21.00 Communication & Data Services

All the requirements of this Section are Mandatory.

21.01 System Generally

All GU campuses are serviced by a structured cabling system comprising a flexible cabling infrastructure that can support computer, telephone, and video systems independent of their manufacturer.

In this structured cabling system, ea a and shall apply to all new cabling installations on all GU campuses, including the ref of existing installations.

Consultants and Contractors shall not depart from these requirements unless it is stated otherwise in t TJ0 -1.155 TD0 Tc0 Tw( )Tj/TT4 1 Tf0 -1.1408 TD.0015 Tc.0466 Tw[(Wo)3(rk)5(A)22.2(r)-6.2(ea)5( )14.1 and/or power surges.

The different subsystems are illustrated in GU Standard Detail Drawing No. GSD-700.

21.03 General Requirements All Systems

21.03.01 Types of Use

As a minimum, the structured cabling system shall be capable of supporting future services that require up to 250 Mhz signalling as amended by ISO/IEC 11801 Class E using Category 6 Cabling for (but not limited to) the following protocols;

Data Communications

>   IEEE 802.3
>   IEEE-802.3ab(1000BaseT)
>   IEEE-802.3af (Power over Ethernet)
>   IEEE 802.11 (Wireless LAN)

Voice Communications

>   Analogue telephone
>   Digital telephone
>   Facsimile
>   EFTPOS
>   Modems

Video

>   Analogue video
>   Digital video
>   Composite baseband video and audio
>   Broadband Video
>   RGB baseband video
>   3D Imaging

21.03.02 Standards Conformance

General - All cabling work shall be implemented and completed in strict compliance with Griffith University Design Guidelines and the latest regulations and standards issued or endorsed by the Standards Association of Australia and Australian Communications Authority.   International

	Ethernet
IEEE 802.3ab	CSMA/CD Access Method Physical Layer Specifications for 1000 Mbps Ethernet

Australian Standards - The cabling materials and practices shall comply with the latest edition at the time of all relevant Australian Cabling Standards including but not limited to the following;

AS 3000	SAA Wiring Rules
AS 3080	Integrated communications cabling systems for commercial premises
AS 3084	Telecommunications installations – Telecommunications pathways and space for commercial buildings
AS 3123	Approval and Test Specification – Plugs, socket outlets and couplers for general industrial application
AS 3260	Approval and Test Specification – Safety of information technology equipment including electrical business equipment
AS 3548	Electrical Interference – Limits and methods of measurements of radio disturbance characteristics of information technology equipment
AS/ACIF S008	Requirements for authorised cabling products
AS/ACIF S009	Installation requirements for customer cabling (Wiring Rules)

The colour of telecommunications cable trays, conduits etc. shall conform to the requirements listed in Clause 20.10.03 of **Section 20.00 Electrical Services**.

Painting and Corrosion - The Contractor shall be responsible for corrosion protection and the painting of all brackets, supports, cable ladders weather shields, etc. being supplied and/or installed. The Contractor shall also be responsible for the restoration of any damaged paintwork on equipment and accessories to the supplier's finish, or to a matching finish approved in writing by the Superintendent.

Testing Documentation - The contractor shall provide a printed and electronic copy of the test summary results for all cabling with detailed test results provided in PDF file format on Compact Disk as outlined later herein.

Fibre optic cabling test results shall be based on using power meter and a light source providing the optical loss of fibre using 850 and 1300nm in both directions for multimode fibres and 1310 and 1550nm in both directions for single mode fibres. In addition to this, all fibres shall be tested using OTDR and a printed copy of the waveform parameters shall be submitted for each fibre of the cable tested. Short runs of optical fibre shall be tested by the Contractor as required by ICTS.

Identification Labelling - Identify (label) all cables and equipment as outlined in this document for each specific subsystem.

Record Books - Ensure that distribution frame record books pertaining to new installations and changes are updated and accurate for each subsystem. Record entries shall be neat, tidy and completed in pencil.

Redundant Cabling - The Contractor shall be responsible for the following when replacing existing cables;

> The end to end removal of all redundant cabling as a result of a building or room refurbishment. This includes any cabling disconnected and not required, any old cabling left in walls, access poles, work station partitions, on cable trays, or in (wall and floor) ducting.
> The removal of any underground cable made redundant by the running of a new replacement underground cable.
> The removal of the cabling is to be from either the patch panel to outlet, from 'Krone' frame to outlet or in the case of underground cable termination point to termination point at both ends.
> In all cases records are to be rewritten to reflect the changes.
> A list of outlets made redundant by during a refurbishment is to be created and provided to NCS as part of the 'as built' information by the Contractor to ensure accurate updating of ICTS records.
> Existing labelling of redundant outlets shall be blanked out on the patch panel end to show that the previous cabling is no longer existent

Cabling in Partition or Wall Cavities - The requirements of **Section 20 Electrical Services** Clause 20.10.06 shall apply equally to the installation of communication and data cabling. Also, cables shall not be installed diagonally and the use of wall frames is not permitted as a cable tray path.

