Monash University

Communications Cabling Manual

(Version 27)

Communications & Networks
eSolutions
Monash University

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Note: This Manual and the ideas behind it have evolved over time. It has not always been fruitful to update all the oldest sections to reflect changes. Hence if there is inconsistency between two sections of the Manual, the newest section takes precedence.

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The following checklist represents the minimum requirements for the installation of cabling & equipment for telephones and data cabling in any buildings to be constructed or modified at Monash University Campuses.

These cabling specifications must be complied with before any Monash University Data & Voice Network equipment will be connected.

2. Minimum cabling requirements

A. The Telecommunications cabling must meet the ACMA specifications as detailed in The Customer Premises Cabling Manual
B. The Data Cabling and termination shall be in accordance with Australian Standard, Premises Wiring AS3080.
C. All cable runs must be continuous and without splices.
D. All skirting ducting shall be Moduline CFC 50150 or equivalent
E. Where cabling is to be enclosed in a solid wall, the cables should be installed in a conduit to facilitate the addition and or removal of cables in the future.

3. General Specifications Checklist

A. **Telephone cable**
   1. Voice over I.P Solution (Horizontal Voice Cabling NOT required)

B. **Data cable**
   1. Cable: CAT6A - UTP.
   2. Terminating method: blue colored PANDUIT CAT-6A RJ45 socket with Green/White-1; Green-2; Orange/White-3; Blue-4; Bl/Wht-5; Orange-6; Br/Wht-7; Brown-8;
   3. Each data point should have all four pairs assigned and terminated as per AS 3080

C. **Labeling of cables**
   1. Telephone & Data plates
      a. On the face plate a unique number indicating for:-
         Data & Voice
         The location of cable termination on the Patch Panel i.e. A3, B24.
      b. Frame records to reflect the same markings.

D. Fibre Optic Cable Installations

1. Grade of cable

The cable shall conform to AS 3080 10.3.4.

2. Labeling

Name of the Rack & location within the rack at other end. e.g.
<campus>-<building>-<room>-<rack number>
CLAY-28-202-RK1 A1-A12mm, A13-A18sm.

3. Terminations

LC duplex connectors (LC-D) are to be used. [AS 3080 9.4] Terminations to be housed in an approved enclosure. A generous surplus of the Fibre cable is to be coiled up at the termination sites (minimum diameter of coil 600 mm). A five meter surplus is suggested.
Fibre to the desktop is to terminate on LC duplex connectors.

4. Colour code of Terminations Panels

62.5 Micron Multimode	Black
OM3 50 Micron Multimode	Green
Single Mode	Yellow

All single mode O/F patch cords should be yellow.

5. Components List

Items	**Brand/Part No.**
Fibre Enclosure	AFC RB-1CP1CT-BB-2L 1RU 24F LC SM Loaded Sliding Enclosure
OM3 50/125 6mm/6sm Tight Buffered Composite Fibre	Belden, General, Pirelli, Panduit
OM3 50/125 6mm/6sm Loose Tube Composite Fibre	Belden,General, Pirelli, Panduit
OM3 50/125 12mm/12sm Loose Tube Composite Fibre	Belden,General, Pirelli, Panduit
OM3 50/125 24mm/24sm Loose Tube Composite Fibre	Belden,General, Pirelli, Panduit
Patch Leads	Andersons, AFC,
Organiser for 36 Core Enclosure	Panduit CMPHF1
Organiser for 72 Core Enclosure	Panduit
Types/Sizes of Cable to use	
Use	Minimum Cable to Use
Between Racks within the same building which are greater then 90 metres apart	OM3 50/125 12mm/12sm
Incoming feed to small Building <20 Data Points	12SM Loose Tube Composite Fibre
Incoming feed to medium Building <200 Data Points	24 SM Loose Tube Composite Fibre
Incoming feed to large building or Core network Location >200 Data Points	24 SM Loose Tube Composite Fibre

4. Data Cabling

A. Unshielded Twisted Pair

Grade of cable

Approved Cat 6A cable

1. Terminations

Internal cabling: segment of UTP Ethernet may not exceed 90 metres under any circumstances. Approved UTP CAT-6A cable

