Clause 6.2 provides further detail.

Cable entry/ exit into the communication rack shall be via a cable tray / basket pathway to ensure the bend radius of the cable is maintained. Cables passing through cavity wall spaces shall be protected via flexible conduit at all times.

Catenary Wires shall be used for horizontal distribution of cables.

## 6.6 Skirting Duct / Service Columns

Where appropriate, skirting duct shall be used for the reticulation of power and communications services to the final outlet location. Cable pathways must be designed to ensure cabling should not run any further than 5 metres within enclosed skirting duct work.

Skirting duct shall be a minimum of 50mm in depth, comprising of 3 channel construction to ensure adequate separation between power and communications services. All outlets mounted to skirting duct shall use the manufacturer’s approved outlet mounting kits.

Changes of direction within the skirting duct shall require the use of suitable bend radius protection of the communications cabling. No sharp edges shall be evident. All outlets should be mounted directly to the skirting duct. The channel system shall use angled faceplates to provide adequate bend radius protection of the communications cable.

Service columns to supply skirting duct and/ or workstations shall provide adequate separation of the power and communications services. Cabling through service columns shall not exceed the maximum allowable fill rate. Bend radius protection of the cabling entering and leaving the service column must be provided for.

Side entry outlets will be used to cater for Cat6<sub>A</sub> and shall be:

1711343-2 SL-Series Modular Jack, category 6<sub>A</sub>, shielded, 4 pair, side exit, without dust cover

Exact skirting/service column type/model must be approved by the CQUniversity Digital Services Project Manager, before any on site work begins.

## 6.7 Media Selection

The category and type of copper cable to be installed shall be:

- CommScope Category 6<sub>A</sub> F/UTP with a **Blue** sheath (Part #: 884028508/10)

The type of horizontal cables used shall be 4-pair 100Ω Category 6<sub>A</sub> high performance, shielded twisted pair (F/UTP) cable for all Category 6<sub>A</sub> applications.

The diameters of the insulated wires shall be different between the pairs to achieve the necessary NEXT and delay skew performance. The 4-pair F/UTP cable shall be run using a star topology format from the cross connect at the floor distributor (CR) on each floor to every individual telecommunications outlet.

The 4-pair UTP cable must meet ISO/IEC 11801 Category 6<sub>A</sub> requirements. It must be proven to ensure connectivity for any application up to and including 10 Gbps from the BD/floor distributor (CR) wiring closet to the telecommunications outlet at the work area.

**Any variation to the above cable grade requires approval from the CQUniversity Digital Services Project Manager.**

For Cat 6A cable installations, the provision of spare cable should be avoided by good design and careful selection of termination locations. The tenderer shall install 2 – 3 metres of spare in the cable runs at the communications rack end which shall be laid into a cable tray system as outlined in 7.12. The tenderer shall install approximately 1 – 1.5 metres of spare cable within the ceiling space prior to the entry to a service pole, skirting duct or wall outlet containing the TO. Place this spare cable in such a manner that it is fully supported and that the minimum bending radius is maintained. Spare cable shall not be stored inside service poles or skirting ducts. If spare cable is contained in loops, there shall be no more than 4 loops in a coil at any one location and each loop shall be of different diameter with minimum diameter of 300 mm. Final outlet locations and quantities shall be confirmed by the CQUniversity Digital Services Project Manager.

**6.8 Telecommunication Outlet (TO)**

All telecommunications outlets supplied by the tenderer shall be Category 6A RJ45 outlet type, accepting standard phone and data modular plugs.

The category and type of copper connector to be installed shall be:

- CommScope Category 6A (Part #: 2153449-2)

A CommScope standard Bezel shall be used for presenting the outlet into the Clipsal-style faceplate, Part Number 64671116-02. The TO shall be multi-application supportive and shall be able to be reconfigured to different applications when required. Each outlet shall have an automatic wire cutting feature for termination and provide 360-degree shield protection.

The TO shall meet or exceed ISO/IEC 11801 Category 6A component requirements. The modular jack offered shall conform to ISO/IEC 11801 standard and be terminated in the T568A wiring scheme.

**6.9 Outlet Presentation**

All wall faceplates shall be able to accommodate two Category 6A FTP RJ45 outlets via a bezel system. Only two gang faceplates are to be used, except for wall hung phone, wireless access points and CCTV, where single gang plates will be required. In computer labs, two gang outlets may be used for two computers that are side by side. Each faceplate shall have the option for the faceplate to be mounted vertically or horizontally.

Faceplates shall be electric white in colour with identification windows and match the power GPOs to ensure the aesthetics of the site are maintained.

**6.10 User Type Outlet Quantities**

Each user type will demand different requirements from the structured wiring infrastructure. The main user types and associated technologies have been defined below as the minimum requirements for outlet concentrations. See table 6.10.1 below.

User Type	Number of channels per outlet
	Data and Voice
General office outlet, workstation user or generic workspace	2 per user
Open plan office space for staff	1 per user

Student Lab Computers	1 per computer
Printer	2
Emergency Lighting	2 per main panel
Fire Alarm	2 per panel
IP CCTV	1 per unit
Wireless AP	1 per unit

Table 6.10.1 Outlet densities per user

## 6.11 Patch Panels

Patch Panels should be used at the CD/ BD and CR locations as approved by CQU. The category and type of copper connector panel to be installed shall be:

- CommScope Netconnect Shielded 24 port 1RU flat unloaded patch panels (Part # 760237046) that shall be installed complete with a cable management saddle kit ( Part # 760229179). All Velcro ties shall be installed into each saddle bracket.

The Tenderer shall supply 24 port Category 6A Patch Panels with identical performance to that listed in Clause 6.8 (TO's).

All patch panels shall be earthed as outlined in section 3.6 of this document. Routing of the cables into the rear of the patch panel shall be installed to ensure that none of the cabling inhibits additional equipment to be installed above or below the patch panel.

## 6.12 Wireless LAN (WAP)

There is a separate standard document for Wireless installation. Please refer to this standard for more details.

- CQUniversity Wireless Installation Technology Standard

## 6.13 Surface Mount Outlets

Cabling mounted on a surface shall use surface mount outlets designed to carry the outlet and maintain the bend radius of the cable. A two-port surface outlet box shall be the maximum number of outlets unless otherwise approved by the CQUniversity Digital Services Project Manager. The copper connector surface mount to be installed shall be:

- CommScope 2 port Surface Module (Part #: 1-1933668-3)

## 6.14 Labelling

Each piece of equipment, faceplates, patch panel and outgoing cable from terminations shall be labelled. Corresponding labelling and numbering shall also be provided on the telecommunication outlets.

All patch panels and TO's shall utilize label holders for clear identification along with coloured label inserts to clearly identify services i.e. active equipment, horizontal cabling etc. Proper labelling and numbering shall also be provided on all outlets. The patch panel and fibre tray labels shall be of trefolite or similar type and be secured to the labelling section of the patch panel.

All cable labels are to be of clear wrap around self-adhesive type and each cable is to be labelled at each end 100 – 150mm from the termination point.

Outlets shall be of the type that include a small window for the label. They will be clearly labelled CQUniversity lettering method. The label shall be white label with black writing.

The frame labels shall be supplied in black on white and fitted by the cabling contractor.



