JAMES COOK UNIVERSITY AUSTRALIA

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Technology Solutions
Digital Infrastructure Services Specifications

Version 1.0 – Official

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Document information

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THE SPECIFICATION IN THIS DOCUMENT IS FOR THE INSTALLATION OF COMMUNICATIONS CABLING AND ASSOCIATED INFRASTRUCTURE FOR JAMES COOK UNIVERSITY CAMPUSES, REMOTE SITES AND ACCOMMODATIONS.

Contents

Definition

Terms	Definition
JCU	James Cook University
TSD	Technology Solution Directorate
TSDIS	Technology Solutions Digital Infrastructure Services
Communications infrastructure	All infrastructure components that transmit data including but not limited to: copper, fibre, and over the air via laser or radio frequencies.
Communications cabling	All cabling that transmit data to services including but not limited to: computer, phone, wireless access points, video conferencing, building systems, door system, and camera
JCU Premises	Premises that provide services to JCU staff, student and research including but not limited to campus buildings, remote office, and student accommodations.
MDF	Main Distribution Frame
Stainless-steel	Generally, refer to Stainless-steel 316 unless otherwise specified
PoE	Power over Ethernet
PSE (in PoE context)	Power Sourcing Equipment
PD (in PoE context)	Powered Device
ID	Internal Diameter
OD	Outside Diameter
MPTL	Modular Plug Terminated Link

1. Introduction

1.1 Objectives

The purpose of this document is to set the communications cabling standards for installation and alterations including data, voice, video conferencing, building services and security at James Cook University (JCU). The main objectives are:

- To provide effortless and reliable access to technology resources from within JCU and around the world to staff, student, research and the wider user community.
- To ensure the technology services are delivered quickly, securely, sustainably and cost effectively.
- To ensure JCU meets standards regulated by Australian Communications and Media Authority

1.2 Authorisation

All communications cabling run within and between JCU premises is part of the University Communications Infrastructure administered by Technology Solutions Directorate.

Any proposed alteration to the JCU Technology Solutions Digital Infrastructure Services Specifications as outlined in this document must be submitted to the Head, Technology Solutions Digital Infrastructure Services for approval. The TSDIS Head may delegate the approval to TSDIS engineers.

When in doubt, please contact the TSDIS team for clarification.

1.3 Expected Audience

As a reference document for the following:

- JCU personnel working with communications cabling
- Installation contractors and technicians
- Design consultants

1.4 Certifications, Workmanship and Experience

1.4.1 CommScope and Molex Certification

The installer shall supply to TSDIS a list of the names of installation staff and current copies of their:

- CommScope NETCONNECT ACT 1, ACT 2 and ACT 3 certificates (The principal installer must have CommScope NETCONNECT ACT 3 certificate)
  OR
- Molex Certificates

…as part of their bid or prior to any installation work commencing. The list shall also display technical staff work experience in the relevant field. Apprentices or trainees must be supervised by a currently qualified CommScope OR Molex installer at all times.

1.4.2 Workmanship and Experience

Cable rough: A minimum of 50% of installation Staff working on site shall have current:

- CommScope job: NETCONNECT ACT 1 & 2 certificates with minimum of 1-year full trade data experience
- Molex job: Molex certificates with minimum of 1-year full trade data experience

Termination and Testing: 75% of installation Staff working on site shall have current

- CommScope job: NETCONNECT ACT 1 & 2 certificates with minimum of 1-year full time trade data experience
- Molex job: Molex certificates with minimum of 1-year full time trade data experience

Every 2 trainees must have minimum 1 certified supervisor.

Support: The main communication installer shall provide the address and contact of their closest support centre with capable support staff that can troubleshoot problems quickly and effectively.

1.5 Documentation

1.5.1 TCA1 form

At the end of installation, the installer MUST provide an ACMA TCA1 form to TSDIS to show the work is done according to the regulatory authority's framework.

Link to form: https://www.acma.gov.au/cabling-advice-forms

1.5.2 As-built documentation

As-built documentation **MUST** be provided to TSDIS at the completion of works. If applicable, the documentation must include:

- Design drawings
- Other technical drawings including but not limited to floor plan with port locations marked, fibre pathway, and cable tray pathway
- Before and after photos related to the jobs: location; access panels and pit; cable path in the ceiling; termination; penetration; wall plates; cable tray; catenary; rack; looming bar.
- Test results.

1.5.3 Test results

Installer must provide test results via electronic data files for each cable run.

- Copper: Fluke test ISO Class Ea (+PoE)
- Earth test for rack and patch panel: Photo of test instrument screen is acceptable.
- Fibre: Light loss test in 1300nm AND 1550nm wavelength range

The results must show test results with all the parameters specified in AS/NZS 11801.1:2019 or latest from all cables installed along with:

- name of the person doing the testing
- date
- building
- cable identification
- cable length, and

If a copper link is more than 90m it must have an explicit warranty approval from CommScope or Molex.

NOTE:

Tester operators must be trained by equipment manufacturer.
A certain percentage of the outlets may be chosen at random for verification of compliance testing by the end-user or by a CommScope or Molex representative.

2. Australian Standards and JCU requirements

2.1 Australian Standards

All Structured Cabling work shall be installed in strict compliance with the JCU Communications Cabling Infrastructure specifications and to the latest Australian standards as listed below. International standards shall be referred to where there is no applicable Australian Standard.

Where specifications are different between standards, the higher specification will be adopted.
Authorisation needed as per section **1.2**

AS/NZS 11801.1:2019 or latest	Information technology – Generic cabling for customer premises.
AS 11801.2:2019 or latest	Office Premises
AS 11801.3:2019 or latest	Industrial Premises
AS 11801.4:2019 or latest	Single-tenant homes
AS 11801.5:2019 or latest	Data centres
AS 11801.6:2019 or latest	Distributed building services

AS/NZS 14763.2:2020 or latest	Information technology - Implementation and operation of customer premises cabling Planning and installation

AS/NZS 3084:2017 or latest	Telecommunications installations – Telecommunications pathways and spaces for commercial buildings
AS/NZS 3085.1:2004 (R2016) or latest	Telecommunications installations - Administration of communications cabling systems Basic requirements
AS/CA S009:2020 or latest	Installation requirements for customer cabling (Wiring Rules)
AS/CA S008:2020 or latest	Requirements for customer cabling products
AS/NZS 2053.1:2001 (R2016) or latest	Conduits and fittings for electrical installations General requirements
AS/NZS 3000:2018 or latest	Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS 3996:2019 or latest	Access covers and grates

2.2 JCU requirements

2.2.1 Cabling vendors

JCU Premises use CommScope OR Molex cabling. No exception unless authorised as per section **1.2**.

- For CommScope standards, refer to www.commscope.com
- For Molex Standards, refer to http://www.molexces.com/
- Analogue copper cabling from other manufacturers with comparable specifications as per **2.2.5** and **3.1.6** are acceptable

Existing buildings shall have the same cabling throughout the building as follows:

- Buildings with existing CommScope cabling shall stay with CommScope
  (Buildings built before 2019 in Townsville are CommScope)
- Buildings with existing Molex cabling shall stay with Molex
  (Buildings built before 2019 in Cairns are Molex)

2.2.2 General requirements

2.2.2.1 Cable Pathways

All installations shall follow the existing Infrastructure pathways if available and must be specified in the planning stages in consultation with the Head, Technology Solutions Digital Infrastructure Services, JCU.

2.2.2.2 Securing communications cable

All communication cables must be secured using the following methods:

- Velcro for securing cable. Zip tie is not permitted.
- Do not secure fibre or copper to cabinet mounting rails.
- All unused Fibre DI tube must be sealed with end caps
- Heavy copper bundles must have lacing bars for support. Bundles must not use active equipment as a holding tray.
- Clearance as per AS/CA S009:2020 or latest with JCU specific requirements is as per section **3.3.6**

2.2.3 Optical fibre

2.2.3.1 Fibre type and grade

- All installations of optic fibre will be OS2 Single-mode or latest Single mode standard (G657 grade or higher)
- Fibre between buildings shall be “gel” filled loose tube outdoor rated cable
- Fibre between floors can be loose tube outdoor rated fibre or tight buffered fibre cable.
- JCU existing blown fibre are to be maintained until replacements are authorised. Extra fibre runs for existing buildings with existing blown fibre system shall be considered as needed.

2.2.3.2 Fibre termination

- Direct Fibre between two termination points (rack to rack OR rack to fibre cabinet) shall be installed with a minimum of 24 cores single mode and all cores must be spliced. In the same building

between floors, 12 cores single mode from each floor back to the main fibre distribution room is acceptable (all cores must be spliced).
Please get authorisation as per section **1.2** for any other configuration

- Trunk cables from pit termination points to fibre cabinets shall have all cores spliced at cabinet or rack. Spare cores in pit enclosures must be arranged and stored safely with sufficient length (minimum 1m).
  NOTE: Around 3m of fibre shall be arranged in each pit as spare.

2.2.3.3 Fibre connectors

- JCU fibre shall be installed using **LC-UPC** connectors for racks, fibre cabinets and field enclosures
- For special cases, TSDIS will explicitly ask for **SC-APC** connectors

2.2.3.4 Fibre patch cords

- Single mode: Yellow switchable boot with flat or thin clip OS2 or latest single-mode standard
- Multimode: Light Blue OM5 or latest multimode standard

2.2.4 Copper communications cabling

2.2.4.1 Copper type and grade

- Any new communications cabling shall be either CAT6A F/UTP, CAT6A U/FTP or CAT6A F/STP
- Low Smoke Zero Halogen jacket (LSZH)
- Solid core 23AWG or better

2.2.4.2 Copper termination

All termination shall use T568A scheme

2.2.4.3 Copper patch panel and socket

Patch panel and RJ45 socket must be compatible with Shielded CAT6A cabling.

2.2.4.4 Copper patch leads

- In rack: CAT6A F/STP 25cm-30cm patch leads including RJ45 connector
- Desk area: CAT6A F/STP 1m, 2m, and 3m patch leads

2.2.5 Analogue copper cabling

2.2.5.1 Analogue copper type and grade

- “Gel” filled multi-pair construction
- UV stabilised jacket
- Solid copper wire 0.64mm (22AWG) or thicker. For cable run with 100 pairs or more, 0.90mm (20AWG) must be used.

2.2.5.2 Analogue copper termination

All terminations shall use wall mount Krone frame and block.

2.2.5.3 Analogue frame to rack

If there is a need for connecting a Krone frame to an equipment rack, 10 pairs analogue cable should be used with a CAT6 24 ports patch panel.

2.2.5.4 Analogue copper patch leads and wiring

- Wires on Frame: **Green** wires for fire services; **Red** for JCU analogue services and **Purple** for NBN
- In rack: CAT6 Yellow patch leads

2.2.6 Power at equipment racks

- Clipsal 56C320F as standard
- Clipsal 56C315 is acceptable on low density floors and will be specified by TSDIS

2.2.7 Cable management

- 1RU cable management: Panduit CMPHHF1
- 2RU cable management: Panduit CMPHH2

2.2.8 Cleanliness

- Communication rooms, rack and associated support infrastructure must be kept clean at all time.
- Any job involves communications room, rack or cabling shall have appropriate covering for the work area to prevent dust.
- Communications infrastructure and associated systems shall be cleaned up after every job.
- For commissioning of a new building or renovation, TSDIS expect the communications room to be clean before putting active hardware in.

3. Installation Specifications

Any new external communication installations are to be documented in full and submitted for written approval by TSDIS.

3.1 External, ceiling and wall infrastructure for communications cabling

3.1.1 Aerial cabling

Aerial cabling is not permitted on JCU premises.

3.1.2 Communications Pits

This section needs to take JCU Design Guidelines section 25 and 32 requirements into consideration.

3.1.2.1 General requirements

- Non-communications cabling must not be run via Communications pits
- Communications pit shall have zero water absorption property
- Any conduit entry and exit points into pit walls shall be sealed to prevent water ingress.
- Applying anti-rust solution such as lithium grease between pit's collar and lid are required after every job.

3.1.2.2 Pit size

- Pit size shall provide minimum of 90% spare capacity for future expansion
- Pits connecting to backbone conduit shall provide minimum of 200% of spare capacity for future expansion
- Pit size shall be at least 600mm (Length) x 600mm (Width) x 600mm (Depth)
- Pits shall be established on both side of the road for conduit crossing.
- Pit on main communications trunk shall be at least 1000mm (L) x 1000mm (W) x 1200mm (D)
- ISPs prefer pits with ~1500mm on at least 1 edge (Length or Width): Ideal pit ~1500 (L) x1500 (W) x1500 (D) mm or ~1500 (L) x 600 (W) x 1000mm (D) or large model ~2000 (L) x650 (W) x 1000 (D)

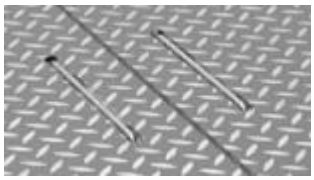
3.1.2.3 Industry standard pre-formed pit

- Industry standard pre-formed pits made concrete are acceptable
  NOTE: Plastic pits are **NOT** acceptable
- Exceptions are to be authorised as per section **1.2**.

3.1.2.4 Custom pits

If a pit is to be made on site:

- Pits shall have a concrete bottom of minimum 75mm thick
- Side shall be brickwork or precast concrete of minimum 75mm thick
- Lid shall be precast concrete or metal



3.1.2.5 Pit lid

- Standard pit lids shall be minimum Class C (D is recommended) as per AS 3996:2019 or latest.
- Pit lids must be made from metal and heavy duty rated as above.
- Pit lids must have lifting support holes suitable for standard Telstra pit lifter.
  Hinged pit lid with lifting handle is strongly recommended.
- Gatic type pit lid is not acceptable.

- Must not have Telstra Logo or marking when buying pre-formed pit. (Most manufacturer allow to change the marking to comms as required, please note when ordering.
- Exceptions are to be authorised as per section **1.2**.

3.1.2.6 Pit support

- 150x150mm concrete collar finishing flush with the ground and top of the pit is required for all pit installation
- Pits shall be bedded with a minimum of 100mm gravel aggregate
- Each pit shall have a drainage hole at the base (connected and designed to drain toward the existing storm water system)

3.1.2.7 Consideration for pit capacity

New pits or running extra conduit into existing pits shall take the number of conduits and their size into consideration. Please use the formulas below to calculate conduit capacity in a pit. Please note that results are always rounded down to the closest even number.

- 100mm Conduit capacity of a pit = (pit length(mm) x pit width(mm)) / 100,000 x 2
  Example: (652mm x 303mm) / 100,000 x 2 = 3.95112 ~ 3x 100mm conduits max in this pit
  Special case: Pit size of minimum 600mm x 600mm are to be used on both sides where conduits cross the roads.
- 50mm Conduit capacity of a pit = (pit length(mm) x pit width(mm)) / 100,000 x 4
  Example: (663mm x 663mm) / 100,000 x 4 = 17.58276 ~ 16x 50mm conduits max in this pit

3.1.2.8 Identification

- Any new pits shall be assigned a unique number through Technology Solutions, Head Digital Infrastructure Services OR Estate Directorate, Head Planning and Development.
- Pits shall have laser-etched stainless-steel or brass plate (embossed is also acceptable) clearly displaying it is a communications pit and its pit number. i.e. "**COMMS**" or "**COMMUNICATIONS**"
- Pits reserve for Internet Service Providers (NBN, Telstra, Optus, etc) shall also have laser-etched stainless-steel or brass plate clearly identify as "**ISP**"
- Cable marker direction arrows shall be provided for all pits. They shall be fully recessed with no sharp edges.

3.1.3 Underground and external conduits

3.1.3.1 General requirements

- Conduit installation between pits must be straight and free from having multiple bends laterally and vertically.
- As a rule, conduit maximum fill is 40%. No exception unless authorised as per section **1.2**.
- PVC watertight conduits and fittings are the default specifications. Special circumstances are outlined below.
- Unless explicitly asked by TSDIS, conduit and associated accessories shall have a minimum rating of "Heavy Duty"
- Building lead in conduits shall be installed via two geographically diverse paths. Example: North + South OR East + West
- If the conduits must bend to avoid existing services. They shall have a minimum bend radius of 3000mm **and** maximum of 2x bends between pits. Smaller radius must be authorised as per section **1.2**.
- Conduits should come straight into the pit from the run even if it's at an angle instead of bend near the pit to come in.
- Comms conduits clearance to the nearest structure: minimum 1000mm

3.1.3.2 Conduit size

- Conduit shall be a minimum of two (2) 100mm diameter
- Conduit size shall be a minimum of 100mm diameter
- External Services (Camera, WAP, counters, etc) conduit size must be a minimum of 50mm diameter ID

3.1.3.3 Conduit capacity

Conduit capacity is calculated towards 40% fill using Inside Diameter of the conduit and Outside Diameter of the cable.

