THE UNIVERSITY OF QUEENSLAND
AUSTRALIA
CREATE CHANGE

Information Technology Services

Network and Data Centres

ICT Cabling Specification

Rev 2.3

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FUNCTIONAL SPECIFICATION

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1 REVISION HISTORY

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2.2	Update released	02 May 2017	Jayan Jayanthan
2.3	Revised and updated	04 January 2019	Jayan Jayanthan

Detailed Revision History is shown in Annex R.

2 ABBREVIATIONS

The following abbreviations have been used throughout this document:

BICSI	Building Industry Consulting Services International
BCA	Building Code of Australia
CP	Consolidation Point
DB	Distribution Board
DLP	Defects Liability Period
DOA	Defects, Omissions, and Additions
FOBOT	Fibre Optic Breakout Tray
F/UTP	Foil Shield over UTP
LSPM	Light Source / Power Meter
MMOF	Multimode Optical Fibre
MNDC	Manager, Network and Data Centres
NCC	National Construction Code (incorporates BCA)
OD	Outside Diameter
OF	Optical Fibre
ORL	Optical Return Loss
OTDR	Optical Time Domain Reflectometer
P&F	The University of Queensland Property and Facilities Division
PC	Practical Completion
PDU	Power Distribution Unit
PLIE	Physical Layer Infrastructure Engineer
QGEA	Queensland Government Enterprise Architecture
RCD	Residual Current Device
RU	Rack Unit
SCS	Structured Cabling System
SWMS	Safe Work Method Statement
TO	Telecommunications Outlet
TR	Telecommunications Room
TLN	Technical Lead, Networks
SMOF	Singlemode Optical Fibre
STP	Shielded Twisted Pair
UFAD	Under Floor Air Distribution
UN	University Networks
UTP	Unshielded Twisted Pair
UQ	The University of Queensland, Australia
WAP	Wireless Access Point
xTP	Twisted Pair Copper Cable (includes UTP, STP, F/UTP)

3 INTRODUCTION

This structured cabling system document has been developed to provide a solid foundation, and a standard approach to cabling UQ plant and offices. This specification will govern the cabling infrastructure for both voice and data communications.

This specification is intended to serve as a living standard and should be treated as such. There are always exceptions and special circumstances that will necessitate modifications and revisions to this document. However, the standard should be followed as closely as possible to ensure consistent cabling practices across all sites.

4 AUDIENCE

This document is primarily intended for:

- UQ Information Technology Service (ITS) Management and Staff
- P&F and external Project Managers and Project Superintendents
- Architects and Electrical Consultants
- Builders and their subcontractors
- Cabling contractors and subcontractors
- All other service consultants, contractors and subcontractors where installation of respective services requires coordination with building's Structured Cabling System.

5 APPLICABILITY

This specification is applicable in all UQ owned or leased buildings. This specification is not applicable to tenancies in UQ owned buildings and UQ's presence in other partner organisation buildings where the respective organisation's cabling standards are applicable.

5.1 New Buildings

All facets and specifications described in this document will apply.

5.2 Complete Refurbishment of Building

All facets and specifications described in this document will apply.

5.3 Partial Refurbishment of a Building

If the current SCS in the area to be refurbished is Category 4, 5, 5e or 6 the entire SCS in the area being refurbished would need to be replaced. New cabling will be of Category 6_A standard and necessary TR, power, rack and pathway upgrades in the respective area has to be carried out as part of the refurbishment.

5.4 Adding additional Outlets to an existing SCS

As a rough guide anything less than 24 outlets can be done at a standard homogenous to the installed SCS except where the current SCS is Category 4, 5 or 5e. In this case the new outlets could be done as a minimum of Class E (Cat 6).

If more than 24 outlets are required then there would need to be compelling reasons not to install Class E_A (Cat 6_A) cables. Examples of valid reasons are:

a. inadequate cable minders,
b. inadequate pathways and spaces to cater for larger bend radius and larger physical cable, etc.

Cost is not a valid reason for non-compliance.

5.5 Tenancies and Partner Organisations

5.5.1 Definitions

Tenant organisation - an organisation which provide support services to student and staff and do not involve in teaching or research activities of the University. Tenants data network will not be connected to UQ network by any means.

Partner organisation – an organisation which involves in teaching and research activities of the University and may have staff members who are dual appointees. The partner organisation may share the UQ network (e.g. QAAFI) or setup an overlay network (e.g. CSIRO, Qld. Health) of their own for their staff use.