21.03.04 Performance Warranties & Guarantees

Installation testing – 100% of all cabling shall be tested prior to commissioning. All tests shall be from end-to-end (patch panel to IO inclusive) and shall include the connectors and terminating equipment fixed in their final position at both ends at the time of the testing. These test results shall use IO identification as reference.

All as installed cable lengths shall be recorded and submitted with the test results, to the Superintendent.

Electrical acceptance tests shall be carried out on all UTP Cables following the termination and labelling of the cabling in compliance with AS/NZS 3087 and AS 3080. The tester used shall have a current calibration certificate from the manufacturer's accredited certification facility.

Post Installation test of all fibre optic cables shall be carried out with the following minimum criteria;

> Optical Loss end to end including connectors
> Physical condition by the use of an OTDR

Warranty - The installation Contractor shall provide a minimum fifteen-year channel warranty backed by the cabling manufa

electrically and mechanically matched to the category of the four pair UTP cable to which they connect.

Horizontal fibre optic cable shall only be installed when specified in writing by ICTS and shall be a minimum of 2 core fibre to each workstation area.

All fibre optic cable shall only be installed using LC Duplex connectors on 19" AFC rack mounted optical fibre termination panels with appropriate labelling ID strips, or as otherwise instructed in writing by an ICTS representative. Part Numbers required are as follows;

OM3
Part No. RC-2GL-D2X-2FF
Description: 1RU Static Sliding 24F LCD OM3 Loaded Encl
+
Part No. FRE-1RU-CTRAY
Description: 1RU Front Mount Cable Tray with ID Strips

OS1

Sufficient excess cable (at least 1.5m) shall be included in the installation to enable each patch panel and fibre optic interconnection unit to be relocated at a later date to any position on the same equipment cabinet.

Cables shall not be installed in floor slabs unless approved by the Superintendent.

Outlets - All outlets shall be mounted on faceplates suitable for flush mounting in standard wall boxes, skirting trunking, ducts in modular partition systems and similar. Mounting shall be arranged to minimise the risk of damage during removal and replacement of skirting trunking covers or other associated hardware. Outlets shall be of the 'Clipsal C2000' type with I.D. covers unless otherwise nominated.

Outlets shall be firmly attached to the structure with Z-point (flat tipped) screws.

Outlets shall be mounted wherever possible with the key at the bottom and contacts at the top to reduce the risk of contamination of contacts with grit and dust. If this is not possible, outlets may be positioned on their side.

Faceplate colours shall be to the approval of the Superintendent.

Outlets shall be mounted at a height consistent with existing outlets in that area or where no outlets currently exist, at 850mm above f.f.l. (underside of cover plate) unless nominated otherwise.

All wall mounted telephone outlets in public areas shall be installed at 1250mm above f.f.l. Outlets for wall-mounted telephones shall be a 'Krone' wall mounted kit Part No. 6467 1 114-10 complete with Keystone km8 Cat 6 jack 6830 1 800-01.

Example: for Room 2.06A
2.06A/CLK – for the first clock data port in the room
2.06A/CLK2A – for the second clock data port in the room
2.06A/CLK1A & 2.06A/CLK1B – for the first dual clock data port in the room

The standard labelling for **Projector** data outlets shall be as follows;

[Room No.] + [/] + [P] + [Outlet No.] + [Port Letter]

Example: for Room 2.06A
2.06A/P1A – for the first projector data port in the room
2.06A/P2A – for the second projector data port in the room
2.06A/P1A & 2.06A/P1B – for the first dual projector data port in the room

The standard labelling for **IP Camera** data outlets shall be as follows;

[Room No.] + [/] + [CM] + [Outlet No.] + [Port Letter]

Example: for Room 2.06A
2.06A/CM1A – for the first camera data port in the room
2.06A/CM2A – for the second camera data port in the room
2.06A/CM1A & 2.06A/CM1B – for the first dual camera data port in the room

The standard labelling for **Digital Signage** data outlets shall be as follows;

[Room No.] + [/] + [DS] + [Outlet No.] + [Port Letter]

Example: for Room 2.06A
2.06A/DS1A – for the first sign data port in the room
2.06A/DS2A – for the second sign data port in the room
2.06A/DS1A & 2.06A/DS1B – for the first dual sign data port in the room

Printed labels at the wall outlet are either to be Times New Roman 10 point bold font if using Microsoft Office software or Times New Roman 4mm font size bold if using Clipsal ID Label Printing software. Wrapping the text to two lines when one line won't fit on a label is acceptable provided the entire label is visible.