2. Labeling

As per 3. c

5. Wireless

All New Buildings and Major Renovations will be wired for full wireless coverage. Locations of the Wireless points will be nominated by the Monash Site Engineering Manager

6. Buildings

A. Building to Building

1. Cabling connections between buildings shall be no less than fibre with 24 cores of single-mode. Loose tube construction,
2. The points of termination of the Fibre cable shall be made at a designated location and shall use the standard Fibre termination with LC style duplex (LC-D) connectors. Enclosures for fibres are to be as per Material List.
3. Fibre is to be laid in a white PVC conduit of not less than 50 mm internal diameter. A draw wire is always to be retained in these conduits.
4. Pits must be provided where the conduit changes direction by 30 degrees or more. Pits are also to be provided at intervals of no more than 50 metres.
5. The path of the conduit shall be completely documented and lodged with ITS and the Buildings and Premises Branch.

6. Cables Entering a Building

A. The point of entry should be inaccessible to the public. Where any such entry is at external ground level, it shall be appropriately protected.

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7. Riser Backbone cables (UPLINKS)

A. Supply and install
6 single CAT-6A uplinks
12 Core Single Mode fibre cable
to every floor distribution frame/rack, from the Main Building Rack. Location indicated on drawings provided.

B. All links must be clearly marked on both ends, including the link number and rack ID. E.g.: **U/L 7-12 to CLAY-28-202-RK1**

C. Labeling. See 3. c.

8. Cabling in Corridors

A. All cables in corridors should be located on a tray that holds only telephone and data cables. Data and telephone cable should be no closer than 100 mm from any power cabling distribution tray, as per AS 3084.

B. All cables not located on a cable tray shall be secured with catenary wires and may never foul ceiling tiles or other plant located in the ceiling space.

9. Moduline ducting in offices

A. The preferred product is Moduline CFC50150. The cover panels shall be fixed in place with the maker's recommended hardware.

B. Cabling Distribution to Offices from Corridors: The maximum length of UTP cables from the telecommunication rack to the outlet shall be 90 metres.

C. The Moduline ducting placed around the exterior walls for office access must have entry points available, a maximum of ten cables (five data, five voice) in any section of duct is suggested to provide the shortest path and reduce congestion within the ducting.

D. Moduline cover plates are not to be obscured or fouled by partition walls

10. Staff Offices

A. All Ethernet cables shall Cat 6A

B. Every desk/workstation shall have a minimum of one data UTP cable. Open plan office environments shall have a minimum of one data UTP cable run to each anticipated position of desks.

C. Printer/Photocopy rooms/locations should have a data UTP point.

D. Power: A minimum of three double GPO's to be provided for each desk/workstation with two of those for the exclusive use of IT equipment. If additional data points are installed greater than the minimum (2) then additional GPOs should be supplied.

11. Computer Laboratories

A. A CAT6 UTP cable from each workstation is to be run to the appropriate communications wiring rack.

B. All labs shall use Moduline ducting for Power and Data connections.

12. Plant/Machinery Rooms

A. A minimum of one run of UTP Data and telephone wire shall be run between every plant/machinery room and the nearest appropriate Comms/Data Rack. If a plant room be located on the roof level, it is acceptable to run the line to the uppermost level rack.

13. Lecture Theatres

Teleteaching Lecture Theatre

A. The front Comms/Data/Equipment Rack
4 x Data Points

B. Rear Control Room
4 x Data Points

Standard Lecture Theatre

A. The front Comms/Data access Point
4 x Data Points

B. Rear Control Room
4 x Data Points

14. Seminar Room

A. Shall be wired with a minimum Four data

15. Layout of communications/data wiring cupboard

A. There should be a minimum of one wiring rack [FD] for each floor. They should be large enough to contain all termination hardware for telephone/data wiring, and computer networking equipment.

B. One floor (usually ground) should be designated for a building distribution [BD] for a building switch and termination of inter-building fibres.