Conduit size (Inside Diameter)	Cable size (Outside Diameter)					
	5mm	10mm	15mm	20mm	25mm	30mm
50mm	40	10	4	2	1	1
100mm	160	40	17	10	6	4

Common cable size (Outside Diameter) below for reference:

- Plenum fibre trunk: 12f – 4.826mm; 24f – 6.858mm; 96f – 12.192mm; 144f – 13.208mm;
- Mini loose-tube fibre trunk: 12-72f – 6.6mm; 96f – 7.5mm; 144f – 8.6mm
- CAT6A F/UTP: Outdoor gel-filled – 8.382mm; Indoor – 7.188mm

3.1.3.4 Installation

- Trenches for conduits should be straight to avoid unnecessary bends to the conduits (and cable).
- Conduit inside buildings or near foot paths must be installed at a minimum depth of 500mm
- Conduit near roads, parking areas or grassed areas accessible to service vehicles must be installed at a minimum depth of 600mm
- Conduits shall be installed with a nylon or polyester pull rope (cord) ready to be use as needed.
- Ends of conduit to be trimmed neatly and free from sharp edges or burrs and shall be fitted with conduit bush (collar, spigot or similar hardware)
- Conduits shall not protruding too far into the pit from the side wall taking up valuable space inside.
- Cemented joints shall be used based on manufacturer's procedure
- Where possible, have conduits pre-formed by the manufacturer. At site, use correctly sized springs to form sets in UPVC conduit. Bends shall be of large radii no less than manufacturers minimum specifications and, after setting, shall maintain effective diameter and shape. Conduit sets that are distorted by kinks, wrinkles, flats or heating are rejected.
- If boring is required to cross the roads, natural water ways, pathways and special ground conditions, directional boring must be utilised.
- Install flexible couplings where structural expansion joints occur in buildings and in straight runs not embedded in wall chases or floor slabs. Space the flexible couplings in straight runs at intervals of not more than 4m. Install conduit saddles close to the flexible coupling in a manner which allows free movement for expansion and contraction.
- Traceable communication tape (with embedded traceable wire) must be installed as part of any new conduit installation.

3.1.3.5 Boring work

- If boring is required to cross the roads, natural water ways, pathways and special ground conditions, directional boring must be utilised.
- The bores shall start and finish at nominally the same depth as the cable run either side of the bore.
- Boring depth shall be consistent along the bored section.
- Hauling pits are to be installed both side or the bores when crossing the road.

3.1.3.6 Run exposed conduit

- If the conduit run must be exposed, it shall be transitioned into screwed stainless-steel pipe via a communication pit or wall box.
  NOTE: uPVC conduit can be used when authorised as per section **1.2.**
- If the conduit must be exposed when passing through risky structures such as a bridge, 100mm stainless-steel (minimum 2mm thickness) or galvanised pipe (minimum 3mm thickness) shall be used
- Inspection-type fittings shall be used as appropriate

3.1.3.7 Damage

In situations where the conduit is exposed to mechanical damage and external to buildings, mechanical protection must be provided to UPVC conduit at a height of not less than 3m above ground or platform level

3.1.3.8 Conduit identification aid for civil work purposes

To help identify multiple communication conduits near each other when doing civil work such as VAC truck, paint stripes via spray or colour tape shall be added onto the conduit during the installation process.

Conduit number	Colour code
01	White with No additional colour
02	White with **Blue** Stripe
03	White with **Red** Stripe
04	White with **Black** Stripe
05	White with **Yellow** Stripe
06	White with **Violet** Stripe

3.1.4 Constructions & Civil work

3.1.4.1 New Building

- Designer and Builders shall contact TSDIS for design consultation advice. Different buildings have different requirements. There is no one size fit all specifications.
- All new builds shall have 2 separate entry points for communication.
- Each entry point shall have a minimum of 2x 100mm conduits with clear access to building service space.
- Multiple tenancies buildings shall have a minimum 3x 100mm conduits at each entry point.
- In addition, each building shall have minimum of 1x 100mm at each entry point dedicated for fire panel services.
- Each building shall have fibre run go back to a network precinct authorised by TSDIS via two geographically diverse paths.
- No analogue copper cabling is to be run into any new building unless authorised as per section **1.2.**

3.1.4.2 Building Renovation

A full building renovation is considered as new building for technology infrastructure.
For a partial refurbishment, please contact TSDIS with floor plan, design drawing for appropriate advisement.

3.1.4.3 Fit out of Tenancies under JCU manage premises.

- Each tenant shall have 10 pairs of analogue cable goes directly back to the closest MDF.
  NOTE: For tenants in the same building with the NBN Node, the cable must go back directly to the room where the NBN node frames reside.
- Each tenant shall have a CAT6A data port that goes back to the closest JCU data rack.
- For tenants with their own communication rack, JCU cabling must be terminated into a separate patch panel in the rack.
- 24 cores single mode OS2 shall be run from the building main distribution data room to the main data room on tenant floor (riser room is acceptable depends on the building). Please confirm and get authorisation as per section **1.2.**

3.1.5 External Fibre Specifications

3.1.5.1 Fibre Protection

- Cabling going through underground conduits or between floor shall be underground rated with nylon sheath and gel-filled construction to prevent water absorption
- All optical fibre not in pre-approved list must be approved by TSDIS engineers.
- Fibre ingress and egress of an external enclosure shall have silicone grease or appropriate product to provide extra protection against water.

3.1.5.2 Fibre types and construction

- All fibre run for JCU shall be single mode OS2 unless authorised as per section **1.2.**

- Single mode type shall be G.657 Category A (A1, A2) for the following applications: backbone network; cross buildings network; external services network; and ISP.
- Single mode type shall be G.657 Category A (A1, A2) and B (B2, B3) or better for the following applications: same floor fibre to infrastructure edge points; same floor fibre to the room; and same floor fibre to the desk.
- Information for G.657 can be found here: https://www.itu.int/rec/T-REC-G.657/en

3.1.5.3 Fibre termination and splicing loss

- All cores are to be spliced unless authorised as per section **1.2.**
  NOTE: For underground fibre splicing enclosures, cores without interconnect must be rolled and preserved properly in the enclosure.
- Pig tails fibre splice must be colour coded.
  NOTE: For preloaded fibre enclosure with single colour pigtails, each pig tail must have core number label or matching core colour label.
- Acceptable loss is: 0.75dB per connector, 0.3dB per splice and 0.4dB/km for single mode cable

3.1.5.4 Fibre service length

- When running fibre, each pit shall have around 2-3m of spare length for ease of service.
- Spare cores and tubes inside pit enclosure must be arranged and stored safely with minimum 1m length.

3.1.6 External Copper Specifications

3.1.6.1 General requirements

- All JCU campuses use fibre as the main medium of external communications.
- All external copper run must be authorised as per section **1.2.**
- If required and approved, minimum of 30 pairs shall be run across buildings.
- If required and approved, minimum of 10 pairs shall be run across floor of the same building.
- Verticals installation and naming always starts from the left. They are to be identified with standard English Alphabet starting from A.
- For building ingress main MDF, backbone ties are always on A frame.
- As a reminder, Krone and CommScope blocks always start from left to right and bottom to top.

3.1.6.2 Copper Protection

- Cabling going through underground conduits or between floor shall be underground rated with “Gel” filled multi-pair construction
- Copper cable must have UV stabilised jacket
- Solid copper wire 0.64mm (22AWG) or thicker. For cable run with 50-100 pairs, 0.90mm (20AWG) must be used.
- Copper ingress and egress of an external enclosure shall have silicone grease or appropriate product to provide extra protection against water.

3.1.6.3 Earthing requirement

- All Krone frames must be earthed.
- Every termination block on each vertical must have earthing clips fitted.
- Earth test must be done on all verticals.

3.1.6.4 Mounting requirement

- Krone or CommScope block can be installed using back mount frame or profile rod frame.
- Each vertical shall be mounted at the minimum 370mm off the floor.
- Each vertical shall have the maximum 500 pairs unless authorised as per section **1.2.**
- Always consult manufacturers for latest mounting standard. Please see below for some standard mounting configuration

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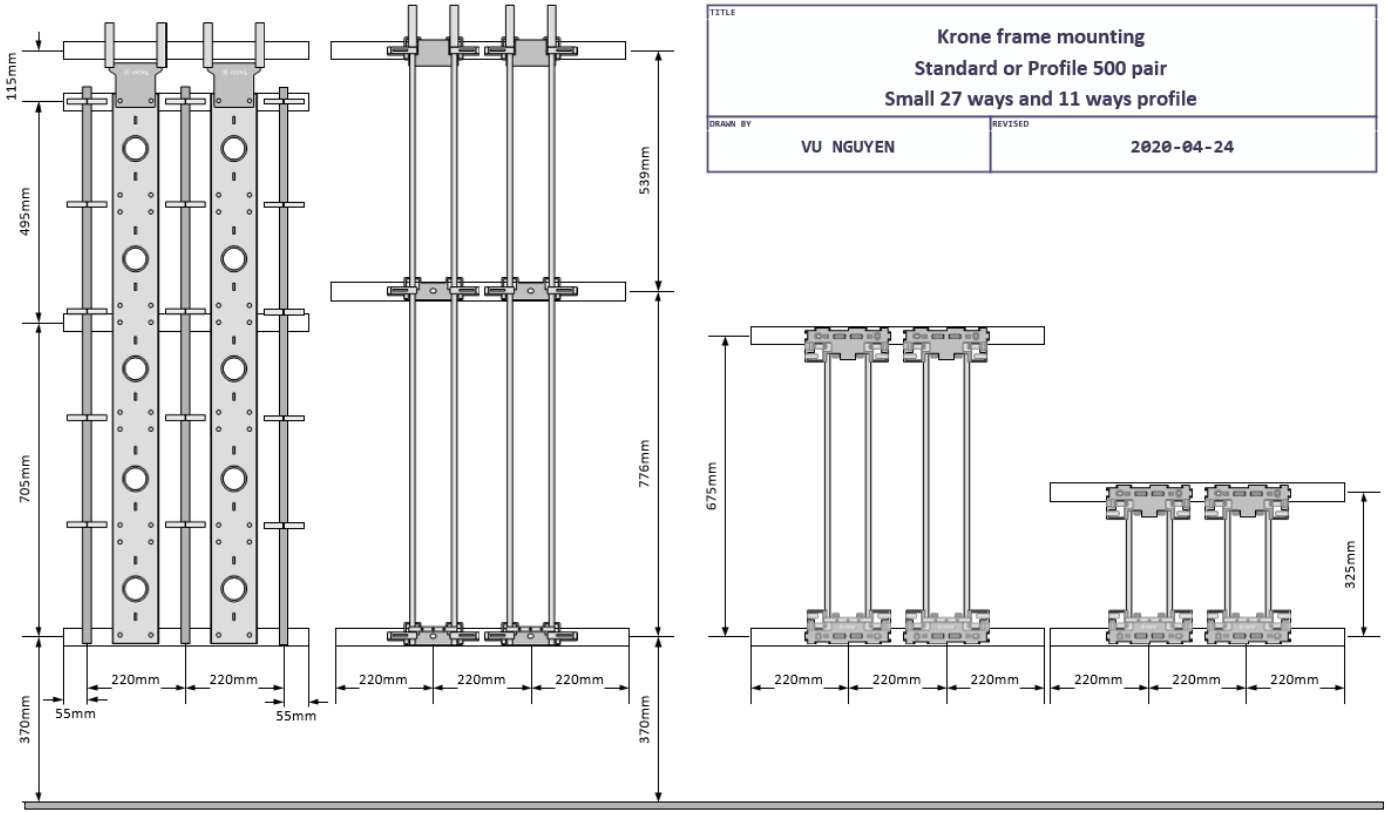


3.1.6.5 External CAT6A

- Copper data cable for external edge points such as Wireless Access Point, Cameras or Building Systems shall be outdoor rated CAT6A with “Gel” filled construction.
- External CAT6A must be run in a protective conduit.
- Length limit of 90m is applied to all external CAT6A for Wireless Access Point, Cameras or Building Systems.
- For external edge points using POE that is not in 90m range of existing infrastructure, an external enclosure shall be installed.
  NOTE: Please contact TSDIS for size confirmation. Different jobs have different requirement. Please see section **5.5** for pre-approved enclosures.

3.1.6.6 External Support for CAT6A

- Patch lead for external edge points shall be in conduit. All ingress and egress shall have silicone seal or other appropriate product added to provide extra protection against moisture.
- Patch lead for external edge point shall be CAT6A F/UTP with outdoor construction UV rated.
- For cameras and WAPs installed on external poles, their data port (RJ45 socket) shall be installed just inside the external pole access panel in a fixed mount, IP65 minimum rated container for ease of maintenance.

3.1.7 Pest control

- All communications spaces and pathways must have best practice pest management treatment.
- If covers are required for cable trays, they must be removable for maintenance or addition of new cables.
- Conduit entry and exit into communications spaces and pathways shall be sealed to prevent pest.

3.2 Indoor communications cabling

3.2.1 Cabling for edge points

3.2.1.1 General requirements

- Copper communications cable shall not go across floors unless authorised as per section **1.2.**
- Ceiling support struts, pipe or air-conditioning duct are unacceptable as cable support.
- All cabling on trays shall be secured firmly in place using velcro.

- All cable trays shall have adequate access for on-going maintenance including installation of new cable or removal of existing cable.

3.2.1.2 Cable information

- All edge points communications cabling shall be CAT6A F/UTP
- Please see section **2.2.1** for acceptable vendors

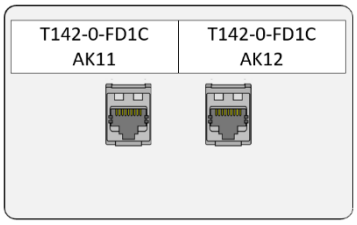
3.2.1.3 Termination Scheme

Termination scheme: T568A as per AS/NZS 11801.1:2019 or latest

3.2.1.1 Cable support

Please see section **3.3** for details

3.2.1.2 Mounting of outlets and orientation



- Outlets are not to be mounted in the desk.
- Outlet sockets are to be installed so connecting pin always at the top.
- For data points above fixed ceilings, access-hatch are to be provisioned for maintenance purposes.

3.2.1.3 Patch cords

- CAT6A patch cords must be used.
- JCU standard patch cord colour is blue
- White patch cord is acceptable for AV equipment.
- Patch cord for ceiling WAP must match the ceiling colour (typically black or white).
- Project shall supply patch cords for new buildings and renovations. Please contact TSDIS for quantity.

3.2.1.4 Quantities

- As a general rule, 1 per edge point and 1x spare in a bundle of 4 edge points.
- Please see section **3.6** for details information

3.2.1.5 Clean up

- As part of any building renovation, ALL CAT5, CAT5e and CAT6 cable are to be replaced with CAT6A.
- Old cables are to be cut and cleaned out of the building completely.

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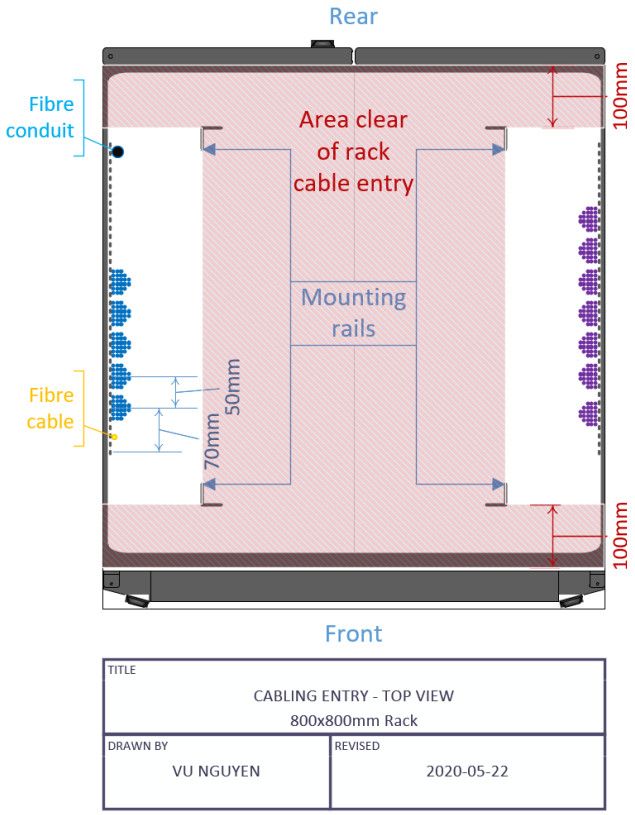
3.2.2 Cabling at equipment racks

3.2.2.1 General requirement

- Cable shall enter the rack via top or bottom entries on appropriate side and not interfere with the equipment mounting rail.
- Cable entryway shall not have sharp edges. Please consult manufacturers for appropriate rack access brush kit.
- All cables shall be secured to internal rack tray or dedicated pathway using velcro.
- Maximum distance between velcro intervals: 500mm (200-300mm preferable)
- Any modification to the design must be authorised as per section **1.2.**

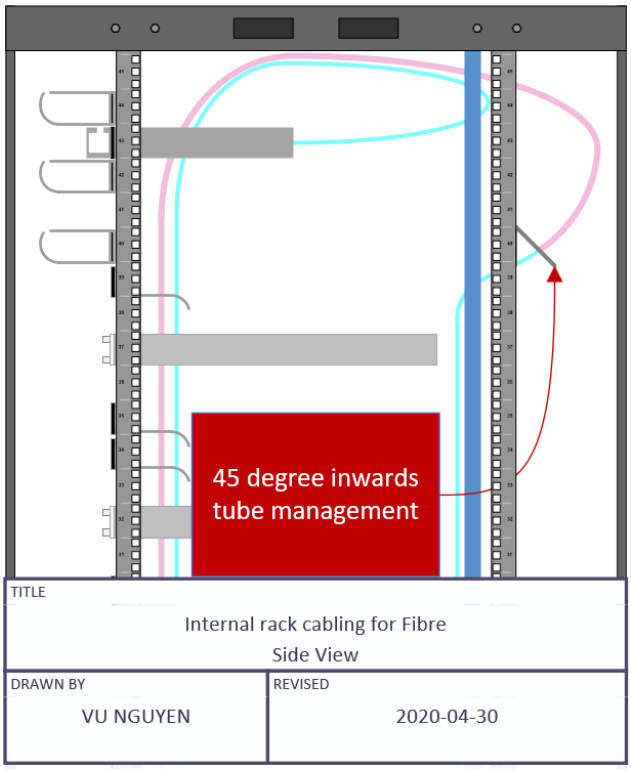


3.2.2.2 Vertical cable position

- Vertical cable within a cabinet shall be spread out in small bundle as part of high-density design
- All copper cable slack is to be stored on cable trays near the rack
- Space clearance for fibre cable: around 70mm from the edge of the tray to the cable bundle

3.2.2.3 Internal rack cabling for fibre

- All fibre cable terminated in an enclosure shall have a full loop within the cabinet. This allows the fibre enclosure to be removed from the cabinet and placed safely on a table during splicing work.
- All fibre cable, tube and DI (if applicable) are to be secured on the cabinet trays.
- Securing fibre to rack mounting rails is unacceptable.