All cabinets and approved connection frames are to be labelled at the top right-hand side of the equipment using a trefolite or similar type label. Complete records are to be provided showing all connections. The installer shall request details on the labelling requirements from CQUniversity Digital Services Project Manager

**6.14.1 Racks:**

Each rack on a floor will have a number. The racks will be labelled as “Rack 1” “Rack 2” etc.

**6.14.2 Panels:**

The labelling shall number each patch panel in a rack alphabetically from A-Z.

**6.14.3 Outlets**

Outlets will be 1-24 to correspond to the port number on the associated panel, so that individual ports on the panel do not need labels.

At the wall socket, the outlet will be labelled as follows. Only Capital letters may be used.

**Floor + '/' + Rack + Panel Letter + '-' + Outlet Number**

Examples

<b>G/1A-24</b>	Associated Rack is on Level G Rack number is 1 Panel is A Port is 24 on that panel
<b>2/2G-8</b>	Associated Rack is on Level 2 Rack number is 2 Panel is G Port is 8 on that panel

This is a new scheme introduced in 2021. Where ports are being added to panels using the old numbering system, they shall follow the previous numbering system which is based on the room location of the port :

Floor / Room . Outlet

e.g. G/1.08 = ground floor, room 1, outlet number 8 in that room

NB: Outlets are numbered from 1 within each room. Panels must be labelled to match the outlet.

Where new panels are added to an existing rack, the new scheme will apply and panels will start at A regardless of location in the rack.

**Failure to correctly label ports will result in relabelling being required at the contractor’s cost. If in doubt, ask CQU to clarify.**



**Figure 6.14.3.1 Example of correct outlet type. (Note uses older numbering method)**

All fibre cabling, the fibre tray and/or piece of equipment that the fibre is terminated into (POE Extender) shall have a label identifying the cable destination and number of cores. Each core shall also be labelled on the face of the adaptor plate. The fibre cable shall also have a wraparound clear wrap around self-adhesive type and each cable is to be labelled at each end 150 – 300mm from entry into the fibre tray.

### **6.15 Security / Access Control**

Access control cabling shall be via a single telecommunications outlet to comply with this document. Consultation with the access control manufacturer should be sought to confirm any other additional cabling/ installation requirements.

Details on the access control system shall be available from the CQUniversity Digital Services Project Manager.

### **6.16 Joiners, Media Converters etc.**

The use of joiners, media converters, repeaters, hubs, splitters and other similar devices is strictly prohibited.

### **6.17 Rack Layout**

Patch panels shall be installed as per the below layouts. When designing the overall rack layout, the number of switch ports should be sufficient to allow patches of ALL data outlets on the floor the rack resides in.

An additional amount of spare capacity (extra, un-patched switch ports) should also be included within the network design. Generally, this will be 15% additional switch capacity above the total data point count on the floor. A concession may be approved by the CQUniversity Digital Services Project Manager to reduce this percentage, if the total port count (including spare capacity) will require an additional switch to be installed just to maintain the percentage spare.

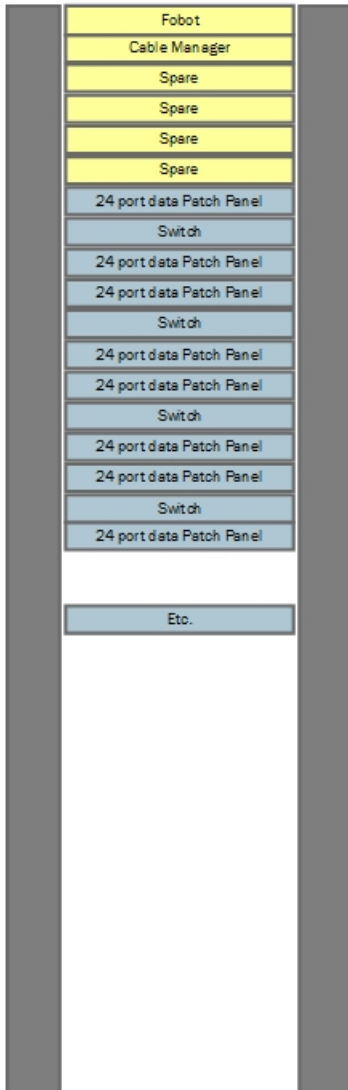
Connecting the patch panel and the switch, the patch leads will be 20, 25 or 30cm. Flood patching will achieve a result similar to the photograph figure 6.1.8.1. To achieve this result, a 24 port patch panel is located above and below each switch. The switch will have 48 ports. Short patch leads connect the ports above the switch to the top row of switch ports, and connects the ports below the switch to the bottom row of switch ports.



**Figure 6.1.8.1 – Example Patching of rack**

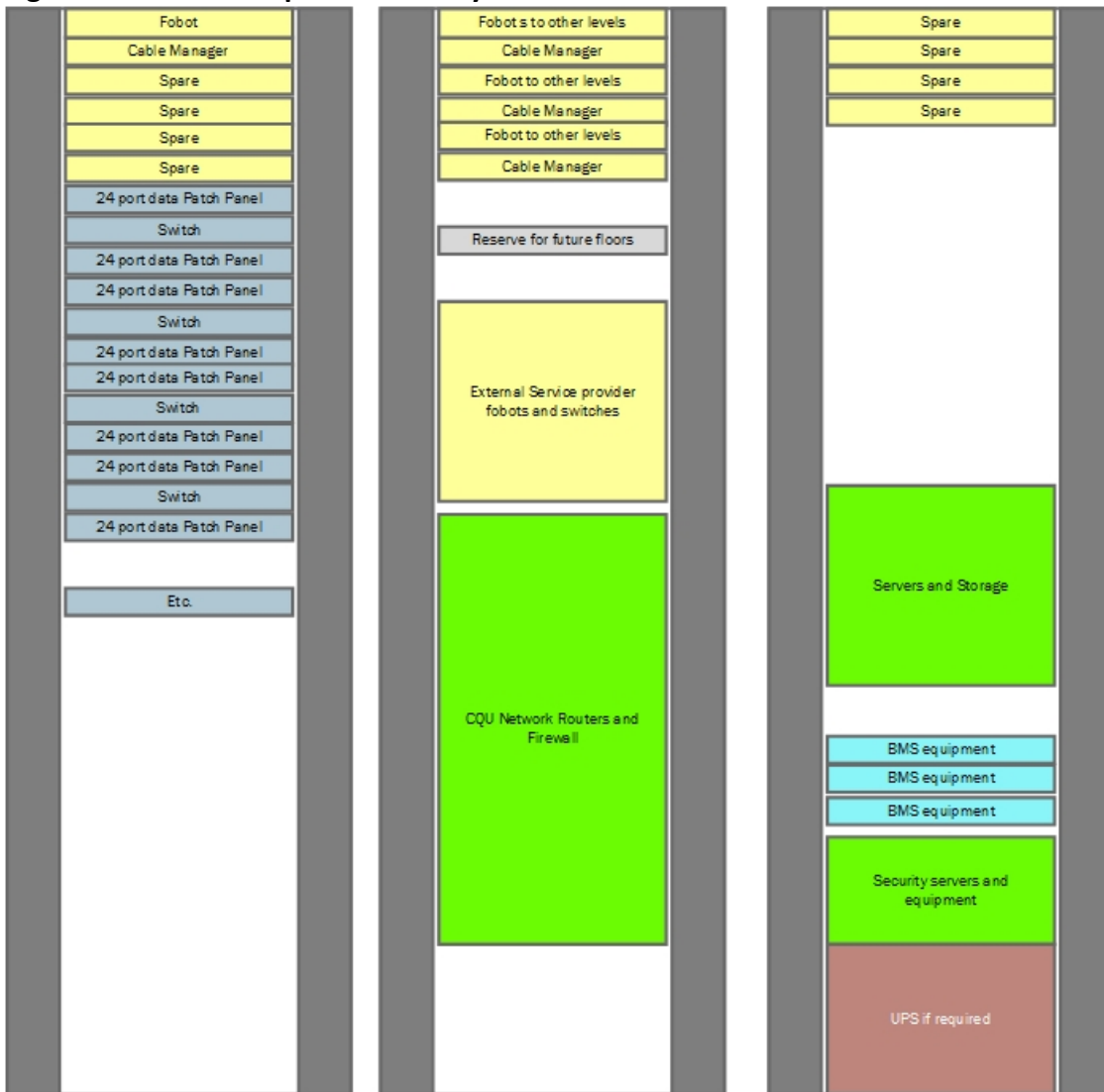
See below Figures (6.1.8.2, 6.1.8.3 and 6.1.8.4) for a typical cabinet layout. Exact layout to be provided in writing by CQUniversity Digital Services Project Manager prior to any installation work commencing. A detailed layout for single building sites must be provided in writing by CQUniversity Digital Services Project Manager.

