

Property Services Group

Information Technology Services

Design Standard Document

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Feedback form

Any submit any updates, changes, gaps/issues to the below feedback form link for review by relevant ITS teams.

<https://forms.office.com/Pages/ResponsePage.aspx?id=cTYy0b7NF0S01L2yS1Exa9ez15f3h85Ahp8VtwhhTf5UMFM4NjNQURFHNEFDWFZDWUY4Q1RRQjAzOSQIQCN0PWcu>

ITS Design Standard Revision Register:

10.2. Introduction

The University's Information Technology Services (ITS) is responsible for all University ITS capabilities such as video, voice, data, and traditional analogue connections such as phone, fax and any key IT hardware and systems that requires connectivity to RMIT enterprise network.

To deliver communications systems required by the university, ITS provides this document to apply reusable, scalable, and operationally efficient standards known for all parties involved in network or system moves, adds, or changes across the university.

10.2.1. Purpose

This document outlines RMIT University ITS communication standards and is to be leveraged when new RMIT buildings are being commissioned, undergoing floor refurbishments, repurposing rooms, floors, or open areas.

Compliance with these standards is enforced through operational readiness handover checklists that are inspected by RMIT ITS stakeholders.

Any deviation from these standards are to be submitted for approval via the Design Compliance Forum.

All Vendors are responsible to refer to the latest published version when conducting network or system moves, adds, changes across the university.

10.2.2. Exclusions

Data centres are purpose-built facilities of individual design and are not covered by this document.

10.2.3. Clarification, Omissions, Conflict of Information

All omissions, conflict of information or clarification if required, shall be confirmed in writing by an ITS representative. It is the responsibility of the consultant and contractor to raise any omissions. No decisions are to be made on behalf of RMIT ITS.

10.2.4. No Substitution of Parts

Only new parts from the specified manufacturer are to be supplied. RMIT specified part number are only to be used, substitution is not permitted without written approval by the ITS University Operations representative.

Samples are to be submitted for approval prior to proceeding for FOBOT, outlets, all labelling, all termination modules, fly leads.

10.2.5. Standards & Regulations

All work shall be implemented and completed in strict compliance with regulations of statutory bodies, and the applicable standards and codes. Cabling infrastructure must meet certification requirements, and as implied must conform to all accepted design and installation guidelines set forth by the cabling infrastructure manufacturer/s as part of a certified site.

Additional infrastructure works undertaken as expansion or modification shall be compliant with the cabling infrastructure as outlined in this document and shall therefore be required to form part of the certified system.

The following standards apply; in all cases the latest version is applicable. If there is a conflict between any of these documents and this specification the order of application shall be AS/ACIF standards, Australian Standards, manufacturers recommendations, ITS Client Standards, International Standards.

10.2.6. Authorities

RMIT University shall comply with ACMA regulatory requirements¹ for all installed systems and hardware that is related against the provided guides.

10.3. Communication Rooms

This document looks at providing standards across two defined room types that is used across all new and existing buildings.

Building Communications Room

This is where you will find your layer 3 and 2 capable switching or router equipment. It will contain incoming utility provider services, and all diverse fibre to all other floors of a building. It is considered a distribution level architecturally.

Floor Communications Room

This is where all access level switching equipment will be deployed and configured for a floor of a building and traditional telephony lines will be connected through to a Building communication room.

10.3.1. General Requirements

10.3.1.1. Doors

- All edges of all doors are to have suitable dust seals of all doors (sides, top and bottom), such as but not limited to Raven commercial door seals.
- The minimum height of all doors shall be not less than 2250mm and 1000 mm opening to allow equipment and racks to pass through.
- The rear door will be rebated and overlap and sealed with raven type seals to prevent dust entry.

10.3.1.2. Ceiling

- All walls and ceiling are to be to have all gaps sealed to prevent dust entry and are to be painted. Access to ceiling space is required for future works.

10.3.1.3. Flooring

- The communication room shall have a flat and level floor. Uneven or slopping floors are not acceptable.
- The floor is to be sealed with either appropriate paint or antistatic vinyl.

10.3.1.4. Cooling

The room shall be air conditioned to maintain optimum operating equipment temperature. This will ensure longevity of products and allow for equipment to be under full load.

- Temperatures must not exceed 24 degrees Celsius.
- Air conditioning units shall operate 24x7x365.
- The cooling capacity is to accommodate the BTU rating of the equipment that will be housed in the comms room.
- The air conditioning is to auto start following a power outage.
- The air conditioning system is to be monitored via centralised Building management system.
- Alarms generated and escalated as per property services processes.
- Urgent alarm for temperatures above 26°C, low temperature alarm for under 15°C High-low humidity, and reduction in air flow due to dirty filters.
- The room design and cooling are to create positive pressure to assist with the prevention of dust ingress.
- Ongoing maintenance is to ensure air filters are cleaned and no reduction of airflow.
- A maximum internal equipment temperature of 24C is required where room and rack UPS are used in place of a central UPS system. This is required as specified by APC to ensure UPS battery life.

¹ ACMA regulatory guides are found in the following link:

<http://www.acma.gov.au/theACMA/About/The-ACMA-story/Regulating/regulatory-guides-guidelines-limitations-on-control-acma>

- All pipes in the room as part of the room air conditioning are to be lagged to prevent condensation and no pipe joints or valves are to be above the racks or wall frames.
- Vents for air extraction require removable dust filters need to be installed.

10.3.1.5. Electrical

The installation of a dedicated electrical switchboard is to be determined through consultation.

- All power circuits are to dedicated circuits.
- All power circuits and outlets are to be surge protected.
- Each rack requires 2X 240V 15Amp captive outlets(like Clipsal type 56).
Where accessible, the preferred location is above the rear of each rack.
If above rear of rack is not accessible, the location of the captive outlets is to be determined within schematic design phase, with signoff by Global Networks.
- Each circuit to be protected by a 20Amp circuit breaker of suitable curve to prevent tripping due to start up load.
- The racks power rails are to be plugged into two of these outlets and made captive by the contractor.
- Racks 2 and 3 require an additional 2 X 15Amp outlets each. To these will be plugged directly into the Router PSU using the C20 plugs to be supplied
- Other GPOs as specified on the room layout.²
- Earthing shall align to Australian Standards and include the supply and install of Communications Earthing System (CES) conductors, the CET blocks.
- All earthing conductors connect to the protective earthing point of all rack and frames.
- Supply, installation and connection to overhead outlets of 4 x C20 IEC to Clipsal 15Amp captive plug of approximately.
- 3.5 metres length for connecting of Router PSU to mains overhead power.

10.3.1.6. Lighting

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

10.3.1.7. UPS protection

A central UPS system providing power to all Floor Communication rooms is preferable and monitored by the Building Management System.

If a central UPS is provided for the building and the UPS power is distributed to all Floor Communications rooms in the building, requirements are as follows:

- The 32Amp isolator circuits specified in the power requirements are replaced with 2X 15Amp UPS feed captive outlets at each rack in addition and alongside the 2 X15amp mains outlets per rack.
- The central UPS is to be monitored by the RMIT building management system (BMS)

10.3.2. Building Communication Room

Building Communication rooms can be considered a core capability for a building or site as it connects to the core RMIT enterprise network and distributes all network connectivity to all floors through the Floor Communication rooms. This is to be a dedicated room per building to accommodate the ITS network routing switching and supporting IT cabling infrastructure.

The Building Communications room will typically service one building but in a select number of locations it will also aggregate the infrastructure for several smaller surrounding sites. The Building Communications room will accommodate the following infrastructure:

- Redundant routers provided by RMIT University

² Refer to Appendix 10.A.1 for room layout plans.

- Optical fibre cabling to each of the Floor Communication room(s) in the building
- Copper distribution cabling to each Floor Communication room(s) for analogue telephony
- Inter building optical fibre cabling to the RMIT ITS router cores I
- Inter building copper telephony cabling to the Distribution MDF or campus MDF.
- Spare capacity on racks of 30% always for future ITS network equipment and infrastructure required for IT services.
- All Building Communications rooms are to be monitored by the Building Management system for temperature.

An Uninterruptable Power Supply (UPS) is required for all Building Communications racks to ensure that Security systems including alarms, door access systems, CCTV cameras and Building systems communications are not interrupted by power outages that interrupt IT systems.

10.3.2.1. Building Room Standards

- The Building Communications room shall be located at least one level above ground level, but it is preferable to be vertically in the middle of the building.
- The room is dedicated to housing IT infrastructure and ITS equipment only.
- No other services e.g. electrical, water, mechanical is to travel through the room.
- Other examples: Security systems including CCTV, BMS, electrical control including mod bus, lighting interfaces etc.
- The room is to be separate secure dedicated space³ and not shared with office, plant, or other rooms.
- Access to the room is to be via a corridor and not through other spaces.
- Floor telecommunication outlets are not to be terminated in this room.
- The room will be accessible to authorise ITS staff only and will have the RMIT Security Door Access Standards applied.
- The Consultant shall specify the installation fire protection.
- The avoidance of or capping of sprinklers is preferred however where cannot be avoided; the sprinkler location needs to be positioned in a suitable location where accidental drops on racks are avoided.
- Two dedicated cable pathways entering the room from separate ends shall radiate out from the Building Communications room to access all sections of the building via two dedicated risers⁴.

The Building Communication room shall follow the minimum internal dimensions which is 6.5m by 3.5m as per the floor layout plans ⁵

10.3.2.2. Building Communication Room UPS

In Lieu of a central UPS system being provided for the building IT systems, then the following is required:

- Racks # 2,3 also and require 1 X 32Amp isolators (such as Clipsal) each for the connection of hard-wired APC 5000XLI and two battery pack in each of these racks.

The Consultant shall specify the following:

- Supply, installation and commissioning (Commission by APC representative) of a 2 X APC 5000XLI and 2 battery packs per UPS in Racks 2,3, and 4
- The UPS are to be supplied and fitted with a network monitoring interface card and all rack mounting rails.
- Consultant to include installation by contractor into Rack RU location as specified by ITS. Refer to respective Rack layouts in Appendix 10.A.5 and 6
- Connection of the UPS by hard wiring to the 32amp isolator is to be specified by the consultant UPS commissioning is to be by the manufacturer.

³ Refer to Floor layout plan for more details – Appendix 10.A.1

⁴ Refer to Vertical/Communications Risers section 10.4.3 for more information.

⁵ Refer to Appendix 10.A.1 for floor plan details.

- Supply, installation of 4 x C19-C20, each approximately 3 metres in length to connect two power supplies on each router supply to each of the two UPS (15amp outlet the UPS rear outlet) and include labelling of power lead with the words UPS 1 or 2 supplied. Refer Appendix 10.A.4

10.3.3. Floor Communication Room

Previously known as Floor communication rooms, this is where all access level switching equipment will be deployed and configured for a floor of a building and traditional telephony lines will be connected through to a Building distribution room.

The Floor Communication room(s) are dedicated room(s) of suitable size to accommodate the structured horizontal UTP cabling, analogue telephony cabling and associated ITS network equipment and supporting infrastructure only.

General Requirements

The Floor Communications room will accommodate only:

- Optical fibre cabling from the Building Communication room though vertical cabling from the communication risers
- Horizontal UTP cabling to outlets for the serviced floor.
- Copper distribution cabling from the Building Communication room for analogue telephony ITS network equipment and infrastructure
- A separate dedicated floor communications room(s) shall be provided on each floor.
- Access layer (LAN) equipment will be provided by RMIT University

The Floor Communications room will only terminate UTP cables from that reside on that floor unless prior approval from the ITS Global Networks Senior Manager.

Known exceptions to the above but still requiring ITS approval and nomination as to which Floor Communication room will be outlets originating from the following locations:

- Outlets located in dual height lecture theatres Roof top or basement Plant and electrical rooms Externally mounted CCTV camera.
- Wireless access points external to buildings and in dual height spaces

An Uninterruptable Power Supply (UPS) is required in all Floor Communications racks where Building Routers are located to ensure that Security systems including alarms, door access systems, CCTV cameras and Building automation systems communications are not interrupted by power outages that interrupt IT systems.

10.3.3.1. Floor Room Standards

The following are the Floor Communication room standards that are expected:

- The communications room shall be preferably in the same location and near the middle of each floor. The room is to be separate and not shared with office, plant or other rooms.
- Access to the room is to be via a corridor and not through other spaces.
- No other services e.g. electrical, water, gas etc. are to travel through the room to remove the possibility of damage and to remove the need for other trades to enter these rooms.
- No tenant equipment is to be accommodated in this room.
- CCTV is the only service which can be installed/ stored into a Communications room.
- Floor telecommunication outlets and floor telephony infrastructure only are to be terminated in this room along with the tie cables to the building distribution room.
- Lighting intensity on the front and back of installed terminations, patch panels, frames and equipment should be 500 lux at 1m above floor to meet AS/NZS 3084 requirements. The lights should be situated to minimise shadows on the patching and termination fields.
- The room will be accessible to authorise ITS staff only and will have the RMIT Security Door Access Standards applied.
- Rear doors to provide rear rack access are to be keyed with the CFS-ITS lock.

- Two dedicated cable pathways entering the room from separate ends shall radiate out from the floor communications room to the dual dedicated risers.
- The room will only house RMIT IT equipment only.

The size and location of the Floor Communication room(s) is dependent on the gross area of the floor and the requirement that the maximum horizontal distance of any UTP cable to any location on the floor now or in the future does not exceed 90 meters.

Below is a set of Gross areas and the suggested communication room sizes amount.

Floor Gross area patterns:

- Floor of gross area <600m²,
 - The internal dimensions and number of rooms per floor are as follows:
 - One (1) room of internal dimensions are 3.6m x 3m Refer Appendix 10.A.2
- Floor of gross area between 600m² and 2000m²,
 - One (1) room of internal dimensions are 5m x 3m Refer Appendix 10.A.3
- Floor of gross area > 2000m².
 - Two (2) rooms of internal dimensions are 5m x 3m Refer Appendix 10.A.3

10.3.3.2. Floor Communication Room UPS

Note: Floor communication UPS are optional and determined if required based on criticality of the communication rack and services being used such as CCTV

In Lieu of a central UPS system being provided for the whole building the following is required:

- 1x 32Amp isolator switches (e.g. Clipsal) for connection of hard-wired UPS in Rack 1 and 3 only

The Consultant shall specify the following:

- The supplies, installation, and commissioning by APC of a 2 X APC 5000XLI and 2 battery packs per UPS in rack 1 and rack 3.
- Each UPS is to include and be fitted with Network monitoring interface card and all rack mounting rails.
- include installation by contractor into Rack RU location as specified by ITS. Refer to respective Rack layouts in Appendix 10.A.4 and 5
- Connection of the UPS by hard wiring to the 32amp isolator is to be specified by the consultant UPS commissioning is to be by the manufacturer representative.
- Supply, installation of C20 IEC plugs to one of the two rack power rails and connection to the UPS and include labelling of power rail with the words UPS supplied.
- The Floor Communication room requirement is one UPS feed of 15amps captive outlet per rack to be mounted alongside the other mains overhead outlets.

10.4. Racks

10.4.1. Rack Standard

The Floor Communication room shall accommodate the following: 45RU(H) X 1000mm(W) x 900mm(D) racks. The racks to be supplied are MFB Part number R3809. This is a custom P/N for RMIT

The outer sides for the two end racks will need to be supplied and fitted. The required sides are MFB Part number and quantity 4 X MFB P/N 06006-31

- All racks are to be earthed as per Australian Standards.

- All racks are to be levelled using the adjustable feet built into the rack.
- All racks are to be labelled using Trefolyte label as per RMIT rack labelling standard.
- Racks are to be bolted together using the MFB supplied rack joining kit included in the RMIT custom part number.

10.5. Network Cabling

10.5.1. General Cabling Requirements

10.5.1.1. Cabling pathway standards

Each of the two cable pathways will provide two cable trays the pathways will consist of dedicated Cable trays each for copper and fibre cables. The dedicated trays will each allow for expansion capacity of 30% for future additions. The minimum width of each cable trays shall be shall not be less than 300mm.

- Cabling is to be overhead and no under rack entry is allowed.
- Cable waterfalls and dropper trays are to be used from the overhead tray to each rack.
- No cabling is to pass through one rack to another.
- All room cable entry points will be sealed to prevent dust entry.
- Fire sealing of any penetrations will be as per RMIT and AS for fire ceiling.

10.5.1.2. Installation Constraints

RMIT does not allow UTP cables between buildings or other floors. All UTP cables are to terminate in the floor communications room on the same floor as the outlet.

Any change to this requires the approval of the ITS Global Networks Senior Manager

Where UTP cable is run between buildings that are not on the same protective earth system, provision shall be made to include the installation of gas arrestor magazines. The gas arrestor magazines shall be fitted with arrestor cartridges enough in number to protect the UTP cables installed. The provision shall include the connection of a protective earth to the module back mount as found in AS/ACIF S009:2006.

Where cable is run in an exposed area, it shall be enclosed in metal and or P.V.C. duct or conduit. The work- station end of a UTP cable shall be terminated in a flush or surface mount RJ45 socket.