C. Required minimum size for ground floor 2000mm wide, 1000mm deep. Other floors 1500mm wide, 900mm deep. Must extend from floor to ceiling with access to the ceiling space for that floor.

D. The riser should be either one and the same or adjacent with easy access for cables.

E. Supply and install two 20 Amp Flat pin Clipsal 56 Series outlets into the bottom of each rack; Each outlet should be connected to a separate circuit

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breaker on the switchboard. The rack itself should have a suitable protective earth connection.

F. The telecommunications/data racks/cupboards shall be keyed alike S63 locks for Cupboard Doors with tamper proof latches.

G. They shall be keyed differently from electrical cupboards.

H. Every cupboard shall have a 20W fluorescent light fitted, unless a suitable light is located directly outside.

I. The top and bottom entry points should be at the extreme left-hand side of the cupboard. The entry ports should be sealed against fire with fire resistant pillows; they should **not** be sealed with cement. Burndy APT cable tray of 300mm width to be secured to the left-hand back wall of the cupboard.

J. All data cable including riser cables should be terminated on a RJ45 patch panel.

K. Patch panels and computer equipment should be mounted in correctly sized racks.

L. All types of communication and data rack or frame, should be securely and rigidly mounted to it designated location. To ensure frame stability the fitting of support bars and braces is recommended.

M. Where there are two or more network racks on one level/floor, the data port identification shall be unique between racks.

N. **Do not use the letters "O" and "I" for data port identification.**

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16. Racks

Racks sizes

A. The racks should be APC as per Material Summary

    i. Supply and install two 20 Amp Clipsal 56 Series outlets – Flat pin into the bottom of each rack; Each outlet should be connected to a separate circuit breaker on the switchboard. The rack itself should have a suitable protective earth connection.

B. Cable tray size, minimum 200mm wide, should be provided to secure all incoming data cables.

C. The customer data cables shall be terminated on a HD 48 way CAT-6A UTP RJ-45 Panduit patch panels 1RU, with a patch cord minder below each patch panel. (If a low density 2 RU 48 Port panel is installed the works will be rejected)