For blown fibre (if applicable):

- The sheath of a DI tubing cable must be removed no closer than 300mm to the commencement of the bend at the bottom of the rack.
- All DI tubing must pass through or terminate on a tube management panel
- The Tube management panel is mounted inward at 45 degrees so the terminal points are accessible from within the cabinet.
- All DI tubing terminating on the tube management rail must be capped.
- Tubes between the Tube management panel and a FOBOT must be secured separately from the incoming DI fibre, using Velcro straps
- The initial DI tubing must be installed so that an additional DI tube can be installed without relocation

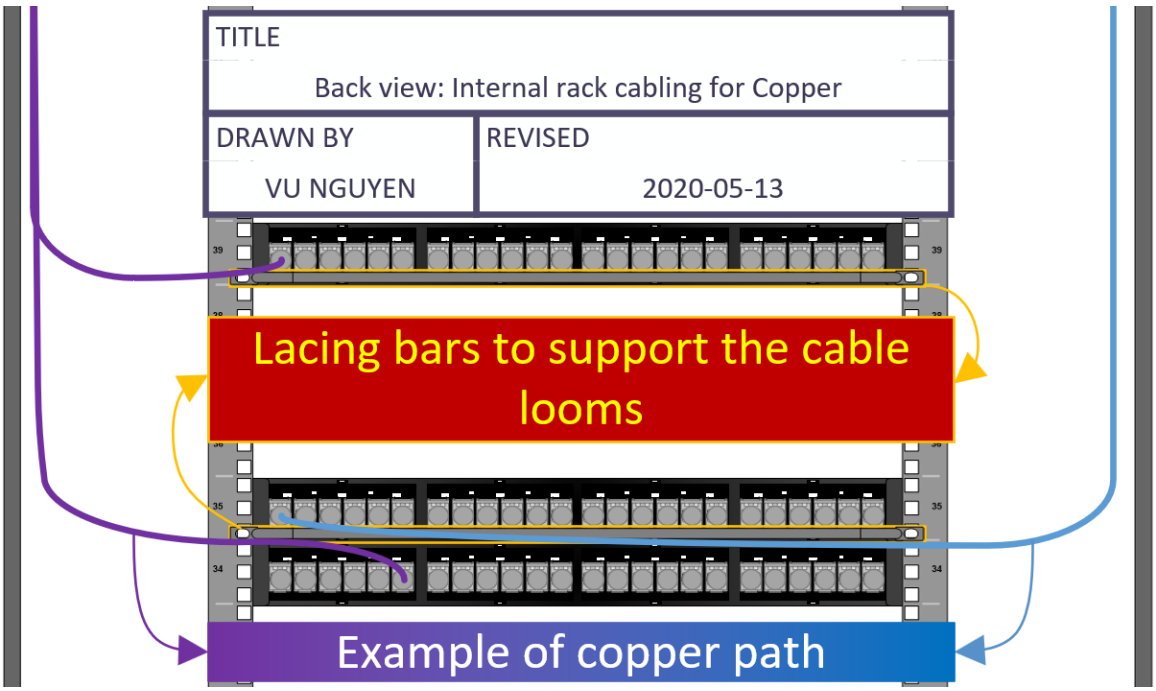
3.2.2.4 Internal rack cabling for copper

- Cable loom for each 24 ports shall be in the same bundle
- The first cable loom shall be located on the side of the cabinet that is closest to the wall

- The next cable loom shall be located on the opposite side tray
- Rack cable loom shall alternate between left and right-side cable tray

Example: if first loom is on the left-side tray, the second cable loom shall be on the right-side. The third cable loom shall be on the left-side and so on and so forth.

- Distance between cable bundle is around 50mm (from the centre)
- *Each loom shall have heavy duty lacing bars installed at the rear mounting rails for support. It is done that way so they do not sag into active equipment.*



3.2.2.5 PoE with fibre

Due to rapid development of the technology, please contact TSDIS for latest instructions. General requirements are below:

- For fibre, please follow JCU standard for fibre installation.
- AFL single-mode Fibre POE solution is acceptable when authorised as per section **1.2.**
- For POE power cable run, please follow Estate Office latest standard for running low voltage power.
- Each POE power cable must be tagged by traffolyte, clearly show the cable as: **ELV POE 54-60VDC ES2**
- Each POE power cable must be tagged every 1000mm or less when it is not in conduit
- Each POE power cable shall have 2m slack loop secured to the cable tray in the cabinet
- Minimum clearance between fibre, or data to POE power cable is: 50mm on tray.
- In the rack, a small cable tray shall be installed for POE power cable.
- Tested and preferable PoE PSU by TSDIS is Ubiquiti EdgePower (with redundant Power Supply).
- First PoE supply unit shall be mounted on RU06 in a full-size rack. Second PSU is to be mounted on RU04.
- JCU max distance tested configuration:
  4x POE+ device sharing a single run: 400m
  1-2 POE+ device sharing a single run: 550m
  1 POE+ device: 650m
  Distance over 650m will **NOT** be endorsed or accepted by TSDIS.

3.2.2.6 Cross rack cabling

- For communications room with multiple racks, appropriate MPO solutions from acceptable vendors are to be installed between the main rack and additional racks.
  Example:
  T142-0-FD1A – 12F MPO – T142-0-FD1B

T142-0-FD1A – 12F MPO – T142-0-FD1C
T142-0-FD1A – 12F MPO – T142-0-FD1D

- Minimum 12 fibre OS2 LC are to be installed between rack.
- No copper cross rack is acceptable unless authorised as per section **1.2.**
- Please contact TSDIS if you have any question.

3.2.3 Exclusions

Non-compliant services as per AS/CA S009:2020 or latest must not be installed into communications infrastructure support system or path way.

3.3 Cable and Conduit Support

3.3.1 General requirements

- Industrial rated products shall be used for support system.
- Non-communications cabling - including, but not limited to Security wiring, Distributed Antenna System, Building System wiring, MATV, Fire, AV speakers and microphone, shall be separated in their own suitably sized support system. They are not to be installed in Communications Rooms unless authorised as per section **1.2.**
- Support system for communication cable shall not be shared with other building items such as ceiling support struts, air-conditioning catching tray or duct.
- Pest control as per section □

3.3.2 Support system consistency

Bends, connectors, trays, ladders, brackets, catenary wires and other supports necessary to make a complete cable or conduit support system shall be of the same manufacture and sized to adequately support the installed cable.

3.3.3 Tray outside of communications rooms

- Galvanized, Powder Coated or stainless-steel tray.
- Thickness are as follows:

Tray size	Minimum Thickness
Up to 150mm wide	1.0mm
150mm to 300mm wide	1.2mm
Over 300mm	1.6mm

- Tray shall have folded edge with a minimum of 20mm radii.
- Tray slotting shall be normal or reverse with no burrs or sharp edges where cables are attached.
- Over the edge cable drop shall have smooth, non-sharp cable waterfall to guide it.

3.3.4 Tray inside of communications rooms

The same as **3.3.3** but Powder Coated or stainless-steel tray only. Galvanised are not permitted.

3.3.5 Catenary wire

Edge points cabling shall be reticulated on cable tray. Catenary wire is acceptable when authorised as per section **1.2** with the following condition:

- Ceiling are covered and not visible to staff and student
- Spacious reticulation space: Minimum 300mm high
- Catenary support max distance: 10 metres
- Catenary allowable sag: maximum 100mm
- Clearance between catenary sag and suspended ceiling: 50mm

3.3.6 Clearance

- Minimum 200mm away from hot water pipes.
- Minimum 500mm away from boiler or furnaces.
- Tray ceiling clearance: minimum 300mm
- Vertical tray front clearance: minimum 300mm

3.3.7 Skirting duct

- Unless otherwise stated, use 2 channel ducting, providing metallic shielding, approved by the University, and capable of supporting 8-way modular outlets (RJ-45) and faceplates. If the skirting duct houses electrical sockets (GPO's) then the duct must be installed by a certified electrician.
- Modular jack with side entry shall be used to keep skirting duct depth low. Due to the positioning of the wall plate socket, cable shall be routed via both left and right-side duct if side entry jack.

3.3.8 Wall boxes and external enclosure

- Generally, wall boxes shall use the same material as the conduit. uPVC is preferable.
- Prefabricated stainless-steel enclosure with Turnbuckle Lock are acceptable when uPVC is not suitable.
- Wall Boxes shall have IP66 or better ingress protection rating.
- All ingress and egress shall have silicone seal or other appropriate product added to provide extra protection against moisture.

3.3.9 Fibre duct

- Large size (have more than 2 racks or have a fibre distribution cabinet) communications rooms shall have fibre raceway installed.
- Each rack or fibre cabinet shall have 2 fibre raceway drops at the top of the rack.

3.3.10 Other requirements

- MPO or harness patch lead in the room must be run in fibre duct.
- Zip tie are not permitted as support system for any communication cabling.

3.4 Communications Rooms

3.4.1 Standard Provisioning

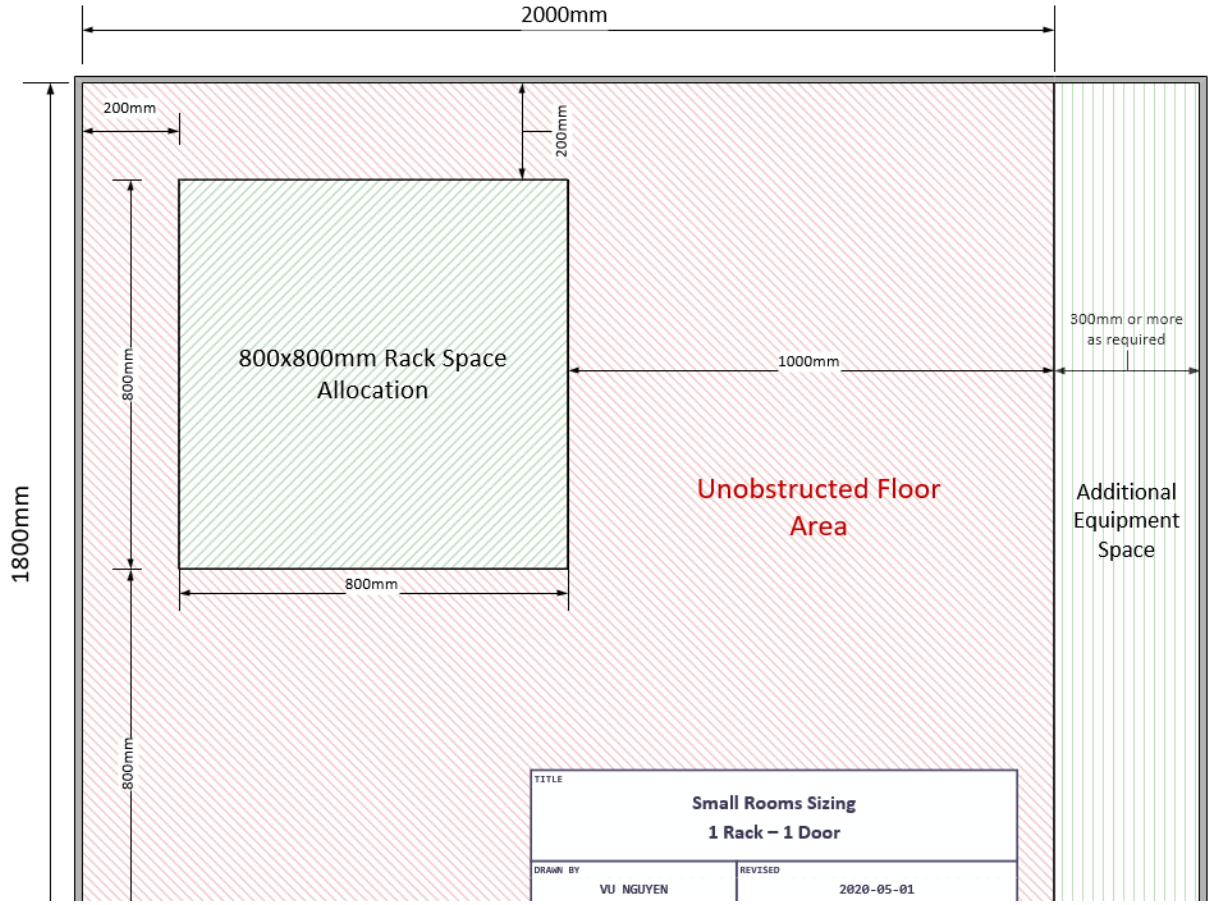
- All new buildings main communications rooms shall have 2 or 3 separate entry points for communications cabling. Please see **3.1.4** section for civil work details.
- The conduits shall have clear access to building main service space leading to the communications rooms.
- Conduits that enter a communications room must be outside the communications cabinets and have their own support system.
- To prevent accidental contact between conduits and the cabling, allowing the cable to enter the cabinets from the top while being supported.
- A minimum of 1 communications room per floor shall be provided.
- The communications rooms are primarily dedicated to communications services. Any additional services that require installation in the communications rooms, please confirm and get authorisation as per section **1.2.** This includes Audio Visual, Building Management, Electronics Access Control equipment.
  NOTE: If Audio Visual Racks are authorised to be in communications rooms, it must follow all communications standard specified in this document.
- No Electrical switch boards or UPSs shall be located within the communications rooms unless directly related with the communications infrastructure and must be authorised as per section **1.2.**
- Cabinet doors within the communications rooms shall be operable without restriction by door frames or walls surrounding the enclosure.

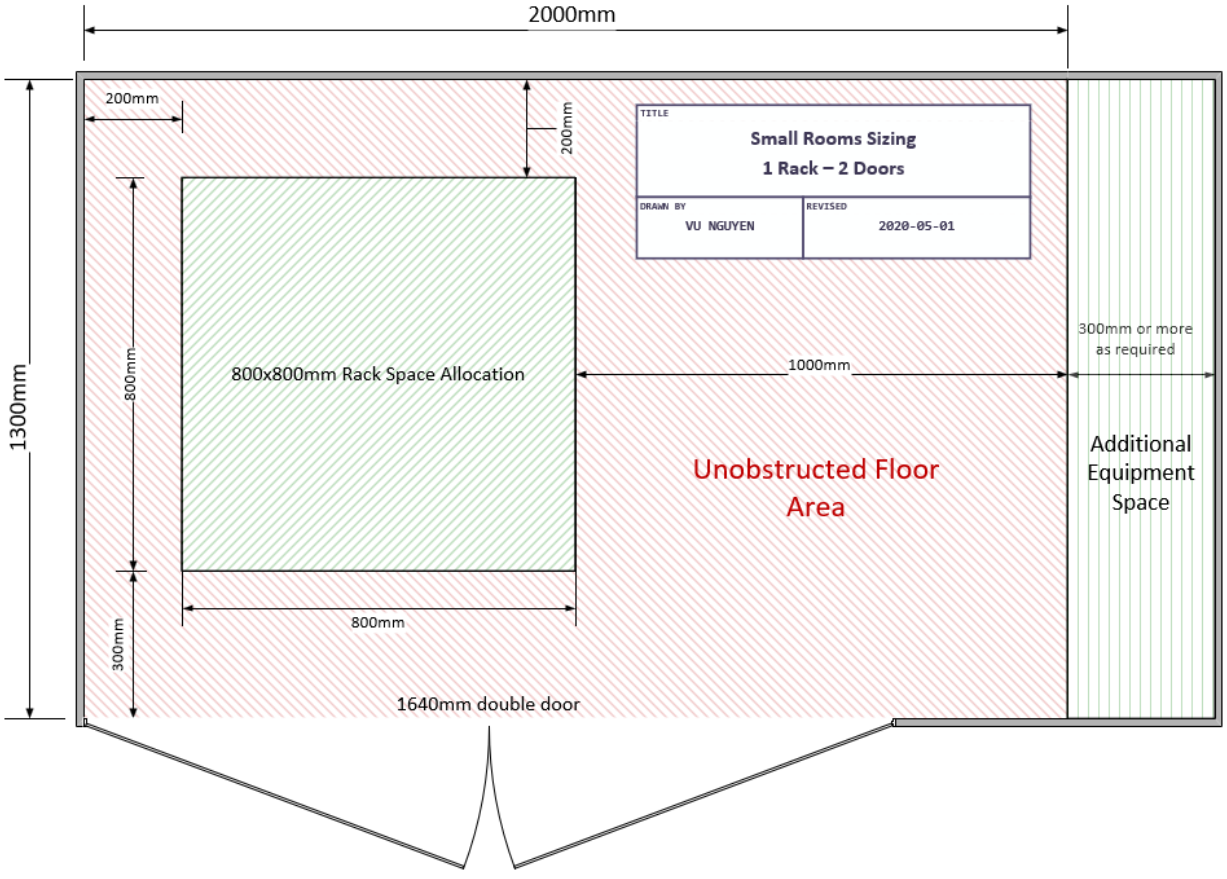
3.4.2 Communication Rooms Size

- All communications rooms shall have a minimum floor to ceiling height of 2400mm.
- The diagram shows the minimum space to be allocated to a communication cabinet.
- Minimum rack space allocation: 800x800mm each rack
- 1 door room: minimum 800mm door clearance
  2 doors room: minimum 1640mm door clearance
- If authorised as per section **1.2** for additional equipment to be installed in the same room, minimum extra equipment space is 300mm or more as required.