Installation shall be in accordance with the following:

- UTP ADC Krone Products: UTP Data Module — Flush mount RJ45 p/n 6467-4-202-00
- Cable Distribution Frames – Patch Panels
 - Distribution and patch panels shall be of a make and type approved for installation in the University. The patch panels should be of a 24-port flat type that allows pair-patching by users without tools. All frames and frame components are to be rated at category 6 or 6A for 100/250 MHz applications (all frequencies) i.e. standard TSB-40 performance. E.g.: or ADC Krone PP24AC6T-A.
 - All patch panels will also incorporate a rear cable manager, such as ADC Krone Mastermind Rear Cable manager p/n 6450-1-090-00.
 - Labelling is to be sequential manner commencing from 1 then to continue in a continuous manner and if additional cables are installed within an established frame, then the numbering should continue from the last number and be extended accordingly.
- Outlets
 - Wall sockets or outlets shall be RJ-45, 8-pin females rated at 100/250 MHz category 6 performance (TSB-40). They are also to be of a make and type approved for University installations, e.g. ADC Krone Flush mount RJ45 p/n 6467-4-202-00.
- Distance guidelines:
 - For UTP applications in this project distance limitations are set at:
 - 90M maximum from patch panel termination to the T.O (Telecommunications Outlet). 3M maximum for fly patch cords from patch panel to LAN Switch interface.
 - 3M maximum for user patch cords from wall outlets to user interface.
- Performance Requirements

- Documentation shall be required for (cable and equipment) components showing performance compliance for all frequencies up to 100/250 MHz for category 6 components. The performance measures be produced for all frequencies up to 150MHz for category 6 shall be provided.
- The documentation shall show results for near end cross talk (NEXT) and return loss for appropriate frequency ranges.
- Vertical and Horizontal Common Installation Requirements
 - All cabling shall be installed in cable trays, cavities (columns, ducts, partitions) and rises. Under no circumstances shall cables be installed in common trays or ducts with power cables, hazardous services, or other services which have extreme nominal conditions (heat, electrical, magnetic, chemical, humidity or mechanical).
 - Wall outlets shall be 100MHz category 6, flush where possible, and be of a type approved for University installation and of a colour/shade as agreed by the Architect.
 - All outlets are to be permanently numbered with a cross reference to documentation schedules.
- UTP Distance Manual
 - A separate document shall be provided which identifies total path lengths for all installed UTP segments. The length shall be from the incoming connection on the MDF to the user wall outlet (i.e. it is not to include fly lead lengths at either the hub or use end). Cross reference numbers to MDF/IDF schedules are also required.
- Commissioning Test Results
 - All results of the commissioning tests shall be documented and presented in MS Word or Fluke FLW format.

The Structured Cabling System shall be tested by the installer for compliance to the requirements specified in the latest AS/NZS 3080 standard for Class E performance using Level 3 testers in accordance with AS/NZS IEC 61935.1 – Testing.

A certain percentage of the outlets may be chosen at random for the final acceptance testing by the end-user or in their absence, by ADC KRONE. The design data and the full results of all compliance tests performed by the installer are to be fully documented and submitted to end-user 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. Length alone is not considered to be a pass/fail criterion.

The compliance criteria shall be in accordance with the compliance requirements set out in AS/NZS 3080:2003 or ISO/IEC 11801:2003 for the Class E Copper Permanent Link or Channel.

10.5.1.3. Connector Specification

- A patch and fly lead is required to be provided for each outlet installed. All patch panel's patch cords and outlet sockets shall conform to category 6.
- CAT6A patch lead, ultra slim.
Model (1.5M): 28 Guage Cat 6A leads, part UTP28X1.5MBU
- All RJ45 outlets, patch leads, fly leads and patch panels shall be terminated using the EIA preferred sequence as per A.S. 3080, T568A.
- All patch and fly leads are to be provided and shall be of category 6a equivalent cable e.g. ADC Krone CommScope RJ45 Patch Cord, Category 6 such as 6451-5-939-XX. Panduit have been used extensively for patch leads; they have a cheaper, thinner cable Cat 6A cable.
- Total number of leads required to be supplied (T) = 2X number of outlets

10.5.2. Optical Fibre

This section details the expected standards for optical fibre cabling for across the university.

- Two (2) x 24 core OS2 optical fibre cables will be installed to each location as a minimum. It is preferred where economically possible that the two cables are installed using diverse pathways both within and external to the building.

- Where this is not possible the two fibre cables to each location should be installed in separate conduits and risers.

10.5.2.1. Optical Fibre Cabling – Building Communications Room

The Building Communication room will terminate all intra and inter building optical fibre cabling. Refer to Optical Fibre schematic in Appendix 10. A.12.

- 48 cores of OS-2 (2X 24Core) via diverse path will originate from the Building Communications room to each Floor Communications rooms within the building.
- An allowance of 16 cores of OS-2 single mode fibre is required per Access Communications rack. This will allow for 2 uplinks per switch stack each up to 40GBps and support the future standard of 100GBps over 4 pairs 25Gbps each.
- An additional 48 cores of OS-2 (2X 24Core) via diverse path will originate from the Building Communications room to the RMIT access core. This will allow for connection of the two building routers to each of the RMIT cores.
- Rack mountable Optic Fibre sliding enclosures are required for the termination of the optical fibres.
- Enclosures shall be capable of supporting LCA Duplex optical fibre terminations and be sized to suit core termination count for all the potential communications rooms in the building.
- See Section 10.4 for full Optical Fibre details.
- The termination of the single mode cables will be undertaken via a direct splicing onto colour coded LCA pigtailed to assist with identification and fault finding.
- The single mode connectors shall be installed into the required patch panel via an LC duplex adaptor. The number of fibre patch leads, and length required will be confirmed during the project.

See section 10.4 for full Optical Fibre details including fibre cabling specifications, Fiber optic break out tray (FOBOT), labelling, testing and associated items.

10.5.2.2. Optical Fibre Cabling – Floor Communications Room

The Optical fibre cabling from the Building Communication room will terminate in each respective floor communication room.

An allowance of 16 cores of OS-2 single mode fibre is required per rack. This will allow for 2 uplinks per switch stack each up to 40GBps and support the future standard of 100GBps over 4 pairs @25Gbps each.

Fibre capacity for the respective Floor Communication room is as follows:

- rack room – 48 cores, two (2) optical fibre cables by diverse path and risers, each of 24 cores OS-2 terminated in a 1RU FOBOT, fusion spliced to colour coded LCA connectors in Rack 1.
 - Appendix 10.A.12, Fibre Optic Cable Schematic
 - Appendix 10.A.5 rack layout for location of FOBOT
 - Appendix 10.A.13 for FOBOT layout
- Rack mountable Optic Fibre sliding enclosures for termination of the optical fibres are to be used.
- Enclosures shall be capable of supporting LCA Duplex optical fibre terminations.
- Enclosures should be sized to suit core termination count for all the potential communications rooms in the building.
- The termination of single mode cables will be undertaken via a direct splicing onto colour coded LCA pigtail.
- The single mode connectors shall be installed into the required patch panel via an LCA duplex adaptor.
 - Refer to Section 10.4 Optical Fibre for full requirements.

10.5.2.3. Optical Fibre Cable Specifications.

- Fibre cables shall meet the following transmission specifications:
 - OS2 Specification 9/125 µm Fibre

- Sheath colour (indoor) Yellow
- Maximum fibre attenuation:
 - 0.4 dB/km at 1310 nm
 - 0.4 dB/km at 1383
 - 0.3 dB/km at 1550 nm
- Supported length for 1GB - 5,000 m depending on design & application,
- Supported length for 10GBE - 10,000 m depending on design & application,
- Supported length for 40GBE - 10,000 m depending on design & application, and
- Supported length for 100GBE - 40,000 m depending on design & application.

10.5.2.4. Optical Cabling Installation Standards

All cables shall be run and installed in accordance with AS/ACIF S009 Wiring Rules for safety and network integrity, and ISO/IEC 11801 for performance, and as per manufacturer's requirements.

Termination of optical fibre cables shall be in rack mounted enclosures using LCA connectors unless otherwise specified.

The installer should ensure that cables shall be installed so as not to exceed the minimum bending radius. Bend Control accessories shall be used at any change of vertical direction by more than 45 degrees.

All cabling is to be adequately supported as per manufacturer recommendations.

The installer is to ensure that all pathways conform to the recommendations in AS/NZS 3084 Pathways and Spaces and the cable manufactures requirements, Cable pathways are to have 30% spare capacity for future expansion.

Cables that penetrate fire barriers shall have the penetrations suitably fire stopped as specified in the RMIT fire standards.

Indoor installations must follow the below standards for Optical fibre cable types and installations.

- Indoor Tight Buffered OF Cable for all internal horizontal and riser use. Cables must not be subjected to heat radiation, condensation, precipitation, or formation of ice.
- LSZH (low smoke zero halogen) cables should be considered.
- Indoor conduits shall be installed in such a way that the indoor OF cable does not lie in trapped or ponded water/fluid/condensation inside the conduit.

Outdoor Above Ground Installations must follow the below standards for Optical fibre cable types and installations.

- Underground Loose-tube Gel-filled cable has a UV-resistant sheath and can be installed in outdoor above ground applications.
- Outdoor conduits above ground shall be self-draining so that the indoor tight buffered cable does not lie in trapped or ponded water/fluid/condensation inside the conduit.
- Note: Indoor Tight Buffered cable may be used for outdoor above-ground applications when installed in weather-proof self-draining UV-resistant conduit. Cables must not be subjected to heat radiation, condensation, precipitation, or formation of ice.

Underground Installations must follow the below standards for Optical fibre cable types and installations.

- Underground Loose Tube Gel-filled OF cable is to be used for all underground applications. The cable is not to be direct buried but to be buried in conduits.
- Underground Gel-filled OF cable must pass the "Water Penetration Test" as referenced in AS/CA S008. A UV-resistant sheath sacrificial sheath over the nylon jacket is preferred for underground loose-tube OF cable.
- Underground Loose Tube Gel-filled cable should be terminated within 15m after it enters a building and changed to an Indoor cable to meet AS/CAS009 flammability and minimise combustion risk. A suitable location is required possibly in each riser using a FIST enclosure.
- Underground cable must be suitably sealed where it enters and exits the ground against UV radiation and mechanical impact.

Network Interconnections must follow the below standards for Optical fibre cable types and installations:

- Cable slack shall be provided in accordance with the following: Within pits 2 metres minimum.
- At termination location 2 metres minimum
- Within termination enclosure 0.5 metres minimum
- Provide Laser Hazard Warning labels at all fibre terminations.

10.5.2.5. Pre-Terminated Optical Fibers

RMIT University does not accept Pre-Terminated Optical Fibre (PTOF).

10.5.2.6. Colours for Optical Fibre Adaptors, Connectors and Cables

- Optical fibre adaptor colours and connector colours for 3 mm patch cords should be OS2. 9 um Green (APC – Angled Physical Contact at 8 degrees).
- The sheath colour for optical fibre patch cords shall be OS2 9 um Yellow.
- All Pigtails are to be colour coded.

10.5.2.7. Optical Fibre Link Testing

- The installer must individually test 100% of the optical fibre cables after installation of the cables to determine compliance to ISO/IEC 11801 performance requirements.
- All testing shall be conducted in accordance with the latest manufacturer testing requirements.
- All single mode optical fibre cores must be tested using a Fluke DTX series or equivalent, Continuity and Maintenance of Polarity.
- Length Propagation Delay
- Optical Attenuation of Link, 2 x wavelengths, 2 x direction

The tests are to be conducted in accordance with ISO/IEC 14763-3 and the manufacturers Performance Testing of Optical Fibre Links for Compliance to ISO/IEC 11801, using Light Source and Power Meter (LSPM).

Tests are to be conducted in both directions and in the following wavelengths.

Single mode: 1310nm and 1550nm

Note: An OTDR is not acceptable for Link Loss measurements.

At both ends of the fibres provide Optical Time Domain Reflectometer (OTDR) graphical lot and cable length measurements for each fibre.

OTDR testing shall utilise a launch and a tail cable.

The tail shall be of such a length to show the loss of the last connector and prove continuity for OTDR testing.

Fibre optic results shall also be presented showing a summary of the loss results. Negative loss results for fibre will not be accepted.

All OTDR Traces saved shall be in Bellcore Format.

10.5.2.8. Test Results of Optical Fibre Testing

Provide an electronic copy of all tests in ASCII text format. Test results shall include the following items:

- Point to Point identification and direction of test; Wavelength.
- Test Method Used.
- Test equipment manufacture, model number, serial number, date of last calibration and stand to which it was calibrated.
- Date of Testing.
- Tester(s) name and qualifications. Cable records to be updated or include on site.

10.5.2.9. Fiber Optic Break Out Trays (FOBOT)

Rack mountable Fibre Optic Break out trays (FOBOT) are to be used for termination of the optical fibres.

- Enclosures shall be capable of supporting LCA Duplex optical fibre terminations.
- Enclosures should be sized to suit core termination count.
- The termination of single mode cables will be undertaken via a direct splicing onto colour coded LCA pigtail. The single mode connectors (LCA) shall be installed into the required patch panel via an LC duplex adaptor

10.5.2.10. Building Communication Room FOBOT

Building Communications room will require several high-density enclosures with capacity to suit a fibre count of all the potential communications rooms in the building.

- TE High density RTCG 3RU panel, 24 core angle Left /Right face pate to allow for multiple 24 cores of OS 2 to be terminated on LCA connectors from each floor communication room of the building.

Refer to Appendix 10.A.12 for Building Communication FOBOT layout.

10.5.2.11. Floor Communication Room FOBOT

Floor communication rooms will use the following:

- TE 1RU RTCG series, fitted with L/R face pate to allow the 2 X 24 cores of OS 2 to be terminated on LCA connectors.
- TE Part No RTC1G-LCA-48-PO-A24-PO-Z-OS2

Refer to Appendix 10.A.13 for Floor Communication FOBOT layout.

10.5.2.12. Fiber Splicing

Joining of cables is not permitted except on optic fibre cabling where terminations have pigtails that need to be spliced to the installed cables.

Suitable trained individuals utilizing state of the art precision fibre splicing equipment shall perform all splicing.

In a limited number of locations where splicing pits have been approved and are established,

- Splicing using Tyco FIST GC02 type enclosure is allowed.
- In these specific locations RMIT ITS network team will allocate the splice trays and cores to be spliced to a new cable.

10.5.2.13. Optical Fibre Patch Cords

The optical fibre patch cords must match the core size of the fibre used on the patch panels and network equipment.

- Fibre Patch Cords shall be Duplex, single mode LCA, 9-micron core with 125 microns cladding to suit the installed OS2 fibre optic cabling. To be used for cross connects and interconnects.

The following specifications shall be met.:

- Minimum bend radius: 25 mm
- Operating temperature: -40 to +75° C
- Loss: 0.75 dB per mated pair of connectors
- Return Loss Maximum: -45dB
- Cable OD: 3 mm
- Tip material: Ceramic
- The fibre cladding is to be covered by Kevlar fibres and a protective outer jacket.

Quantity and length required are to be advised once the number of outlets are known which will determine the switch capacity to be provided.

For costing purposes, the following quantities of fibre patch leads can be used per Floor Communications room parts.

- 10 X 2m OS-2 LCA –LCA e.g. TE Part No 6881 1 488-3020YL
- 10 X 3m OS-2 LCA – LCA e.g. TE Part No 6881 1 488-3030YL

Final quantities will be confirmed as part of the project.

10.5.2.14. Labelling of FOBOT

All cables entering and/or leaving buildings, riser or terminations enclosure (FOBOT) shall follow the following standards:

- Fitted with a durable label indicating including cable type, unique cable identifier, total number of cores and source and destination buildings and the riser.
- Each cable at each pit location will be denoted with a source and destination label. Labels shall be engraved on stainless steel tags with type, size and fixing being approved by the ITS Global Networks Senior Manager.
- “Brother U and “Dymo” type labels shall only be used as an interim label; Handwritten labels are not permitted even in the interim. Permanent labelling shall be of the “Brady” metallised polyester type, Trefolyte or approved equivalent.
- All FOBOT at the front for each fibre to be labelled:
 - Fibre type, fibre cores and destination Building-level –Room and Rack NO.
 - E.g. 24 Core OS-2 80-03-409-02 TO 80-01-404-01
- Fibre cables at the rear are to be labelled with
 - Fibre Type and size and the destination Building-Level–Room and Rack NO.

All labelling is to be submitted for the approval of the RMIT ITS Global Networks Team prior to installing.

10.5.2.15. As Built Documentation & Acceptance Testing

- As built showing all cable pathways,
- A schematic diagram of fibre optic cabling installation.
- Cable manufacturer’s warranty
- A pdf of the test result for all cables including lengths is to be available for RMIT ITS representative to review. Inspection of the installation by ITS representatives.

10.5.3. Horizontal Cabling

Horizontal cabling will be established through Category 6A structured cabling system for data and communications. The system will be installed to Class Ea standards 500 MHz RMIT ⁶horizontal UTP cabling through to the patch panels.

10.5.4. Unshielded Twisted Pair (UTP) Cabling

This section details the expected standards for Unshielded twisted pair cabling for across the university.

- RMIT requires a Category 6A structured cabling solution for data and communications. The system will be installed to Class EA standards 500 MHz.
- The Structured Cabling Solution will comprise Category 6A components capable of providing 10 Gigabit Ethernet operations using full duplex transmission.

10.5.4.1. UTP Cable Specifications

- Cable Type is to be TE four pair Category 6A. RMITs preferred colour is grey but if it is not readily available Blue is acceptable. Part No TE640R-GYM2 (GREY), TE640R-BLM2 (BLUE)
- Grey is used to distinguish newer installation Category 6 and Category 6A from the legacy blue cables used at RMIT for Category 5 and Category 5e.
- Cable Standard is to be to AS/NZS 3080 and AS/CA S008
- Installations requiring a reduction in PVC materials can use the low smoke zero halogen (LSZH) cabling.

10.5.4.2. UTP Cable Terminations

- All UTP cable terminations shall use the insulation displacement contact (IDC) method.
- All RJ45 outlets, patch leads, fly leads, system tails shall be terminated using the EIA preferred sequence as per A.S. 3080, T568A.

10.5.4.3. Copper System Tails / Patch/ Fly Leads

- All patch leads fly leads (1 per outlet) and system tails (1 per outlet) are to be supplied.
- Patch cables shall be capable of the highest operating transmission rates as per AS/NZS 3080 class EA. TE Category 6A fly leads are to be required to be supplied.

A fly lead is required for every outlet installed. The leads are required in a combination of 3m, 2.1 and 1.2 metre for the work area. The length and quantity of each will need to be confirmed with the ITS Global Networks Senior Manager as it depends on outlet location at the desk and other devices.

