IT Network Infrastructure Standard

Printed copies are for reference only. Please refer to the electronic copy in the Policy and Procedure Manager (PPM), the electronic policy management system (EPMS), to ensure you are referring to the latest version.

Policy Supported:

IT Infrastructure Policy

Audience:

Staff, Students, contractors

Objectives:

- Provide the minimum installation and operational requirements for Murdoch University cabling systems.
- Provide the minimum installation and operational requirements for Murdoch University Wireless networks.

Standard:

1. Wireless Network Infrastructure Requirements

1.1. All Wireless Network installations must conform to the safety regulations defined by the University; this is particularly important where installations are on or near building materials containing asbestos.

1.2. To minimise tampering with the access point, and to maximise antenna efficiency, access points must be mounted out of reach and secured to the mounting surface.

1.3. Only access point hardware provided by Information Technology Services is to be installed on university grounds.

1.4. Access points must meet the requirements outlined in the following table:

Requirement	Details
RJ45 Outlet	The outlet terminates to a standard RJ45 distribution panel at the same enclosure where the network switch is located. The outlet provides a network connection and power over Ethernet.

2. Fixed Network Infrastructure Requirements

2.1. Any individual, group or organization involved with the installation of cabling infrastructure at Murdoch University must ensure that:

2.1.1. All cabling work conducted is consistent with regulatory and legislative obligations including relevant Australian and Western Australian Standards; and

2.1.2. All relevant stakeholders are consulted prior to commencing cabling projects; and

2.1.3. Comprehensive audits are conducted on completion of cabling projects; and

2.1.4. Only cabling systems offering appropriate warranties are used; and

2.1.5. Warranty documentation for cabling infrastructure is kept up to date and that copies are provided to Information Technology Services.

2.2. Any conflicting information should be clarified with Information Technology Services. Any conflicting information should be governed by reference to the following documents:

2.2.1. Relevant Australian Standard; or

2.2.2. Relevant International Standards; or

2.2.3. This standard; or

2.2.4. Internal Instructions by Information Technology Services.

2.3. Must ensure that:

2.3.1. Where cabling is purchased as part of a major building project contracts between Murdoch University and the contractor/vendor are formed in compliance with AS4000 or AS2124; and

2.3.2. This standard is referenced as requirements in tender and contract documentation; and

2.3.3. All installers must be registered by one of the Australian Communications Authority (ACA) approved registrars; and

2.3.4. All installers have undergone appropriate induction; and

2.3.5. All installers must be selected in consultation with Information Technology Services.

2.3.6. All requests and purchases must comply with Australian and Murdoch University purchasing standards.

2.4. All new cabling installations must:

2.4.1. Adhere to a single certified system throughout a new building installation; and

2.4.2. Undergo certification tests prior to acceptance of work completed; and

2.4.3. Provide copies of certification tests to the Office of Information Technology Services; and

2.4.4. Comply with the installation specifications detailed in this standard.

3. Detailed Cabling and Building Space Requirements

3.1. The following table outlines detailed cabling requirements:

Cabling Type	Requirements
Horizontal Cabling	The required performance level for horizontal cabling is Class E permanent link, or channel, utilising Category 6 cable and connecting hardware. This is the general requirement unless compelling reasons exist to use a lower performing category of cable and connecting hardware: • Compliance testing for Class E installations requires a Level III tester as defined by the Standards Australia AS/NZS 3087. • All certification documents must be lodged with IT Services before outlets can be officially approved for operation. • Warranty provisions shall include on-site repair for a period of at least 1 year following completion of commissioning with a minimum defects liability of 15 years. • A defects liability period of 20 years is preferred.

The requirements for all outlets that radiate from a data enclosure associated with that building, or building wing are as follows:

- The cable pathway shall not exceed an overall length of 90 metres.
- Cable terminations will be made at Cat6 compliant High Density (1RU, 32 port) patch panels, fitted in a rack of appropriate size for the building.
- All conduits and ducts for building wiring shall be installed so that cabling is not exposed to moisture.
- Where multiple outlets are installed in a single room the minimum conduit size is 25mm per 6 x CAT6 outlets.
- Where ceiling spaces will not be available to provide future cable installations, spare conduits shall be installed. 1 x 25mm spare conduit shall be installed for every 2 offices.