3.4.2.1 Small rooms

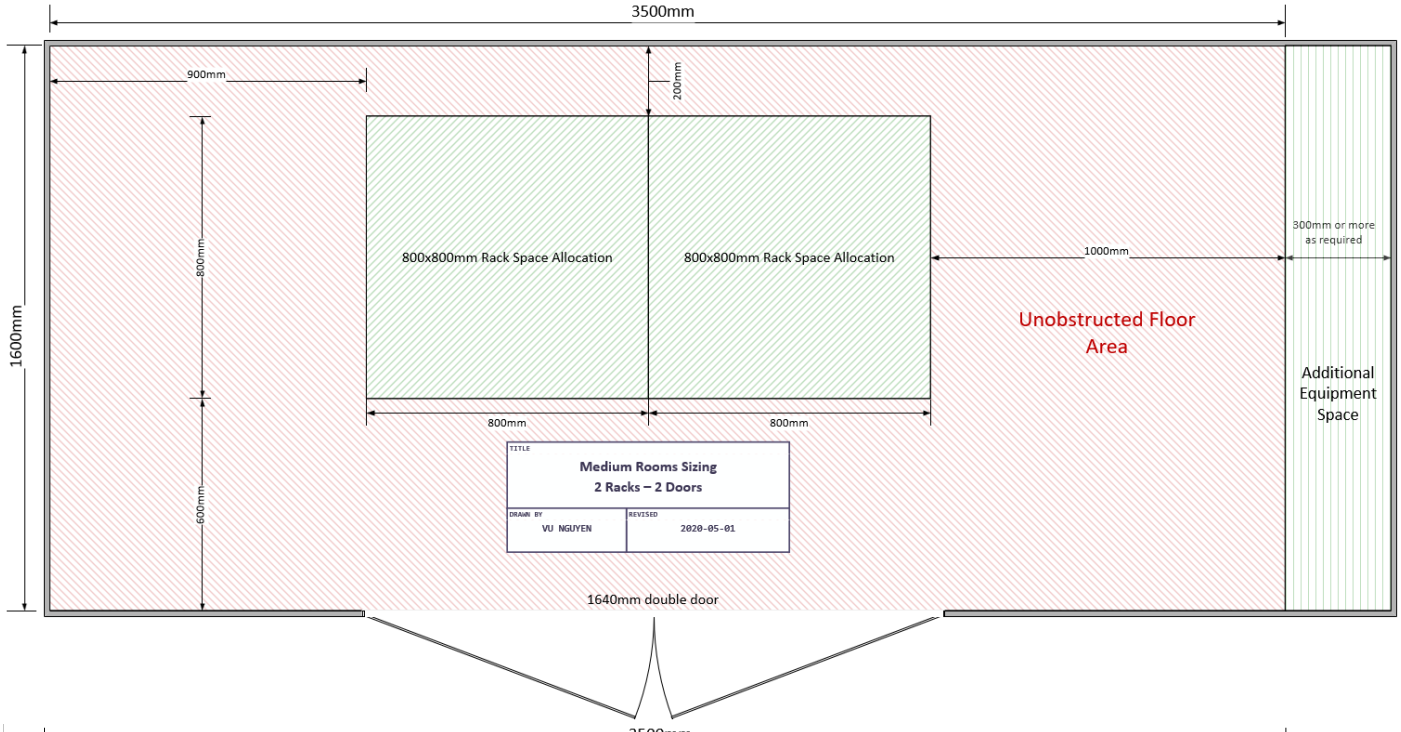
- Minimum workspace allocation around the rack:
  200mm – Left 200mm – Back 1000mm – Right
  800mm – Front (1 door) OR 300mm – Front (2 doors)
- 1 door without additional equipment: minimum internal room space is 2000x1800mm
  2 doors without additional equipment: minimum internal room space is 2000x1300mm
- Leave rack rear doors off

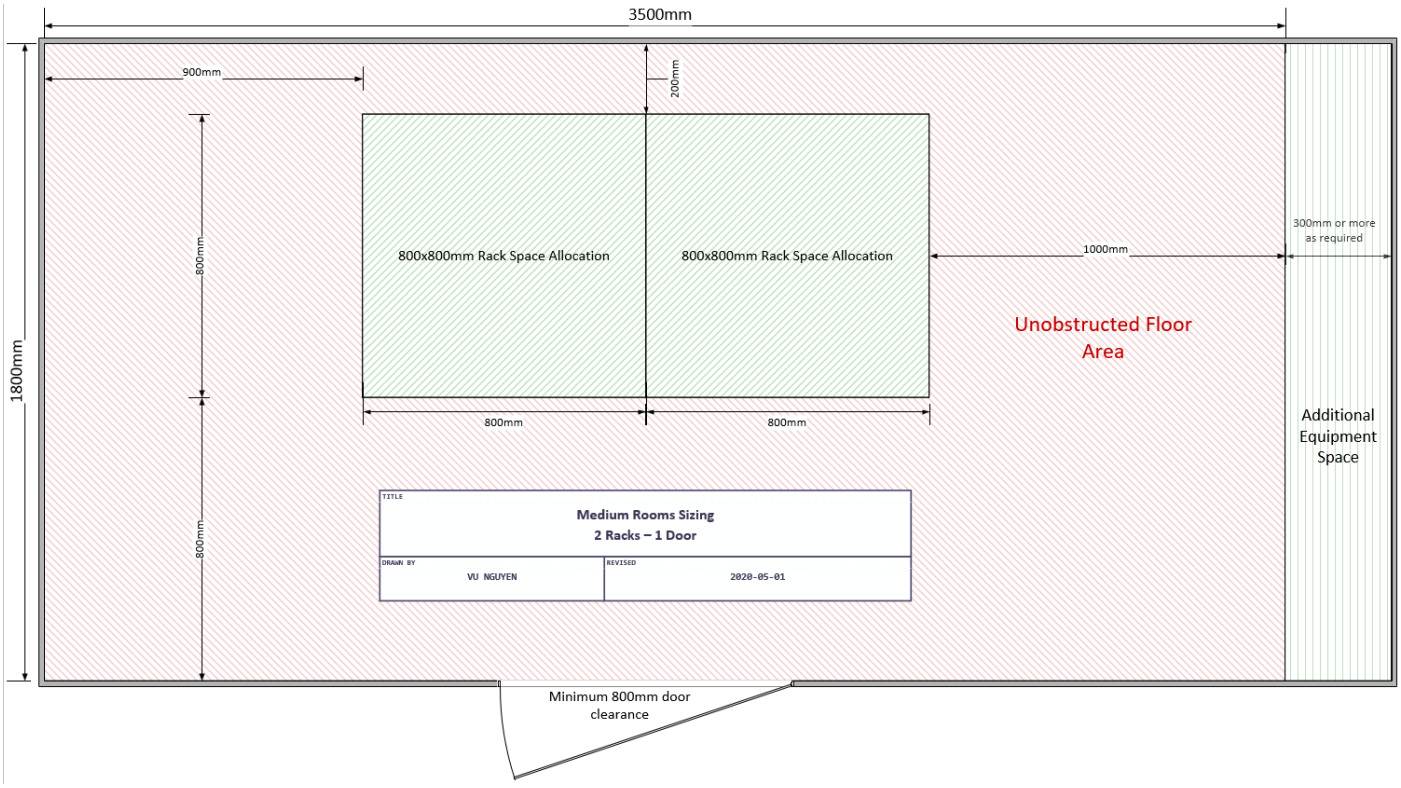




3.4.2.2 Medium rooms

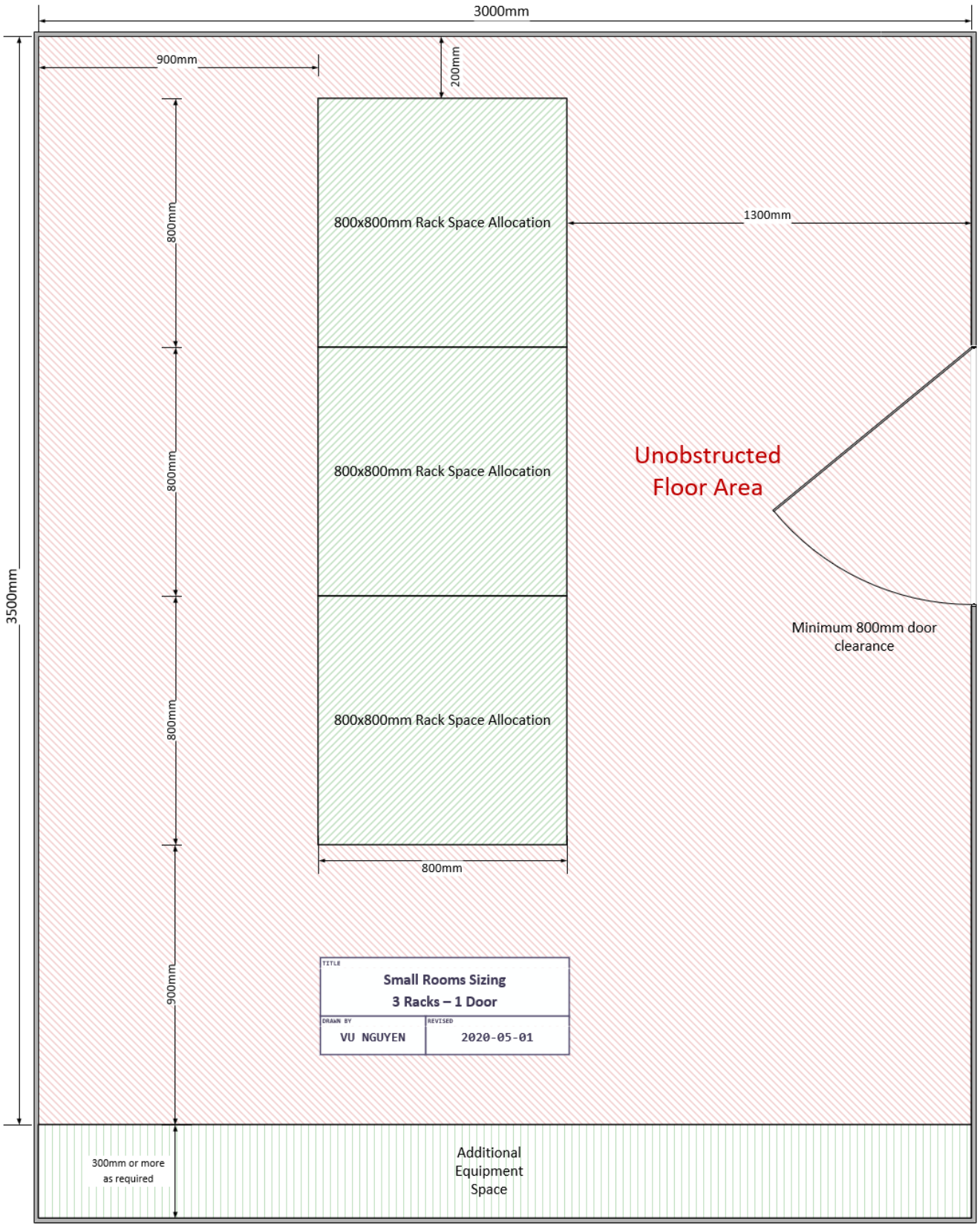
- Minimum workspace allocation around the rack:
  900mm – Left 200mm – Back 1000mm – Right
  800mm – Front (1 door) OR 600mm – Front (2 doors)
- 1 door without additional equipment: minimum internal room space is 3500x1800mm
  2 doors without additional equipment: minimum internal room space is 3500x1600mm
- Leave rack rear doors off





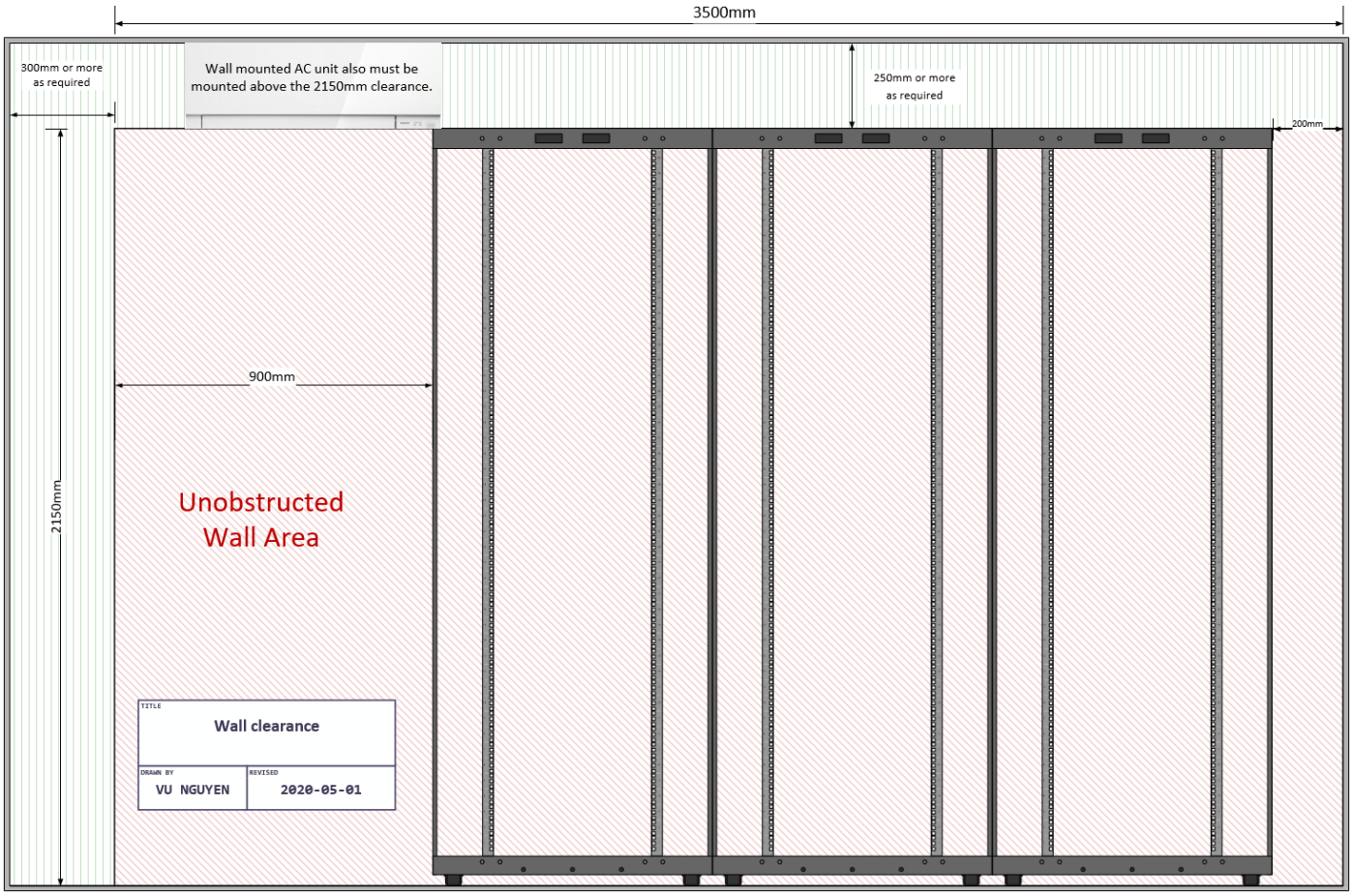
3.4.2.3 Large rooms

- Minimum workspace allocation around the rack:
  900mm – Left 900mm – Back 200mm – Right
  1300mm – Front
- 1 door without additional equipment: minimum internal room space is 3000x3500mm



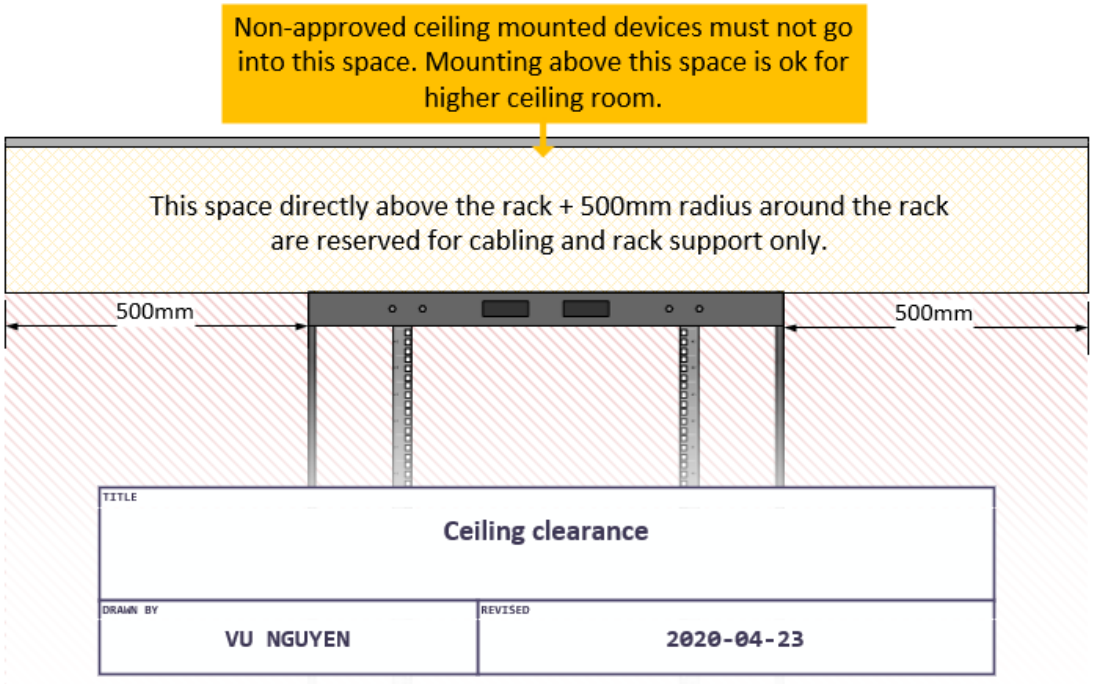
3.4.2.4 Wall clearance

- Wall clearance height is 2150mm.
- Reserved floor space also indicates wall clearance area.
- No equipment to be mounted on the wall unless authorised as per section 1.2.