5.5.2 Structured cabling for Tenancy

a. All data, telephone and any other service cabling (CCTV, etc.) to be confined within the tenancy area and to be terminated on a dedicated Communication Equipment cabinet or frame located within the tenancy area.
b. No activate network equipment serving the tenant to be located in the building TR.
c. UQ ITS strongly recommends the structured cabling in the tenancy area to follow the UQ ICT cabling specifications as far as applicable. However it is not mandatory to follow UQ Specification.
d. Minimum of 10 pair Category 3 copper lead in cable to be provided to the tenants Comms cabinet from the appropriate building TR.
e. Optionally a 6 core single mode lead in fibre terminated in LC connectors at both ends to be provided to the tenant's Comms cabinet from the appropriate building TR.
f. Any carrier services (voice or data) to be organised with prior knowledge of UQ ITS to facilitate the service delivery to the tenancy area utilising UQ cabling infrastructure.

5.5.3 Structured cabling for Partner Organisation

a. Partner organisation horizontal cabling shall run to the appropriate building TR.
b. Partner organisation shall share building lead-in and campus cabling infrastructure to provide external connectivity or carrier services.
c. The structured cabling in the partner organisation area to follow UQ ICT cabling specifications unless agreed otherwise.

6 RESPONSIBILITY MATRIX

Following table describes the responsibility of stakeholders in a project which has installation of Structured Cabling System in its scope.

Description	Specified By	Supplied By	Installed By
Structured Cabling System			
Data Outlets for workstations and phones	User Group	Builder[4]	Builder
Data Outlet for Wireless Access Points (WAPs)	UQ ITS	Builder	Builder
Data Outlets for AV[1]	UQ ITS-AV	Builder	Builder
Data Outlets for Security cameras	UQ Security	Builder	Builder
Data Outlets for Building Management Systems (BMS)	P&F Engineering	Builder	Builder
Horizontal Cabling (copper)	UQ ITS	Builder	Builder
Patch Panels (copper)	UQ ITS	Builder	Builder
Network Racks	UQ ITS	Builder	Builder
Power Distribution Units (PDU) for Racks	UQ ITS	Builder	Builder
Power feeds for the Telecommunication Rooms (TR)	UQ ITS	Builder	Builder
Fibre backbone for the building	UQ ITS	Builder	Builder
Voice (voice) backbone for the building	UQ ITS	Builder	Builder
Lead in fibre cables from designated building(s)	UQ ITS	Builder	Builder
Lead in voice (copper) cable from designated building(s)	UQ ITS	Builder	Builder
Copper patch leads for the network rack - ITS to provide Part No.	UQ ITS	Builder	UQ ITS
Customised mounting accessories for WAPs[2]	UQ ITS	Builder	Builder
Copper or Fibre connection to the outdoor WAPs	UQ ITS	Builder	Builder
Power feed for the outdoor WAPs	UQ ITS	Builder	Builder
Cable Pathways			
Cable trays in building risers	UQ ITS	Builder	Builder
Cable trays in ceiling spaces	UQ ITS	Builder	Builder
Conduits and pathways in walls & partitions	Consultant	Builder	Builder
Conduits and pathways in the floor	Consultant	Builder	Builder
Floor boxes	Consultant	Builder	Builder
Fire-seals for wall & floor penetrations (as required)	P&F Engineering	Builder	Builder
Underground cabling conduits	P&F Engineering	Builder	Builder
Underground cabling pits and hand holes.	P&F Engineering	Builder	Builder
Network Equipment			
Network Aggregation Switches	UQ ITS	UQ ITS	UQ ITS
Network Access Switches	UQ ITS	UQ ITS	UQ ITS

Optical interfaces for switches	UQ ITS	UQ ITS	UQ ITS
Fibre patch leads (as required)	UQ ITS	UQ ITS	UQ ITS
Wireless Access Point (WAP) - Indoor	UQ ITS	UQ ITS	Builder
Wireless Access Point (WAP) - Outdoor	UQ ITS	UQ ITS	Builder
Standard mounting accessories for WAPs[3]	UQ ITS	UQ ITS	Builder
Antenna for WAPs	UQ ITS	UQ ITS	Builder
Power Injectors for WAPs	UQ ITS	UQ ITS	UQ ITS
WiFi Licences	UQ ITS	UQ ITS	UQ ITS
Telephony			
Desk phones	UQ ITS	UQ ITS	UQ ITS

Notes:

1. *This are the outlets which are terminated on standard wall outlets and patch panels in the rack*
2. *Any additional mounting fixture required for feature ceilings be supplied and installed by the builder*
3. *WAP standard mounting brackets caters for solid and tiled ceilings.*
4. *Builder in the above matrix represents builder, cabling contractor or subcontractor in the project*

7 TRADE NAMES OR BRANDS AND SUBSTITUTIONS

Throughout this document where trade names or brands or propriety products or equipment are stated, the use of such names and/or brands is intended to define concepts/features/attributes/records of performance which are required to be provided in the product or equipment tendered. In each case, where a name or brand is stated, this shall be understood to mean “or alternative which is technically equivalent”.