10.5.4.4. Outlet Type

- All outlets supplied shall be TE Category 6A modular 8P8C fixed connector outlets, accepting standard modular RJ45 free connector plugs Part No 6467 4 272-00
- Made from high-impact, flame-retardant, UL94 -V0 rated thermoplastic material or shielded metal Meet or exceed AS/NZS 3080 and ISO/IEC 11801 Category 6A, component requirements.
- RMIT approved type – TE Krone flush mount

10.5.4.5. Mounting

- Flush mount or surface mount to suit location at desk, wall etc.
- Outlets should be above the desk height where possible and located in the centre of the desk area to from the need for long fly leads and to accommodate left or right-hand people.
- The rear of the outlet and cabling should be protected from disturbance. Open back outlets with no covering under desks etc. will not be accepted.
- Surface mount kits are to be used in wall behind IP clocks and in false ceiling where outlets are used for wireless access point.

10.5.4.6. UTP Cable Installations

- All 4-pair cabling shall be run using a star topology format from the cross connect at the floor distributor (FD) on each floor to every individual telecommunication outlet on that floor.
- Each run of cable from the cross connect at the floor distributor (FD) to the telecommunication outlet (TO) shall be continuous without any joints or splices. Consolidation points (CP) are not permitted by RMIT.
- The length of each cable from the floor distributor (FD) to the telecommunication outlet (TO) shall be based on the distance set out in the tables and formulas in ISO/IEC 11801 plus the appropriate length de-rating for ambient temperatures above 20°C. Installed lengths may differ from the designed lengths if they pass testing and do not exceed 90m in length.
- The 4-pair UTP cable should be Underwriter Laboratories (UL) listed as type CM or CMR; or be nominated as LSZH to IEC 60332-1.
- All data and telecommunications cables are to be run on their own dedicated cable pathways.
- Cables trays of sufficient design and side height, Bundles of correct size and installation method are used,
- Separation of fixed telecommunications cabling and parallel runs length of LV fixed electrical cabling.
- Correct bend radius is maintained throughout – minimum of 50mm Radius Maximum hauling tension not exceeded.
- Cables are secured using Velcro only. Cable ties are not acceptable.

10.5.4.7. Installation Constraints

RMIT does not allow UTP cables between buildings or other floors. All UTP cables are to terminate in the floor communications room on the same floor as the outlet.

10.5.4.8. Testing of UTP Cabling

- The installer must individually test 100% of the copper cables.
- The Structured Cabling System shall be tested by the installer for compliance to the requirements specified in the latest ISO/IEC 11801 standard for Class EA, F or FA performance using at least Level 3 testers or better in accordance with AS/NZS IEC 61935.1 – Testing.
- The design data and the full results of all compliance tests performed by the installer are to be fully documented.
- 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, and all the parameters specified in ISO/IEC 11801. TE will not accept permanent link cable lengths greater than 90 metres into their warranty program.
- Cables that fail or *fail will not be accepted.
- Cables where the length is >90metres will not be accepted by RMIT. This length is to ensure sufficient overhead for the addition of system tail, cross connect, and work area patch lead up to 3m and remain under 100m.
- Alien Crosstalk (AXT) testing is not required on TE Category 6A, installations; therefore, no AXT sampling plan is necessary.

10.5.4.9. Installer

- The contractor shall be trained and certified to install the vendor products system and must offer a single 25-year extended warranty on the entire structured cabling system installation.

10.5.4.10. Labelling

Field Outlet labelling is to be used as per standards below:

- Building Number. Level Number. room of the floor communications room followed by the outlet number starting at 001 and increasing clockwise around the floor.
- This numbering assists with locations that are on building boundaries, originate in two story lecture theatres and other outdoor locations where it is difficult to know where an outlet originates from. Contractor to suggest options.
- Frame outlet labelling is to be the same as the field outlet.
- Subject to space on the label it would be advantageous if the level and room that the outlet resides in could also be added.
- System cabling labelling is to be switch name and port number. RMIT will advise the required label that will be fitted at both ends.

10.4.3.11. Outlets Requirements

All outlets are to be positioned to allow the correct bending radius of the fly lead out of the outlet.

Exact quantities of outlets required are to be confirmed with RMIT client, but the following is a minimum requirement:

- Staff Workstations-1 per workstation in the middle of the desk area Note specialist areas may require additional.
- Reception desks will require additional outlets (depending on reception design)
- MFD (Printers and faxes) locations require a minimum of 2 outlets per device Wireless Access point Two (2) per Access point location.
- Ceiling Projectors one outlet per projector (AV design – this could change depending on AV equipment).
- Security Challenger door controller – 2 per location CCTV camera 2 per location
- Fire panel – 2 outlets.
- X1 Data point for Space Counters
- Building Automation System (BAS) as per solution requirements
 - Minimum of 2 outlets per location but more may be required depending on the number of devices. One for device and other for technician

- Lighting control 1 outlet minimum (this could change if a different system is in place).
- Emergency lighting controller – 2 outlets 1 outlet for device and 1 for technician Student Lab workstation
- Per PC but one additional per workstation cluster for printers etc. Meeting rooms -large
- Four (4) outlets in the middle of the meeting table, IP telephone, Analogue conference phone, AMX touch panel and one for presenter laptop
- AV rack will require up to 8 – AV to confirm requirements 1 for projector if installed.
- If wall mounted displays – 2 outlets – above display to allow bend radius of fly lead out of outlet Meeting room –Medium 8 people.
- Wall mounted displays with or without in-built PC as follows:
 - Outlets per display located slightly above the top of the mounted screen height – position to ensure that patch lead at outlet and unit can be fitted and maintain the correct bend radius for Cat6A.
- AV racks – 8 outlets as follows:
 - Lectern- 2 On top for IP telephone and laptop and 6 underneath in AV rack

10.5.4.11. Acceptance Testing and Handover

- A certain percentage of the outlets may be chosen by the customer at random for verification of compliance testing.
- The installation will be checked against the ITS communication room check list and the floor check list. A pdf of the test result for all cables including lengths is to be available for the customer to review.
- The completed patch record folder will be inspected as part of the review.

10.5.4.12. Documentation

- Plan of all cable pathways and as built floor plan showing outlet location and all outlet numbers
- A pdf of the test result for all cables including lengths is to be available for RMIT ITS representative to review. Field outlet frame diagram and
- All records completed at both sides of jumper.
- Warranty

10.5.5. Patch Cables

The following cabling standards are to be followed when patching works are conducted on new communications racks. Racks that currently exist are to be analysed by through project initiative to determine if suitability of updating e.g.: lifecycle, high troubleshooting effort exists, ongoing maintenance issues.

- All cables used must be CAT6a Ultra slim cable colored in Blue.
Model (1.5M): 28 Gauge Cat 6A leads, part UTP28X1.5MBU.
- Patch leads are to be bunched no more than 12. (exception for WAPS)
- Fibre cables must be correctly assigned blue color fibre cable to LC (link) and green to LCA (link-angled) on panel (colours)
- Fibre cables must be coloured Yellow with blue coloured connector (router connection) and green (LC connector to switch) on the other end.
- Saturated patching is to be conducted as a part of the patching schedule provided by RMIT.

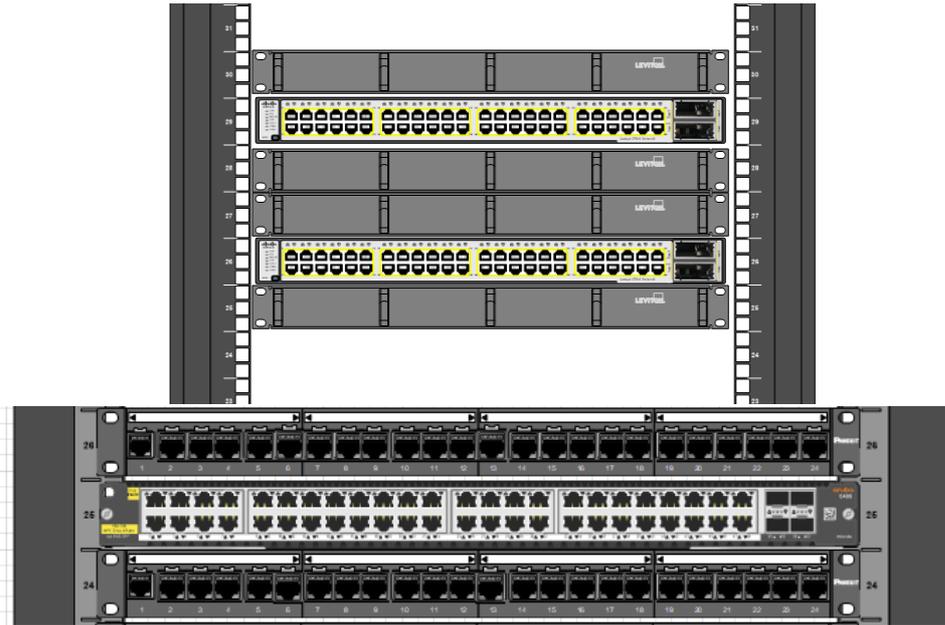


Figure 1: Cable organiser rack layout

Patch panel cabling sizing pattern:

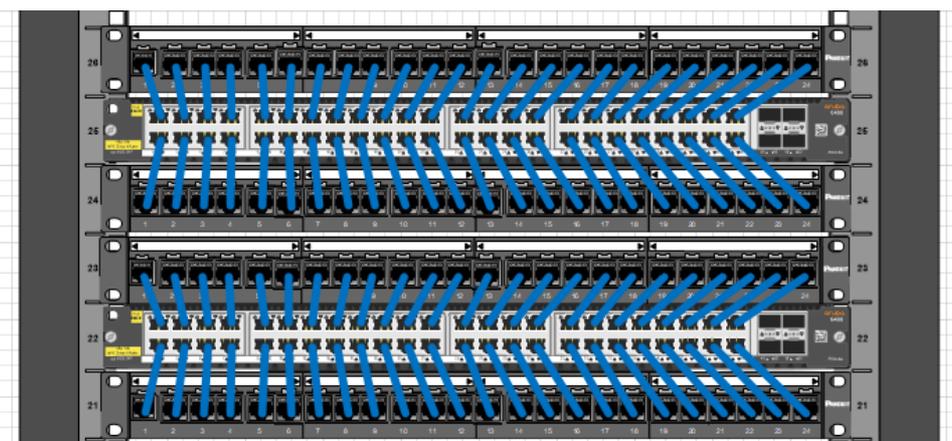
Below provide the cabling requirements based on multiple patch panels as per defined project requirements.

- 1 patch panel
 - 24 * 15cm cables
- 2 patch panels
 - 48 * 15cm cables
- 3 patch panels
 - 72 * 15cm cables
- 4 patch panels
 - 96 * 15cm cables
 -
- 5 patch panels
 - 120 * 15cm cables

Patching Pattern – Rack Front

The following lists out the patching standards accepted in RMIT – Refer to diagram below for illustration.

Patching pattern to adhere to is listed below, refer to following diagram for illustration:



24 Port Patch Panel Top																							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47
48 Ports Network Switch																							
2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
24 Port Patch Panel Bottom																							

The above mapping table shows how the network switches is embedded between 2 patch panels, the sample top patch panel numbering is from 1-24, the bottom patch panel numbering is from 25-48.

The network switch has 48 ports, the order of port number is vertical counted, for example the port number 2 is under port number 1, not located at right side of number 1, so the mapping between patch panel and switch will be:

Patch panel port 1 <===== 15cm patch lead =====> Network Switch port 1
 Patch panel port 2 <===== 15cm patch lead =====> Network Switch port 3
 Patch panel port 3 <===== 15cm patch lead =====> Network Switch port 5
 Patch panel port 4 <===== 15cm patch lead =====> Network Switch port 7
 And so forth.

Figure 2: Patching Pattern physical view

Patching Pattern – Rack Back

- Yellow fibre cable must be run underneath the rails to ensure last RU can be used/reserved for UPS.
- Daisy chain links to be established across switches.
- Dual power links to switches
- Grey coloured cat 6 thin cables to be used from wall mounts to the back of the patch panel for punching.
- No Purple cabling from AV installations is to be run through the building. This is to be purple from wall mount to the AV devices only.

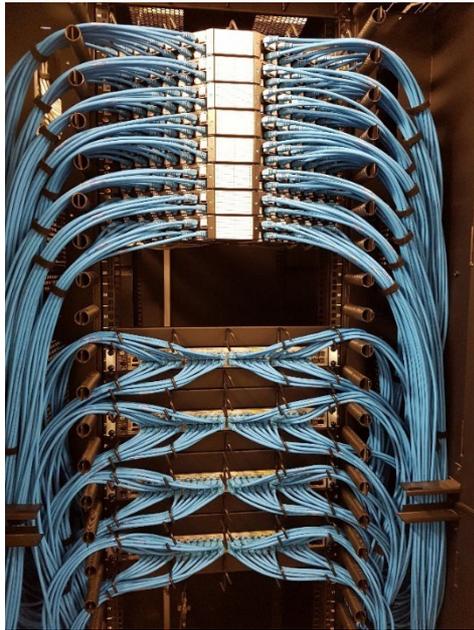


Figure 3: Front of rack sample



10.5.6. Category 3 Telephone Cabling

The telephony cabling will be used for faxes, emergency phones and direct lines and any for any analogue services required by RMIT or its tenants.

Telephony Cabling Requirements – Building Room

- The Building Communications room will include a wall mounted TE building telephony distribution for the building and the intra tie cabling from the building /site MDF.
- The building telephony distribution frame will be a minimum of 2 X 500way Krone wall mount profile frames and include any jumper bars and 10 pair disconnect modules and all records.
- To each floor communication room, a 20-pair category 3 telephony tie cabling is to be installed and terminated on the floor patch panel frame for category 3 telephony cabling.
- Wherever possible it is required that 2 X 10 pair Category 3 cables are run using diverse cable pathways and diverse risers to increase the survivability in the unlikely event that a riser is damaged.
- Records are to be as per Telephony frame records.
- All cables are to be tested as per Analogue cabling testing. Refer to Appendix for Schematic of cable requirements.
- Refer to Appendix for the Room Cable termination.

Telephony Cabling Requirements – Floor Room

The telephony cabling will be used for faxes, emergency phones and direct lines and any for any analogue services required by RMIT or its tenants.

- A 20-pair category 3 telephony tie cabling from the Building Communications room wall mounted distribution frame is to be terminated on the patch panel frame.
- Wherever possible it is required that 2 X 10 pair Category 3 cables are run using diverse cable pathways and diverse risers to increase the survivability in the unlikely event that a riser is damaged.
- A record book is to be supplied and completed in pencil for this tie cabling and the frame and cabling are to be labelled with source and destination room, cable type and pair number as per labelling requirements.

10.5.7. Communication/Vertical Risers

The communication risers will accommodate fibre optical cabling, RMIT telephony distribution and other carrier services. The communication cable risers are to extend continuously to the full height of the building.

- Two separate dedicated communications risers each comprising a minimum of three (3) cable trays are required per building.
- The risers are to be separate and not shared with other services.
- The separate and dedicated communication risers provide secure and diverse vertical pathway through the building and remove the risk of a damaged riser interrupting building IT services.
- The horizontal pathways from the vertical risers to the various communications room are to be kept separate and enter each communications type room from opposite sides.
- The cable trays are to be dedicated for copper telephony tie cables, fibre cables and other carrier services e.g. in building mobile phone cabling, NBN cabling tie cabling to the MDF.
- The capacity of each tray is to allow for 30% growth.
- Trays are to be labelled as Telephony, Optical Fibre and Carrier services.
- No other services are to be installed in the communication risers and nothing is to be mounted on or across the communication riser trays.
- Communication riser keys will be by CFS-ITS
- Lighting should be situated to minimise shadows work area.

10.5.8. Building Distribution Frame (BD)

10.5.8.1. New Buildings

The consultant is to liaise with RMIT carriers and specify a Building Distribution (BD) of suitable size, conduit access, and power to accommodate at least the following:

- In accordance with appropriate standards including AS/NZS 3084 Multiple Carrier incoming copper and fibre optic cables
- Multiple Carrier racks for in building for mobile coverage, IP WAN services, and future NBN or similar.
- All cable terminations shall use the insulation displacement contact (IDC) method.
- Two walls mounted TE 500-way Profile back mount and rod are to be provided and installed on a 20mm back mount
- A space of 300mm at each end for shoulder room.
- All Category 3 cabling is to be terminated on TE 10 pair (1-10 labelled) disconnect modules. 100 pair designation labels are to be used.
- A record folder, completed in pencil is to be clear and legible, is to be provided and a suitable wall mounting point.
- The Building Main Distribution Frame is to have 50pairs of Cat3 copper and 24 cores OS-2 fibre tie cabling to the RMIT building communications room to allow interconnection to RMIT infrastructure if required.
- At least 4 x 15amp captive (Clipsal style) power outlets are required along with 2 x 10amp for miscellaneous use.
- Supply and installation of all Communications Earthing System (CES) conductors, the CET blocks, and all earthing conductors up to the protective earthing point of all rack and frames.

10.5.8.2. Testing

Testing of cables must include:

- Cable route length,
- Continuity,
- Pin Assignments,
- Correct sequence,
- Reversed pairs,
- Transpositions and split pairs.

10.5.8.3. Existing Campus MDF for RMIT PABX Connection

The provisioning of new Building communications room requires a tie cable to an existing campus MDF. ITS networks and M365 Unified Communications team to determine the most suitable site for connectivity.

10.5.8.4. Documentation

A record folder, completed in pencil is to be clear and legible, is to be provided and a suitable wall mounting point. A copy of all test results.

10.5.8.5. Handover

Handover will require test results and an inspection of the records and the installation.