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D. Rack Layout

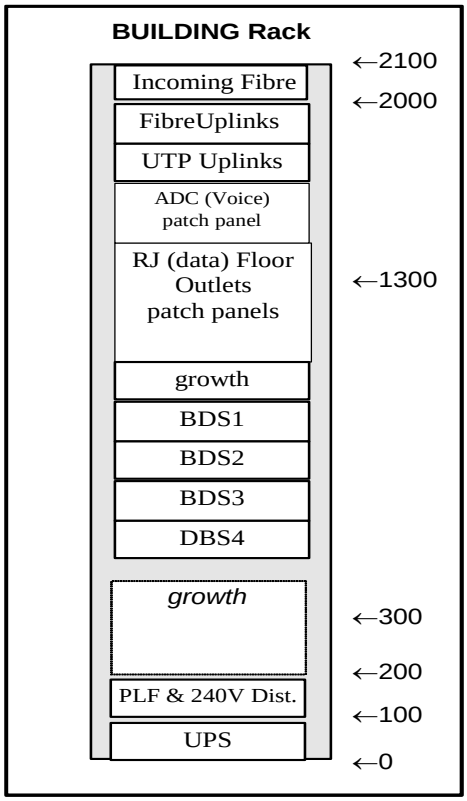

Figure 1: BUILDING Distribution – single equipment rack layout

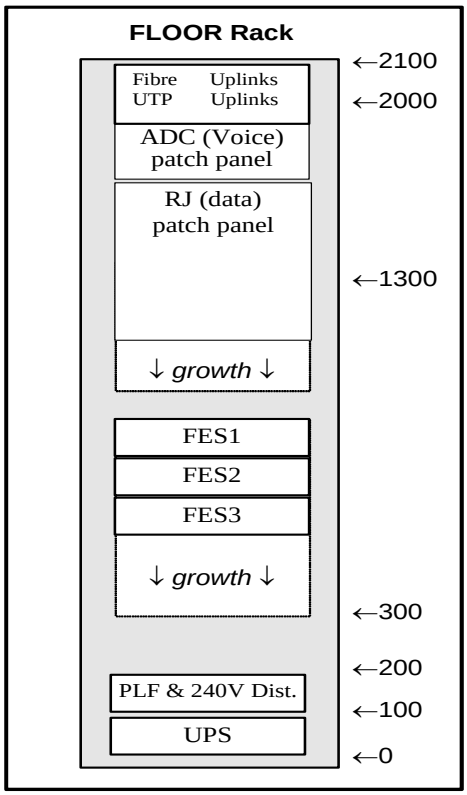

Figure 2: FLOOR Distribution - single equipment rack layout

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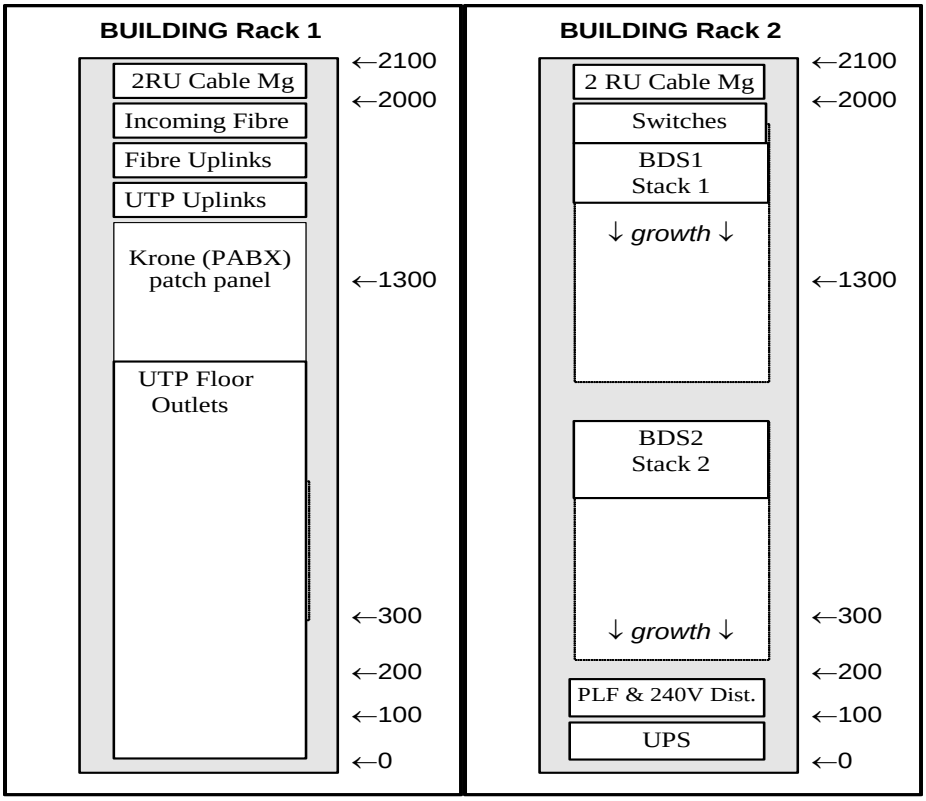

Figure 3: FLOOR Distribution - equipment rack layout using two racks

E. Rack Sizing Table

Use	Data points on floor	Minimum rack size	Models
Floor Rack	300 or Less	48RU 800 W x 1000 D 1 Rack	APC Easy Rack, 48U, Black 2258H x 800W x 1000D mm ER8802
Floor Racks	300 or more	48RU 800W X 1000 D 2 Racks	APC Easy Rack, 48U, Black 2258H x 800W x 1000D mm ER8802
Wall mount	48 or Less	18RU 600W X 600D	

17. Uplinks

A. Supply and install six single CAT-6A uplinks, 12 Core Single Mode to every floor distribution rack, from the Main Building Rack. Location indicated on drawings provided

B. All links must be clearly marked on both ends, including the floor number and the link number like 2 - 3 (second floor link number 3).