Floor chases may be used where required, however the following requirements must be met:

- Minimum installation is 2 x 25mm conduits.
- 1 x 25mm conduit shall be installed for every 6 x CAT6 cables required.
- For each floor chase installed an additional spare conduit with pull cord shall be installed for future expansion.
- Audio/visual and data/phone cables should be installed in their own conduit.

Each outlet should be clearly marked at each end with a unique outlet number, and meet the following requirements:

- The wall plug numbering scheme is defined, managed and assigned by IT Services.
- The contractor shall obtain the above information from Information Technology Services at the time of installation.
- Unless otherwise specified by Information Technology Services, new outlets will be installed at a convenient point, adjacent to telephone and power services.

	• Some specialist applications may benefit from having fibre optic cable installed as the horizontal cable. • Support for such applications will be handled on an individual basis with direct consultation with Information Technology Services.
Backbone Cabling	• Backbone cabling shall be considered as any cabling that interconnects campus building ICT services together. Backbone cabling must meet the following requirements: • All backbone cabling for all data services shall be comprised of fibre optic cabling. • Copper cabling may be used in special circumstances. Earthing and surge protection shall be used for these circumstances. • Subject to application, cabling for telephone services may either be multi-core copper cabling, or optical fibre cabling, as advised by Information Technology Services. • Communication pits should be established at locations no greater than 70 metres apart or at any point where there is a change in direction. • Wherever possible communications pits must be aligned so that they are easily located • Communication pits should be located such that they remain permanently unobstructed (by landscaping, flowerbeds etc). • All backbone pathways shall be connected by 3 x 50mm conduits. • All major backbone pathways shall be connected by 3 x 100mm conduits. • Pathways between the backbone's entrance point into • the building and the entrance room must meet the following requirements: • Appropriate external conduits must be provided so that the proposed building can be connected back to the to the existing campus network infrastructure. • The building entrance rooms should be connected to the external data pit via 3 x 50 mm conduits (minimum requirement). • External data pits shall be inter-connected by 3 x 50

	mm conduits. • Bends on conduits entering the building from the cabling pit should have a bend radius of no less than 150 mm. • Each building shall have 2 entrance points and pathways to the entrance room. These entrance points should enter from different sides of the building to provide redundant paths. • These facilities shall be used for ICT services only.
Fibre Optic Distribution	Where computer conduits cross open ground, approved external grade single mode or multimode fibre shall be used and the following requirements must be met: • To minimise the possibility of damage due to mechanical stress on the cable, wherever possible fibres shall be reticulated in their own conduit and not with other building services. • Each fibre shall be tagged at each terminating fibre patch panel, and at every communications pit along the way. • Tags shall be made of durable material to resist weathering. • 12-core Single-mode fibre cable is the minimum recommended fibre capacity to all major buildings. Where conduits do not traverse open ground and therefore moisture is not a problem, the following requirements must be met: • Suitable loose sheath single mode multi-core fibre of the "external light duty loose tube riser fibre" will be used. • Where internal fibre is used to inter-connect groups of data enclosures, the fibre must be housed in physically continuous conduit. Each fibre shall be clearly tagged with a unique identification number, the fibre numbering scheme is managed by Information Technology Services. A unique fibre number can be obtained from Information Technology Services at the time of installation. All fibre pairs are to be clearly identified at each terminating patch panel. Fitted off fibres should comply with the following mechanical requirements:

	• Epoxy bonded SC connectors to be used for all single mode fibre terminations and ST connectors to be used for all multimode fibre terminations. • Each fibre termination is to be adequately reinforced and supported with the appropriate zero force sleeving. The fibre termination panel or enclosure should be fitted with strain relief bars, to support fibre patch cables. Where approved enclosures are used to house the fibre and termination, panels on the enclosure should be such that they are easily removed for inspection and maintenance of the fibre. All fibre patch panels shall be enclosed in a sliding tray or removed front panel, such that fibre outlets are not visible. Fibre loss and fibre transmission characteristics should conform to the appropriate Australian standards. New fibres will not be put into operation until the appropriate certification documentation has been lodged and approved by Information Technology Services.