10.5.9. Building Lead In, Pits, Pipes

10.5.9.1. Conduits

- There is to be a minimum of 2 x 100mm communication conduits in each of the two building lead-in pathways dedicated to RMIT ITS infrastructure. Additional conduits may be required for other services, e.g. fire cables etc.
- The two lead-in pathways are recommended to be geographically separate conduit paths (each of 2 conduits) to increase the redundancy of a building's connection in the unlikely event that conduits are damaged.
- Other conduits from telecommunication carriers and other education carriers may also be required. Minimum Depth of conduit 300mm
- All removed fill is to be discarded and new backfill is to be used.
- Tape over conduits half the depth of advising of conduits below is to be installed.
- The conduits are to be labelled at point of entry as communication conduits use only.
- Conduits entering buildings shall be sealed using products like the Rayflute Duct Sealing System (RDSS)

10.5.9.2. Conduits Spacers

- Where a conduit infrastructure is intended to service multiple buildings now and progressively in the future, then use of Maxicell fabric liners from Tyco is to be used.
- This eliminates the loss of space due to cables twisting around each other and allow for the removal of redundant cabling and ease of adding additional cabling.
- The use of the 6 bags per 100 mm conduit is required. The product is available by the km only and will be used for significant conduit installations.
- Installation is to be as per manufacturers recommendations.

10.5.9.3. Pits

In ground pit, should be of suitable construction for that locality with the following standards.

- An allowance to cater for at least four (4) dual 100mm conduits from 2 sides only (i.e., a total of eight x 100mm conduits).
- The pit should have a suitable lockable cover of metal construction.
- All Conduit entry points into a pit need to be sealed using products like the Rayflate Duct Sealing System (RDSS).
- Large radius bends shall only be used.
- Pit lids are to be metal and to be of suitable classification for cars etc. Gatic lids are acceptable.
- If pits covers are required to have additional covering for aesthetics that increases the weight, a suitable mechanical lifter is to be provided to allow easy and safe handling access to the pits.
- Pits shall be installed on suitable material to provide drainage.
- Cable runs are to be continuous and without joints unless approved by ITS Global Networks Senior Manager
- Long conduit runs are to have a pit at suitable location to allow the easy installation of additional cabling in the future. Between pits the total angle of all bends is not to exceed 180degrees.

10.5.9.4. Fibre Jointing Pits

- Nominated fibre jointing pits are to be of a suitable size to allow cable coils to allow joint to be removed for future terminations.
- Tyco FISTGC02-xx joint of suitable capacity is to be used. A suitable hanger is required in the pit.
- Large pits are to have suitable catenary wires to allow cables to be held off the bottom of the pit keeping them pout of the water and mud.
- Copper cabling is not to be jointed in pits unless approved by ITS representative. If approved a Tyco or similar copper joint kit is to be approved by RMIT prior to proceeding.

10.5.9.5. Cable Testing

All testing is to be as per

- Fibre testing is as per section 10.5.
- Copper telephony testing is as per 10.8.

10.5.9.6. Labelling

- Labelling of cables in every pit is to include source and destination in the format (Building NO.-Level NO.- Room number) as per RMIT room number schema., cable type, cable size, cable riser number.
- Labels shall be engraved on stainless steel tags with type, size and fixing being approved by ITS.
- Pit shall be clearly labelled RMIT COMMUNICATIONS

10.5.9.7. Documentation

Documentation is as per section 10.5,10.8.

Plus, an accurate map suitable for loading into Property Services tools showing the following:

- conduit pathways
- depths of all conduits and pits
- pit sizes, location including GPS co-ordinates of all pits number of conduits including conduit layouts.
- Jointing pits are to indicate joint type and capacity.

All new conduit work shall be documented in a form suitable for registration with Dial before you dig.

10.5.9.8. Handover

Handover will include an inspection of the following:

- Documentation
- Cabling test results
- As built drawings etc.
- Physical inspection of a random number of pits and cable runs

10.5.9.9. Power at Desks.

- A minimum of 2 double GPO is required at staff desks.
- Ideally power is above desk to avoid crawling under to plug in devices and laptops.
- Note: Power points to have enough spacing to all surroundings to allow for large power adaptor packs to be connected without the need for alternative cables or adaptors.
- Note: all switches are capable of POE capable.

10.5.9.10. Tenant Locations

10-pair category 3 cable from the building MDF or central MDF is applicable is to be installed.

This will be terminated on an IDC displacement using patch panel.

Horizontal UTP outlets from the floor communication room are also to be installed to this.

The final fit out of a tenancy will need to accommodate the respective carrier's equipment. At that time the cabling can be extended to the required location within the tenancy.

10.6. Wireless Access Points

As RMIT has an established wireless network solution, ITS will be providing wireless access to sites where required. The following standards are listed below:

RMIT recommends the use of HPE wireless planning guide as a rough guide to assist in the basic wireless access point quantity required as part of a fit out for a per type of area.

The location and mounting of WAP is to be in line with specifications of RMIT recommended vendor recommendation for installation.

- Mounted below the ceiling and at least 1 metre from any light or metal.
- Horizontal and parallel to the floor unless approved and signed off by RMIT ITS representative.
- The RMIT supplied WAPs are to be mounted by the contractor and the UTP patch leads is to be connected as instructed by RMIT network staff.
- Dual cabling is required for the WAPs when connected to the switch.
- The contractor is to record the details of each WAP label (**MAC Address**), the location installed and the outlet it is connected to. The WAP is to be plugged into the outlet with the lowest number.

10.7. Serraview

Serraview is a SaaS solution used for RMIT's Integrated Workforce Management Solution. It is used for staff in activity-based work environment to identify an available desk, meeting room, or identify where a colleague is situated in the building.

The following considerations needs to be made if the new building is to have the IWMS capability.

- Serraview is for staff-occupied building/floors. Not to deploy it for Student spaces.
- Floor plan should be completed and made available for Serraview.
 - o This is done by Campus Planning and Services, PSG
- Setup Kiosk on the floor
 - o Technical Experience (Insights) team is responsible for setting up Kiosks.
 - o AppSpace installation is done - UO PAS Apps.
 - o Serraview dash-boarding on AppSpace - UO PAS Apps.
 - o Kiosk access should be limited to staff only.
- Wireless design: Utilizing Serraview BSS ID to capture the required access point needing to present this Serraview BSS ID – Global Networks and UO PAS Apps.
- Wire-up each desk that has network port to Serraview (MacAddress to Map on Serraview)
- Serraview server needs the read access (SNMP) to the switches on the new building.
- Deploy LDM package for all required end user devices – UO EUT

10.8 Traffic/ Space Counters

Devices are procured by Property Services from TPS, TPS also install the devices.

TPS Contact: 'Travis Edwards' <tedwards@trafficparking.com.au>

Ph: 1300 997 026, M: 0404 074 487

www.trafficparking.com.au

Once ordered the device MAC address/s are supplied to the Network team > Networks supply IP addresses > Electrical as built are supplied to networks > Networks config ports > Vendor configures the device with details stored in vendors tracking artefacts.

People Counter VLAN 2834

Procedure for install:

1. Cabling run to locations from comms patch panel (Builder's Electrical Subcontractor) see termination instructions,
2. TPS supply MAC address for units to RMIT ITS to assign IP addresses.
3. RMIT ITS patch and configure units to RMIT network VLAN
4. TPS 'preconfigure' the space counters before delivery to site
5. Space Counters are installed by TPS contractor (Prime Electrical)
6. TPS test, and do final commissioning on to the system server (in cloud)

10.8. eLockers

Solution overview:

- Please refer to Cloud Architecture document – Appendix 10.A.18.

Software:

- Vendor: Schiavello Systems (Vic), reseller on behalf of Veco
- Schiavello Contact:
 - Lily Dowling: 0428 856 844, LDowling@schiaavello.com (Client Relationship Manager)
 - Brock Pettigrove: 0484 333 200, BPettigrove@schiaavello.com (VECOS Technical Coordinator)
 - Daniel Grilli: 0438 773 363, DGrilli@schiaavello.com (VECOS Brand Manager)
 - Brian Chircop: 0409 431 798, BChircop@schiaavello.com (Site Manager)
- RMIT Contacts:
 - Turiya Orme: (03) 9925 8245, turiya.orme@rmit.edu.au (RMIT Training, Building 108, Level 7 & 8)
 - Cathy Hallandal, ourplace@rmit.edu.au (Building 106 & Building 108, Level 13)

Network requirements:

- Each locker bank controller requires a wired network connection (one port) to communicate with the cloud.
- Communication IP addresses:
 - IP address 13.75.147.240 on port 80

- DNS name 'capi-au.releezme.net' with IP addresses 52.187.233.91 and 40.127.68.208 on ports 80 & 443
- DNS lookup is required.
- Firewalls must allow the IP addresses and DNS.
- Authenticating proxies are not supported.

Procurement & installation information

- Orders are placed via RMIT Property Services (PSG) or through the builder (at PSG's direction)
- The joinery is custom and built to match the specified design.
- Lead time is typically 6-8 weeks from date of order and finalisation of shop drawings.
- Installation timeframe varies based on scope of works.

10.9. Electronic Access Control

The EAC solution is managed by Facilities Management team under the Director, Facilities and Asset Management.

Network requirements: To be confirmed by Facilities Management team on a project-by-project basis.

Procurement & installation information: Equipment is not to be in the ITS Comms room. Confirm with facilities team and appropriate vendors regarding procurement lead times, space, and location requirements.

10.10. End User Technologies

Standards below are set by the End User Technologies team in University Operations. Contact via po.eut@rmit.edu.au for guidance and clarification.

10.10.1. Device Standards Device Staff Standards

Specs and prices displayed on [GetIT](#)

Bulk orders (>5) will not be supplied from stocked items. Allow for 6week delivery from manufacture.

Computer Labs

Standard devices available via [GetIT](#)

Bulk orders (>5) will not be supplied from stocked items, allow for 6weeks delivery from manufacture.

End User Technologies team are to be consulted should software require a deviation to the standard devices.

10.10.2. Audio Visual

Audio Visual (AV) equipment is managed via the Platforms & Field Services teams within ITS.

RMIT University is currently managed under the Master Services Agreement with Insight Systems (CON/2023/01758)

Insight Systems is responsible for all Programming activities & Symphony reporting across all standard AV deployments.

To submit a request for a new installation, upgrade or purchase, please complete the '[Submit an Initiative](#)' form in ServiceNow. Once submitted, the ticket will be prioritized by the business and operational teams for execution.

Refer to [RMIT AV Standards Final](#) document.

Order Form for RMIT Padlocks for ITS Assets



Fill out this form and email to ITS staff member for approval. Once approved email to locksmith@rmit.edu.au for ordering, invoicing etc.

Date of Order:	
Order Placed By:	
Order Number:	
Quantity Required:	

Padlocks to be coded to RIA.1

Approved by Name: _____ Signature: _____

Must be an RMIT ITS Staff Member – Penny Karvelis or Delegate – can be done via email

Date: / /

Processed by United Safes Date: / /

10.10.3. Facility Standards

All spaces require swipe-card access for ITS support staff.

Staff Desk & Infrastructure Requirements

- Cable management hole in bench top. Cable slot w/ brush strip (per 2x workstations), or Cable hole - standard 90mm hole (per 1x workstation).
- Cable tray below bench-top at rear against wall full, length of bench surface below data and power sockets.
- Power Outlets
 - 2x GPO outlets below bench top.
 - 1x GPO / USB charge 'pixel' unit surface mounted above bench-top per workstation or 2x GPO outlet above bench-top per 2x workstations.
- Data Points 1x ethernet network points below bench-top
 - Ethernet connection at each staff desk. Please consider the following: Laptop Device rebuild via SCCM, Intune or Jamf.
 - Serraview space utilization application

Staff PC Setup

Monitor Arms

- Vendor: Backcare & Seating, Carlton VIC.
- Model: M8.1 Monitor Arm (single arm)
Link: [M8.1 Monitor Arm \(backcare.com.au\)](http://backcare.com.au)
- Cost: \$375 (ex. GST) per/arm
- Note: Procure two x single monitor arms (do not procure the dual monitor arm option, as this will constrain the screen mobility).

PC Equipment

1. Monitor

- [HP EliteDisplay E24 23.8in Monitor](#)
Purchase via GETIT RMIT
- Cost: \$242 (ex. GST)

2. Docking Monitor:

- [HP E24m G4 USB-C Conferencing FHD Monitor](#)
Purchase via GETIT RMIT

- Cost: \$465 (ex. GST)

Computer Lab

- Bench-top laminate or surface material proven to allow accurate tracking of optical mice.
- Cable management hole in bench top. Cable slot w/ brush strip (per 2x workstations), or Cable hole - standard 90mm hole (per 1x workstation).
- Cable tray below bench-top at rear against wall full, length of bench surface below data and power sockets.
- Power Outlets
 - 2x GPO outlets below bench top.
 - 1x GPO / USB charge 'pixel' unit surface mounted above bench-top per workstation or 2x GPO outlet above bench-top per 2x workstations.
- Data Points 1x ethernet network points below bench top. Consider the following:
 - Data transfer and connectivity requirements when upgrading and deploying devices at scale.
 - Additional data points to future proof additional desks
 - Spare data point for testing cabling issues
 - Data point for printer or other peripherals
- Security anchor point mounted at rear below bench-top near cable hole. 1x per workstation.

10.10.3. Printers

- Ricoh are contracted to provide RMIT with a fully managed print service.
- Ricoh must be engaged via the IMACD process for any new printers or changes to the printer fleet in relation to new spaces, fit outs or refurbishments.
- Requests should be initiated using the Ricoh [IMACD form](https://rapnet.ricoh.com.au/cpq/form/001200000K34CIAAZ/) – refer image below (<https://rapnet.ricoh.com.au/cpq/form/001200000K34CIAAZ/>) which is setup to capture any general requirements.
- Once submitted Ricoh will perform an assessment to finalise the requirements against the printing guidelines and will coordinate any work required to fulfil the request.



imagine. change.



Print Device IMACD Assessment

Please complete this form if you have a requirement for Ricoh to install a new device, relocate an existing device or remove an existing device for recycling. You can also use this form to request a settings change or have additional print accessories added to an existing device.

Please consider RMIT's print guidelines before completing this form. Please allow **10 business days** from approval for a new device, and **5 business days** for all other requests.

If you have print device requirements across multiple sites, please submit a separate form for each site, or contact your Account Relationship Manager - Matthew Field on 13RICOH or by email mfield@ricoh.com.au.

Your Details

Please provide us with your contact details so we know how to contact you and process your request.

Your Name*	<input type="text"/>	Phone*	<input type="text"/>
Your Email*	<input type="text"/>	Mobile	<input type="text"/>
Business Unit*	Please select...		

Site Detail

Please provide us with details regarding the physical site/building where the devices are currently located

Site Name	<input type="text"/>		
Site Address:	<input type="text"/>		
	Can't find your address? Enter it manually		
Site Building / Level / Room	<input type="text"/>		
Site Street*	<input type="text"/>		
Site Suburb*	<input type="text"/>		
Site State*	<input type="text"/>		
Site Postcode*	<input type="text"/>		
Same as originator			
Pick-Up Contact Name*	<input type="text"/>	Pick-Up Contact Phone*	<input type="text"/>
Pick-Up Contact Email*	<input type="text"/>	Pick-Up Contact Mobile	<input type="text"/>
Customer Ref / PO	<input type="text"/>		

Is there an elevator that will need to be used at the site? Please select... ▼

Are there any stairs to be used to access the device? Please select... ▼

Are there any on site security requirements for accessing the site? Please select... ▼

10.11. Physical Server Applications

The design of the solution will be subject to RMIT ITS review and advice

ITS will provide all Physical servers and operating systems for all systems at the cost to the project.

The vendor will need to provide an architecture overview of the solution that includes but is not limited to the following:

- Application hardware specifications
- Operating system options,
- Configuration,
- Security hardening,
- Account management and
- Integration

10.11.1. IP Address Allocation for Devices

All IP addressing will be allocated by the ITS networking team for devices, servers etc. The contractor is to complete and submit the form embedded to the ITS Global Networks Senior Manager. IP Addresses will only be allocated after the solution design is approved by RMIT ITS.

This is to be used for

- Security access control devices
- CCTV
- Audio visual systems
- BMS system and controllers
- Lightning interfaces
- Emergency lighting controller
- IP clocks etc.
- Printers

Any other system or device requiring IP address and network connectivity are subject to the above process. Refer to the [IP Allocation Template Excel](#), Appendix 10.A.16 IP Allocation Spreadsheet Template.

10.12. Labelling

10.12.1. Building Comms Rooms

Building Communication room labelling is as follows:

- The Building Communication room will be labelled Building Communication Room and include the RMIT assigned numbering format as detailed below:
- Labelling for rooms are as follows: **Building (Bxxx).level (yy).room (rrr) e.g. B106.06.111**
- Labels are to be Trefolyte labels black characters on white background in the font and size to suit the uses.
- Rack labels, it is suggested font of Arial Narrow, 10mm Black character on White background.
 - E.g. 100.07.001-Rack 1
- Room Door to be labelled: **“Communication Room- Building N0. –LevelN0. - Room N0”**
- Racks front and rear are to be labelled: **“Building –Level- Room –Rack N0”**.
- All FOBOT at the front for each fibre to be labelled: **“fibre type, fibre cores and destination Building-level – Room and Rack N0.”**
 - E.g. 24 Core OS-2 80-03-409-02 TO 80-01-404-01
- Fibre cables at the rear are to be labelled : **“destination Building-level –Room and Rack N0.-rack N0.”**
- UPS are to be labelled: **1 and 2**
- All power outlets are to be labelled as per electrical standards of DB and CCB
- All system tails are to be labelled.
- Switches are to be labelled by RMIT installer with the switch naming standard.

The details of the label and room number needs to be confirmed with the property services project manager as it may differ from the architectural plans and allocation.

All labelling is to be submitted to the ITS Stakeholder for approval.