3.4.2.5 Ceiling clearance

- 250mm head space directly above the rack with 500mm radius around the rack are reserved for cabling and rack support only.
- Ceiling mounted devices can be installed above that reserved space in room with ceiling higher than 2400mm



3.4.3 Safety and other considerations

All communications rooms shall be compliance with AS/CA S009:2013 or latest. The minimum expected:

- Smoke detectors
- Emergency Lighting
- Containment openings to communication spaces must be sealed with fire retardant material
- Doors to communication rooms must be of solid wood core or steel construction with fire retardant rating of 2 hours or more.
- If required by Building Code Australia and Queensland Development Code, communications rooms shall have fire retardant rating of 2 hours or more. Please consult with Estate Directorate, Head Planning and Development for confirmation.
- Doors must have automatic closer system fitted
- Doors must have labelled: "**Communications Room**" and have "Authorised personnel only" sign. Signage must match the aesthetic of the building.
- Communications rooms must be free from contaminants and pollutants
- Communications rooms shall have basic firefighting capability (handheld fire extinguishers)

Fire rating for the room:

- If the room have more than 2 racks, it must be fire rated
- If the room have 2 racks and the rack houses other equipment with high operating temperature such as amplifier, it must be fire rated
- If the room has 1 rack equipment, it is generally does not need to be fire rated.
- If the room need a fire sprinkler system because it is not fire rated, it cannot be water based.

Communications Rooms shall not be directly beneath or next to wet areas such as:

- Showers
- Washrooms
- Garbage areas
- Cleaner chemical storage areas

Communications Rooms shall not have non-related items in them such as:

- Utility pipes and ducting
- Sprinkler systems
- Water cooler or water supply system

Pest control must be done as per section □

3.4.4 Surface finishes

- All communications rooms shall have vinyl floor
- Ceiling shall be enclosed
- Walls and ceiling shall have primer and finished with paint that minimise dust and ingress of pests
- Walls, floor and ceiling shall be treated with anti-dust and anti-static coating to minimise dust and static electricity

3.4.5 Lighting requirements

- Communications rooms shall be fitted with adequate lighting
- LED lighting are preferable for longevity and brightness

3.4.6 Cooling and Ventilation

This section reiterates JCU Design Guidelines Section 20 (20.1.10)

- All communications rooms shall be provided with ventilation or air-conditioning capable of maintain a stable ambiance temperature of 23 degrees Celsius ± 3 degrees Celsius, ideal relative humidity is 50% ± 10% (maximum allowed for short period spike is to 75%) the front of the racks with all doors closed.

- If active air-conditioning units are used, they must be setup to turn back on after a power outage.
- Air-conditioning reliability should be addressed by having redundant units or active monitoring by building management system.
- New or full refurbished buildings shall have a backup standalone air-conditioner for the main communication rooms.
- For drip trays and drainage specification, please see JCU Design Guidelines Section 20

3.4.7 Noise isolation

High performance network equipment has loud and high pitch fan noise. It is unsuitable for office and teaching environments. As such, communications rooms must be constructed to minimise noise and/or located in suitable location. Please see JCU Design Guidelines Section 18 for more details. Doors for Communications rooms must have acoustic seals.

3.4.8 Security requirements

- All communications rooms shall be keyed to the communications master system.
- All communications rooms shall also have electronic access control system installed.
- For the purpose of pre-open building commissioning, construction key and lock are acceptable.
- All communications rooms shall have a high security locking setup.
- All communications rooms with double doors shall have locking bolt for extra security.
- Please see JCU Design Guidelines Section 15 for more details

3.4.9 Access and clearances for Krone frame

- Front clearance: minimum of 900mm
- Left and Right-side clearance: minimum of 300mm
- Krone frame are to be installed into its own room or in **Additional Equipment Space** in Communications rooms.

3.5 Equipment racks in Communications Rooms

3.5.1 Rack size

- Please confirm with TSDIS for rack size.
- 45RU 800x800mm is the standard size.
- Open frame rack is also acceptable. Note that rack spacing will still be reserved for open frame racks.
- Increase of racks size will also increase the room size.
- If AV cabinet is authorised to be in the communications room, it must match the rest of the cabinets in the room.

Rack sizes	**Notes**
800mm (w) x 800mm (d)	Standard size – drawing in this document shows this size
700mm (w) racks	Depends on the project, please get authorisation as per section **1.2**
1000mm (d) or 1200mm (d)	Acceptable. 1200mm is the preferable size for main distribution room.

3.5.2 Rack capacity

Number of data points	**Rack size**
0-288 ports	1x 45RU 800x800mm
289+ ports	1 additional 45RU 800x800mm rack per 288 ports or part there of

3.5.3 Minor installation

- Any minor installation with small size cabinet 6-18RU must be authorised as per section **1.2.**
- Wall mount 6-12RU cabinet are only acceptable for small installation (usually in workshop or shed) with less than 8 ports.
- 18RU rack must be floor mounted.

3.5.4 Rack RU designation

- The rack designation running from the top of the rack to the bottom. It consists of 2 alphabetical letters starting with “AA”

- Rack Designation for some common size racks below (45RU, 42RU, 18RU, 12RU, and 6RU) in Appendix **6.2**

3.5.5 Rack physical configuration

3.5.5.1 Front and rear mounting rail

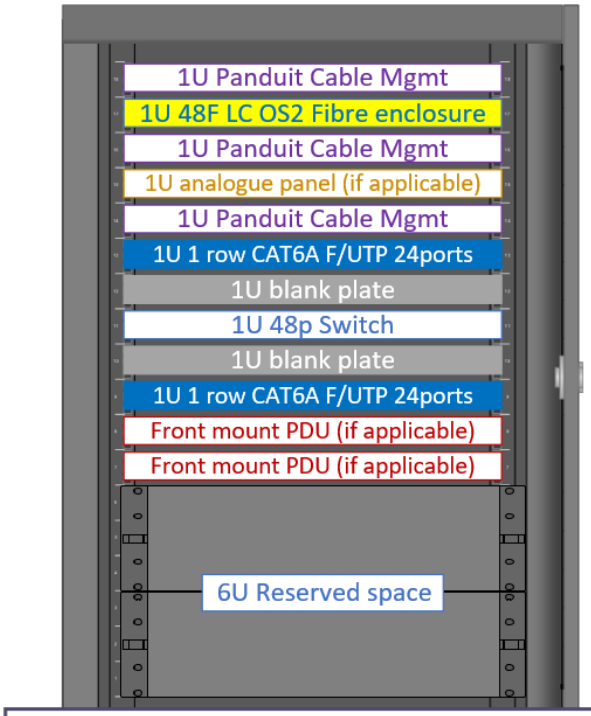
- All supplied racks shall have back mounting rails
- Mounting rails front clearance: 100mm
- Mounting rails back clearance: 100mm

3.5.5.2 Rack layout

- Rack shall always be filled from the top down except reserved locations for certain equipment
- If an installation does not require a full rack, simply leave out excess components and leave the space available for future growth
- Do not randomly relocate rack components unless authorised as per section **1.2.**
- For any installation, always consult TSDIS for rack layout.

Please see below for some standard rack setup.

3.5.5.2.1 Minor installation example



TITLE	
18RU Minor installation example (with authorisation)	
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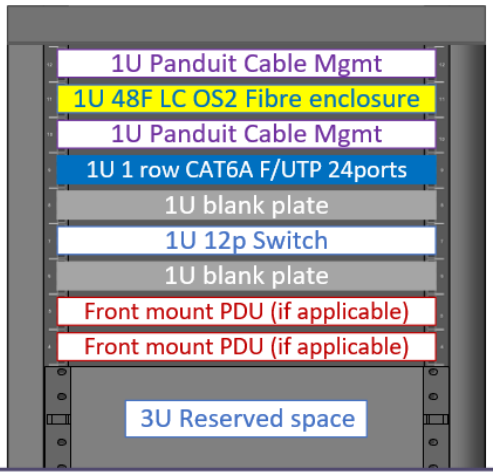

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12RU Minor installation example (with authorisation)	
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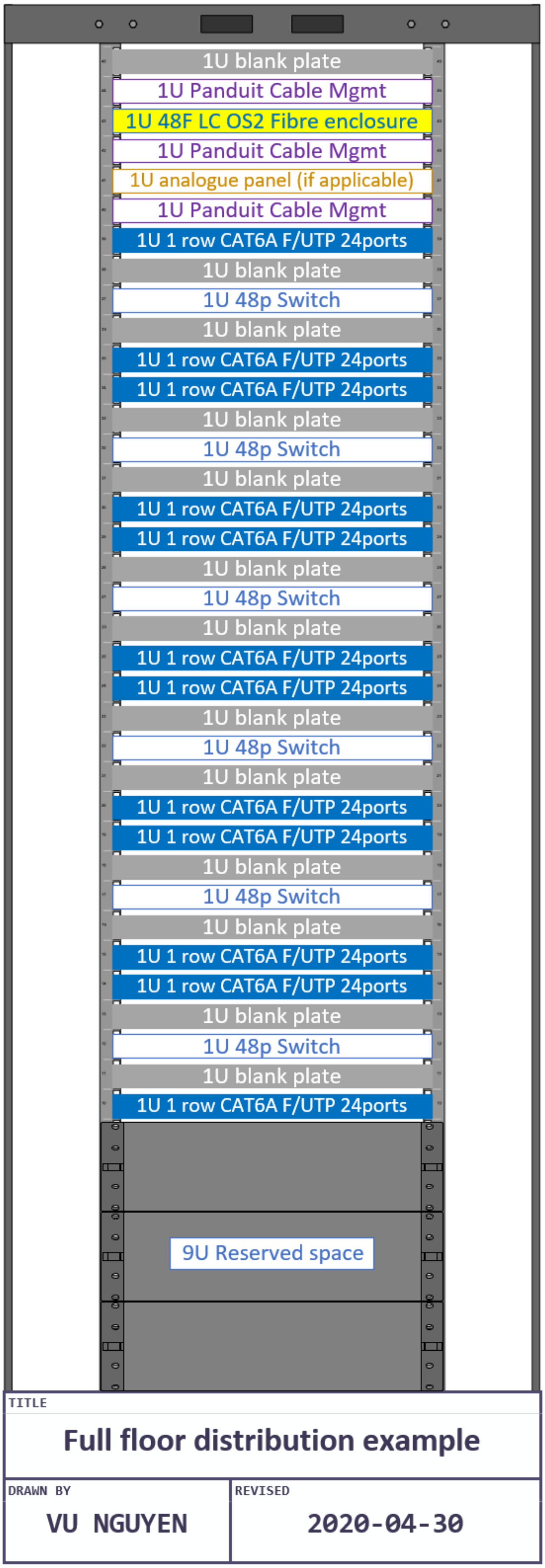
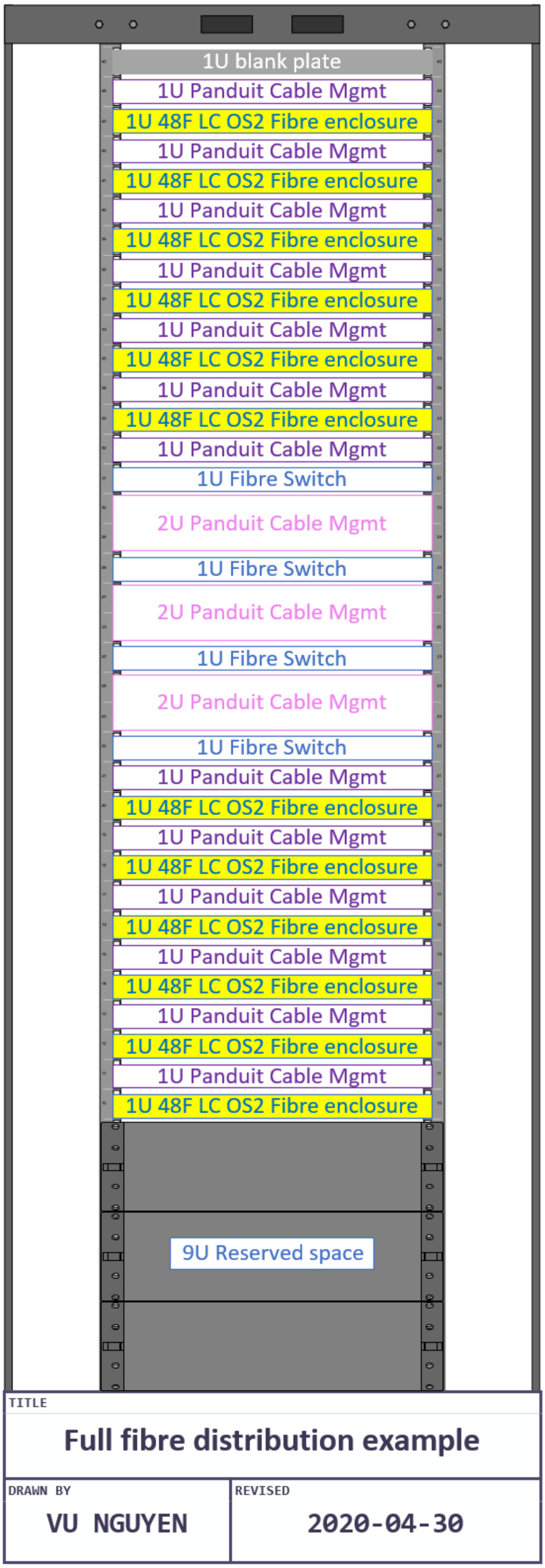
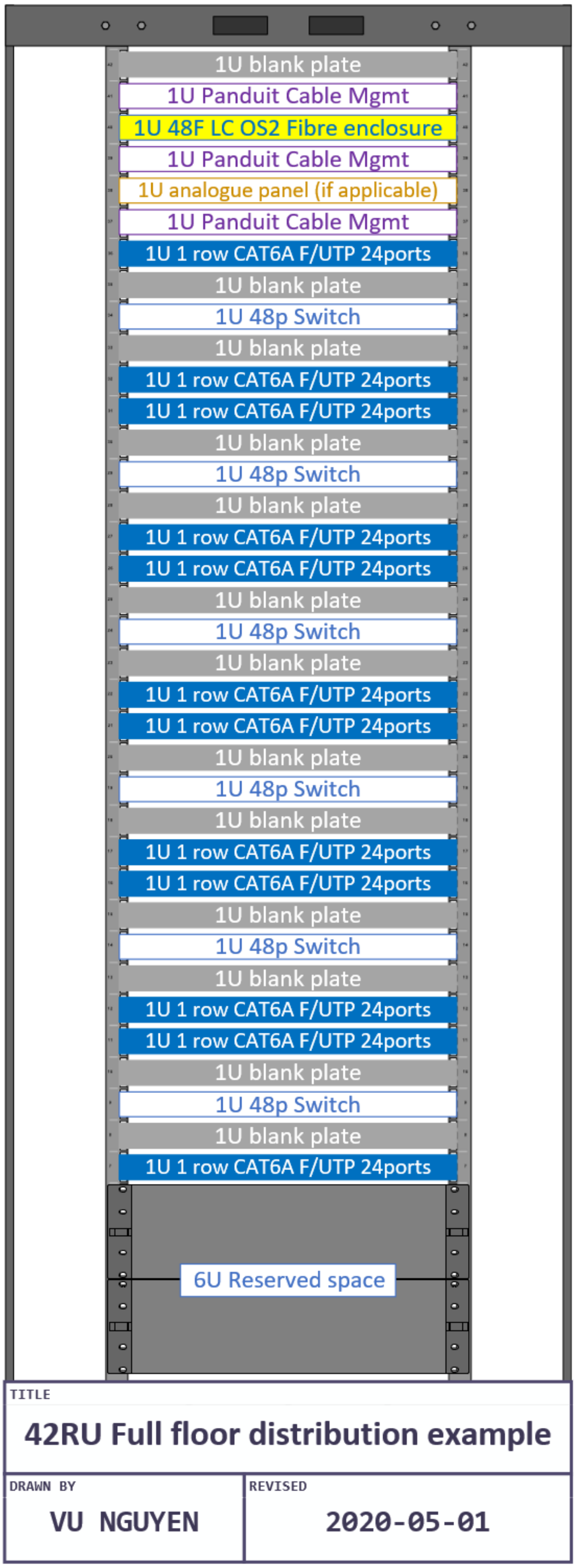
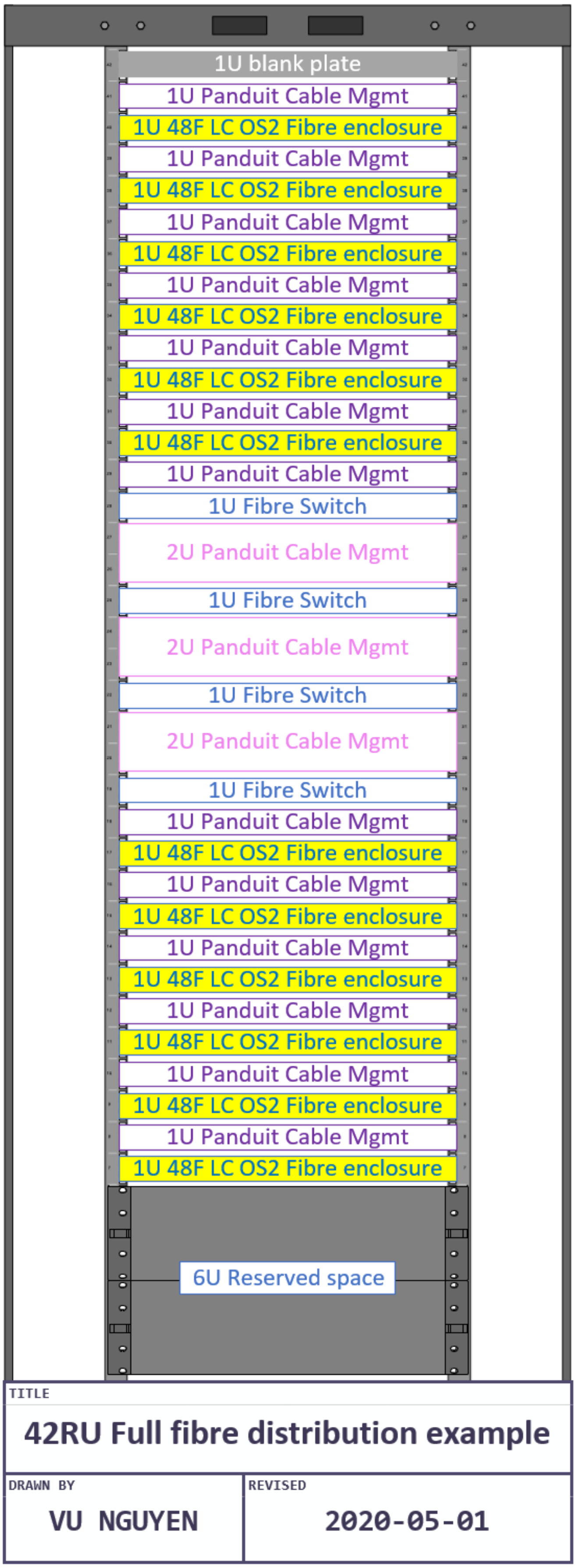
3.5.5.2.2 Full size 45RU example