18. Material Summary

Plates	Clipsal 2000 Series (White Preferably)
RJ45 Panels	Panduit 48 Port High Density 1RU (CPP48HDWBLY) If ANY other Panels are used the job will be rejected (This includes Panduit 24 Port Panels)
RJ45 Connectors (Data) Cat 6A	Panduit Smart Jack (Blue) Field Outlet Panduit Smart Jack (Black) Patch Panel
Cable Organizer	Panduit CMPHF1
Rack – 48RU 800W X 1000D	48RU X 800W X 1000D APC Easy Rack, 48U, Black ER8802
Rack – Wall Mount Only to be used with less than 48 Points	18RU 600W X 600D
Floor Cable Data - Cat 6A	Approved Cables covered by Panduit's Certification Plus Warranty
Uplink UTP Data - Cat 6A	Approved Cables covered by Panduit's Certification Plus Warranty
Floor Cable Comms - Cat 6A	Approved Cables covered by Panduit's Certification Plus Warranty
ADC Patch panel 50 Port Voice	ADC Part No. 7022 4 001-50
Communication Modules	Krone modules (No.6089 1 121-02)
Fibre Enclosure (24 Cores)	AFL RB-1EH1EK-BB-2GG 1RU 24F LC SM Loaded Sliding Enclosure
Communications Rack Mounts	Krone 19" rack mount (No. 6450 1 008-00)
Fibre Cables	12 Core Multimode 50micron OM3 12Core Singlemode 24 Core Singlemode

19. Testing

A. Data Cables:

All Data points and uplinks must be tested Cat 6A specification depending on the cable run with a Fluke DSP Cable tester with full detailed and summary test report provided in an electronic format.

B Communication Cables

All terminated pairs to be continuity tested.

C. Fibre

All Fibre cores to be tested with DB loss results provided.

D. All test results are to be supplied to the Network Site Engineering Manager

20. Certification

A. All telephone, data and fiber optic cable installation should be certified.

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So that the entire system meet the necessary level of performance specified in. AS 3080 (clause 7).

21. Documentation

A. The telephone documentation should be completed as per standard practice. It should include information pertaining to the unique identifier on each cable label. A main frame (MDF) book shall be used and left within the Riser/Cupboard/Rack.

B. The data documentation requires a floor plan showing the patch panel location for each of the data points and the test results from the Cat 6A testing in electronic format. Contractor shall consult with eSolutions Network Project Manager before commencing work to become familiar with eSolutions Documentation Standards.

22. UTP Patch Lead Colour Code for Gigabit Network

Colour	*Use*
Blue	In the field: "Basic" 10/100/1000 Mb Ethernet user service (BDS or FES user) In a computer room: Dedicated 10/100/1000 Mb Ethernet service (BGS host)
Red (Straight through)	1Gig Ethernet uplink (BDS –to- FES)
White	Voice Analogue
Yellow	Wireless
Green	Non Monash Service

23. Data Centre Material Summary

Plates	Clipsal 2000 Series (White Preferably)
RJ45 Panels	Panduit 48 Port High Density Angled 1RU (CPPA48HDEWBL Panels)
RJ45 Connectors (Data) Cat 6A	Panduit Smart Jack (Black) Patch Panel
Cable Organizer	Panduit CMPHF1
800mm W Rack	Panduit CN1 and CN2
Floor Cable Data - Cat 6A	Approved Cables covered by

	Panduit's Certification Plus Warranty
Uplink UTP Data - Cat 6A	Approved Cables covered by Panduit's Certification Plus Warranty
Floor Cable Comms - Cat 6A	Approved Cables covered by Panduit's Certification Plus Warranty
ADC Patch panel 50 Port Voice	ADC Part No. 7022 4 001-50
Communication Modules	Krone modules (No.6089 1 121-02)
Fibre Enclosure (24 Cores)	AFC RB-1CP1CT-BB-2L 1RU 24F LC SM Loaded Sliding Enclosure
Communications Rack Mounts	Krone 19" rack mount (No. 6450 1 008-00)
Fibre Cables	12 Core Multimode 50micron OM3 12Core Singlemode 24 Core Singlemode

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