**Figure 6.1.8.2 – Cabinet Layout – single rack room.**





**Figure 6.1.8.4 – Example Cabinet Layout – server room – full site**



## 7 Communication Room (CR)

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### 7.1 Overview

CQUniversity has specific design requirements and methodologies that shall be adhered to for all new and refurbished Communications Rooms (CRs) and associated spaces across all campuses of CQUniversity.

This document provides minimum standards for a general CR without servers. A **larger CR** will be required to cater for **servers and other equipment** at a standalone site. *Room and Rack Layouts will need to be approved by CQU before construction.* This document was drafted with reference to AS2834 Computer accommodation, 1995. CQUniversity standards are supplemental to Australian Standards and manufacture requirements or methodologies. Where CQUniversity have not made comment then the design and methodologies of the associated Australian Standards or products manufacture methodologies apply.

A CR consolidates all connectivity from the enterprise network and building control systems and distributes it to pre-determined areas of the enterprise. It is the 'horizontal' convergence point between the building's network backbone, workstations and conference rooms. Each building is to have a designated 'Main Communications Room' on the ground floor level.

CRs shall be centrally located and adjacent to risers within the building to ensure maximum cables lengths of 90 metres are not exceeded at the furthest point. If the building is multi-level each floor shall have a CR, and CRs shall be vertically aligned and connected with propriety cable trays.

CRs contain critical equipment and require clean, dry, environmentally controlled and secure rooms. Shared accommodation with plant rooms, lift motor rooms, air handling rooms, cleaner's rooms or similar **shall not be considered**. CRs must be directly accessible via a corridor and not located inside store rooms or other spaces.

All CRs should not contain, or have passing through them, other building services e.g. electrical services, water, sewer etc. to exclude the possibility of accidental damage and to prevent the need for trade access.

Access will be restricted to authorised CQUniversity Digital Services personnel or approved contractors only.

### 7.2 Minimum Dimensions

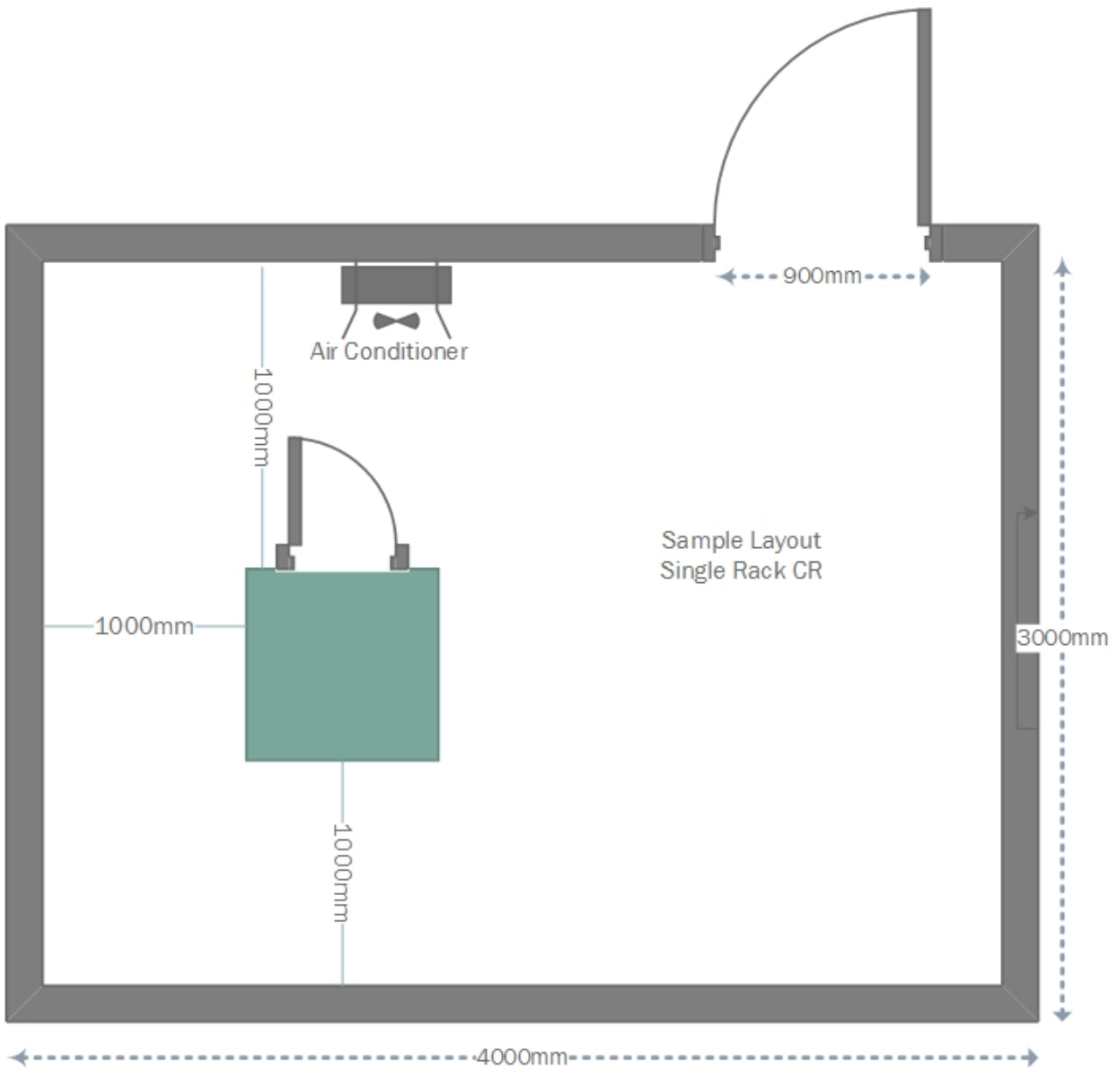
Adequate floor area is essential for CRs; the minimum required dimensions are 3 metres by 4 metres to achieve a 12 square metre room. Other dimensions will be considered by the CQUniversity Digital Services Project Manager in order to achieve the required 12 square metres if they do not compromise accessibility to the equipment for installation and maintenance.