The exception to this rule is the terminating hardware and cable of the specified SCS vendor (see ANNEX E – QGEA COMPLIANCE) or where a substitute product will violate the SCS warranty.

8 IMPORTANT INFORMATION

This document MUST be read in conjunction with the job specific document.

9 DOCUMENT SUMMARY

This section may be used as a quick reference for anyone who is required to design, tender, install or test and certify the cabling system. For a complete description of the requirements in detail please refer to the body of the document.

9.1 Class of Cabling

Unless otherwise specified, all installed horizontal permanent links will be Class E_A (Category 6_A) F/UTP or STP.

Class E (Category 6) may be installed under the provisions of section 5.4.

9.2 Optical Fibre

All new installed optical fibre (OF) will be single-mode (SMOF) unless specified otherwise.

All SMOF will be OS2. All multi-mode (MMOF) will be OM4. All OF (MM and SM) connectors will be LC Duplex.

All FOBOTs will allow access to the front panel without the use of tools. Specifically, the Krone LKH series of FOBOTs are not to be used.

9.3 Independent Third Party Test Result Verification

For all optical fibre installations and all installations of more than 50 copper outlets all test results will be independently verified by a UQ approved NATA inspection body at the contractors cost.

9.4 Horizontal Distribution

The bulk of cable runs will be on cable tray or cable mesh. Cable tray/mesh will be powder coated white. Minimum specifications are described elsewhere in this document. It is the contractor’s responsibility to identify those runs to be carried on tray/mesh and to include all costs to supply and install.

9.5 Outlet Density

UQ is moving towards a unified communications system which includes IP telephony. A significant cost benefit of this approach is a reduction in the size of the horizontal SCS. Unless otherwise specified the contractor will install two outlets per workstation.

Excluding CCTV outlets - all outlets will be duals.

9.6 Patch Panel Density

Wherever wide (300mm) vertical minders are installed the default patch panel density is 48 port in 1RU.

9.7 Workstation terminations

Unless otherwise specified all faceplates with telecommunications outlets will be at least 100mm above the finished desk surface.

9.8 Termination Scheme

Unless otherwise specified all installed horizontal channels will be terminated as T568A.

9.9 Testing

100% of all installed cables are to be fully tested in accordance with AS/NZS ISO/IEC 61935.1 (copper) and AS/NZS ISO/IEC 14763.3 (fibre). xTP and LSPM results will be supplied to UQ in *LinkWare* (*.flw) format and *Bellcore Telcordia* (*.sor) format for OTDR.

9.10 Abandoned Cable

All data and voice cable which has been replaced or made redundant by new horizontal cable is classed as abandoned. All abandoned cable is to be removed in its entirety (from TO to Patch Panel). All patch cords plugged into outlets (at either end) previously connected to abandoned cable are to be removed.

All inter-building MMOF made redundant by the installation of SMOF will be removed in its entirety from each building and the pit and pipe system.

9.11 Wireless Access Points

For areas undergoing refurbishment it is the contractor's responsibility to remove all existing WAPs and return them to the PLIE.

For all areas (new or refurbished) it is the contractor's responsibility to mount all WAPs. Where architectural / aesthetics requirement exist for colour matching the WAP with the environment or mounting them in feature ceilings, it will be the contractor's responsibility to supply suitable covers for the WAPs and/or custom manufactured mounting fixtures to meet the architectural / aesthetic and technical requirements.

9.12 Acceptance and Commissioning

In SCS installations consisting 24 or more outlets, the acceptance checklist in Annex A of this standard will be used as a quality assurance mechanism for acceptance and activation of newly installed outlets. Any defects identified shall be rectified and reviewed before acceptance and commissioning.

9.13 Warranty

All new installations shall carry a minimum 20 year vendor's warranty on the product and the installation.