Patch Panel Identification - Each patch panel shall be fitted with a type printed label in accordance with AS 3084. Printed labels shall be the same as for wall outlets provided there is no need to wrap around to a second line. If this necessary, reduce the font size to fit one line.

The identification label shall clearly identify the corresponding room and outlet number as

21.06 Riser Subsystem

The riser subsystem is the main cable route between floors within a building and between TERs within a building. The riser subsystem is only to be used for the through passage of cables. No cables shall be terminated in telecommunications risers.

The material requirements, mechanical protection of cables and Fibre, and installation practices are identical to those of the horizontal subsystem outlined in GU Standard Detail Drawing No. GSD-700.

The identification and documentation requirements are identical to the requirements of the previous Clause with the addition of the following;

> All fibre cables shall be identified with an indelible label in every telecommunications riser closet and TER through which they pass.

21.07 Administration Subsystem

21.07.01 Generally

The administration subsystem provides for the interconnection of two or more wiring subsystems. The logical arrangement of hardware in the TER is an important part of hardware administration.

All administration shall be performed in the TER.

21.07.02 Materials

All patch leads shall be factory terminated four pair UTP Cable with RJ 45 connectors or connectors to suit the manufacturer's modules.

Fibre optic patch leads shall be at least 2m in length with LC Duplex connectors at both ends. ST connectors may be used where installed equipment exists.

Jumper wire shall only be used for interconnecting existing telephone wiring systems which are terminated on 'Krone' disconnect modules.

All UTP and fibre patch leads will be supplied by GU.

21.07.03 Mechanical protection

All patch leads shall be contained by cable management facilities on the equipment and/or equipment rack.

All telecommunications conduits in ground will be white.

Underground cable joints are not acceptable.

Maximum distance between pits on underground cable runs shall be 60m.

All underground pits shall have their lids marked with a brass plate indicating the service installed and the route from the pit, and shall be positively drained without the use of pumps. Ensure pits do not receive water inflows through conduits.

Brass marker plates with lettering not less than 10mm high shall be installed at kerbs and road crossings and any changes in direction. In unpaved areas, the marker shall be set in a concrete pad not less than 300mm square x 200mm deep.

Fibre Optic Cable - All fibre Patch Panels shall be 'AFC' rack mounted optical fibre termination panels (see Clause 21.05.01). All fibres shall be terminated on to a type 'LC' connector. The fibre

4	>120m and < 180m	2 rooms, located equidistant along the second floor
4	> 180m and < 240m	2 rooms on the second floor, each located 60m from opposite extremes of the building.
5	<120m	1 room, centrally located on the third floor
5	>120m and < 180m	2 rooms, located equidistant along the third floor
5	> 180m and < 240m	2 rooms on the third floor, each located 60m from opposite extremes of the building.
6	<100m	1 room, centrally located on the third floor
6	>100m and < 150m	2 rooms, located equidistant along the third floor
6	> 150m and < 200m	2 rooms on the third floor, each located 50m from opposite extremes of the building.
7	<100m	1 room, centrally located on the third floor
7	>100m and < 150m	2 rooms, located equidistant along the third floor
7	>150m and < 200m	2 rooms on the third floor, each located 50m from opposite extremes of the building.
Other	Other	To be determined by the ICTS representative.

The size of each TER and number of cabinets required are directly related to the number of outlets, which will be terminated in that room.

No. of Outlets Served	Size of Equipment Room (mm)	Number of Cabinets Required
<190	2600 x 2500	2
>190 and <290	2600 x 3250	3
>290 and <380	2600 x 4000	4
>380 and <480	2600 x 4750	5
> 480	Consult NCS	Consult NCS

The TER will be for the exclusive use of telecommunications equipment and associated power distribution systems. *All other services are prohibited in this room.*

The door shall have a minimum clearance of 900mm wide x 2000mm high and shall be fitted with

transfer of the cables to a wall mounted cable tray. Conduits shall not terminate in a pit within the body of the TER.