3.5.5.2.3 For existing building with 42RU rack





3.5.6 Rack power provisioning

3.5.6.1 General requirement

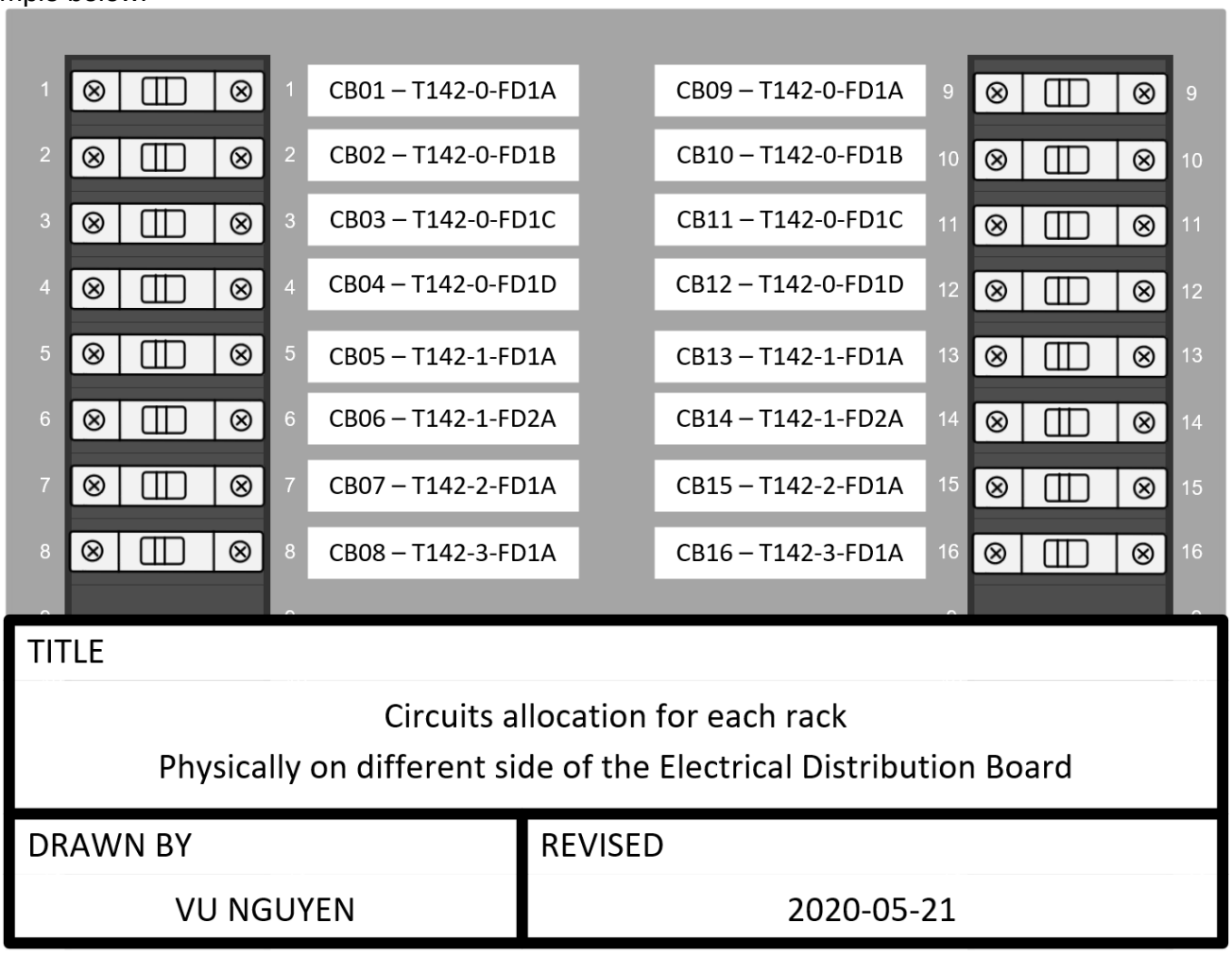
- Each communications rack shall have 2x filtered and surge protected circuits.
- If the circuit is not exceeding 20A and required RCD, Super Immunised RCD variant are to be used.
- Circuits for communication are not to be shared with any other building services
- Acceptable power outlet: Clipsal 56C320F - Switched Socket Outlet, 250V, 20A, 3 Flat Pin, IP66, 1 Pole or equivalent.
- Acceptable for low port count rack, Clipsal 56C315 - Switched Socket Outlet, 250V, 15A, 3 Flat Pin, IP66, 1 Pole or equivalent. Please get authorisation for low port count 15A provisioning as per section **1.2.**
- A communication earth system shall be provided to each rack. Earth test for each rack is expected.

3.5.6.2 New building centralised supply

- In all new buildings, the ground floor communications room must be equipped with an electrical distribution board that supplies power to all communications rooms in the building.
- This board is to have two supplies: 'A' and 'B'. A: left side or top side; and B right side or bottom side.
- A or B is to be supplied from a building UPS (if applicable) or a direct feed from the building supply
- A or B is to be provided with a generator backup changeover in the event of a power failure (if applicable)
- The 'B' supply must also allow for the insertion of a rack mounted UPS to maintain the active network equipment in the event of a power failure until the generator is on-line
- A and B power rail shall have the ability to be independently switched off completely for maintenance.

3.5.6.3 A and B power separation

For each rack, A and B power must come from a different side of the power rail on the distribution board. Example below.



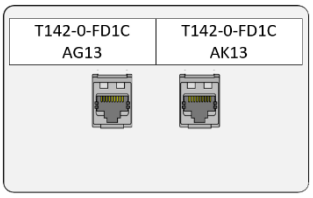
3.5.6.1 *Rack mount power distribution Unit (PDU)*

- A minimum of two PDU must be provided within the racks.
- Vertical mounted PDU is preferable.
- Each PDU shall use appropriate captive plug to fit socket outlet
- Please consult rack manufacturer for PDU mounted accessories such as PDU tray.
- PDU must be mounted at the back of the rack
- For large size room with spacious back access: PDU outlets are to be facing outwards the back of the rack
- For room with 1 large side access: PDU outlets are to be facing inwards or towards the front of the rack

3.6 Edge points installations

Edge points are in reference to: Wireless Access Point, Cameras, Projectors, Building Systems, etc

3.6.1 General requirement



- Data ports for edge points in the field shall be install into standard face plate. Surface mounting block are to be used if applicable.
- For devices such as WAP, HAP, Cameras, and Intercom, the face plate shall be installed in recessed wall cavity behind the device (unless as per 3.6.2 and 3.6.3).
- For standard external installation, please see **3.1.6.5 External CAT6A** and **3.1.6.6 External Support for CAT6A**

3.6.2 Floating jacks

- Floating jacks are **only** acceptable when authorised as per section **1.2.**

In scenarios where floating jacks are accepted, they must satisfy the following criteria:

- The last 100mm of floating jack cable shall be held into place using either cable clip or velcro into the closest fixed surface (wall / stud / enclosure / etc).
  Minimum 2x separate clips or 2x separate velcro loop are required.
- For devices in locations that are exposed to weather elements, floating jacks are to be installed in conjunction with an appropriate size weatherproof plastic-based enclosure.
  Example areas including but not limited to: Under croft, Building eaves, light pole, external walls, etc
- Enclosure minimum rating: IP66

3.6.3 Modular Plug Terminated Link (MPTL)

- MPTL are **only** acceptable when authorised as per section **1.2**.
- TSDIS will explicitly instruct which MPTL part to use.

In scenarios where MPTL are accepted, they must satisfy the following criteria:

For CommScope installation, CommScope Acceptable part are:
- 760250028 - ECO CCA, SHIELDED – KIT. (To be used with CAT6A lead)
- COP1KZ2-88F0XX is also acceptable: CCA-CAT6A-SHIELDED LSZH (come with pre-attached pigtails)

For Molex installation, Molex part is: Category 6A Field Termination Plug #KSP-00001

- MPTL are designed for WAP, HAP, Camera, Intercom, and similar devices that have difficult cable access space and there is no other alternative.
- MPTL is only acceptable at edge point side.
- Custom consolidation point or custom ceiling assembly are not acceptable
- For devices in locations that are exposed to weather elements, Ceiling Connector Assembly for MPTL must be installed with an appropriate size weatherproof plastic-based enclosure.

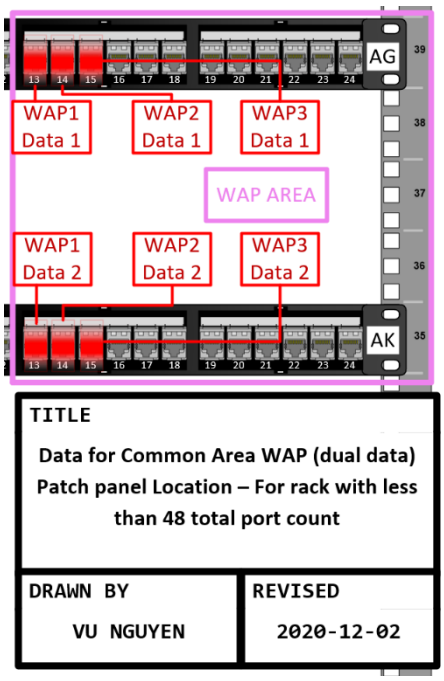
- The last 100mm of MPTL cable shall be hold into place using either cable clip or velcro into the closest fixed surface (wall / stud / enclosure / etc)
  Minimum 2x separate clips or 2x separate velcro loop are required.
- Appropriate Fluke test is required: **AS/NZS MPTL Class Ea (+PoE)**

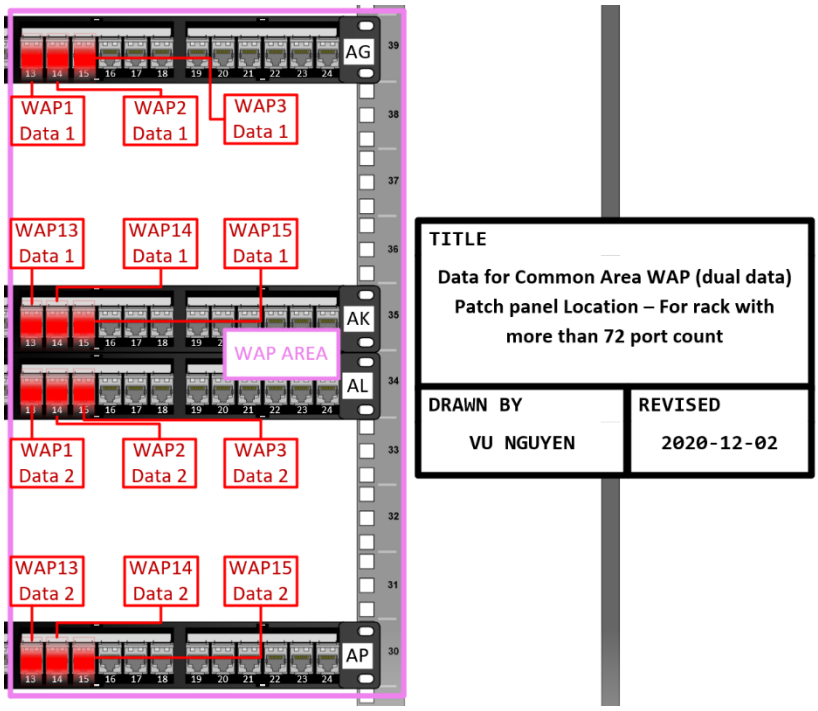
3.6.4 POE standard

New communication cabling at JCU must support PoE Type 4 standard **802.3bt (Class 4)**: 90w Power Source Equipment supply up to 71.3W Powered Devices.

3.6.5 Wireless Access Point

- Standard provisioning: 2x data ports per WAP. **Please contact TSDIS for WAP installation location on patch panels.** It's different for every floor depends on the number of WAP and port counts. 2 common scenarios are provided below as an example.
- For rack that has low port count (less than 48 ports): WAP data ports shall be split between the same locations between 2 patch panel sharing the same switch. Example: AG & AK; AL & AP; etc. WAP 01-12 data ports shall be installed between port 13-24 on the first 2 patch panels (AG & AK).
- For rack that has high port counts (more than 72 ports): WAP data ports shall be split between patch panel belong to alternate switch. WAP 01-12 data port 1 shall be installed on AG patch panel. WAP 13-24 data port 1 shall be installed on AK patch panel. The same alternation is done for WAP data port 2. WAP 01-12 data port 2 shall be installed on AL patch panel. WAP 13-24 data port 2 shall be installed on AP patch panel.
- **Please confirm with TSDIS before deciding any field termination method for WAP.** Depends on the location of the WAP, CommScope MTPL using CCA maybe acceptable. **Authorisation is required.**
- Short patch lead is to be used going from data outlet to the WAP with appropriate protection (if applicable).