Each CR shall conform to the minimum requirements as specified in AS/CA S009. Passive cabinets shall provide minimum of 900mm clearance at the front and rear, with an additional 100mm added to this figure if active components are present within the cabinet.

Sample layouts for rooms that contain 1, 2 or 3 racks are below. The designated 'Main Communications Room' for a building will contain a minimum of 2 racks. Other rooms will contain as many racks as are required for the patch panels with at least 6RU free for spare.

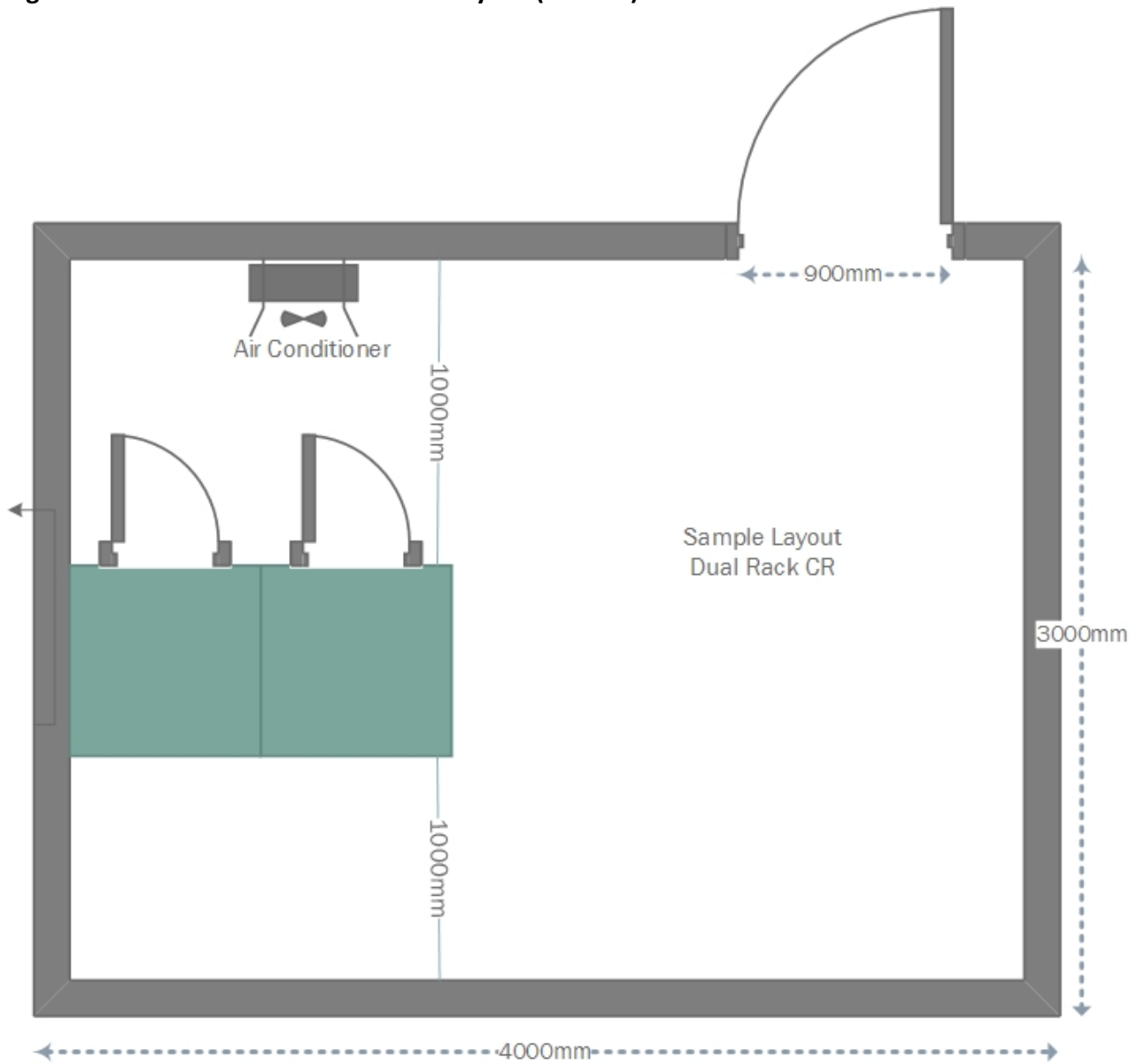
The tenderer shall seek the CQUniversity Digital Services Project Manager written approval for the final communications rack lay out and position prior to the installation commencing.