Appropriate portable fire extinguishers, in accordance with local fire regulations, shall be provided, and maintained within the equipment room. They shall be located as close as practicable to the entry/exit.

Security Access Control Equipment shall not be installed in the TER without consultation with ICTS.

21.10.03 Telecommunication Risers

Telecommunications risers shall run the vertical height of the building and shall be used for routing all horizontal cables back to the telecommunications equipment room.

A telecommunications riser shall be located within 5 metres of each telecommunications equipment room.

The minimum size of the riser shall be 1000mm wide x 500mm deep.

The telecommunications riser shall be accessible on each floor by way of door 900mm wide x 2000mm high.

Cable ladders shall run the entire height of the riser and feed the horizontal cable trays in the telecommunications equipment room.

No communications equipment is to be mounted or terminated in a riser.

21.10.04 Campus Subsystem

Unless specified otherwise in writing by ICTS, the following shall apply for each new building;

It shall be connected to the campus TER by at least one 100mm conduit for optical fibre cable.
The optical fibre conduit(s) shall be installed to provide a diverse path in order to establish and maintain redundancy for the data network to the new building.
It shall be connected to the campus TER by a 24-core Composite Fibre Optic cable. Composition of the Fibre shall be determined by ICTS.
It shall be connected to the Campus MDF by 100mm conduits for telephone copper

Where the distance between multiple TERs within a building is less than 90m, they shall also be star-wired to the main TER in that building using Category 6 UTP cables, quantity to be determined by ICTS, and terminated on a separate patch panel and labelled.

21.11 Standard Documentation & Labelling Requirements

Block Diagrams

Outlets must be identified at the field end and at the TER patch panel end. NCS is to be provided with a schedule of the outlet numbers

The TER room shall be secure, safe and with a stable electrical power supply, lighting and ventilation

The Building/Campus fibre link must be installed and tested

The MAC address of the BMS equipment is to be plugged into the outlet/network

The IP address for the BMS outlet is to be obtained from NCS

Reasonable notice (minimum 10 working days) is required to allow NCS/ICTS activities to be completed before activating the BMS network in the building

All test results for cables and outlets are to be provided to NCS

21.13 Wireless Networks

A single data outlet for each wireless access point (WAP) is to be provided where access to Wireless Networks is required as a standard feature in, but not limited to, the following rooms;

All Libraries
Lecture Theatres
Learning Centres
Collaboration Zones
Seminar/Tutorial Rooms
Meeting Rooms
Board Rooms
Teaching Laboratories
RHD/PG Student Rooms
Common Rooms (Staff & Student)

This is a requirement in all new building and refurbishments, but does not replace the need for fixed cable data connections to the network in other spaces. The location of all such data outlets must be approved by ICTS.

Wherever possible, the WAP shall be installed above the ceiling at a height not exceeding 3 metres above finished floor level (f.f.l.) to enable easy access for maintenance using a standard platform ladder and to prevent unauthorised access by members of the general public. Generally the WAP shall be located over the entry door/s to the space it is covering. In spaces where the floor to ceiling height is greater than 3 metres, the WAP may be fixed below the ceiling but not at a height that is less than 3 metres above f.f.l.

Generally WAPs shall be wall mounted, but where this not practical, fixing to columns, cable trays or the slab soffit is acceptable as long as it does not require the removal of more than one ceiling tile to gain access. WAP brackets will be supplied by GU however the Contractor is responsible to fix them, but only in locations which have been approved by ICTS.

Mounting Brackets – WAP mounting brackets are to be securely fixed and correctly aligned close to the WAP data outlet. Ensure that there is adequate clearance between the WAP and the slab soffit, ductwork, cable trays and the like to allow for the wireless device to be easily slid in and out of the mounting bracket.

External Mounting – WAP devices installed externally of buildings in exposed locations shall be mounted in an IP55 watertight enclosure (equal to Code GR17016) with minimum internal dimensions of 310mm L x 240mm W x 100mm H. The mounting bracket and data outlet shall also be contained within the enclosure and positioned to ensure that the device can be easily installed and removed if required for maintenance.

Access to WAPs in Ceiling Spaces – Where the WAP device and bracket is located above a ceiling, it must be mounted within arm's length of a removable ceiling tile (T bar grid ceiling) or an access panel (flush ceiling). Access panels in flush ceilings shall not be less than 450 x 450mm square and shall open downward and be fitted with a simple Allen key locking mechanism.

21.14 Particular Telecommunications & Data Requirements – Teaching Spaces

The following communications and data requirements for Teaching Spaces are outlined in the

One double outlet per group Study Room/Booth