10.12.2. Floor Comms Room

Floor Communication room labelling is as follows:

- Currently a proof of concept for LED Lighted patching cables is being considered. Please consult with BTP for design decision if required.
- The Floor Communication room will be labelled Level X Communication Room and include the RMIT assigned numbering format as below:
 - **Building number.Level.room number**
- Labels are to be Trefolyte labels black characters on white background in the font and size to suit the uses.
- For rack labels, it is suggested font of Arial Narrow, 10mm Black character on White background E.g. **100.07.001-Rack 1**
- Room Door to be labelled **Communication Room Building –Level- Room**
- Racks front and rear are to be labelled as **Building –Level- Room –Rack NO.**
- All FOBOT at the front for each fibre to be labelled: **fibre type, fibre cores and destination Building-level – Room and Rack NO.**
 - E.g. 24 Core OS-2 80-03-409-02 TO 80-01-404-01
- Fibre cables at the rear are to be labelled with **Fibre Type and size and the destination Building-level –Room and Rack NO.-rack NO.**
- UPS are to be labelled **1 and 2**
- All power outlets are to be labelled as per electrical standards of DB and CCB.
- All system tails are to be labelled.
- Switches are to be labelled by RMIT installer with the switch numbering standard.

The details of the label and room number needs to be confirmed with the property services project manager as it may differ from the architectural plans and allocation.

All labelling is to be submitted to the ITS Stakeholder for approval.

10.12.3. Communication/Vertical Risers

Labels of cables and trays are to be Trefolyte labels black characters on white background in the font and size to suit the uses.

Note: The RMIT standard for labelling for rooms are Building(Bxxx).level(yy).room(zzz)- Rack 1. The details of the label and room number needs to be confirmed with the property services project manager as it may differ from the architectural plans and allocation.

suggested font of Arial Narrow, size to suit use, Black character on White background.

E.g. 100.07.001-Rack 1

All labelling is to be submitted to RMIT ITS Global Networks Senior Manager for approval prior to proceeding.

The following is to be labelled:

- Room Door to be labelled Communication Riser 1 or 2 and the building –Level- Room No.Communications trays to indicate use, Optical fibre, Telephony, or other carrier service.
- All fibre entering or leaving the riser are to be to be labelled with source and destination Building-level –Room and Rack NO. E.g. 80-03-409-02 TO 80-01-404-01
- All cables leaving a riser are to be labelled at point of exit with RMIT assigned and standard building.level.room number and rack NO. of source and destination, cable type and capacity.
- The risers are to be labelled Communication riser and BB-LL-Room Number

All power outlets are to be labelled as per electrical standards of DB and CCB

All labelling is to be submitted to the ITS Global Networks Senior Manager for approval.

10.13. Telephony/VoIP

10.13.1. Handsets

The University uses Polycom VoIP handsets hosted by Microsoft Teams Common Area phone.

- The Consultant shall confirm the allocation of all telephone handsets and types with the ITS University Operations M365 Team. All handsets shall be purchased by the project.

If wall mounting of handset is required, please discuss with the Facilities Management team.

- Approval is required for cost of each item including allowances for the purchase of handsets, programming of extensions and handset configuration by ITS telephony staff, for project budget purposes.
- A monthly charge may be applied for new Teams extension allocation.
- VOIP Handsets are required at all locked door entrances and at all lecterns.
- Analogue line will be provisioned to areas where emergency handset is required or areas outside network coverage where analogue cabling/all socket is available. VOIP handsets will be provided to all areas within network coverage. Analogue installation is done by exception only – there are 3G and 4G solutions available for lifts and fire alarms – please discuss with the Facilities Management team.
- For campuses outside Bowen St, Carlton, Bundoora East and West, analog line can be provided using Polycom ATA unit over RMIT's data network with similar requirements to the Polycom VoIP handsets above. The Consultant shall confirm the allocation of analog ATA unit/s with the ITS University Operations M365 Team. All ATA units must be purchased in advance.

10.13.2. Analogue Telephone Distribution Cabling (May still be applicable to areas where emergency handset is required or areas outside network coverage)

10.13.2.1. Analogue Telephone Cabling

All cabling work on the University network shall be carried out by a registered cabler with appropriate endorsements. All such work shall meet the minimum requirements of the current standards and comply with all regulations.

Installation shall be in accordance with the following criteria.

- Include Communications Earthing System (CES) conductors, the CET blocks, and all earthing conductors up to the protective earthing point of all rack and frames.
- Underground service cables shall be specified as 1/0.40mm² jelly filled underground telephone cable.
- Internal telephone block cabling shall generally be specified as indoor grade 1/0. 50mm² standard telephone cable (Cat3).
- Cable between Campus Distribution locations (MDFs) and Building distribution room and the same to the Floor distribution located in the floor Communications room shall provide 50% spare capacity.
- Telephony will use the Cat6 A outlets as part of the structured cabling solution; All cable terminations shall use the insulation displacement contact (IDC) method.
- Multi-pair tie cables between building MDFs shall terminate onto standard Krone "white" "Profile" LSA Plus disconnection modules and mounting system catering for up to 10 pairs each labelled 1-10 only.
- All pairs of all cable shall be tested.
- Outlets for Analogue services are to be part of the Cat6A structured cabling solution. 100 pair Designation strips are to be fitted and labelled.

10.13.2.2. Inter Building and Internal MDF Cabling

- Inter building cables from both the central MDF (for VOIP analogue services) and from a local MDF (if applicable) shall be 50 pairs of Category 3 cabling.
- Wherever possible it is required that 2 X 25 pair Category 3 cables are run using diverse cable pathways and diverse risers to increase the survivability in the unlikely event that a riser is damaged.
- The cabling is to terminate on IDC displacement at both the source and destination. Modules will be as outlined in 10.8.
- The cables will terminate as per Appendix 10.A.8 on Vertical A of the telephony frame located in the building Communications room.

- The cables from the Building MDF will terminate on Vertical A pairs 1-50 in the Building Communication room.
- The cable(s) from a RMIT MDF used to deliver PABX analogue circuits will terminate to the allocated building communications room. Please engage ITS for this location.

10.13.2.3. Intra Building Cabling

- A 20-pair category 3 telephony tie cabling from the building communications room wall mounted distribution frame (Refer Appendix 10.A.8) are to be terminated patch panels on the racks.
- Wherever possible it is required that 2 X 10 pair Category 3 cables are to be installed diverse cable pathways and diverse risers.

10.13.2.4. Retail Tenancy

This section defines the standards if a retail tenant is to have their required services from their preferred carrier delivered.

- A 10-pair cable from the building MDF to each retail tenancy is required.

This is required for the retail to have their required services from their preferred carrier delivered.

- A 10-pair category 3 cable from each tenancy is required to the Building Communication Room IDF. These cables will be terminated on Vertical A using 10 pair disconnection modules in the location indicated in Appendix 10.A.8

This is required should RMIT services need to be delivered to the spaces.

10.13.2.5. Testing of Telephony Cables

Testing of all Category 3 cables must include:

- Cable route length,
- Continuity,
- Correct sequence,
- Reversed pairs,
- Transpositions and split pairs.

10.13.2.6. Telephone Distribution Frame Records

- A record book is to be supplied and completed in pencil and is to be clear and legible at all telephony frames.
- The record book is to record all pairs cross connected.
- Records are to be cross matched at both ends of the jumper and include the respective service number.
- The records are to include details of the following.
 - tie cabling, frame location, cable size, location of destination Building, Level, Room number and vertical and cable pairs at the destination end.
- A suitable holder for the records is to be provided at each frame location.
- The record book is to of a size that can accommodate the records of the entire back mount capacity.

10.13.2.7. Labelling

All tie cabling is to be labelled with the following:

- Source and destination room, cable type and pair number and which of the two cable risers is used, where the cable leaves the rooms, exits risers, in all pits and at entry and exit of all buildings.

Frame labelling is to include:

- 10 counters at the end of each module Vertical are to be labelled - Vertical A, B etc.
- Designation modules are to be fitted and labelled after each 100 pairs, Labelled with vertical and pairs.
 - e.g. Vert A, 1-100

10.13.2.8. Documentation for retail tenancy

- The contractor shall provide all records folders at each frame and complete all records in pencil and is to be legible.

- The documentation is to include a schematic diagram of the category 3 cabling showing all cable type, size, (pairs), room of all terminations and risers.
- A cable pathway floor plan is required for all cabling.

10.13.2.9. Permitted Attachments

- All equipment intended to be attached to the University telephone system shall be of an ACMA approved type and be fitted with a label displaying the relevant ACMA permit number.
- Data modems shall not be connected to the University telephone system, without permission from ITS.
- FAX machines shall be connected to the RMIT VOIP Telephone Network. The connection of FAX machines via direct exchange line is to be avoided where possible.

10.13.2.10. Handover

ITS will inspect the cabling, termination locations, documentation, and test records as part of handover.

10.14. Minor Augmentation or Partial Renovation

10.14.1. Overview

- Minor works to add additional cabling to existing floors including minor renovations are to meet the minimum standards set out below:
- The minimum standard for all augmentations is a structured cabling solution comprising of TE Category 6 Structured cabling solution using Krone angled 24 port patch panels.
- TE Category 3 patch panel
- All mounted in MFB Rack custom part number R3462 as per RMIT Category 6 Rack layout.
- A maximum of 192 outlets are to be installed on patch panels per rack.
- A suitable sized communication room as per specifications outlined in Floor Communications Room is required.
- Renovating a floor in multiple small works does not remove the need for the complete floor meeting Section 10.1 to 10.15 inclusive.
- Where there is availability within an existing stack, switch ports can be used under the provision that 4 ports per switch/per stack are available for emergency use (minimum reserve)
Where new works exceed the minimum reserve, the project owner must procure new switch equipment.
- Old/ non supported switches are not to be installed to support new work, unless being used as an interim solution for replacement upon new hardware arrival.

10.14.2. Floor Communication Room

- Shall be dedicated to communications cabling and data equipment only.
- If a new room is required to be built or the existing expanded, the floor communications room sizing, and layout shall be of the sizing outlined in Appendix 10.A.2 or 3
- The minimum rack to be used for category 6 cabling.
- Rack to be 45RU 800mm(W) x 900mm(D) equipment racks. RMIT specifies that the rack be MFB Series cabinet RMIT custom Part Number R3462
- Each data rack is to support no more than 192 TO data termination, if the installation is greater, than an additional data rack(s) will be required.
- LAN switches and routers are provided and installed by RMIT or their representative.
- ADC Krone UTP Cat 6 Angled Patch Panels.
- ADC Krone Optical fibre termination cabinet/panel as per Section 10.5. ADC Krone Patch Panel 25 port voice 1RU slide out frame p/n as per section.

- Rack mount UPS, APC 5000XLI with 2 battery packs if no central building UPS for communications rooms is to be provided were Building Comms Rooms only.

Krone patch and fly leads are required for all outlets. Length to be approved by RMIT ITS Global Networks Team prior to proceeding.

10.14.3. Telecommunication Outlet (TO) Identification

The existing numbering scheme is to be expanded. The University has an established system for allocating point numbers. The Project Architect shall consult the Project Manager before allocating point numbers and shall ensure that the University system is followed from the developed sketch plan stage.

- Room/Points are to be numbered in a clockwise direction commencing at the major point of entry to a floor or area, working around the perimeter of the floor or area about the central corridor.
- On the face plate a unique number indicating the point number as follows: 001, 002 etc. The existing numbering is to be continued sequentially from the last number used.

10.15. Documentation

The following documentation is to be provided upon the completion of the works.

- An updated schematic diagram is to be provided of the fibre and copper cabling including cable type and size and destination.
- Certification of cabling results as per standards.
- Photo evidence is to be provided of the works and room condition.
- Documentation and Test results of all cabling as outlined in relevant cabling sections.

10.16. Handover & Acceptance Testing

Upon completion, and prior to hand over to the university, the following is required to acceptance.

- the room and equipment racks are to be fully cleaned and free from construction dust and debris associated with installation and any unused cables or labels.
- Expected documentation is to be handed over for review.
- Photo evidence of racks and room condition is to be provided and forwarded for review.
- As built patching schedule is to be provided by RMIT, if any unforeseen changes are required ITS is to be engaged for amendments.

The following checklists shall be completed to supplement a handover and acceptance:

- The room is to be initially checked using the ITS Communications Pre-Occupancy Checklist
- Once the Preoccupancy check list is met, a comprehensive check using the RMIT Communications Room Checklist is completed.

Additional outcomes are required as a minimum for handover consideration:

- A complete copy of the fibre test results will need to be available for review.
- The room will not be accepted by RMIT until all works is completed and all outstanding items are resolved.
- The room will not be accepted if all the cabling is not terminated and tested and certified.

Inspection to ensure meets specification, room and trays labelled correctly, locks fitted, tidy and clean, and all penetration sealed.

Note: Please engage ITS for checklists if required.

10.16.1. Handover

Project completion is required to comply with all hand over specifications of each section above relevant to what works was completed. The following requirements are expected to be conducted:

- Prior to hand over of the completed installation, approved as-built drawings shall be submitted.
- All Drawings shall be completed on approved Property Services drawing system of the day.
- The format and system type is to be confirmed with Property Services.
- Soft copy of manual is to be supplied to RMIT ITS
 - Including: all original equipment with the cable specifications, all test results, testing parameters, loss budgets, light source power meter loss, OTDR test results, cable schematics, cable routes, pit locations, building names, patching details adaptor configurations and relevant descriptions of general system operation.
 - Any documentation of exemptions to standards and subsequent approvals.
- The contractor shall provide complete documentation covering the installation and maintenance of the Structured Cabling System.
- Documentation of locations of all installed equipment and racks in all Communications Rooms, All main cable runs, cable trays, catenaries and conduits, pits, risers, and rack layouts.
- Documentation of floor plans showing the location of all TOs, complete with outlet numbering
- Documentation of schematic cabling diagrams are to be in a suitable holder within the building communications room and building MDF.
- Documentation of as built floor drawing is to be in a suitable holder in each floor communication room.

10.16.2. Certification and Guarantee

The complete structured cabling system shall be certified by personnel trained and authorised by the cable and connector manufacturer (TE Krone) and a formal certificate detailing the certification results shall be provided to RMIT Property Services.

The contractor shall be a TE Krone ND&I certified to carry out 25-year warranty installations.

The contractor shall be trained and certified to install the vendor products system and must offer a single 25-year extended warranty on the entire structured cabling system installation.

On completion of the certification phase the installed system shall be guaranteed to perform to the manufacturer's specification for a period of no less than twenty (20) years. Full details of the performance standards shall be included with the as-installed documentation.

A manufacturer guarantees and certificate for application performance for the full system is required.

The 25-year application assurance shall cover the failure of the offered 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 AS/NZS 3080, ISO 11801 or TIA/EIA 568-B.2-1).

Provision of Training

Prior to Practical Completion, the Contractor and Specialist Sub-contractors shall provide the services of competent personnel to instruct the appropriate University personnel in the operation and maintenance of the installed systems.

10.17. Decommissioning

Prior to decommissioning of a floor, the ITS Global Networks Senior Manager needs to be advised. This is required to arrange for the decommissioning and removal of IT equipment. This includes at the project cost the careful removal of all wireless access points and associated brackets from the walls and ceiling with guidance from RMIT ITS as to the correct method of removal.

All redundant cabling, cable pathways outlets etc. must be removed completely and disposed of. Partial small decommissioning of less than 10% of the total number of outlets in a rack will remove the outlet, horizontal UTP cables at both ends as far as is practically possible and arrange with the network team to have the jumper removed from the patch panel and switch. The contractor will provide a record of the outlet numbers that have been removed. If the patch panel is of the type prior to Category 6 then the patch panel needs to be updated to no cable instead of the outlet number.

Larger decommissioning follows the same requirements as above for removal of redundant cabling etc. but it is recommended that all new cabling and outlets are to be as per current standards for new fitouts. Decommissioning of Cat6 or 6A sites will allow for the slots freed at the floor distributor to be reused for the new cabling. Note the as built plans will need to be updated to reflect the new location of the outlets and removal of the old from original locations.

If the decommissioning involves IP connected Security, BMS or other BMS plant and lighting then the ITS project manager must be advised of the IP address and or application that are no longer in service.

If any printers need to be decommissioned or temporarily removed for refurbishments, Ricoh must be engaged to complete this work. RMIT are not permitted to move or remove any printers without Ricoh authorisation. Requests should be raised using the Ricoh [IMACD form](#)

For any Audio-visual decommissioning needs, log the request via ITS Field Services in ServiceNow.

10.18. EWaste

The following vendors are to be utilised to eWaste hardware.

Note: Prior to eWaste, ensure the hardware has been decommissioned – see above instructions.

1. Network Infrastructure:
Vendor: SIMS Recycling, email contact Yousaf Siddiqui (Mohammad.siddiqui@simsmm.com)
2. EUT hardware: Log a ServiceNow ticket titled 'EUT eWaste Request: BBB.RR.LLL)
3. Audio Visual: NA – refer to decommissioning instructions above.