**Figure 7.2.1 – Communications Room Layout (1 Rack)**

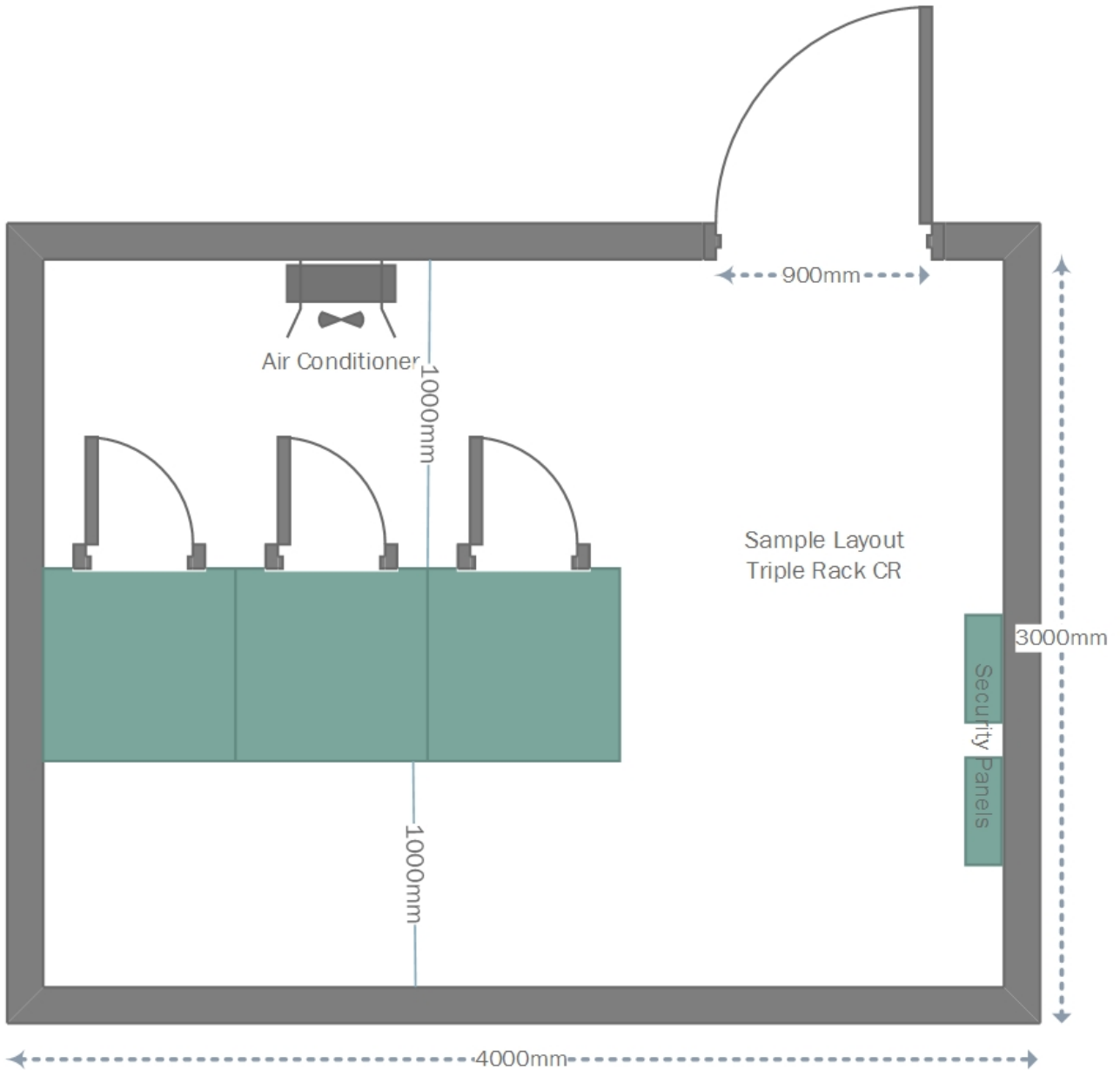




**Figure 7.2.2 – Communications Room Layout (2 Racks)**



**Figure 7.2.3 – Communications Room Layout (3 Racks)**



### 7.3 Doors

All CRs are to be provided with a door that has as a minimum clear opening of 900 mm and opens outwards. All CR doors are to have, as a minimum, 2 metres clearance in front to ensure adequate clearance for the manoeuvring of communication racks.

### 7.4 Door Locks

If an electronic swipe card or proximity card security system is installed on the site, card access must be installed on all CR doors. A unique BiLock cylinder override shall also be fitted in line with CQUniversity BiLock profile. Each site has a specific key for CRs which must be used. On a new site, a specific lock shall be provided for all CRs. The CQUniversity Digital Services Project Manager shall be supplied with keys for this lock on final commissioning.

### 7.5 Ceilings

All CRs are to be provided with a demountable ceiling (removable tiles) at a height generally of the surrounding rooms or at 2.8m. No continuous plaster board sheeting is to be used.

### 7.6 Flooring and Walls

All CRs shall have a flat level floor; uneven and sloping surfaces will not be accepted; this is essential for a safe working environment. All CRs shall be provided with anti-static vinyl floor covering. Concrete floors that are level polished and sealed are also acceptable. Carpet is not to be used due to static build up which can damage the equipment.

All CR walls shall be painted / polished sealed.

### 7.7 Lighting

Lighting intensity on the front and back of installed terminations, patch panels and equipment should be 500 lux at 1m above floor to meet AS/NZS 3084 requirements. The lights should be situated to minimize shadows on the patching and termination areas.

### 7.8 Cooling – Ventilation

The CR shall be fed by a dedicated HVAC system that is designed to provide the correct operational environment for all active equipment to be installed. To allow a safety margin of cooling it should be designed to accommodate the requirements of flood wiring with all ports active. As a minimum, there must be a single AC unit rated to a minimum of 750W output of cooling per cabinet.

Each HVAC unit shall be fed from a separate mains cable to the circuit board. Each HVAC unit within the same data room must not share the same circuit breaker with any other HVAC unit. Consideration must be taken for future power requirements of any new equipment.

The HVAC shall be provided and operational on a 24 hour, 365 days a year basis.

The temperature and humidity shall be controlled to provide continuous operating ranges of 18° C (64° F) to 23° C (73° F) with 45% to 55% relative humidity. Humidification and dehumidification equipment may be required, depending upon local environmental conditions.

Location of the HVAC inlets (head units) should not obstruct or be located directly above the IT equipment racks.

Airflow from HVAC should be from the front to the back of the rack and not from the side.

### 7.9 Fire Services

All CRs shall be fitted with fire and smoke detectors but must **not** be fitted with sprinklers unless required by BCA for fire regulations. One fire extinguisher of the 'High Voltage' foam type shall be supplied per room. Dry chemical or CO<sub>2</sub> extinguishers are **NOT** to be supplied.

## 7.10 Power

### 7.10.1 Rack Power

The power requirements for each cabinet must be calculated from the maximum amount of equipment that can be fitted. In standard CR where there is no Uninterruptible Power Supply (UPS), a single 20A captive socket shall provide a feed to each active cabinet, and their rating shall be based on the calculated power rating for each cabinet.

The captive sockets shall be ceiling mounted and hung by chains within close proximity to top of the racks.

The power should be fed from a local distribution board, which in turn is fed from the main distribution board. Each outlet shall be labelled with Distribution Board and Circuit number using a plastic label with black lettering on a white background.

### 7.10.2 UPS power distribution

In server rooms and standard communications rooms where a UPS is installed, an additional captive socket shall be installed above each rack to connect to the UPS. The UPS must also have its own captive socket to connect to mains power. It will be on a separate circuit. The rating on this circuit will depend on the size of the UPS.

### 7.10.3 PDUs in Racks

In a standard CR that only services the floor it is situation on, the PDU must be **SRA PV113-023014320433-1M0**. These must be ordered with the correct plug to connect to the captive socket as described in **7.10.1**.

In a CR that is designated as the main for the site (Data Room), PDUs must be APC or SRA brand PDUs with built in network management. There shall be one PDU for each captive socket. In racks without a UPS feed that is one PDU per rack. In racks with a UPS feed, there shall be two PDU per rack. PDU model to be used is **APC 8858 EU3** or the **SRA ES1326** with power cable suitable to connect to the captive socket as specified in **7.10.1**.

### 7.10.4 Other GPOs in room

At least 1 double GPO should be provided on the wall.

## 7.11 Uninterruptible Power Supply (UPS)

The CR shall be fitted with surge protection. Where the main communication room is the main communication room for the site or will house servers, it shall also have a managed UPS with a minimum one-hour rating for that room's expected load. When a UPS is installed in the cabinet, the surge filter protection device will be fitted between the captive outlet and the UPS, and the UPS will then connect to the cabinet's PDU(s). Each UPS shall be fitted with a network management card.

## 7.12 Environmental Monitoring

Where a main communication room contains servers, the PDUs shall include environmental monitoring that is compatible with APC's StruxureWare.