10 SCOPE OF WORKS

10.1 In-Scope

The scope of work is:

a. Audit the outlets in the proposed demolition area and provide a report to UQ ITS prior to the demolition.

b. Supply, assembly and installation of structured cabling and cabling equipment (racks, patch panels, cable management, telecommunications outlets, etc.).

c. Supply and installation of support systems dedicated to structured cabling (cable tray/mesh, ladder tray, catenary, etc.)

d. Testing and certification of any new SCS and testing of standard telephone cabling.

e. Providing product warranty documentation.

f. Labelling of all cabinets, racks, patch panels and outlets.

g. Earthing of all cable trays, cabinets, and racks.

h. Providing test results and marked-up documentation (As-built).

i. Supply of any additional rack components as required

j. Supply of patch cables as specified for every copper outlet installed (for the patch panel end only).

k. All miscellaneous items to provide the complete communications cabling systems.

l. Delivery of all equipment and materials to site.

m. Unpacking and removal of all packing material.

n. Removal and disposal of abandoned cable.

o. Mounting of UQ ITS supplied WAPs according to the mounting specifications provided.

p. Fabrication and installation of custom mounting brackets for WAPs to meet the mounting specifications and to meets the aesthetics of the project area.

q. Supply and install non-metallic covers and/or enclosures for WAPs to meet the architectural or weather-proof requirements.

10.2 Not In-Scope

The following are not in-scope:

a. Supply and installation of active equipment.

b. Connecting patch cables to active LAN switch equipment or terminal devices, unless specified otherwise.

10.3 Instructions

Changes in the scope of work will only be issued in writing by the MNDC or his delegate TLN:

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11 SYSTEM REQUIREMENTS

11.1 Applicable Performance Standards

In addition to general standards, the following standards and reference documents will be applicable to the SCS:

AS/NZS 3000	SAA Wiring Rules (latest edition) - **Mandatory**
AS/NZS 3080	Telecommunications Installations – Generic Cabling for Commercial Premises
AS/NZS 3084	Telecommunications Installations - Telecommunications Pathways and Spaces for Commercial Buildings
AS/NZS 3085	Telecommunications Installations - Administration of Communications Cabling Systems
AS/NZS ISO/IEC 61935.1	Testing of Balanced Communication Cabling in accordance with ISO/IEC 11801.
AS/NZS ISO/IEC 14763.3	Telecommunications Installations – Implementation and operation of customer premises cabling – Testing of optical fibre cabling
AS/NZS ISO/IEC 24702	Telecommunications Installations – Generic cabling – Industrial premises
AS/CAS008	Requirements for customer cabling products – **Mandatory**
AS/CA S009	Installation requirements for Customer Cabling (Wiring Rules) – **Mandatory**
QGEA	Information and communication technology (ICT) cabling infrastructure technical standard – **Mandatory**

The revision number of each standard has been deliberately excluded from this table. The edition of each standard current at the time of the installation will be considered as applicable for that installation. If additional cabling is installed on an existing site the revision current at the time the additional cable is installed will be the applicable standard for the additional cable only.

11.2 Quality Standards

The scope of works includes on-site monitoring of the quality of all equipment components and installation practices and the standard of completion. Poor materials shall be replaced and poor work practices shall be corrected without delay.

The scope of works includes reporting progress (this may be via weekly progress meetings) of pre-determined milestones during the course of the project. If the schedule for a milestone is unlikely to be met, the PLIE is to be advised of the fact in writing, with a statement of the reason(s) for the delay and proposals for recovery for consideration by the PLIE.

12 GENERAL INFORMATION

The SCS offered and quoted, shall incorporate all features and facilities listed in this specification. The SCS shall comply with AS3080 applicable Class performance requirements including component compliance and permanent link compliance.

12.1 Supported Applications

The complete SCS to be installed for this project shall be suitable to support analogue and digital voice applications, data, Local Area Networks (LAN), video and low voltage devices for building controls and management on a common cabling platform.

13 INSTALLATION CONTRACTOR

13.1 Manufacturer Authorisation

The installation contractor shall hold authorisation from the respective cable plant component manufacturer to install and obtain minimum 20 year warranty certificate for the installation. The authorised installer shall carry out the entire installation of the structured cable system, terminations and testing. Cable rough in by non-authorised sub-contractors and subsequent termination and testing by an authorised contractor will not be acceptable.

13.2 Property & Facility Requirements

All contractors shall read and comply with the requirements and stated in the Property and Facilities Building Contractors and Consults web site published at the following address:

https://coo.uq.edu.au/operational-areas/property-and-facilities/pf-staff-and-contractors/building-contractors-and-consultants

14 PATHWAYS AND SPACES

14.1 General

All pathways shall be sized so that a minimum of 20% spare capacity is provided for the installation of future cabling.