3.2 The following table outlines detailed building space requirements:

Space	**Requirements**
Work Area	A work area is an office or area where staff will work. Work areas must meet the following standards: • For building areas where it is difficult to add additional telecommunication outlets at a later date (for example private offices), a minimum of 2 separate outlet locations should be provided in the initial design of the area. • They shall be located to offer maximum flexibility for change within the work area. (For example, on opposing walls in private office space.) • Telecommunication outlet locations should be co-coordinated with the furniture layout. • A minimum of 1 power outlet should be installed near each telecommunications outlet.
Telecommunications Room	The telecommunication room (also called a riser or distribution closet) shall be able to contain: • Telecommunication equipment. • Horizontal and vertical cable terminations.

	• Associated cross-connect cables. A telecommunication room shall be provided on each building level. The following requirements must also be met: • Additional rooms (one for each area up to 1000m^2) should be provided when the area to be served exceeds 1000m^2 or when the horizontal pathway distance to any work area exceeds 90m. • The telecommunication room shall be located as close as practicable to the centre of the area served. • Horizontal pathways should terminate in the telecommunication room located on the same floor as the area being served. • For security reasons telecommunication rooms shall only be used for ICT Services. • Each telecommunication room shall have a minimum total door opening width of 2000 mm, and a depth of no less than 1000 mm, the enclosure should be fully secured by 2 full height doors. • The floor level in the enclosure should be the same as the outer access area, so that equipment racks and equipment can be easily installed and maintained. • The proposed telecommunication room must be fully accessible from public areas. • All telecommunication rooms should be vented (or air-conditioned) such that internal temperatures do not exceed 30 degrees Celsius. • Concrete walls shall be treated to minimise dust. Finishes shall be light in colour to enhance room lighting. In multilevel buildings the risers shall be vertically aligned. The following requirements must also be met: • Appropriate sleeves or slots to be provided between each riser in a multilevel building. The requirement is 2 x 100 mm conduit.

Building Entrance Room	An entrance room is a space that includes terminations for backbone cabling into the building. It may also serve as a telecommunications room. Entrance rooms must meet the following requirements: • The entrance room has the same requirements as the communications room. • Each entrance room should have 2 entrance pathways connecting to different entrance points.
Equipment Room	An equipment room is a centralised space for the telecommunication equipment (e.g. network, AV and security devices) which serves users of the building, Any or all the functions of a telecommunication room or building entrance facility may be provided by an equipment room. The room should be of appropriate size to accommodate the required equipment and have a minimum internal area of 8m2.
Main Distribution Frame Room	An MDF (main Distribution frame) room is included as a requirement in a building process when one or more of the following design criteria need to be met: • Is the proposed location likely to be a major distribution point for multiple buildings? • Is the proposed location likely to be a primary distribution point for multiple campuses? • Is the space being regularly accessed by external suppliers for the maintenance of ICT equipment? • Will the space potentially be used to house third party ICT equipment? An MDF room may serve as telecommunications room and/or entrance room. The following requirements must be met: • Ease of access between internal and external connecting services and distribution equipment located in the MDF. • Adequate floor and ceiling access. • Raised floor where necessary. • Removable ceilings. • Adequate cable conduits between equipment racks within the room. • Allow for 100% expansion capacity within conduits

	to cater for future growth. • Emergency power to satisfy critical system requirements. • Controlled access to ensure that only authorised personnel gain entry. • Easily accessible at all hours during emergencies. • Air conditioned to a maximum 21 C degrees under all environmental conditions. • Adequately protected from the elements. Minimum room size 10m^2.

4. New Building Requirements

4.1. Prior to commencement of any new building projects, Information Technology Services will be provided with:

4.1.1. Details of the relevant Property, Development and Commercial Services Office (PDCSO) project officer responsible for project; and

4.1.2. A relevant University project account code to which agreed costs can be debited.

4.2. For all new buildings and extensions that do not currently have data, telephone and other communication services, the current University regulations allow the installation of premises cabling and communications infrastructure to be included in the building contract provided that the following requirements are met:

4.2.1. The building contract specifications must ensure that all relevant requirements as defined in this standard are met.