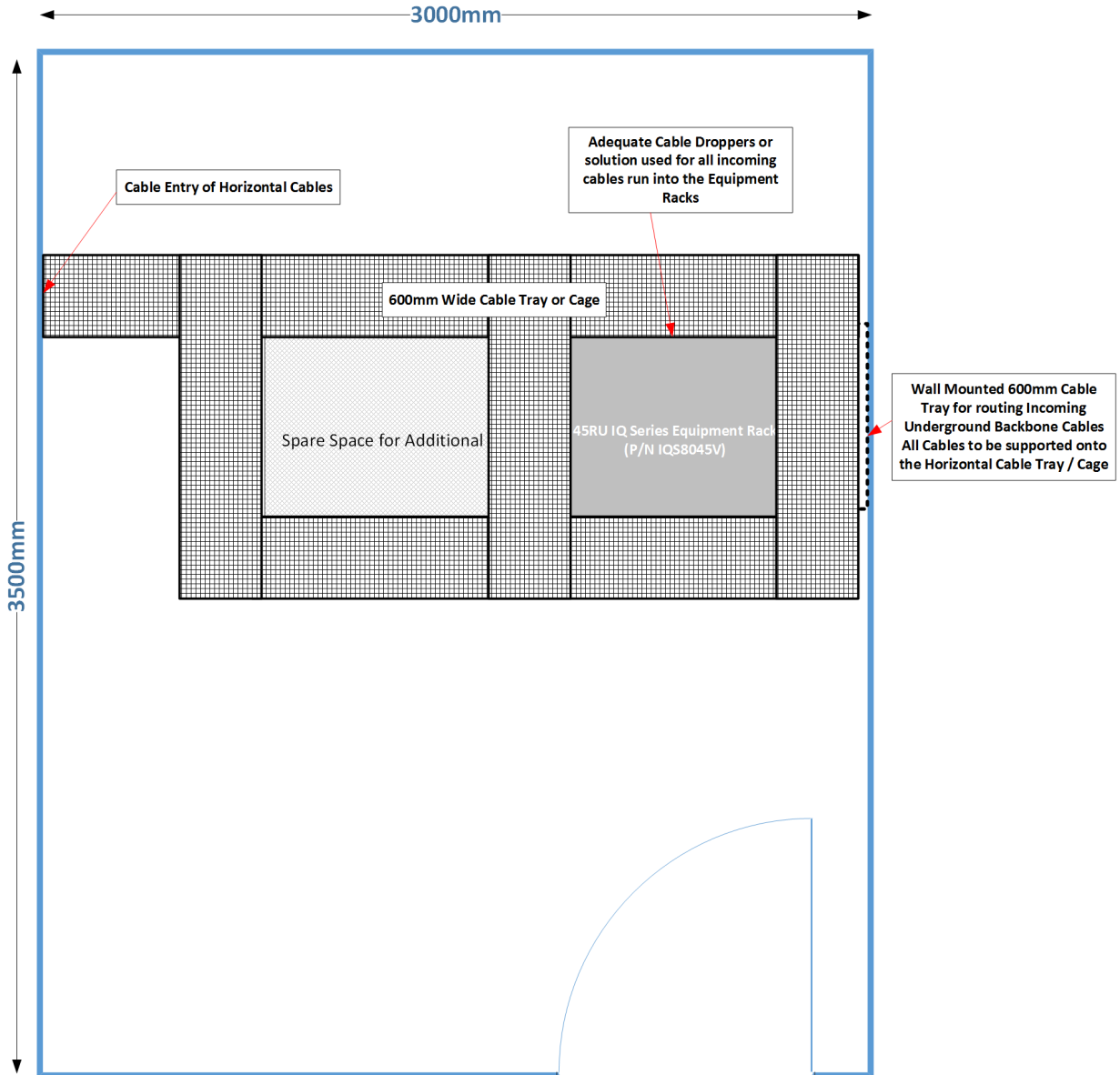
## 7.13 Internal Cable Tray

Either an overhead ceiling mounted tray/basket, or under-floor mounted basket solution shall be used to carry cables within the CR's. The cable tray/basket system shall be designed above the equipment racks to hold the cable slack, the cables shall be loomed into the cable tray/basket storage area to ensure that it can be easily accessed at a later date for any potential moves.

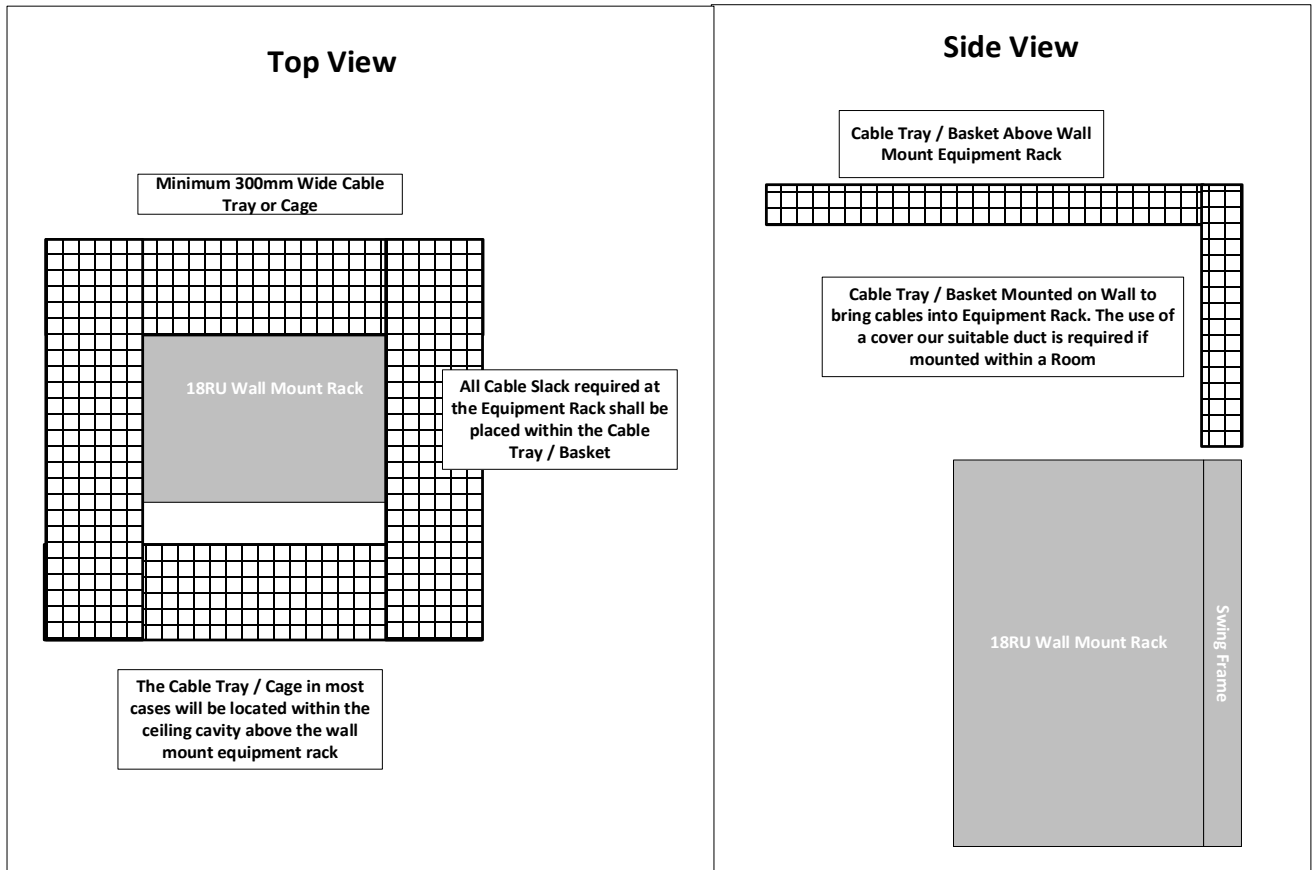
There shall be separate trays for power and telecommunication services. Where the trays cross, they must be bridged and cross with 900mm separation. Horizontal building backbone cables must be dressed to enter either the top or the bottom of the designated structured wiring cabinets.