3.6.6 Hospitality Access Point

- Standard provisioning: 1x data port per HAP
- **Please confirm with TSDIS before deciding any field termination method for HAP.** Due to the nature of HAP, CommScope MTPL using CCA maybe acceptable. Authorisation is required.
- Short patch lead is to be used going from data outlet to the HAP. Do not use excessively long patch leads for HAP (if applicable).

3.6.7 Cameras

- Standard provisioning: 1x data port per camera
- The data port for 01-12 cameras on the same floor shall be installed on the first patch panel in the cabinet (AG01-AG12)
- The next 12-24 additional cameras shall use the next patch panel in the cabinet (AK01-AK12)

- **Please confirm with TSDIS before deciding any field termination method for Camera.** Depends on the location of the camera, CommScope MTPL using CCA maybe acceptable. Authorisation is required.
- Short patch lead is to be used going from data outlet to the camera with appropriate protection (if applicable).

3.6.8 Intercoms

- Standard provisioning: 1 data point per intercom
- The data port for intercom on the same floor shall be installed on the first patch panel in the cabinet. If there is no space due to WAP and Cameras taking space, the next patch panel will be used.
- **Please confirm with TSDIS before deciding any field termination method for Intercom.** Depends on the location of the intercom, CommScope MTPL using CCA maybe acceptable. Authorisation is required.

3.6.9 Building Systems

- Designer and installer shall contact TSDIS with your proposed design for advice
- Network data cable for building systems shall be provisioned as needed.
- Standard provisioning: 1x data point per main controller.
- Spare capacity provisioning: 1x data point per 1-4 controller.
- Building systems IP interconnect end points do not always must be run back to the main communication room. However, they shall be installed with CAT6A F/UTP.

3.6.10 AV systems

- Designer and installer shall contact JCU Audio Visual Services with proposed design for advice
- Network data cable for AV systems shall be provisioned as needed.
- Standard provisioning: 1x data point per networked AV device.
- Spare capacity provisioning: 2x data points per 1-6x networked AV devices.
  Example: 6 networked AV devices: 8 data points; 8 networked AV devices: 10 data points
- AV network data cable are to be centralised at main floor communications rack.
- Non-network data cable dedicated for AV system shall not be run into floor communications rack unless authorised as per section **1.2.**

3.6.11 Staff area and Student Access lab

3.6.11.1 Staff area

- Standard provisioning: 1x data point per computer.
- Spare capacity provisioning: 1x data point per 1-4x computer cluster
  Example: 4 staff computers: 5 data points; 6 staff computers: 8 data points; 8 staff computers: 10 data points
- Printer: 2x data points per printer

3.6.11.2 Student General Access lab

- Standard provisioning: 1x data point per computer
- Spare capacity provisioning: 1x data point in 1-6 computer cluster.
  Example: 4 lab computers on the same bench: 5 data points; 6 lab computers on the same bench: 7 data points; 8 lab computers on the same bench: 10 data points
- Printer: 2x data points per printer

3.7 Testing, Labelling, and Identification

- Testing must be done as part of the work. No exception authorised as per section **1.2.**
- Contractor shall consult TSDIS for labelling of any installation. Do not assume the labelling format for any installation.
- All test shall include technician and test information as per section **1.5.3**

3.7.1 Testing

3.7.1.1 Acceptable test electronic files formats

All results must be provided to TSDIS as part of the job.

- Fibre light loss test: **.FLW** AND second copy in **.PDF** formats
- Fibre OTDR test: **.FLW** AND/OR **.SOR** AND second copy in **.PDF** formats
- CAT6A test: **.FLW** AND second copy in **.PDF** formats

3.7.1.2 Fibre

3.7.1.2.1 Common fibre test requirements

The requirements below are applied to both light loss and OTDR test.

- The test must be done via appropriate through adapter.
- The test must be done in 1300nm range.
- The test must be done in 1550nm range.
- Maximum acceptable loss is: 0.75dB per connector, 0.3dB per splice and 0.4dB/km
  Standard acceptable general loss is: 0.65dB per connector, 0.15dB per splice.

3.7.1.2.2 Light loss measurement test

- A light loss test shall be done on each fibre core termination.
- The test standard is ISO/IEC 14763-3:2014 or latest.
- The test must be done both ways.
- Only a PASS result is acceptable. PASS* is not acceptable.

3.7.1.2.3 OTDR test

- If the fibre is going across buildings, OTDR test also must be performed on each fibre core.
- Launch lead minimum length: 500m
- Pulse: between 10ns and 30ns
- 1-way test from upstream point is acceptable.

3.7.1.3 Copper trunk installation

- Each pair must be tested for: correct pair sequencing, resistance and short circuit. Electronics or MDF book record is acceptable.
- Earth test for each vertical: Photo of test instrument screen is acceptable.

3.7.1.4 CAT6A

- External CAT6A installation: Fluke test shall be done on each copper port in the job.
- The only acceptable test is: Fluke test **ISO11801 PL2 Class Ea (+PoE)** for CAT6A installation.
- Only a **PASS** result is acceptable. **PASS*** is **NOT** acceptable.

3.7.1.5 Earth test

Earth test for each rack and patch panel: Photo of test instrument screen is acceptable.

3.7.2 Labelling and Identification for Cable, Pit, Conduit and Enclosure

3.7.2.1 General

- In the Cabinet Fibre Enclosure and Patch Panel the labelling must be using heavy duty outdoor rated tape with UV and heat resistant. (Vinyl is preferable).
- In the Pit Enclosure, Conduit, Cable must use laser etched stainless-steel tag (embossed stainless-steel is acceptable).
- Cable should have 2 tags in each pit: Infrastructure ID tag and Path tag

3.7.2.2 Universal Identification

Universal Key ID	Explanation
100	Communication Infrastructure for Core Services
300	Communication Infrastructure for Building Services
500	Communication Infrastructure Building Interconnect
700	Communication Infrastructure for External and Special Services
900	Reserved for Future use

3.7.2.3 Pit and conduit identification

Object Code	Explanation
CID	Communication Infrastructure Conduit ID (use for tag and documentation)
PID	Communication Infrastructure Pit ID (use for tag and documentation)

3.7.2.4 Cable and enclosure identification

Object code	Explanation
F	Fibre
C	Copper
FIP	Fire Indicator Panel
CBL	Cable
ENC	Enclosure
MTP	Trademark High Performance Multi Fibre Push on (MPO) cable
CAS	Only use when go with MTP/MPO: MTP/MPO cassette, typical 12 cores (6 ports)

3.7.2.5 ID format

Info	Object code	Universal Key ID	Divider	Additional Object code	ID number in 8 digits format	IDs example in full
Conduit ID	CID	100	-		12345678	CID100-12345678
Cable ID	F	300	-	CBL	00000001	F300-CBL-00000001
Enclosure ID	F	100	-	ENC	00000101	F100-ENC-00000101

3.7.2.6 General Tag format

Owner	**Infrastructure ID FROM LAST SPLICE LOCATION TO NEXT SPLICE LOCATION**

3.7.2.6.1 Path cable tag

Current PIT ID
ADJACENT PIT / ROOM
ADJACENT PIT / ROOM

3.7.2.6.2 Conduit tag example

JCU	CID100-12345678 PID-024 PID-034

Explanation: JCU Back Bone Communication Infrastructure Conduit number 12345678 go from Communication Infrastructure Pit 24 to Pit 34

JCU-ISP	CID100-87654321 PID-111 PID-222

Explanation: JCU Back Bone Communication Infrastructure Conduit number 87654321 go from Communication Infrastructure Pit 111 to Pit 222 allocated for ISP

3.7.2.6.3 Cable tag example

Please see Appendix **6.3** for details example. Some explanation example below

JCU-OS2(24)	F300-CBL-00000101 F100-ENC-00000101 T200-0-FD1A-ENC-01

Explanation: Single mode OS2 24 cores cable functions as a building tail from Back bone Fibre Splicing Enclosure number 101 to building 200 Enclosure number 01

Current Pit: 456 North: 789 West: 258

Explanation: This cable in pit 456 go North pit 789 and West Pit 258

JCU-OS2(12)	Cable ID: F300-CBL-00000102 FE100-ENC-00000101 T200-0-FD1A-ENC-02

Explanation: Single mode OS2 12 cores cable functions as a building tail from Back bone Fibre Splicing Enclosure number 101 to building 245 Enclosure number 02

Current Pit: 159 South: Riser 245-X002 East: 056

Explanation: This cable in pit 159 go South into the Riser in 245, the other way goes to pit 056

3.7.2.7 Enclosure, termination point tag and label

3.7.2.7.1 Underground enclosure

- Underground splicing enclosure shall have tag with ID provided by TSDIS reference in **3.7.2.5**
- In most cases, they are fibre enclosure so Fibre code: F is added.
- Example:

Enclosure ID
F100-ENC-00000101

3.7.2.7.2 In cabinet termination point

Cabinet designation	Divider	Object code	Divider	Enclosure number	Label example in full
T099-0-FD1A	-	ENC	-	002	T099-0-FD1A-ENC-002

3.7.2.7.3 Fibre splicing label and record:

- Each tray shall have label.
- Each enclosure shall have paper record in the pit.
- Technicians must fill out the record and label after every job.

F100-ENC-00000101(01-24)
F500-CBL-00000101(01-24)
F300-CBL-00000101(01-24)

Explanation: Tray core position 01-24 in Enclosure 101 splice cable F500-CBL-00000101 core 01-24 to cable F300-CBL-00000101 core 01-24

F100-ENC-00000101(25-36):
F500-CBL-00000101(25-36)
F300-00000102(01-12)

Explanation: Tray core position 25-36 in Enclosure 101 splice cable F500-CBL-00000101 core 25-36 to cable F300-CBL-00000102 core 01-12

F100-ENC-00000101(37-48)
F500-CBL-00000101(37-48)

Explanation: Tray core position 37-48 in Enclosure 101 have cable F500-CBL-00000101 core 37-48 Spare not spliced

3.7.3 Labelling and Identification for Cabinet

3.7.3.1 General

Contractor shall consult TSDIS for labelling of any installation. Cabinet general format is:

Example	Campus Designation	Building Number	Separator	Floor number	Separator	Cabinet Designation	Communication Room Designation	Rack count
Townsville	T	001	-	0	-	FD	1	A
Cairns	C	D04	-	1	-	FD	2	B

- Floor number will start from 0 for Ground Floor and go up from there.
- Room Designation start from 1 and go up from there.
- Rack in the same room will start the count using alphabetic symbols: A, B, … Z
- Room with 1 rack shall have A count as default
- Cabinet label should be engraved (embossed is also acceptable) on industrial strength traffolyte or stainless-steel.
- Cabinet shall have laser warning sign as per Australian standard.
- JCU communication cabinets run switches that provide POE++ (Energy Source Class 2 - ES2). They shall have **"AUTHORISED PERSONNEL ONLY"** warning sign on the doors.

Please contact TSDIS for labelling of JCU premises at Remote Sites.

3.7.3.2 Fibre cabinet

JCU uses CommScope FACT Optical Distribution Frame solution for fibre cabinet or as specified by TSDIS. Cabinet designation for Fibre cabinet is: **FC**.

Example:

- T004-1-FC1A: Fibre cabinet 1 in Townsville Building 004 – First floor
- T039-1-FC1A: Fibre cabinet 1 in Townsville Building 039 – First floor
- CD04-1-FC1A: Fibre cabinet 1 in Cairns Building D04 – First floor

3.7.3.3 Floor distribution cabinet

Cabinet designation for Floor Distribution is: **FD**

Example:

- T142-1-FD1A: Floor distribution cabinet 1 in Townsville Building 142 First floor Room 1
- T142-1-FD1B: Floor distribution cabinet 2 in Townsville Building 142 First floor Room 1
- T142-1-FD2A: Floor distribution cabinet 1 in Townsville Building 142 First floor Room 2

3.7.3.4 Special

JCU Communication Hub Cabinet Designation is: **CR**

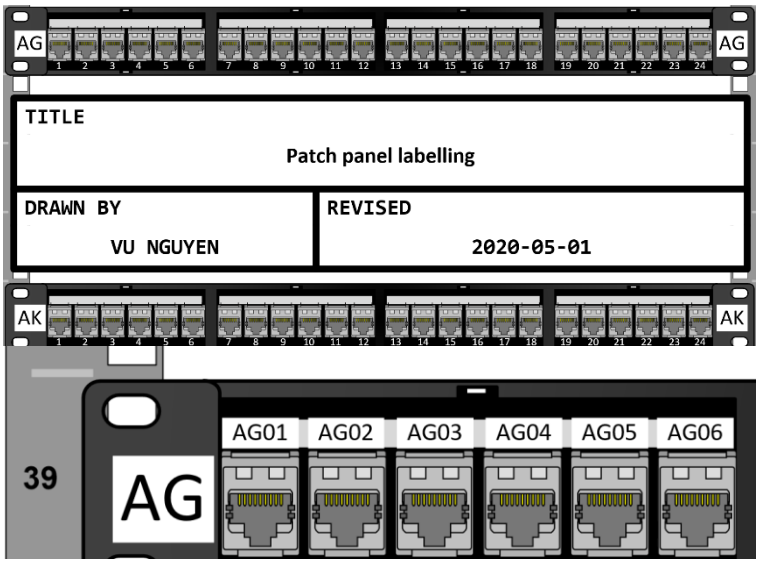
Example:

- T004-1-CR1A: Communication Rack 1 in T004 Hub First floor Room 1
- T004-1-CR1B: Communication Rack 2 in T004 Hub First floor Room 1

3.7.4 Labelling and identification for CAT6A Cable and Outlets

3.7.4.1 General requirements

- Clipsal Pro Series wall plate with side clear identification window is recommended. Standard series wall plate is also acceptable.
- Vinyl labelling are to be used for Patch Panel, Cable and Wall Outlets
- For data outlets, traffolyte is recommended. Vinyl is also acceptable.
- For cable wrap label, nylon cloth is also acceptable. Ideally self-laminating vinyl should be used.
- Cable wrap can be maximum 100mm away from the termination point but no further.



3.7.4.2 Patch panel

- Data patch panel are to be label with its designation.
- If patch panel does not have built-in port numbering like drawing sample here, then outlet identifier for each socket on patch panel are to be done. Please consult manufacturers of patch panel for appropriate label accessories.

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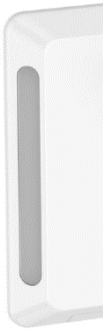
3.7.4.3 Cable end and outlets

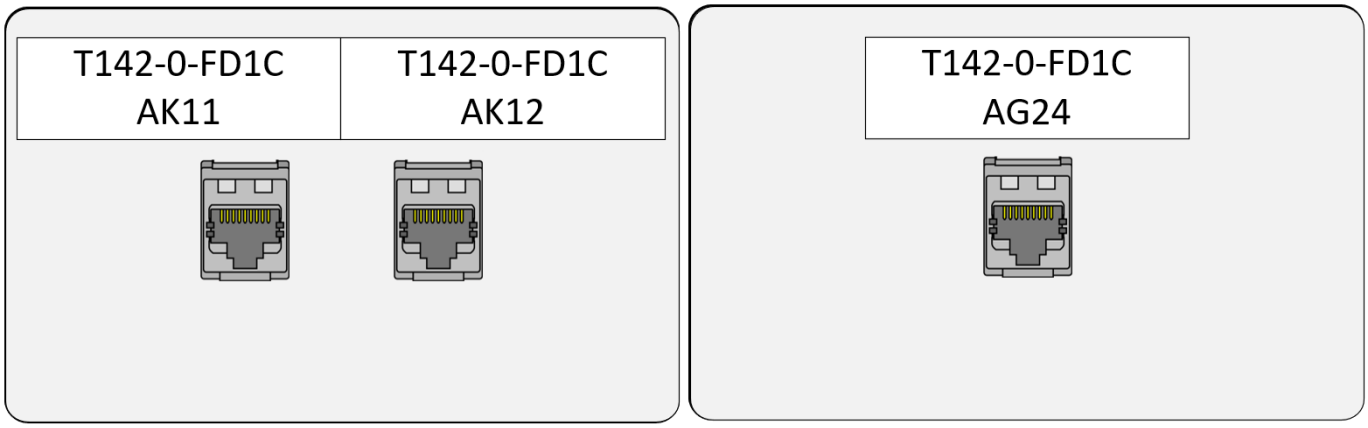


Structured cable and outlets are to be labelled with the following format:

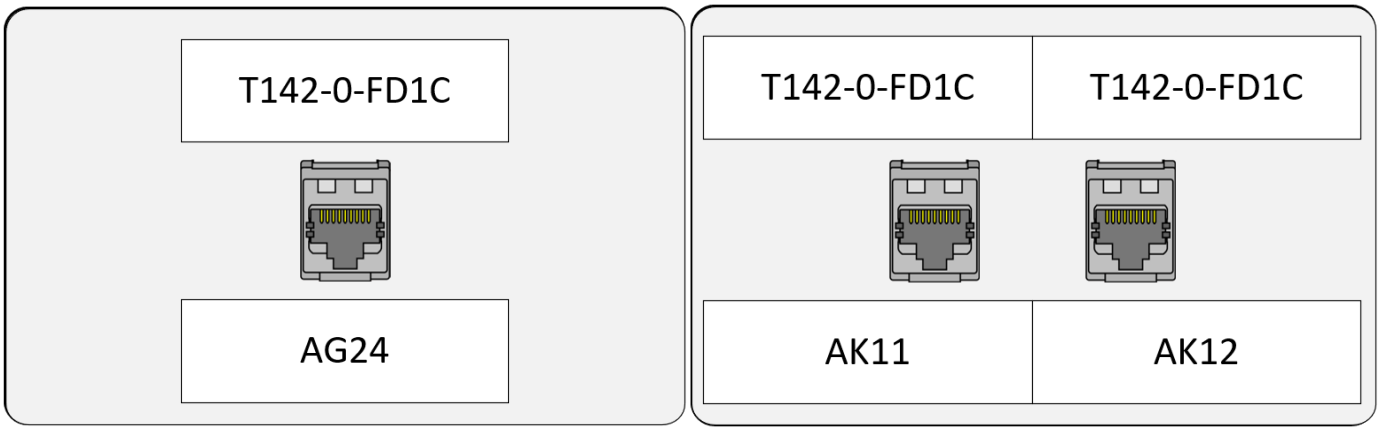
Cabinet designation Port designation

For Clipsal pro series, please use the clear side identification windows for label. See Clipsal documentation for more information.