10.19. Appendix

Appendix A. Australian Standards

Standard/ Specification or Technical Bulletin Number	Description
AS 1049	Telecommunication Cables Insulation and Sheath Polyethylene
AS 1882	Earth and Bonding Clamps
AS 2834	Computer Accommodation
AS/NZS 3000	Wiring Rules
AS/NZS 3080	Telecommunications Installation – Generic cabling for commercial premises.
AS/NZS 3084	Telecommunication Installations – Telecommunication Pathways and Spaces for Commercial Buildings
AS/NZS 3085.1	Telecommunications Installations – Administration of Communications Cabling Systems
AS/NZS 4117	Surge Protective Devices for Telecommunications Applications
AS/NZS IOS/IEC 14763.3	Implementation and Operation of Customer Premises Cabling – Part 3: Acceptance for Optical Fibre Cabling
AS 60950.1	Information technology equipment – Safety – General Requirements.
AS 3594	Information processing systems interface connector and contact assignments for ISDN basic interface located at reference points S and T

AS/NZS CISPR 15	Information technology equipment – Radio Disturbance characteristics – limits and methods of measurement
AS 4251.1	Electromagnetic Compatibility – Generic Emission Standard – Residential, Commercial & Light Industry
AS 4251.2	Electromagnetic Compatibility – Generic Emission Standard – Industrial Environments
AS 2053	Conduits and fittings for electrical installations
AS/NZS 61935-1	Telecommunications installations – Generic cabling systems – Specification for the testing of balanced communication cabling
ISO/IEC 14763-3	Telecommunications installations – Generic cabling systems – Specification for the testing of optical fibre communication cabling
ISO/IEC TR 24704	Information Technology – Customer premises cabling for wireless access points

Appendix B. AS/CA Technical Standards & Codes

Standard/ Specification or Technical Bulletin Number	Description
	Telecommunications Act (1997)
CCM	ACMA Communications Cabling Manual (Volume 1 and 2).
AS/CA S008	Requirements for authorised cabling products
AS/CA S009	Installation requirements for customer cabling (wiring rules)
ACMA TCPR 2000	Communications Cabling Provider Rules 2000
ACMA CRCPR 2000	Competency Requirements for Cabling Provider Rules 2000

Appendix C. International Standards

Standard/ Specification or Technical Bulletin Number	Description
IEC 297	Dimensions of mechanical structures of the 482.6 mm (19 inch) series
ISO/IEC 11801	Information Technology – Generic Cabling for Customer Premises
ISO TR 24750	IT - Assessment and mitigation of installed balanced cabling channels to support of 10GBASE-T
IEEE 802.3	Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications
IEEE 802.3an	Standard for Information technology— Telecommunications and information exchange between systems—Local and metropolitan area networks— Specific requirements Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications Amendment: Physical Layer and Management Parameters for 10 Gb/s Operation, Type 10GBASE-T
IEEE 802.3af	Power over Ethernet
IEEE 802.3at	Power over Ethernet enhancements
IEEE 802.5	Token Ring Access Method and Physical Layer Specification
IEEE 802.11a/b/g/n/ac	Wireless Ethernet
TIA/EIA 758	Customer owned Outside Plant Telecommunications Infrastructure Standard

Appendix 10.A.1 Appendix Building Communication Room Layout

Below is the floor layout plan and some specifications for a Building Communications room.

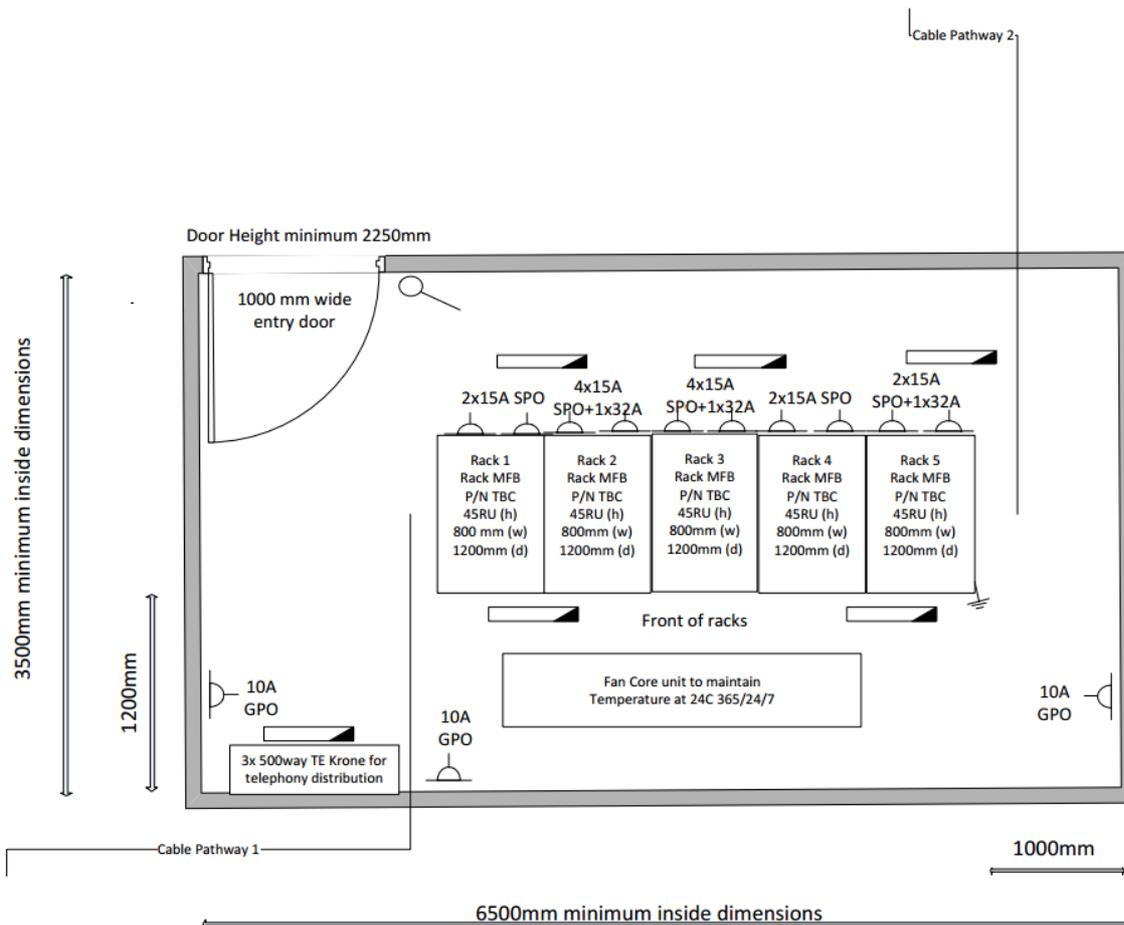
Power

- 1X32 Amp isolator at Racks 1, 2, 3 and 5 for hard wired UPS, if no central UPS is provided.
- Two (2X) 15amp dedicated and surge protected captive e.g. Clipsal outlet above and at the back of each rack
- Rack 2 requires 2 additional 15A outlets
- Other 10 A GPO for other use as indicated

Other Services - No other services are to be installed or travel within the communication room

Room

- All Room Dimensions are inside measurements
- Inside Dimensions min. 6.5m X 3.5m Floors and walls sealed, painted
- Doors to be fitted with Raven or similar dust seals on all edges
- All Pipes in room to be lagged and not above racks
- Door min height 2250mm and 1000mm wide.
- Door are not to obstruct rack face
- Minimum space at front of racks is 1200mm.
- Air Conditioning 365/24/7 to maintain equipment temperature of 24C



Appendix 10.A.2. Floor Communication Room (Floor <600 Gross M2)

Below is the floor layout plan and some specifications for a Floor Communications room where the general floor space coverage ranges less than 600 M².

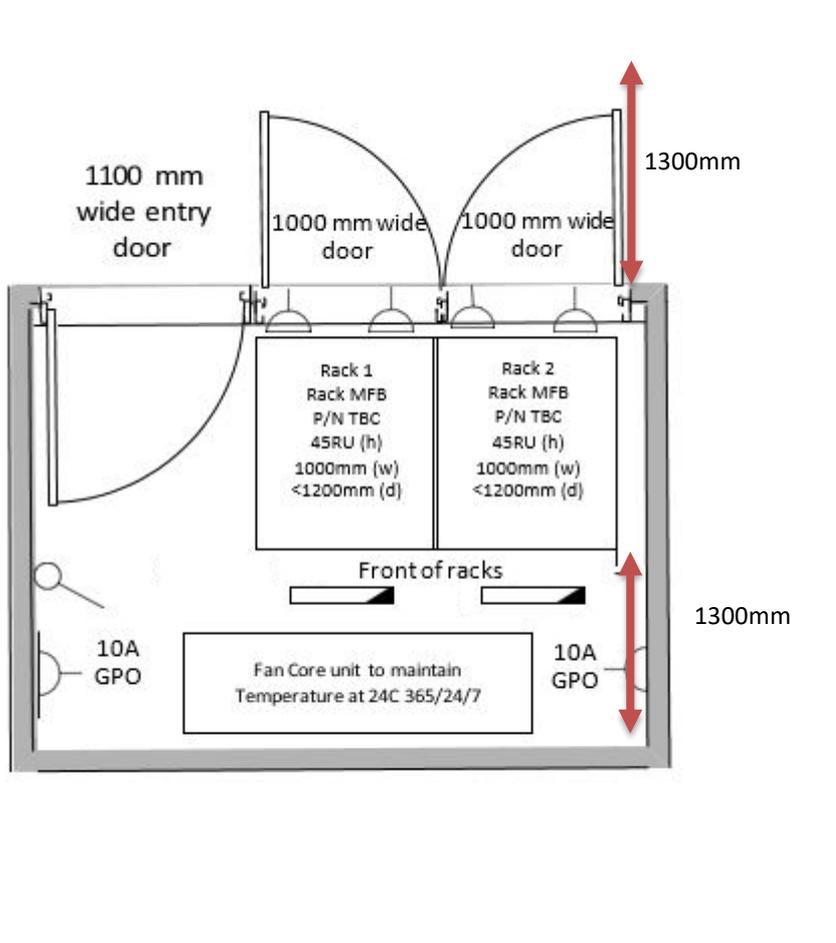
Power

- 32 Amp isolator at each rack for hard wired UPS if no Central UPS.
- Two (2X) 15amp dedicated and surge protected captive Clipsal outlet above and at the back of each rack.
- One (1) 10 A GPO for other use as indicated.
- All Room Dimensions are inside measurements.
- Services- no other services are to be installed within communication room.

Room

- Inside Dimensions min. 3.6m X 3m Sealed, painted.
- Doors to be fitted with Raven or similar dust seals.
- All Pipes in room to be lagged and not above racks.
- Door min height 2250mm
- Doors are not to obstruct rack face.

Minimum space from **back of rack to external area** and **front of racks to the back wall** of the room is 1300mm to ensure workability of large equipment installations.



Appendix 10.A.3 Floor Communication Room (Gross 600 M² to 2000 M²)

Below is the floor layout plan and some specifications for a Floor Communications room where the general floor space coverage ranges between 600 M² to 2000M².

Power

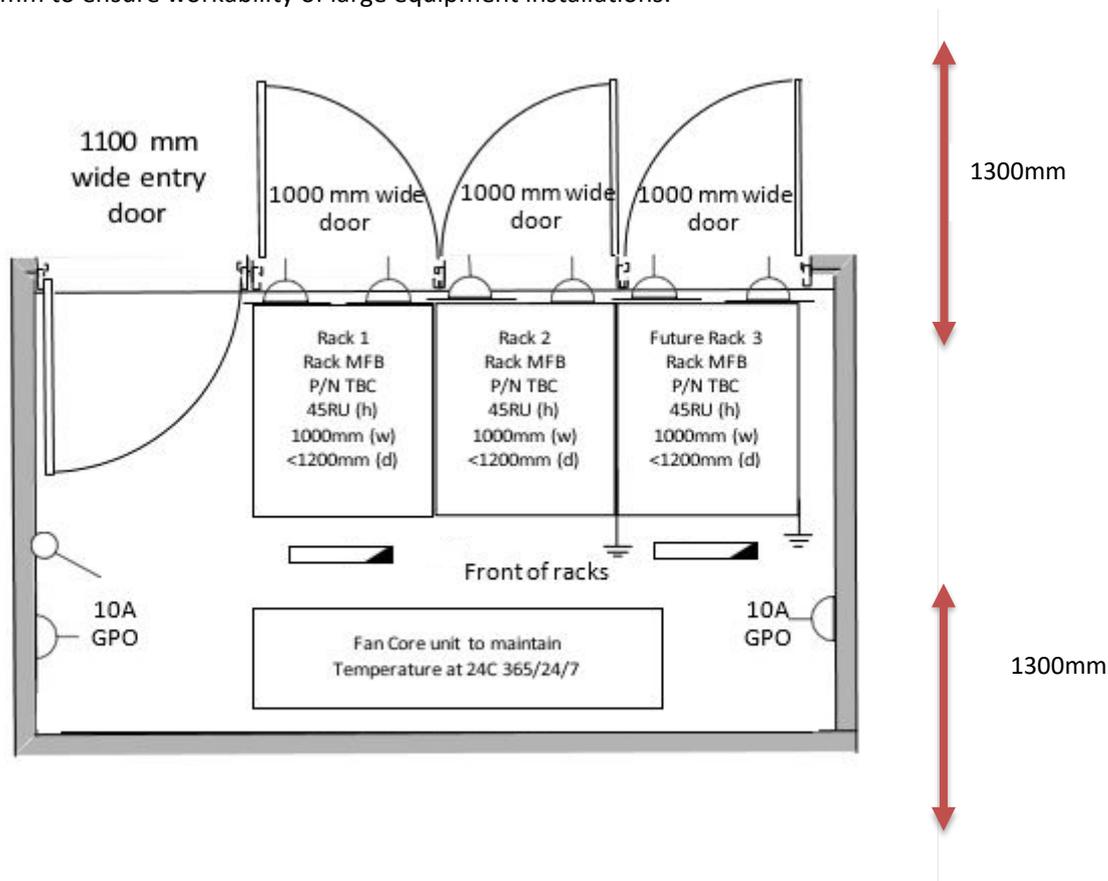
- 32 Amp isolator at each rack for hard wired UPS if no central UPS.
- Two (2X) 15amp dedicated and surge protected captive Clipsal outlet above and at the back of each rack.
- One (1) 10 A GPO for other use as indicated.
- All Room Dimensions are inside measurements.

Services - no other services are to be installed within communication room.

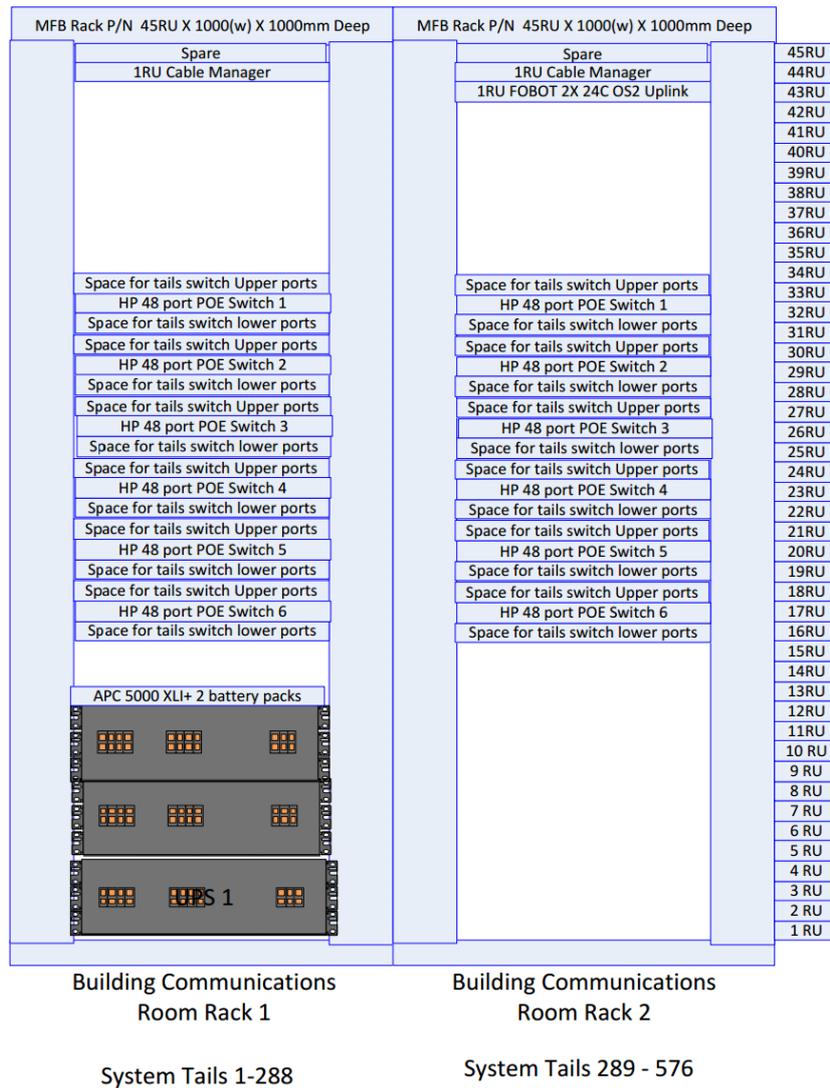
Room

- Inside Dimensions min. 5m X 3m
- Sealed, painted.
- Doors to be fitted with Raven or similar dust seals.
- All Pipes in room to be lagged and not above racks.
- Door min height 2250mm.
- Doors are not to obstruct rack face.
- Room Temperature: 23-24 degrees Celsius.

Minimum space from **back of rack to external area** and **front of racks to the back wall** of the room is 1300mm to ensure workability of large equipment installations.