Cable entries and exits shall be via a system that ensures the bend radius of all cables is maintained (e.g. waterfall or similar).

### 42RU Rack Installation Example (Top View)



### 18RU Communications Rack Installation Example



#### 7.14 Ceiling Void

Planning of overhead cable trays must be co-ordinated between all parties involved in the planning, design and implementation of the building works.

Lighting must not be impeded by tray work.

#### 7.15 Fire Stopping

Any doors into CR's that require venting must have vented grills with inbuilt intumescent fire stopping materials.

Any cabling or associated pathway associated with telecommunications services penetrating fire related elements of the building shall be fire stopped to comply with the BCA and Australian Standards.

#### 7.16 Communication Rack / Cabinet

The tenderer shall use 19" wide, 42 RU high cabinets for cable termination panels and for all equipment mounting. Lockable cabinets with mesh doors, front and rear, must be used. The racks must be charcoal grey in colour. All frames, racks and cabinets shall be mechanically fixed to the floor to prevent movement to themselves and the cables. Doors shall be mesh not glass.

Side/Vertical cable management on the 19” racks shall be by suitable rubber access entry/ exit containers complete with bend radius protection to comply with ISO/IEC 11801:2002 Table 25 to ensure mechanical protection and performance is maintained.

Acceptable models are:

APC Netshelter SX42U AR3140 Rack 42U x Width 750mm x Depth 1070mm - Integrated High Density Cable Management
SRA (Server Racks Australia) 132901 42RU Width 800mm x Depth 1050mm - Full height vertical cable management x2
MFB S2005 42RU Rack Height 1886mm x Width 800mm x Depth 1000mm - Vertical cable management duct

Horizontal cable and patch cord management between patch panels, fibre trays or equipment on the 19” racks shall be 1 RU cable managers, exact horizontal cable minders required shall be specified by the CQUniversity Digital Services Project Manager within the Scope of Works.

**Non-Standard Rack Sizes**

Where the structured cabling system at the site in question has less than 24 outlets, a smaller sized cabinet may be considered. The smaller sized cabinet shall be no smaller than 18 RU high – 800mm x 800mm. Smaller sized cabinets shall be floor mounted, dependant on the mounting structural integrity. Approval to use, and exact mounting specifications, will be provided by CQUniversity Digital Services Project Manager.

**7.17 Rail Positions**

Vertical rails must be positioned to allow the door to close after patching is complete. Rails must be set to allow 150mm between rails and door. In non-standard/smaller racks, care must be taken to allow room for switches to be installed.

**7.18 Cleaning**

Once all work and installation in any CR is completed, the contractor shall clean all dust, dirt, debris, and other foreign material that is either on the cabinet, patch panels, cable or floor. When final handover of the CR is undertaken and the work is completed, an inspection shall take place to ensure that the room is left clean and in an ‘as new’ condition.

**8 Testing**

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**8.1 General**

Testing of all installed services shall conform to the cabling manufacturer’s installation specifications and all local regulations. Where there is conflict between any of these requirements, the more stringent shall be utilised. A copy of all test results shall be provided to the CQUniversity Digital Services Project Manager a minimum of 48 hours prior to the practical completion of the project.

**8.2 Copper – Category 6A F/UTP System Performance**

Permanent Link performance is the accepted criteria for testing of the installation. A certain percentage of the outlets may be chosen at random for the final acceptance testing by the end user or in his absence, by the manufacturer. The design data and the full results of all acceptance tests performed by the installer are to be fully documented and submitted to CQUniversity to hold for the period of the warranty.

The results must include 100% of total installation and provide full electronic data files for each cable run

indicating the name of the person doing the testing, date, building, cable identification, cable length, insertion loss, NEXT, PSNEXT, ACR, PSACR, propagation delay, delay skew, ELFEXT, PSELFEXT, and Return Loss.

All copper cabling shall be tested in accordance with AS/NZS IEC 61935.1 and CommScope's copper cable testing requirements.

Summary files in electronic format are **not** acceptable. All test results must be provided in native format.

### **8.2.1 Permanent Link Performance**

Permanent Links shall meet the minimum requirements of:

- AS/NZS 3080 for Class E<sub>A</sub> (using Cat6A F/UTP components), or
- ISO/IEC 11801 Ed 2 for Class E<sub>A</sub> (using Cat6A F/UTP components).

## **8.3 Fibre Optic – System Performance**

Permanent Link performance shall be the accepted criteria for all fibre optic installations. All permanent links are to be installed and tested at the completion of the installation.

### **8.3.1 OS2 Links**

100% of the single-mode optical fibre links must be tested for attenuation (power loss):

1. In both directions, and
2. At both frequencies, SMOF (1310 nm & 1550nm),

Conduct the tests in accordance with the manufacturers OF Testing Guidelines (e.g. use mode of stripping) and ISO/IEC 14763-3 using, as a minimum, LSPM and OTDR equipment if links are longer than 300 metres. If conflict exists, correct testing with LSPM shall be taken as correct.

**Ensure Reference Grade leads have been used and qualification of these has been saved as part of fibre optic test results.**

Summary files in electronic format are **not** acceptable. All test results must be provided in native format.

## **8.4 Customer Acceptance & Manufacturer Inspections**

During the installation that tenderer shall engage with the CommScope Representative to provide a minimum of 2 site inspections of the installation. The first inspection shall be at the completion of cable rough-in when the cabling installation is 100% to standard and prior to walls being sheeted or ceiling grid or plasterboard being installed. The second inspection shall be at completion of termination or the field and communication racks.

At the conclusion of the installation and prior to practical completion a preliminary walkthrough with the CQUniversity Digital Services Project Manager and installation contractor will be performed to check for installation quality, accurate performance of the work, and to verify engineering diagrams. Builder / Tenderer are to notify the CQUniversity Digital Services Project Manager when the walk through is ready and verify with CQUniversity Digital Services Project Manager in writing.

Any modifications to the documentation or the installation that may be required shall be accomplished within a 2-week period. 'Customer Acceptance' shall consist of a final walkthrough with the installation contractor and the CQUniversity Digital Services Project Manager. The walk through shall be scheduled within 3 weeks of the completion of the installation in order to turn the project and documentation over to the end user. Please note that 'Customer Acceptance' does not release the installation contractor from repairing any cabling errors or improperly labelled circuits, caused by the installation contractors that may be discovered at a later date.

The cabling contractor shall warrant all cabling installation works for a period of no less than 12 months.