14.2 Telecommunications Rooms

a. TR's shall be sized in accordance with AS3084 unless otherwise specified by the PLIE

b. A minimum 900mm clearance from the rack foot print shall be available in all side to ensure safe working space and to maintain airflow for effective ventilation of the active equipment. Minimum requirements for TR with 1 and 2 rack are presented in ANNEX D – TELECOMMUNICATIONS ROOM EXAMPLES

c. TR's shall not have a ceiling fitted.

d. TR walls will be slab to slab.

e. An electronic lock shall be fitted to at least one door of the room. A proximity card reader will be fitted as close as practicable to this door.

f. All doors are to be fitted with GM2 key barrels.

g. All rooms are to have 24hr, 7 day Air Conditioning. The air conditioning system should be capable of supporting a minimum 4kW heat load per rack. The temperature shall be set to 24° Celsius.

h. Sound seals shall be fitted to all doors to ensure the Sound Pressure Level measured at a distance of 1m from the door is less than 15dBA.

i. Floor finish shall be anti-static vinyl in a neutral (grey) colour.

j. Bare concrete walls and ceilings will be painted white.

14.3 Horizontal Distribution

The bulk of the horizontal distribution will be done on cable tray or cable mesh. Cables are to be run loosely (not bundled) wherever possible. These measures are to:

a. provide a clearly defined pathway for telecommunications cabling

b. minimise Exogenous Crosstalk (ANEXT)

c. aid in dissipating heat generated in PoE applications.

The contractor shall supply and install all required communications cable trays/mesh for the support of all horizontal and backbone cabling, **whether indicated on the drawings or not**. Where there are cable runs which contain 12 (or less) cables a catenary system may be used. Running parallel catenary systems to avoid using cable tray is not allowed.

Cable trays/mesh shall be installed to a specific approved design, and any variation shall only be allowed following approval by the PLIE.

14.3.1 General

All horizontal pathways shall be installed parallel to the building lines. Pathways shall also be installed in a horizontal/vertical plane with any changes in direction or height affected by way of the appropriate manufacturer's accessory. The finished installation shall be neat and orderly in appearance.

Where struts and trapeze brackets are to be used for support of cable trays/mesh beneath concrete beams/floors the struts shall be minimum 10mm diameter threaded rods attached to heavy duty U-brackets (or angle brackets for vertical supports) fixed to the concrete. Fixing of brackets to the concrete shall utilise minimum 10mm diameter expansion type bolts inserted within correctly sized drill holes in the concrete.

Cable trays/mesh shall be secured to walls and ceilings with brackets of approved design installed so as to support trays in a straight and true line. The distance between supports shall not exceed the manufacturer's recommended load/support criteria to Pathways and Spaces standards as a minimum, and in any case shall not exceed 1800mm.

Cable tray/mesh installed under a raised floor will be supported from the concrete slab below and not from elevated floor mounting hardware or posts.

Where cables are installed in horizontal cable ladder/tray, the individual 4-pair xTP cables or fibre optic cables shall be neatly and loosely laid out and not loomed.

All metallic cable ladder/trays/mesh must be earthed. Equipotential bonding along the length of the cable ladder/tray shall be provided by 6mm^2 Green/Yellow cable straps between sections. The finished installation shall be electrically contiguous from any point to any other point and bonded to the building PE system.

Securing bolts for joiners, bends, support mounts etc. shall have the head of the bolt within the cable bearing area.

Where cables need to exit the cable tray and travel vertically off the tray/mesh an appropriate bend radius device shall be used.

Prior to cabling a formal inspection of the entire cable tray/mesh system shall be arranged with the PLIE.

All cable tray/mesh shall have a minimum 150mm vertical clearance from the uppermost edge.

14.3.2 Cable Tray

Cable tray shall be galvanised steel, with a minimum thickness of 1.5mm and of a specified width and powder coated white. Sides shall be rolled or folded and a minimum of 30mm high. All tray, bends, tees & joining pieces, covers and cable retainers shall be shop manufactured and shall be sourced from the same product range. Butt joining Tee intersections is not acceptable.

All cable trays and all fittings such as bends, tees, reducer's, fishplates shall be powder coated white. Any modifications made to tray (including cuts or bends), channel, rods or other fittings shall be coated with white, rust inhibiting paint.