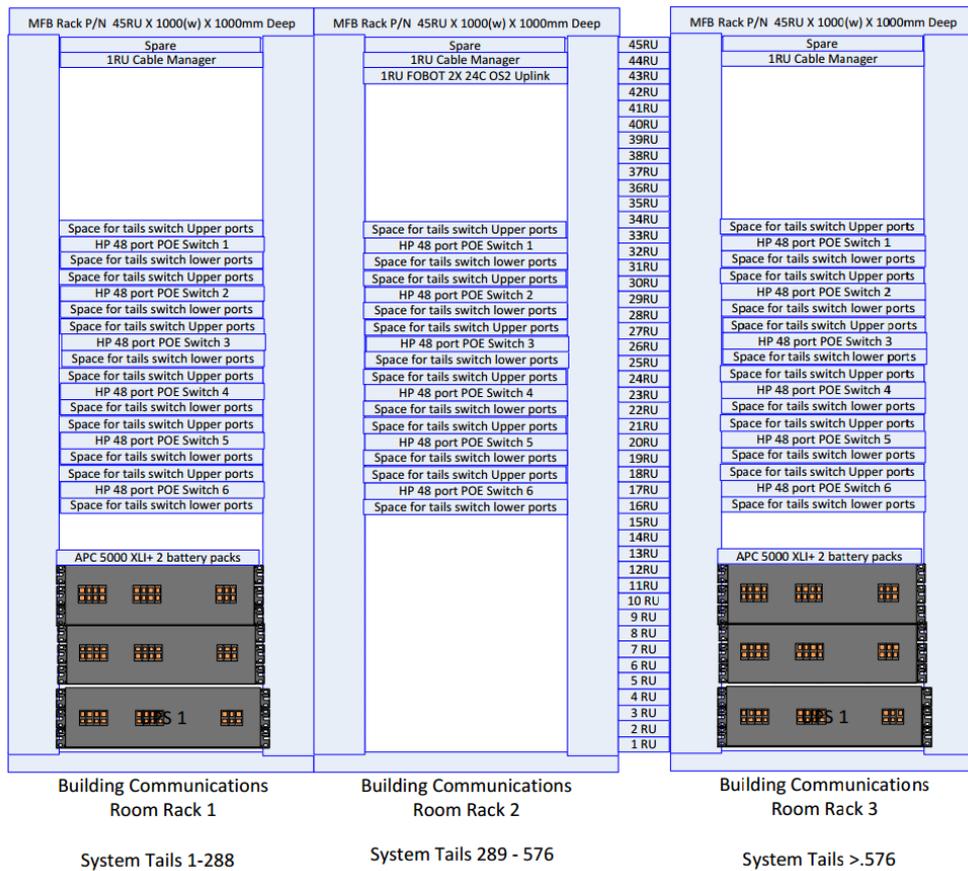


Appendix 10.A.5 Floor Communication Room Rack Layout (<600M2 FLOORS)



Note: Patch by exception is no longer a standard. Refer to ITS for additional information on how this is designed and section 10.4.2.5

Appendix 10.A. 6 Floor Communication Room Rack Layout (>600M2 to 2000M2 FLOORS)



Note: Patch by exception is no longer a standard. Refer to ITS for additional information on how this is designed and section 10.4.2.5

Appendix 10.A.8 Building Communications Room – Telephone Distribution Frame Layout

Wall mounted

- 2 X 500 Way profile
- Hard cover Record Folder
- 300 mm shoulder space each side of frame

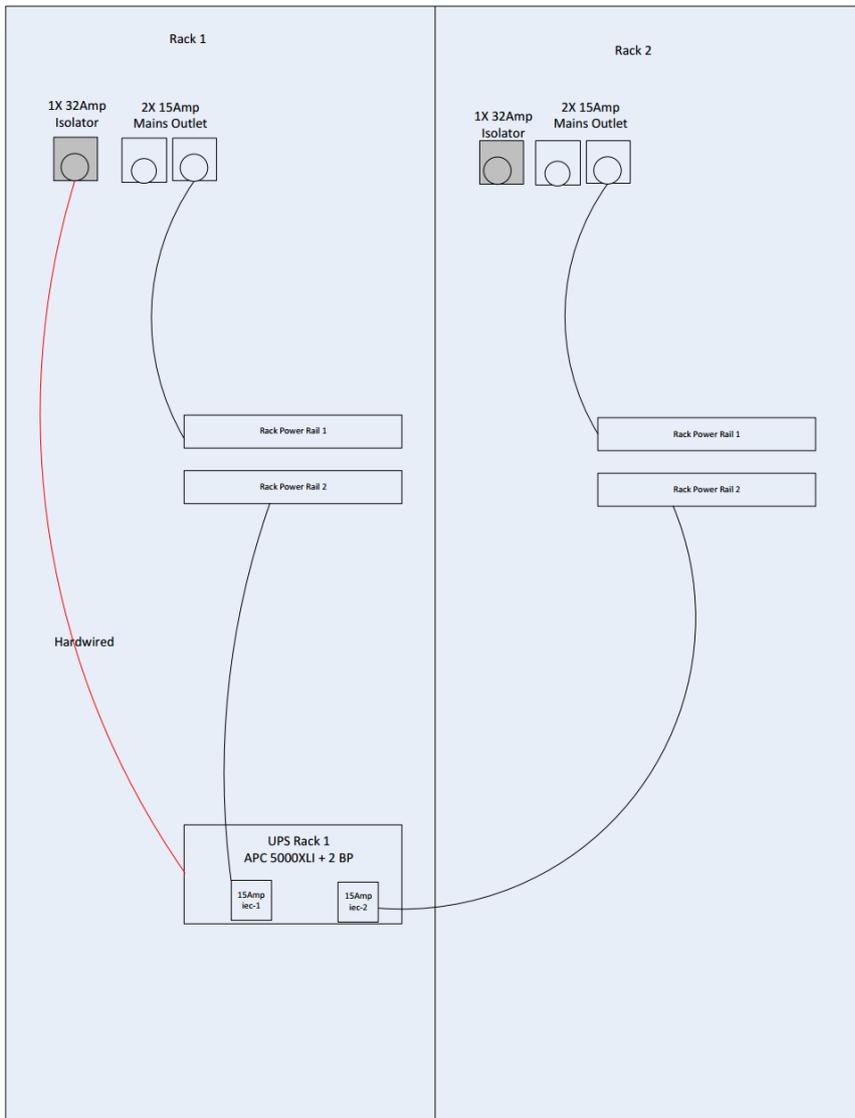
Vertical A

- 01-25 25 Pair cable from building MDF via Riser A
- 26-50, 25 Pair cable from building MDF via Riser B
- 51-75 25 Pair cable from RMIT main MDF via Riser A for PABX analogue
- 76-100 25 Pair cable from RMIT main MDF via Riser B for PABX analogue
- 201 – 500 10 Pairs reserved for cables direct to Tenant and other areas e.g. lift motor rooms etc .

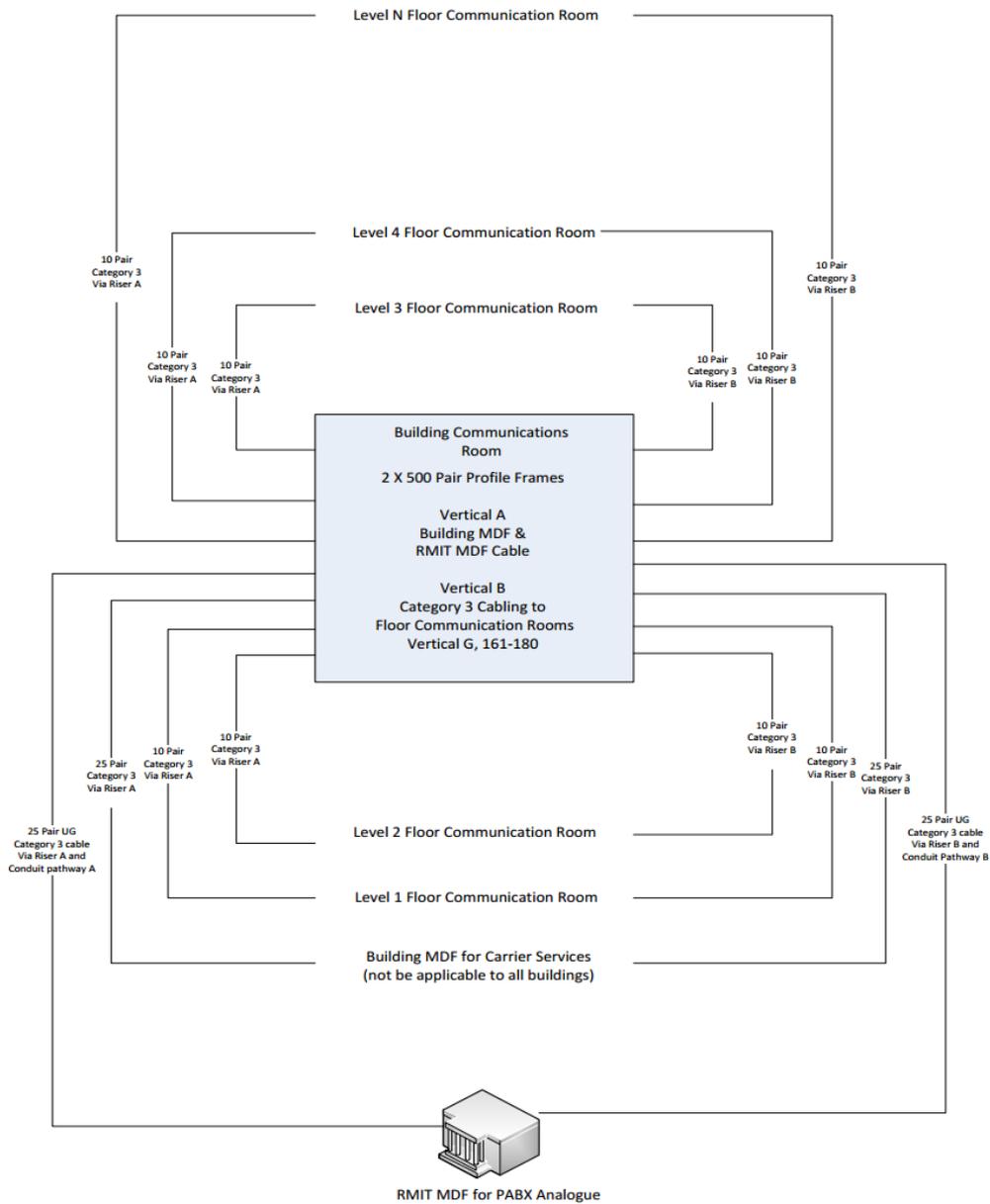
Vertical B

- 01-10 10 Pair to Level 1 Floor Communications Room via Riser A
- 11-20 10 Pair to Level 1 Floor Communications Room via Riser A
- 21-30 10 Pair to Level 2 Floor Communications Room via Riser A
- 31-40 10 Pair to Level 2 Floor Communications Room via Riser A

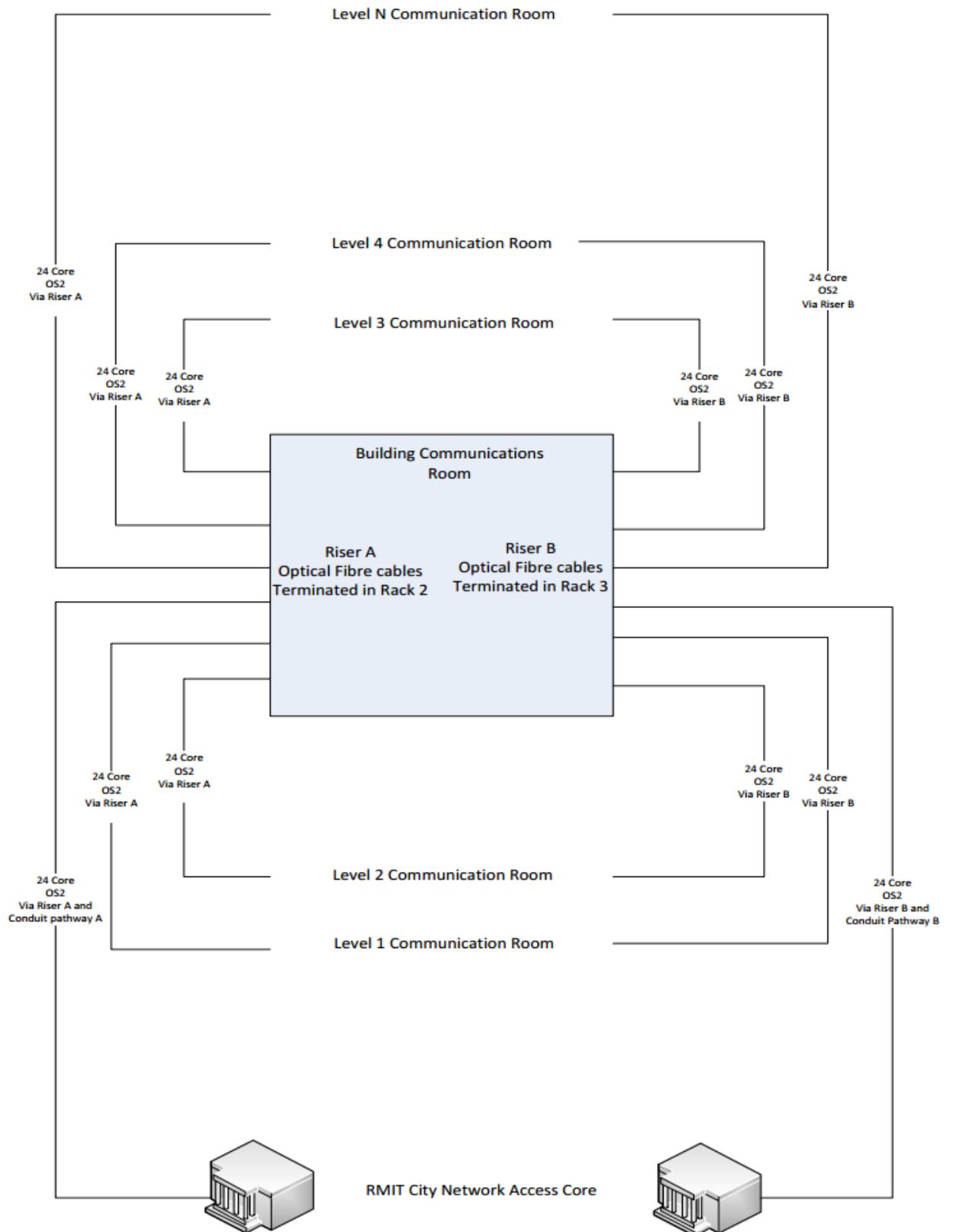
Appendix 10.A.9 Floor Communications Room UPS and Power



Appendix 10.A.10 Telephone Distribution Cable Schematic



Appendix 10.A.11 Fibre Optic Cable Schematic



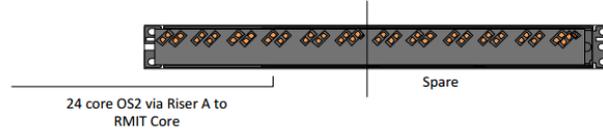
Appendix 10.A.12 FOBOT Building Communications room

Rack 2 Fibre Optic via Riser A

Rack 2, FOBOT mounted 42RU

Optical fibre to RMIT core via Riser A

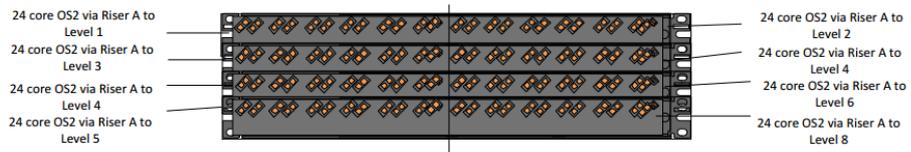
TE Part No RTC1G-LCA-48-PO-A24-PO-Z-OS2



Rack 2, FOBOT mounted 39RU-41RU

Optical Fibre Cables to Floor Communication Room by Riser A

RTCG 3RU panel -LCA-48-PO-A24-PO-Z-OS2

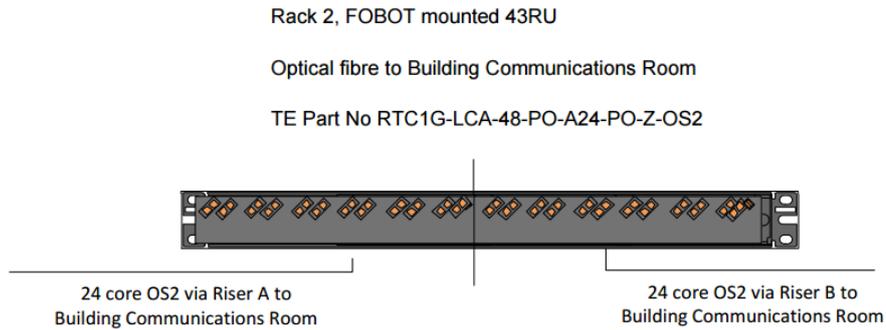


Etc

Rack 3 Fibre Optic Cables via Riser B

Same FOBOT and Rack layout as Rack 2 but in Rack 3.

Appendix 10.A.13 FOBOT Floor Communications Room



Appendix 10.A.14 eLocker Data Sheets

Link [eLockers](#) information and data sheets.

Appendix 10.A.15 Project Acceptance Form (Closure Form)

Template link: [Project Acceptance Form Template.docx](#)

Customer and Operational Acceptance Form

ITS Project ID	
Project Title	
ITS Project Manager	
PSG Project Manager	
Project Start Date	
Hypercare Period	
Project Closure Date	

Customer and Operational Acceptance for stated deliverables as per the Completion checklist acknowledges:

- Agreed deliverables/outputs have been delivered and handover to <Area> Operations team
- Paper and/or electronic copies of project documentation have been received
- Exceptions have been noted and accepted as per below
- Project will end as per agreed 'Project Closure Date'
- Any defects identified post the closure will follow the standard Service Request process.

ITS Deliverable Completion Checklist		
Project Deliverable/Output	Status	Date Completed
Communication room checklist complete <ul style="list-style-type: none"> • Infrastructure installed and configured 		
RMIT Network live <ul style="list-style-type: none"> • WAPs installed and configured 		
Audio Visual equipment active <ul style="list-style-type: none"> • Equipment installed, commissioned and configured • UAT complete 		
Non standard equipment (please detail)		
Serraview deployed		
eLockers activated		

Space counters live		
BMS live		
Workstations live and ready for use		
Printers live		
User Acceptance Testing complete		

Project Risk Acceptance (if any)

Network Infrastructure Recycling

Equipment Type(s) Including Model.	
Installation date	
Reason for Re-Use	
<p>Customer accepts the Network Infrastructure has not been upgraded as part of this refurbishment, and therefore accepts that if the devices failed, they will need to be replaced funded by _____.</p>	

Audio Visual Recycling

Equipment Type(s) – Including Model/Serial/Age	
Previous Location	
New Location	
Reason for Re-Use	
<p>Customer acceptance acknowledgement for terms & conditions listed below for AV equipment re-use:</p> <ul style="list-style-type: none"> • Equipment being re-used must adhere to current RMIT standards or can be uplifted to align with RMIT current standards. This assessment will be completed prior to approval of equipment being re-used and may incur additional costings to the project for required works (including but not limited to - hardware/programming etc) • For equipment that is being re-used, they must align with the below lifecycle guiding principles (outside of 2-year period) to ensure RMIT AV standards are met. • The end user will be liable for any additional cost(s) for re-used equipment that is no longer within the warranty period – this may include (but not limited to): <ul style="list-style-type: none"> - Repairs - Equipment faults - Equipment failure - Damaged goods 	

Project Governance & Approvals

Project Documentation	
Project Document Title	Location

Exceptions (Outline exceptions or residual items, owner and agreed position)		
Exception item	Confirmed Owner	Date Accepted

Approval/Endorsements

Endorsement is required prior to final Approvals. This is the acceptance of the content and overall intention of this document, including acceptance of any commitments described to successfully deliver the initiative. The approver, where relevant, also confirms that this document complies with relevant strategies, policies and regulatory requirements.