Example for outlet labelling on standard wall plate



This is also acceptable



Example for cable labelling

Note: for ceiling mount data points, if the data port is not visible on the suspended ceilings, extra labels are to be put on the ceiling tiles or ceiling frames where the data ports are hidden above it.

Please do not hesitate to contact TSDIS if you have any question.

4. Compliance check list and Hand-over

4.1 Compliance Check List

Please supply the compliance check list in Appendix **6.1** to TSDIS before requesting active equipment to be installed and commissioned

4.2 As-built record for hand over

As-built records are to be submitted to TSDIS as part of the work completion. For major projects please see JCU Design Guidelines Section 30.

4.2.1 Reticulation drawings

- As-built reticulation drawings must include elements of the job as appropriate: route, conduit path, conduit depth, numbers and size of conduits, pit locations and size, cable tray path, cable tray size, cable tray locations, etc.
- Acceptable file format: **Visio** or **AutoCad** format (depends on the job) AND second copy in **.PDF** format.

4.2.2 Ports locations

- As-built floor plan with clear ports locations and label.
- Acceptable file format: **Visio** or **AutoCad** format (depends on the job) AND second copy in **.PDF** format.

4.2.3 Test results

All required test results as per section **3.7.1**

4.2.4 Before and After Photos

Before and After photos of related infrastructure for each job including but not limited to:

- Cable, Pits, conduits and tray
- Cabinet
- Patch panel
- Ceiling space
- Labelling

NOTE: minimum 1 before and 1 after for each job.

5. Pre-approved items

This list is updated regularly every 6 months or less. Please contact TSDIS if you want to provide hardware sample for testing and acceptance.

WARNING: Fibre pigtails without colours are UNACCEPTABLE. TSDIS will reject ANY installation using non-colour pigtails. *IN SHORT, DO NOT USE NON-COLOUR FIBRE PIGTAILS.*

5.1 CommScope

- **SC-APC** polish pre-approved items below required authorisation as per section **1.2**
- All **MPO** pre-approved items below required authorisation as per section **1.2**

Part number	Description
884028508/10	Cat 6A F/UTP Cable, 23AWG, OD 7.2mm, LSZH, Blue - 305mtr Reel
460158784	Cat 6A F/UTP Cable, 23AWG. OD 7.9mm. BLACK. Gel Flooded. Polyethylene Jacket (UV Resistant) – 305mtr Reel
2153449-2	Cat 6A RJ45 AMP-TWIST SLX Shielded Jack Black without Dustcover (MOQ = 24)
1-2153449-3	Cat 6A RJ45 AMP-TWIST SLX Shielded Jack Alpine White without Dustcover (MOQ = 24)
1711343-2	Cat 6A 500Mhz RJ45 AMPTWIST Shielded SL Series Jack - 90º Exit
CO11192-01 | PCOSP-6AS-BK	CommScope CAT 6A, F/UTP, Outdoor Rated Patch Cord
760237046	24 port STP Patch Panel, 19” - 1RU (INCLUDES rear Cable Management) - DDM FLUSH mount. UNLOADED
760250028	ECO CCA, SHIELDED – KIT (5 PCS)
COP1KZ2-88F0XX	CCA-CAT6A-SHIELDED LSZH-ECO PKG (2 PC) XX=Length
64623447-**XX**MLT XX=12/24/48/72/144	12/24/48/72/144 Core SM CSM External Mini Loose Tube OD 6.3mm

760242476 **Must be used with 4x 760216762 and 2x 760241378 (Total 96F / 1U)**	1U Sliding Enclosed Panel, accepts (4) G2 modules or adapter packs, up to 48 DPX LC or 32 MPO ports **– TSDIS preferable.**
760241378	Fibre Optic Splice Tray Kit, stackable, 48-fiber capacity
FAWLCUC0C-XXF005	LC Pigtails, OS2, 1F, 0.9mm, 1.5m - Pkt of 12
CZ6937-000	Pigtail, A1, SCA, 1F, 1.5m Long, 900 Micron, Pkt of 12 Colour Coded
760216762	G2 Singlemode Distribution Adapter Pack 24F LC Blue
760216770	G2 Singlemode Distribution Adapter Pack 24F LC APC Green
EK2247-000 TENIO-6CH-NT-0-V	TENIO High Density Fiber Optic Splice Closure, Gel Cable sealing, no pre-installed splice trays, with test valve
EH0460-000 TENIO-C6H-TRAY-SLE-24	TENIO Splice Tray for large closures (CH6 size) for up to 24 heat shrink splice protectors (SMOUV 45 mm)
103897-000 SMOUV-1120-02	SMOUV Fiber Optic Splice Heat Shrink Protective Sleeve for FIST Trays 45mm
CW8862-000 TENIO-SKG-DUMMY	TENIO Cable Gel Seal kit, dummy, no cable outlets, black
CV6797-000 TENIO-SKG3-7/10	TENIO Cable Gel Seal kit, 3 cable outlets, 7 to 10 mm diameter per cable outlet
CW6618-000 TENIO-SKG2-13/16	TENIO Cable Gel Seal kit, 2 cable outlets, 13 to 16 mm diameter per cable outlet
CW8094-002 | TENIO-CTU-L-(10)	TENIO Cable Termination Unit kit
760242454	1U Sliding Recessed ANGLED Panel, accepts (4) G2 modules or adapter packs, up to 48 DPX LC or 32 MPO ports
760242500	G2 MPO-12 Distribution Module, 2x12F MPO pinned to 24F LC, Method A Pair Straight Singlemode, Blue
760242501	G2 MPO-12 Distribution Module, 2x12F MPO pinned to 24F LC, Method A Pair Flipped Singlemode, Blue
AJGMPMPAD-JAM**XXX**	MPO to MPO Trunk Cable, OS2 SM, LSZH, 12 Fibre (10m – 100m)
OFDC-A4	OFDC-A4 Fiber Optic Splice/Patch Closure, gel cable sealing (for Fibre with POE application), OS2 SM, LC/UPC 4 adapters

5.2 Molex

Part number	**Description**
CAA-0322XX-XX	PowerCat 6A U/FTP cable
PID-00217	PowerCat 6A Shielded Patch panel
MMC-00017-XX	PowerCat 6A ModClip Shielded Jack
MMC-00020-XX	PowerCat 6A Shielded Side Entry ModClip Jack
AFOUH0XXOS1	Outdoor Unitube 9/125µm OS1/2 Type Optical Cable – NOTE: OS2 is JCU standard
AFOLHXXXOS1	Outdoor Loose Tube 9/125µm OS1/2 – NOTE: OS2 is JCU standard
AFOIRXXXOS1	Indoor TB Riser 9/125µm OS1/2 – NOTE: OS2 is JCU standard
AFR-00613-BL	96 Fibre LC Quad Unshuttered Loaded Adapter Plate – Blue
AFR-0624-GR	48 Fibre LC-APC Quad Unshuttered Loaded Adapter Plate – Green
AFR-00470	Universal Splice Tray, 24 Fiber with built in Cable Management, 1U Global Enclosure (Self-Adhesive, 2 PC)
AFR-00468-04	Adapt Plate MFE Multimedia Black Unloaded
91.N0.832.00B00-6	OF PIGTAIL LC APC SM OS1 1.5M 6 PK LSZH
91.NN.872.XXXXX	OF PATCH LEAD LC:APC SM OS1-2 YEL LSZH
RFR-00311-BK **Must use with AFR-00613-BL plate and**	1U Multi-Function Fibre Enclosure - Gen II

4x 24F trays (total 96F / 1U)	
MLCDLC12OS2L	MODLINK 12 FIBER SM OS1/2 DLC
MLCQLC24OS2L	MODLINK 24 FIBER SM OS1/2 QLC
91-X2233-4XXX	CABLE MODLINK 12F MTP(C)F-F OS2 LS0H YL
91-X2422-4LXXX	CABLE MODLINK 24F MTP(A)F-F OS2 LL LSH YL
KSP-00001	Category 6A Field Termination Plug
PCD-070XX-0H	PCAT 6A Shielded Patch cord LSZH BLUE
SBX-00019-08	EUROMOD IP66 2 PORT ENCLOSURE UNLOADED (for Fibre with POE application), (need LC/UPC keystone)

5.3 Power socket

Part number	**Description**
Clipsal 56C320F	Switched Socket Outlet, 250V, 20A, 3 Flat Pin, IP66, 1 Pole
Clipsal 56C315	Switched Socket Outlet, 250V, 15A, 3 Flat Pin, IP66, 1 Pole

5.4 Cable Management

Part number	**Description**
Panduit CMPHHF1	High-density D-Rings on front only, 1RU
Panduit CMPHH2	High-density D-Rings on front only, 2RU

5.5 External Enclosure

Part number	**Description**
B&R Monarch IP - 316SS series	Depends on the job, please contact TSDIS for your appropriate model. Minimum 400mm height Must include: DIN rails mount kit and 19” Mounting Rails mount Kit
B&R Ausrack IP – 316SS	Depends on the job, please contact TSDIS for your appropriate model. Minimum 11RU size Bottom cable entry only Rainhood Wall mount kit
NHP N-Line	Plastic enclosures

5.6 Power Supply for External PoE with Fibre application

Part number	**Description**
EP-54V-150W	Ubiquiti EdgePower - 150W PSU for PoE application with AC input Secondary PSU is required
EP-54V-150W-AC	Secondary PSU for EdgePower
EP-54V-150W-DC	This will be specified by TSDIS

5.7 Smart PDU

Part number	**Description**
Enlogic 6000 EN6113 EN6101 EA9103	Enlogic Smart PDU switched and metered per outlet – default option 32A, 1 phase 230V 20xC13 and 4xC19 with 20A flat pin captive plug – default option 16A, 1 phase 230V 12xC13 with 15A flat pin captive plug – for smaller rack Temperature and Humidity Sensor – 1x per rack
Enlogic 2000 EN2113 EN2101	Enlogic Smart PDU switched outlet, metered PDU – must be authorised (section **1.2**) 32A, 1 phase 230V 20xC13 and 4xC19 with 20A flat pin captive plug 16A, 1 phase 230V 12xC13 with 15A flat pin captive plug – for smaller rack
Enlogic 1000 EN1113 EN1101	Enlogic Smart PDU Metered only – must be authorised (section **1.2**) 32A, 1 phase 230V 36xC13, 6xC19 with 20A flat pin captive plug 16A, 1 phase 230V 24xC13 with 15A flat pin captive plug
Enlogic (horizontal) EN2601 EN1601	Horizontal Smart PDU – must be authorised (section **1.2**) 16A, 1 phase 230V 8xC13 with 15A flat pin captive plug (input metered, outlet switched) 16A, 1 phase 230V 8xC13 with 15A flat pin captive plug (input metered)
Raritan 5000 PX3-5493 PX3-5260V DX2-T1H1	Raritan Smart PDU switched and metered per outlet – default option 32A, 1 phase 230V 20xC13 and 4xC19 with 20A flat pin captive plug – default option 16A, 1 phase 230V 12xC13 with 15A flat pin captive plug Temperature and Humidity Sensor – 1x per rack

Raritan 2000 PX2-2493 PX2-2260	Raritan Smart PDU switched outlet, metered PDU – must be authorised (section **1.2**) 32A, 1 phase 230V 20xC13 and 4xC19 with 20A flat pin captive plug 16A, 1 phase 230V 12xC13 with 15A flat pin captive plug – for smaller rack
Raritan 1000 PX3-1493V PX3-1260-N1	Raritan Smart PDU Metered only – must be authorised (section **1.2**) 32A, 1 phase 230V 20xC13 and 4xC19 with 20A flat pin captive plug 16A, 1 phase 230V 12xC13 with 15A flat pin captive plug
Raritan (horizontal) PX2-2190A4R PXE-1190R	Horizontal Smart PDU – must be authorised (section **1.2**) 16A, 1 phase 230V 8xC13 with 15A flat pin captive plug (input metered, outlet switched) 16A, 1 phase 230V 8xC13 with 15A flat pin captive plug (input metered)

5.8 Racks

Part number	**Description**
RT IQ Series #IQS8845V (800x800) #IQS8045V (800x1000) #IQS8245V (800x1200)	Rack Technologies IQ Series Must have: - Extra brushed cable entry kits (small and large) - Vertical cable tray - PDU mounting tray - Air dampener kit
RT IQ Open Frame Series #iQOF4501 (2-Post) #iQOF9511 (joiner kit)	Rack Technologies Open Frame IQ Series Must have: - 4 Posts - Adjustable Joining Kit - Top cable support - Vertical Cable Management (to be used for cable route path)
SRA Solutions (Server Racks Australia) S6 Professional Series #133108 (800x800) #132896 (800x1050) #132895 (800x1200)	SRA Solutions (Server Racks Australia) S6 Professional series Must have: - Extra brushed cable entry kits (320mm and 520mm) - Vertical cable tray - PDU mounting tray - Air dampener kit
SRA Solutions (Server Racks Australia) 4 Post Open Frame Serries 11 #133213 (2-Post) #133218 (joiner kit)	SRA Solutions (Server Racks Australia) 4 Post Open Frame Racks Must have: - 4 Posts - Adjustable Joining Kit - Vertical Cable Management (to be used for cable route path) - Top cable support - 350D shelf
SRA Solutions (Server Racks Australia) 4 Bays Multi-Tenancy Rack #131715 (800x1050) #131713 (800x1200)	SRA Solutions (Server Racks Australia) 4 Bays Multi-Tenancy Rack Must order with keying option

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6. Appendix

6.1 Compliance check list

Item	Requirements	Relevant section in the standard	Contractor 1	Contractor 2	TSDIS	Notes/ Exemption approved
			Y/N.	Y/N	Y/N	
Room	Rack, Floor and Wall Clearance	**3.4.2**				
	Safety	**0**				
	Surface finish	**3.4.4**				
	Environmental	**0, 3.4.5, 3.4.6** and **3.4.7**				
	Security	**3.4.8**				
	Cleanliness	**2.2.8**				
Rack	Configuration, Layout and Clearance	**3.5.5**				
	Power	**3.5.6**				
	Earthing	**3.5.6.1**				
	Cleanliness	**2.2.8**				
	Fibre Optics Labelling	**3.7.2**				
	Rack Labelling	**3.7.3**				
	Copper Labelling	**3.7.4**				
Cabling	Cable entry and internal cabling	**3.2.2**				
	Fibre termination	**2.2.3** and **3.1.5**				
	Test result for fibre	**3.7.1.2**				
	Test result for copper	**3.7.1.4**				
	Test result for Earthing	**3.7.1.5**				

6.2 RU Designation Sample

45	AA
44	AB
43	AC
42	AD
41	AE
40	AF
39	AG
38	AH
37	AI
36	AJ
35	AK
34	AL
33	AM
32	AN
31	AO
30	AP
29	AQ
28	AR
27	AS
26	AT
25	AU
24	AV
23	AW
22	AX
21	AY
20	AZ
19	BA
18	BB
17	BC
16	BD
15	BE
14	BF
13	BG
12	BH
11	BI
10	BJ
9	BK
8	BL
7	BM
6	BN
5	BO
4	BP
3	BQ
2	BR
1	BS

42	AA
41	AB
40	AC
39	AD
38	AE
37	AF
36	AG
35	AH
34	AI
33	AJ
32	AK
31	AL
30	AM
29	AN
28	AO
27	AP
26	AQ
25	AR
24	AS
23	AT
22	AU
21	AV
20	AW
19	AX
18	AY
17	AZ
16	BA
15	BB
14	BC
13	BD
12	BE
11	BF
10	BG
9	BH
8	BI
7	BJ
6	BK
5	BL
4	BM
3	BN
2	BO
1	BP

18	AA
17	AB
16	AC
15	AD
14	AE
13	AF
12	AG
11	AH
10	AI
9	AJ
8	AK
7	AL
6	AM
5	AN
4	AO
3	AP
2	AQ
1	AR

12	AA
11	AB
10	AC
9	AD
8	AE
7	AF
6	AG
5	AH
4	AI
3	AJ
2	AK
1	AL

6	AA
5	AB
4	AC
3	AD
2	AE
1	AF

6.3 Label example