All major pathways along building corridors longer than 15m are to be minimum 600mm wide.

14.3.3 Cable Mesh

The cable mesh shall be Cable Cage Systems or approved equal. All cable mesh and all fittings shall be powder coated white.

14.3.4 Catenary Wire Support Systems

The Contractor can only supply and install a catenary wire support system through a tiled ceiling space where cable tray/mesh cannot be accommodated. The Contractor to consult with PLIE before finalising the proposed installation.

Bundle sizes shall not exceed twelve (12) xTP cables in new building installations and full or partial building refurbishments. This will allow growth to a maximum of 24 cables when adding additional outlets.

For more than 12 cables an appropriate cable tray/basket to be installed.

The communications cables shall be supported by 19mm Velcro style wraps at a maximum of 1000mm centres, and shall be supported at changes of direction to provide adequate cable support.

Ceiling tile hangers are NOT to be used for the mounting of any hardware.

14.4 Segregation

The contractor shall ensure that all communications cables are sufficiently separated from power cabling or other cabling to ensure satisfactory performance of the communications cabling system. Separation distances shall be in accordance with AS/CA S009.

It is the contractor's responsibility to ensure that any breaches of minimum separation requirements caused by other service installers after the SCS is installed are brought to the attention of the other service installer (in the first instance) and UQ if compliance cannot be achieved.

14.5 Vertical Riser Cabling

Where cables are installed on vertical cable ladder/tray, the individual 4-pair xTP cables shall be loosely loomed together and fixed to the cable ladder/tray with velcro style cable ties at 500mm centres. Cable bundles shall not be combed. There shall be no more than 24 individual cables in each bundle, and bundles shall not be stacked more than one layer high. OF cables shall be fixed to the cable ladder/tray with velcro style cable ties at 500mm centres to provide adequate support for the cables. OF cables shall be installed on the rightmost edge of the cable tray unless otherwise specified.

14.6 Core Holes

The cabling contractor will be responsible for the drilling of any core holes. Where core holes are required there shall be a minimum of two 100mm diameter holes. Locations for core holes shall be X-Rayed and an independent engineering certificate supplied to P&F Engineering before commencing work.

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Drilling of core holes will be carried out in accordance with relevant legislation and codes of practice.

14.7 External Pathways (Outside Plant)

14.7.1 Pit and pipe

This information is provided as a guide only. The pit and pipe infrastructure at UQ is managed by the P&F Engineering section. Please direct any questions to:

Adrian Mengede
Senior Electrical Engineer
The University of Queensland
Brisbane 4072

e: a.mengede@pf.uq.edu.au
p: 07 336 53438
m: 0411 152 356

All telecommunications pits not installed flush into a footpath or roadway shall have a flush, 100mm minimum reinforced concrete border installed as a “mowing strip” which will also prevent the pit wall from accidental damage.

All telecommunications pits installed in locations where vehicles (including self-propelled mowers) may impact the integrity of the completed pit with damage by crushing will have a bollard installed adjacent to the pit.

14.7.2 Size

The minimum size pit shall be a Type P3 plastic pit with the following dimensions, length 663mm, width 243mm and depth 570mm with concrete cover.

The Type P3 pit shall be used when there is a requirement for no more than two 100mm conduits to be installed at each end.

All 100mm conduits entering pits will be connected to the pit-wall with a Bell-mouth adapter.

Where there is a requirement for 3 or more of 100mm conduits to enter the pit the minimum pit size shall be length 600mm, width 600mm and depth 600mm, plastic pit with concrete cover.

14.7.3 Lids

All pits shall have:

a. A concrete lid with the word “Communications” or “Communications Cables” on it.

b. A brass label installed on the outside to identify the pit number

c. A brass label shall be installed to indicate the direction of the conduits exiting and entering the pit.

14.7.4 Drainage

To allow drainage of the pit, drainage holes shall be provided and the pit shall be bedded on

a. 100mm of fine sand

b. a layer of permeable, durable, underlay

c. 150mm of gravel.

14.7.5 Trenches

Trench depths will be specified by P&F. Where this has not been specified then the minimum depths are:

a. 300mm from the ground surface to top of the conduit in non-trafficable areas

b. 500mm in trafficable areas.

Trenches will be backfilled with fine sand, such that the sand provides a minimum 100mm bed around the entire circumference of the installed conduit, and

a. ACMA approved PVC marker tape is to be laid on top of the sand prior to filling in the trench (minimum 150mm above conduit)

b. all open trenches will be guarded by approved safety barriers

c. restored by filling and compacting

d. all surfaces restored to original condition.