*Decisions (email/meeting minutes/physical signature) must be in PDF & embedded in the "Signature" column.

Version	Name	Role	Decision Type	Date	Signature*
		Networks Representative	For Endorsement		
		ITS Platforms	For Endorsement		
		ITS Portfolio & Planning Representative	For Endorsement		
		PSG Representative	For Endorsement		
		Project Control Group (PCG)	For Endorsement		
		Sponsor	For Approval		

Appendix.

1. Audio Visual End of Life (EoL) – Lifecycle Guiding Principles

Vision Lifecycle	< 7 years
Audio Lifecycle	< 11 years
Switching Lifecycle	< 9 years
Control Lifecycle	Control equipment to be exhausted to end of manufacturer support, within a 12-year period

- The above table outlines the guiding principles for end-of-life timeframes regarding AV equipment and their respective designations.
- Equipment that is being re-purposed as a part of a project MUST be outside of the 2-year window of the AV lifecycle guiding principles as provided in the table above. This is to ensure that our AV assets do not risk exceeding the lifecycle principles.
- AV equipment to be assessed pending age & use-case scenario to ensure suitability for re-use.

Appendix 10.A.15 Wayfinding Beacons

Note: Open action to investigate whether WayFinding is currently operational or being decommissioned and replaced with 'Campus M'.

- RMIT Campus Navigator is a Mobile app which enables Students/Visitors to navigate around Melbourne campuses to reach a point of interest inside buildings.
- Bluetooth beacon needs to be deployed in the building with the considerations detailed in the following guide.

Location Beacon Deployment Guide:

<https://docs.meridianapps.com/hc/en-us/articles/360040136073-Location-Beacon-Deployment-Guide>

Appendix 10.A.16 IP Allocation Spreadsheet Template

Link: <https://www.rmit.edu.au/about/our-locations-and-facilities/facilities/safety-security/building-and-safety-information#collapseOne>

CCTV

CCTV

IP Address	SUBNET MASK	DEFAULT GATEWAY	Device	Make	Model	Location RMIT Building -Level-room	MAC ADDRESS	Device supports DNS name	Data Outlet number	Device interface speed**	POE required Yes or No	DHCP Support	NTP configuraiton via DHCP options
			eg CCTV Camera 1										
			eg 2 CCTV NVR 1										

Provided by Buildings and contractors
Supplied by RMIT based on requirements provided

**if NIC interface speed is 1000mbps then autonegotiation will be used. For all other NIC speeds both NIC and switch port will need to be locked at NIC speed

Appendix 10.A.17 Patching Schedule Template

Link: [07 Patching Schedule_Template.xlsx](#)

Side of Rack	Patch Panel No	Patch Panel Point No	Switchport	VLAN	NEW SWITCHPORT
LEFT	A				
CENTRE / SEPARATOR					
RIGHT	A				

Appendix 10.A.18 PSG Checklist

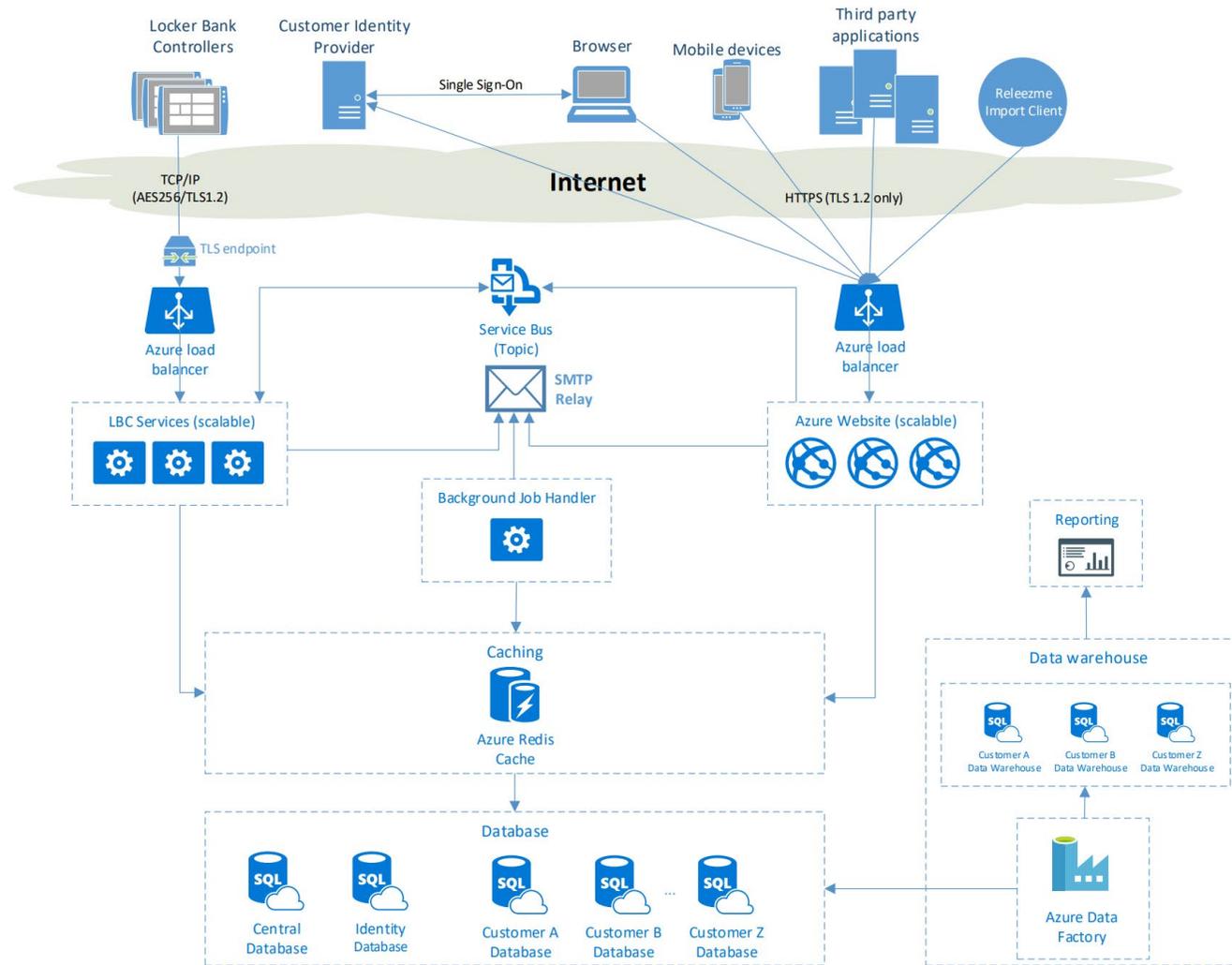
Below is a guide / checklist for the sections of the document that Property Services must review during the phases of PSG projects:

Index	Plan Phase (Feasibility)	Plan Phase (Schematic Design)	Deliver (Detailed Design)	Deliver (Construction)	Completion (DLP)
-	-				
10.1. Introduction	Review				All sections
10.1.1. Purpose					ITS Support where required
10.1.2. Exclusions					
10.1.3. Clarification, Omissions, Conflict of Information					
10.1.4. No Substitution of Parts					
10.1.5. Standards & Regulations					
10.1.6. Authorities					
10.2. Communication Rooms	-	Size & Design the Comms room (& router room if required)			
10.2.1. General Requirements	-	Size & Design the Comms room (& router room if required)			
10.2.2. Building Communication Room	-	Size & Design the Comms room (& router room if required)			
10.2.3. Floor Communication Room	-	Size & Design the Comms room (& router room if required)			
10.3. Racks	-	Confirm rack capacity / power & fibre requirements			
10.3.1. Rack Standard	-			Order racks	
10.4. Network Cabling	-	Confirm cabling requirements			
10.4.1. General Cabling Requirements	-	Review cabling requirements for input in to designs			
10.4.2. Optical Fibre	-	Fibre			
10.4.3. Horizontal Cabling	-	Horizontal			
10.4.4. Unshielded Twisted Pair (UTP) Cabling	-	Cable standards			
10.4.5. Patch Cables	-	Patch cable requirements			

10.4.6. Category 3 Telephone Cabling	-	Telephony cable requirements			
10.4.7. Communication/Vertical Risers	-	Riser cabling			
10.4.8. Building Distribution Frame (BD)	-	Building Distribution Frame (BD)			
10.4.9. Building Lead In, Pits, Pipes	-	Building Lead In, Pits, Pipes			
10.5. Wireless Access Points	-	Confirm Wi-Fi requirements & WAP locations (PSG to provide floor plans for predictive survey to ITS)		Purchase devices	
10.6. Wayfinding Beacons	-	Confirm Wayfinding Beacon requirements		Purchase devices	
10.7 Serraview	-	Confirm Serraview requirements - licensing, cabling/ config		Purchase devices	
10.8 Traffic/People counters	-	Confirm people counter requirements - cabling & procurements		Purchase devices	
10.9. ELockers	-	Confirm requirements - quantity, space requirements, power & data		Purchase devices	
10.10. Electronic Access Control	-	Confirm requirements - quantity, space requirements, power & data		Purchase devices	
10.9 End User Technologies	-	Confirm EUT requirements - PCs, lease/purchase etc. Add to cabling and power requirements		Purchase devices	
10.7. Physical Server Applications	-				
10.8. Labelling	-	Add labelling requirements to design and tender docs		Complete ITS labelling requirements	
10.9. Telephony/VoIP	-	Confirm telephony requirements - handsets and cabling		Terminate any telephony cabling (ITS to installed handsets)	
10.9.1. Handsets	-				

10.9.2. Analogue Telephone Distribution Cabling	-	Wireless solution utilised for all lift & fire panels.			
10.10. Minor Augmentation or Partial Renovation < 20% Of Existing Floor Area	-	Confirm floor space % under renovation			
10.10.1. Overview	-	Review section based on %			
10.10.2. Floor Communication Room	-	Review section based on %			
10.10.3. Telecommunication Outlet (TO) Identification	-	Review section based on %			
10.11. Documentation	-			Complete and hand over all as built and ITS required documentation	
10.12. Handover & Acceptance Testing	-	-		Complete ITS handover and remediate any defects	
10.12.1. Handover	-	-			
10.12.2. Certification and Guarantee	-	-			
10.13. Decommissioning	Confirm what equipment & services that need to be removed / decommissioned	Confirm what equipment & services that need to be removed / decommissioned		Physical decommission / removal	

Appendix 10.A.19 Releezeme Cloud Architecture (eLockers Solution)



Locker Bank Controllers

- A proprietary protocol is used which works on TCP/IP (OSI level 4) and is not HTTP based (OSI level 7). This type of communication must be allowed on firewalls to be initiated outbound i.e., contact to Releezme services is always initiated by an LBC and never from the services. Also, the TCP/IP session is retained as long as possible to allow 2-way communication between LBC and Releezme services.
- Either a fixed IP address or a dynamic IP address via DHCP is used.
- DNS lookup is required for LBC3's.
- An AES256 key is regenerated by controller upon each connection. LBC2's only communicate with an AES256 encryption. LBC3's use TLS 1.2 on top of the AES256 encryption.
- Authenticating proxies are not supported.
- Customer firewalls must allow the IP addresses and DNS as mentioned below depending on the region that they connect to.

Communication IP addresses Europe:

- IP address 23.97.164.250 on port 80.
- DNS name 'capi.releezme.net' with IP addresses 137.117.195.253 and 52.169.161.189 on ports 80 and 443.

Communication IP addresses Australia:

- IP address 13.75.147.240 on port 80
- DNS name 'capi-au.releezme.net' with IP addresses 52.187.233.91 and 40.127.68.208 on ports 80 & 443.

Note: port 80 configuration in a firewall is **only** needed in case one or more LBC2's are part of the installation.

Import Client

- Import Client Application is installed on a customer server and used to transfer locker users from customer data sources to Releezme.
- Note: alternatively the Releezme SCIM API can be used.
- Import client supports one-way synchronisation only, i.e., it can only take data from the data source and push to Releezme, it can however not read back from Releezme.
- Import client connects to private import API in Releezme.
- See document RZM_072.SRS_IMPORT_SYSTEM_REQ for system requirements.
- See document RZM_123.SAD_IMPORTCLIENT_INFRA for detailed Import Client infrastructure.
- Support data sources: CSV, Active Directory/LDAP(S), Azure Active Directory, Table/view in MS SQL Server

SCIM API Integration

- The SCIM (System for Cross domain Identity Management) API is a REST based API which implements the SCIM standard as written in <https://tools.ietf.org/html/rfc6585> and <https://tools.ietf.org/html/rfc7643>.
- The SCIM API allows for create, read, update and delete operations on locker users, and it allows read-only operations on locker groups.
- Badges are supported.
- Can be used instead of the Import client, but it requires an integration implementation by the customer in case existing software does not implement the SCIM API.
- The SCIM API is for server-to-server communication and authentication is based on OAuth2 with password and refresh grants, i.e., resource owner password flows.

Websites

- All websites are accessible by HTTPS with TLS 1.2 or higher only. Any HTTP request is automatically redirected to HTTPS.
- The Releezme Mobile app only supports devices allowing TLS 1.2 or higher as default, i.e., devices using Android 4.4 or newer are supported and Apple devices with iOS version 9 and newer are supported.
- Configuration website supports Internet Explorer 9 or newer and recent Chrome, Firefox, Safari browsers. Optional two-factor authentication via email is supported for configuration website logins.

Public website/API URL's Europe:

- Configuration website: www.releezme.net
- Reporting API: reporting.releezme.net
- Identity Server: identity.releezme.net
- System API: sapi.releezme.net
- SCIM API: scim.releezme.net

Public website/API URL's Australia:

- Configuration website: au.releezme.net
- Reporting API: reporting-au.releezme.net
- Identity Server: identity-au.releezme.net
- System API: sapi-au.releezme.net
- SCIM API: scim-au.releezme.net

Single Sign-on

- Single sign-on is supported via WS-Federation and SAML2.
- SAML2.0 is also supported for the Okta SSO service (<https://www.okta.com>)
- Customer side configuration document RZM_102.MAN_SSO_CUSTOMERSIDE_CONFIGURATION describes ADFS (Server 2012/2016), Azure Active Directory and Okta SSO.
- For customer side usage see document RZM_104.MAN_SINGLE_SIGNON.

Email

- Emails from Releezme are sent through Mailjet (www.mailjet.com), which is used as an SMTP relay.
- SPF and DKIM are enabled.
- Optional two-factor authentication via email is supported for configuration website logins.

System API Integration

- The System API allows for customers to integrate their first-party or a third-party application, such as a building management application.
- Several integration levels are supported: System Status for basic read-only information of the system, Personal Locker Control for locker user integration (similar to the Releezme app), System Locker Control for full system level operation of the system and PIN code locker functionality.
- The System API is for server-to-server communication and authentication is based on OAuth 2 with password and refresh grants, i.e., resource owner password flows.
- See RZM_085.SDD_SAPI_INTRO for an introduction of the System API. Detailed information requires an NDA.

Appendix 11: ITS Revision Updates

No.	Date	Version	Section	Request / Change	Updated by	Completion date
11A	27-11-23	V.12	10.17	Request: Include additional information on eWaste. Change: Additional information included on eWaste procedures & Vendors.	Madison Turner	17-04-24
11B	27-11-23	V.12	10.10.3	Request: 1. Dot points re laminate bench-top should be removed as it is information that is outlined in the Furniture Standards and should not be duplicated 2. Dot point re 800mm usable bench-top depth should be removed as it is a spec that is outlined in the Furniture Standards (as 850mm) and should not be duplicated. Change: Actioned as per above.	Madison Turner	17-04-24
11C	06-05-23	V.12	10.A.3	Request: Include temperature control outlined for Floor Communication Rooms. Change: Temperature included, refer section '10.3.1.4. Cooling'	Madison Turner	17-04-24
11D	13-Nov-24	V.12	10.5.1.3	Request: Include Cat6a model specification Change: Updated section 10.5.1.3 to reflect the above.	Madison Turner	17-04-24
11E	13-Nov-24	V.12	10.5.5	Request: Include cable model specification <ul style="list-style-type: none"> • Inclusion of 'Model (1.5M): 28 Gauge Cat 6A leads, part UTP28X1.5MBU' • Inclusion of cable organisation rack layout image • Inclusion of cable cm length • Inclusion of sample panel numbering • 	Madison Turner	13-11-24
11F	13-Nov-24	V.12	10.5.8.3	Change: Internal team allocation	Madison Turner	13-11-24
11G	13-Nov-24	V.12	10.8	Change: Update RMIT contact	Madison Turner	13-11-24
11H	13-Nov-24	V.12	10.10.2	<ul style="list-style-type: none"> • Inclusion of Audio-Visual subheading with information on how to log new initiatives internally. • Inclusion of order form for padlocks 	Madison Turner	13-11-24
11I	13-Nov-24	V.12	10.10.3	Inclusion of Staff PC setup information	Madison Turner	13-11-24
11J	13-Nov-24	V.12	10.10.4	Inclusion of printer's subheading	Madison Turner	13-11-24
11K	13-Nov-24	V.12	10.13	Updates to Telephony/ VIOP	Madison Turner	13-11-24
11L	13-Nov-24	V.12	10.14	Inclusion of information on existing stacks	Madison Turner	13-11-24

11M	13-Nov-24	V.12	10.17	Inclusion of information on decommissioning printers	Madison Turner	13-11-24
11N	13-Nov-24	V.12	10.18	Inclusion of information on eWaste	Madison Turner	13-11-24
11O	13-Nov-24	V.12	10.A.17	Inclusion of patching schedule template	Madison Turner	13-11-24