4.2.2. Information Technology Services must be given timely notice of any pending works which may involve the installation of communication services within the above category.

4.2.3. Information Technology Services must have input throughout the planning, design and construction process to ensure that published Murdoch network reticulation standards are met, and to ensure compatibility with existing services.

4.3. The building contract for above category may include:

4.3.1. Premises cabling;

4.3.2. Premises communications infrastructure;

4.3.3. Enclosures;

4.3.4. Equipment racks;

4.3.5. Conduits to rooms;

4.3.6. Ducted skirting;

4.3.7. End to end terminated cabling;

4.3.8. The physical interconnection of the new building to the existing physical communications infrastructure, i.e.

4.3.9. Inter-building conduits;

4.3.10. Associated service pits.

4.4. The building contract for above category must not include:

4.4.1. The provision and installation of network equipment;

4.4.2. The provision and installation of telephones handsets and related phone extension;

4.4.3. The provision and installation of inter-building cabling and optical fibres;

4.4.4. The provision and installation of communications cabling and optical fibre to connect the new building to the existing University infrastructure;

4.4.5. The relocation of data and telephone services from existing locations to the new location.

4.5. The Above Items in the building works shall be fully managed supplied and installed by Information Technology Services. Additionally:

4.5.1. A provisional sum shall be included as part of the building project budget to cover the cost associated with items above;

4.5.2. Information Technology Services will be responsible for identifying an appropriate Budgetary provisional sum for the above items, but it is the responsibility of OCS (or its representative) to provide Information Technology Services with a clear scope of works;

4.5.3. Any costs incurred as a result of variations to the agreed scope of works will be met by the building project.

5. Existing Building Requirements

5.1. Prior to commencement of any work, Information Technology Services will be provided with:

5.1.1. Details of the relevant Property, Development and Commercial Services Office (PDCSO) project officer responsible for project; and

5.1.2. A relevant University project account code to which agreed costs are to be debited.

5.2. Information Technology Services shall be given full contract responsibility for the effective completion of the work, this role shall include:

5.2.1. Interaction with clients to define their telephone/data requirements.

5.2.2. Cabling contractor selection and supervision.

5.2.3. Installation of all telephone and data cabling equipment.

5.2.4. Activation and testing of relevant services.

5.3. An agreed provisional sum shall be included in the project budget to cover the cost of above.

5.4. It is the responsibility of Information Technology Services to identify the appropriate budgetary provisional sum for the above portion of the work, but the responsibility of facilities management to provide Information Technology Services with a clear scope of works.

5.5. Any costs incurred as a result of variations to that above agreed scope of works will be met by the building project.

5.6. Violation of this standard may result in legal action. If work must be carried out to ensure any incorrectly commissioned or maintained Network Infrastructure meets this standard, the party which breached the standard may be liable for costs related to the work.

6. Administration And Documentation

6.1. All documentation is to be delivered in electronic formats to:
Communications Administrator, IT Services
comshelp@murdoch.edu.au

References:

Standards Australia, “General conditions of contract” AS 4000-1997 Standards Australia, “General conditions of contract” AS 2124-1992

Standards Australia, “Specification for the testing of balanced communication cabling in accordance with values set out in AS/NZS 3080:2000” AS/NZS 3087:2000.

Approval and Implementation:

Approval Authority:	Director Information Technology Services
Responsible Officer(s):	Manager Infrastructure Services
Contact Officer:	Manager Infrastructure Services

Revision History:

Approved/ Amended/ Rescinded	Date Approved	Effective Date	Next Review Date	Resolution No. (if applicable)
Approved	17/09/2022		17/09/2024	
Reviewed no changes	18/11/2019		06/06/2020	
Reviewed no changes	11/09/2018		06/06/2019	
Administrative amendments	15/11/2016		20/02/2018	
	20/02/2015		20/02/2018	