Where appropriate, under-boring should be considered as an alternative to trenching.

14.7.6 Conduit

All external conduit either above (covered walkways etc) or below ground shall be white rigid only UPVC 4.5mm wall thickness, self supporting, 100 mm diameter conduit to AS 2053, and:

a. all UPVC joints to be glued with external – blue PVC cement

b. conduit ends are to be fitted with a white UPVC conduit flare (bell-mouth) installed flush with the wall surface

c. to be installed in complete lengths

d. ends to be cut square and all burrs removed so that conduits are completely clean inside

e. to be installed such that water does not accumulate

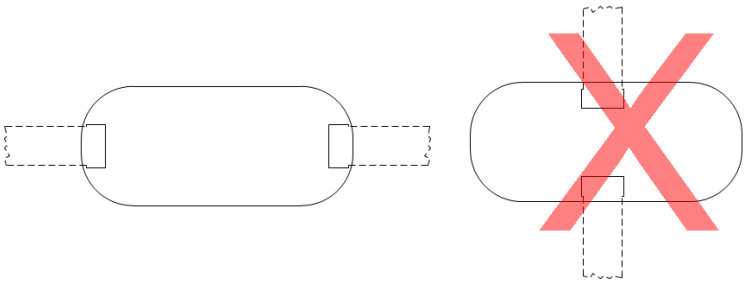
f. to be capped and sealed until used to ensure that the conduits remains free of all material and moisture

g. all exposed UPVC conduit between ground level and 2400mm will be provided with a “hat section” cover. This will eliminate accidental damage to the conduit and ICT cabling within. In high risk areas steel bollards should be considered.

A nylon draw rope is to be installed and left in each conduit and shall have sufficient strength to withstand a pulling tension of greater than 4000Nm and installed in one continuous length.

14.7.7 Pit Entry Points

All conduit entering a pit will be done through the ends (sides with the shortest walls). Conduits shall not be installed in the long sides of P3 pits.



15 INSTALLATION STANDARDS

15.1 xTP Installation

15.1.1 General

a. The length of each permanent link shall be a minimum of 15m and a maximum of 90m.

b. Each cable run shall be continuous without any joints or splices (excluding CPs).

c. If CPs are used there shall be a minimum of 15m cable distance from either end of the cable run (ie: minimum 30m permanent link).

d. Fixed xTP Cable shall have an OD less than 8.5mm, and a minimum bend radius less than 32mm.

e. The list of cable and equipment shall be verified for completeness by the cabling vendor. The list of cable and cabling equipment shall be made available to the PLIE for review prior to commencement.

f. All communications cable and cabling equipment shall be installed in accordance with the manufacturers' guidelines, relevant Australian Standards and this specification.

g. The installation method shall be designed to avoid damage to cables, during and post installation.

h. RJ45 plugs will be of the 'Catch free latch' type.

i. Excess cable shall be concertinaed (maintaining minimum bend radius) and not coiled.

j. Velcro style cable ties shall be used.

k. Nylon cables ties shall not be used where they come directly into contact with the cable sheath.

15.1.2 **Cable Installation**

a. The first set of 48 cable terminations shall be inspected by the PLIE. Once approved the standard of termination is to be maintained or exceeded for all other terminations.

b. Looming of cables shall allow for equipment installation and flexibility in the positioning of patch panels in the rack.

c. Each cable shall be labelled at both ends in accordance with UQ's standard.

d. Cables shall be installed to a high standard of quality using cable tray/mesh, catenary, duct and conduit. Cabling shall not be secured to ceiling hangers, building services or allowed to lie on ceilings, floors (including under or above false floors) or grids.

e. The contractor shall ensure that the maximum pulling tensions of the specified distribution cables are not exceeded and cable bends maintain the proper radius.

f. Failure to follow the appropriate guidelines will require the contractor to provide in a timely fashion the additional material and labour necessary to properly rectify the situation. This shall also apply to any and all damages sustained to the cables by the contractor during the implementation of the SCS.

g. Where cables are installed on a horizontal cable tray:

- Cables shall be run with a view to minimising alien crosstalk (ie: cables should be laid as loosely as possible)

- Cables shall not be bundled

h. Cables shall be installed observing the minimum bend radius requirements and without kinks or loops,

i. An allowance of "excess" cable (service loop) shall be left at each end of the cable run. A minimum length of 1 metre and a maximum of 2 metres is required and shall be formed in an "S" bend or gooseneck (not coiled).

j. On completion of cable rough-in and before termination, all cabling shall be securely supported (taking care not to deform the cable sheath at any point) to reduce the likelihood of mechanical damage.