## 9 Documentation

### 9.1 Overview

The contractor shall provide complete documentation covering the installation and maintenance of the Structured Cabling System; this includes

- As-Built drawings showing the location of all installed equipment and racks in all Building Distributor or Communication Room/s, all main cable runs, cable trays and catenaries, CPs, MUTOs and TOs, complete with outlet numbering. An A3 drawing of the as built infrastructure showing all the details outlined above shall also be provided in an A3 picture frame that is mounted on the wall adjacent to each of the equipment racks installed.
- A copy of the CommScope 25 Year Warranty certificate.
- A complete electronic copy of all test results conducted in the installation in both detailed PDF form and the native tester format as outlined in 11.3 of this specification.
- Detailed photos of the final installation of the front and rear of each equipment rack. Other photos of main cable pathways shall also be provided.
- An electronic copy of technical / product data sheets for all products installed into the project.

All of the documentation outline above shall be supplied to the CQUniversity Digital Services Project Manager in both printed and electronic format.

#### 9.1.1 Quantity

The Tenderer shall provide three complete sets of documentation. As built drawings shall be provided within 14 days of completion of the project to the CQUniversity Digital Services Project Manager

#### 9.1.2 Printing and Binding of Documentation

The Tenderer shall provide all documentation in suitably labelled, A4 sized binders. All binding shall be of a high quality to provide for a long and durable service.

#### 9.1.3 Document and Drawing Sizes

All documentation shall be typed on either single or double-sided A4 pages. Drawings shall, where practicable, be on A3 sized paper. Electronic versions of drawings shall be supplied to CQU as an AutoCAD drawing.

#### 9.1.4 Contents

The Installation/Systems manual shall cover the following areas:

- a) A detailed overview of the building cabling system
- b) Full description of the specific installation
- c) Full schematics showing the overall layout of the installation
- d) Floor layout drawings showing the location and designation of each outlet, location of cable trays and ducts and location of all connection frames.

### 9.2 Warranty

The tenderer shall provide a 25-year CommScope Netconnect System Warranty for all installed communications cabling from the date of successful completion of testing and commissioning of the Structured Cabling System. The CommScope Netconnect System Warranty shall cover the failure of the installed cabling system to operate the applications that the system was initially designed to support, i.e. those identified in the current (at the time of tendering) versions of the Cabling Performance Specifications (that is the ISO/IEC 11801). The CommScope Netconnect System warranty shall cover the repair or replacement of all Product that is deemed necessary to correct the problem. This includes the provision of reasonable labour and removal and reinstallation of such Product at CommScope's discretion.

The installer shall warrant the cabling system against defects in installation workmanship for a period of one year from the date of system acceptance. The installer's warranty shall cover all labour and materials necessary to correct a failed portion of the system. This warranty shall be provided at no additional cost to the CQUniversity.

The Manufacturer's Warranty Registration form and test results shall be submitted via CommScope's Partner Portal for approval. This shall be appraised and approved after the manufacturer has carried out their site inspections.

The warranty documentation shall be contained within the Maintenance Manuals. Included in this documentation shall be the Manufacturer 25-year Warranty Certificate.

If required, Calibration Certificates for the test equipment used to test the site shall be forwarded to CQU.

The practical completion will only be achieved once the CommScope warranty certificate and all relevant documentation is supplied.

## 10 Standards

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### 10.1 Standards

All stated standards must be adhered to, but not limited to, where applicable. In the case of conflict between standards the most onerous standard must be adhered to for the individual section under discussion.

#### 10.1.1 Australian Standards

AS/CA S008	Requirements for Customer Cabling Products
AS/CA S009	Installation Requirements for Customer Cabling (Wiring Rules)
AS/NZS 3000	SAA Electrical Wiring Rules
AS/NZS 3080	Telecommunications Installations – Generic Cabling for Commercial Buildings
AS/NZS 3084	Telecommunications Installations – Telecommunications Pathways and Spaces for Commercial Buildings
AS/NZS 3085.1	Telecommunications Installations – Administration of Communications Cabling Systems – Basic Requirements
AS/NZS 3087	Telecommunications Installations – Testing of Balance Communications Cabling
AS/NZS 4117	Surge Protective Devices for Telecommunications Cabling
AS/NZS ISO/IEC 14673	Information Technology – Implementation & Operation of Customer Premises Cabling: Part 3. Testing of Fibre Cabling
AS/NZS IEC 61935.1	Testing of Balanced Pair Cabling – Site Certification

#### 10.1.2 ISO/IEC

ISO/IEC 11801	Information Technology – Generic Cabling for Customer Premises.
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## 11 Appendix A - Definition of Terms

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### 11.1 Overview

To provide detailed information regarding the definitions of terms that is pertinent to this standard.

### 11.2 Definition of Terms

#### 11.2.1 Building

A roofed structure enclosed by walls on all sides, used for the express purpose of housing telecommunications related equipment for the transmission and reception of data, voice, video etc, signals and any related processing of the signal content.

#### 11.2.2 Backbone Cable

A cable that connects any combination of carrier and network devices for the transmission of multiplexed signals.

#### 11.2.3 Channel

ISO/IEC 11801 defines a channel as *“The end-to-end transmission path connecting any two pieces of application specific equipment. Equipment and work area cords are included in the channel, but not the connecting hardware into the application specific equipment.”*

#### 11.2.4 Communications Room (CR)

A room within the building that houses all the core telecommunications transmission and processing equipment.

#### 11.2.5 Consolidation Point

ISO/IEC 11801 defines a consolidation point as *“A connection point in the horizontal cabling subsystem between a floor distributor and a telecommunication outlet.”*

#### 11.2.6 CP Cable

ISO/IEC 11801 defines a CP cable as *“A cable connecting the consolidation point to the telecommunications outlet(s).”*

#### 11.2.7 CP Link

ISO/IEC 11801 defines a CP link as *“The part of the permanent link between the floor distributor and the consolidation point, including the connecting hardware at each end.”*

#### 11.2.8 Cross Connect

ISO/IEC 11801 defines a cross connect as *“An apparatus enabling the termination of cable elements and their cross-connection, primarily by means of patch cords or jumpers. Incoming and outgoing cables are terminated at fixed points.”*

#### 11.2.9 Data Room

Generic term used to describe entrance, equipment and main communication rooms.

#### 11.2.10 Entrance Room

A room within the building that caters for the entry of cables into the building.

#### 11.2.11 Floor Distributor (TR)

A room within the building that houses all cabling termination frames and PABX equipment. The Floor Distributor shall not contain communications equipment such as CATV, public address, and security or fire alarm systems. A CR may also be referred to as the ‘Local Communication Cabinet’ or ‘Communications Room (CR)’.

**11.2.12 HighBand**

A KRONE horizontal cable distribution frame.

**11.2.13 Pit**

A box, joint box, manhole or cable chamber.

**11.2.14 Pit Cover**

A covering lid used to seal a pit.

**11.2.15 Solution**

An end to end network of active and interconnecting passive devices that are required to transmit and process a stream(s) of client or application specific data.

**11.2.16 Telecommunications**

A branch of technology concerned with the transmission, emission and reception of signals, that is, information of any nature by cable, radio, optical or other electromagnetic systems. Telecommunications covers all forms of information whether voice, video, data etc.

**11.3 Abbreviations**

a.c.	Alternating current
BD	Building distributor
CR	Communication Room
CP	Consolidation point
d.c.	Direct current
ER	Equipment room
FD	Floor distributor
ISO	International Standards Organisation
LAN	Local area network
TE	Terminal equipment
TO	Telecommunications outlet
POE	Power over Ethernet