

Purpose and Scope

This standard provides the minimum installation and operational requirements for Murdoch University cabling systems and wireless networks.

Overarching Policy

[IT Infrastructure Policy](#)

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 Digital & 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	<p>The outlet terminates to a standard RJ45 distribution panel at the same enclosure where the network switch is located.</p> <p>The outlet provides a network connection and power over Ethernet.</p>

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 Digital & Technology
 - 2.2. Any conflicting information should be clarified with Digital & Technology. 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 Digital & Technology.
 - 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 and Media Authority (ACMA) approved registrars; and
 - 2.3.4. All installers have undergone appropriate induction; and
 - 2.3.5. All installers must be selected in consultation with Digital & Technology.
 - 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 Digital & Technology; 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	<p>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:</p> <ul style="list-style-type: none"> • All certification documents must be lodged with Digital & Technology 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. <p>The requirements for all outlets that radiate from a data enclosure associated with that building, or building wing are as follows:</p> <ul style="list-style-type: none"> • The cable pathway shall not exceed an overall length of 90 metres. • Cable terminations will be made at Cat6 compliant High Density (1RU) patch panels, fitted in a rack of appropriate size for the building. Patch panels must follow the existing scheme established for that building. For example, where 32 port patch panels have been installed previously, 32 port patch panels are to be used unless this is explicitly authorized by Digital & Technology Services. • Patch panels with keystone inserts are to be used for all new installations • Unused capacity on pre-existing patch panels is to be used prior to the installation of new patch panels. • 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.

	<ul style="list-style-type: none"> • 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. <p>Floor chases may be used where required, however the following requirements must be met:</p> <ul style="list-style-type: none"> • 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. <p>Each outlet should be clearly marked at each end with a unique outlet number, and meet the following requirements:</p> <ul style="list-style-type: none"> • The wall plug numbering scheme is defined, managed and assigned by Digital & Technology. • The contractor shall obtain the above information from Digital & Technology at the time of installation. • Unless otherwise specified by Digital & Technology, new outlets will be installed at a convenient point, adjacent to telephone and power services. • Support for such applications will be handled on an individual basis with direct consultation with Digital & Technology.
Backbone Cabling	<ul style="list-style-type: none"> • 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 Digital & Technology .

	<ul style="list-style-type: none"> • 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 Information Communication Technology services only.
Fibre Optic Distribution	<p>Where computer conduits cross open ground, approved external grade single mode or multimode fibre shall be used and the following requirements must be met:</p> <ul style="list-style-type: none"> • 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

	<p>weathering.</p> <ul style="list-style-type: none">• 12-core Single-mode fibre cable is the minimum recommended fibre capacity to all major buildings. <p>Where conduits do not traverse open ground and therefore moisture is not a problem, the following requirements must be met:</p> <ul style="list-style-type: none">• 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. <p>Each fibre shall be clearly tagged with a unique identification number, the fibre numbering scheme is managed by Digital & Technology. A unique fibre number can be obtained from Digital & Technology at the time of installation. All fibre pairs are to be clearly identified at each terminating patch panel.</p> <p>Fitted off fibres should comply with the following mechanical requirements:</p> <ul style="list-style-type: none">• Epoxy bonded LC or SC connectors to be used for all single mode fibre terminations and ST connectors to be used for all multimode fibre terminations. Connector type is to be confirmed with Digital & Technology Services on a per installation basis.• Each fibre termination is to be adequately reinforced and supported with the appropriate zero force sleeving. <p>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.</p> <p>Fibre loss and fibre transmission characteristics should conform to the appropriate Australian standards.</p> <p>New fibres will not be put into operation until the appropriate certification documentation has been lodged</p>
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	and approved by Digital & Technology.
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3.2 The following table outlines detailed building space requirements:

Space	Requirements
Work Area	<p>A work area is an office or area where staff will work. Work areas must meet the following standards:</p> <ul style="list-style-type: none"> • 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-ordinated with the furniture layout. • A minimum of 1 power outlet should be installed near each telecommunications outlet.
Telecommunications Room	<p>The telecommunication room (also called a riser or distribution closet) shall be able to contain:</p> <ul style="list-style-type: none"> • Telecommunication equipment. • Horizontal and vertical cable terminations. • Associated cross-connect cables. <p>A telecommunication room shall be provided on each building level. The following requirements must also be met:</p> <ul style="list-style-type: none"> • Additional rooms (one for each area up to 1000m²) should be provided when the area to be served exceeds 1000m² 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,

	<p>and a depth of no less than 1000 mm, the enclosure should be fully secured by 2 full height doors.</p> <ul style="list-style-type: none"> • 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. <p>In multilevel buildings the risers shall be vertically aligned. The following requirements must also be met:</p> <ul style="list-style-type: none"> • 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	<p>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:</p> <ul style="list-style-type: none"> • 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	<p>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.</p> <p>The room should be of appropriate size to accommodate the required equipment and have a minimum internal area of 8m².</p>
Main Distribution Frame Room	<p>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:</p> <ul style="list-style-type: none"> • Is the proposed location likely to be a major distribution point for multiple buildings? • Is the proposed location likely to be a primary

	<p>distribution point for multiple campuses?</p> <ul style="list-style-type: none"> • 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? <p>An MDF room may serve as telecommunications room and/or entrance room. The following requirements must be met:</p> <ul style="list-style-type: none"> • 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. <p>Minimum room size 10m².</p>
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4. New Building Requirements

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

4.1.1. Details of the relevant Campus Development 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. Digital & Technology must be given timely notice of any pending works which may involve the installation of communication services within the above category.
 - 4.2.3. Digital & Technology 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 Digital & Technology. 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. Digital & Technology will be responsible for identifying an appropriate Budgetary provisional sum for the above items, but it is the responsibility of Campus Development (or its representative) to provide Digital & Technology 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, Digital & Technology will be provided with:

5.1.1. Details of the relevant Campus Development 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. Digital & Technology 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 cabling 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 Digital & Technology to identify the appropriate budgetary provisional sum for the above portion of the work, but the responsibility of facilities management to provide Digital & Technology 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, Digital & Technology comshelp@murdoch.edu.au

Governance

Approval Authority	Senior Leadership Team
Owner	Chief Experience Officer
Legislation mandating compliance	

Category	Primarily a function of management
Related University Legislation and Policy Documents	<i>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.</i>
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Amended	17/09/2022	
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