15.1.3 Patch Panel Installation

a. All new cabling shall be terminated on new patch panels.

b. Unless otherwise specified, all 24 port patch panels will be angled.

c. Wherever wide vertical minders are installed the default patch panel density will be 48 port in 1RU

d. All patch panels to be mounted securely into racks as per the supplied rack elevations.

e. A self-supporting cable loom is to be installed at the rear of each patch panel.

f. For 24 port patch panels: the bundles of 24 cables feeding the rear of the patch panel will be fed from one side. Descending patch panels feeds will alternate between left and right vertical minders. Example:

g. For 48 port patch panels: cables for outlet numbers 1 to 24 will be fed from the right hand side and 25 to 48 from the left hand side (no more than 24 cables per finger management guide).

h. Where 48 port patch panels are used there is to be NO gooseneck in the vertical minder. All slack, including the service loop, is to be pulled back up onto the overhead tray.

15.1.4 Consolidation Points

Consolidation Points (CP) are not preferred by UQ and shall only be used where specified in writing by the TLN./PLIE

15.1.5 Multi User Telecommunications Outlet Assembly

Multi User Telecommunication Outlet Assemblies (MUTOA) are not preferred by UQ and shall only be used where specified in writing by the TLN/PLIE.

15.2 Optical Fibre Cable Installation

15.2.1 General

a. All cores will be terminated.

b. 48 Core, underground loose tube, gel filled sacrificial sheath SMOF cable will be used for all external applications unless otherwise specified.

c. All underground fibre will be transitioned to indoor tight buffered (through the use of a wall mounted splice enclosure) within 15m of entering the building.

d. All OF connectors (MM and SM) shall be LC Duplex.

e. All permanent links shall have a transposition between adjacent cores, ie: within a pair.

f. Where OF makes an unsupported transition (eg: between tray and a cabinet, horizontal tray and vertical tray, etc) it shall be installed in corrugated conduit for a minimum 300mm either side of the transition.

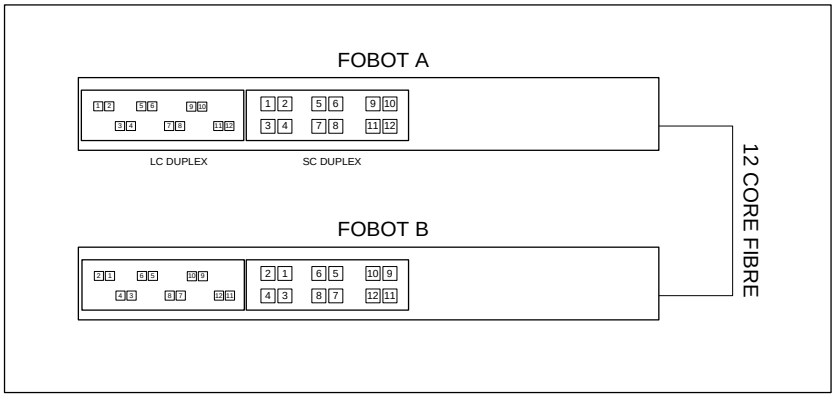
g. A minimum of 4 metres of cable shall be coiled at each end of a permanent link. The coil shall be as close as practicable to the FOBOT. The coil will allow for the FOBOT to be removed from the rack and placed on a table for additional OF installation and testing.

h. SM and MM connections shall be on separate FOBOTs unless otherwise specified.

i. FOBOTs will be the sliding drawer type.

j. OF entering the drawer from the rear shall be fixed in such a manner that there is sufficient length to slide the drawer 150mm forward.

k. OF core numbering and placement will be as per below (LC and SC shown for clarity only):



15.2.2 Single Mode

a. All Single Mode fibre will be OS2.

b. All OS2 supplied patch leads shall be yellow in colour.

c. All OS2 through connectors shall be blue in colour

15.2.3 Multimode

a. All Multimode fibre shall be OM4.

b. All OM4 supplied patch leads shall be aqua in colour.

c. All OM4 through connectors shall be aqua in colour.

15.2.4 FOBOTS

UQ is moving toward a medium / high density FOBOT design. Medium density is 48 cores in 1RU. High density is 96 or 144 cores in 1RU (only used in data centres).

a. 1RU FOBOTS will be used (unless otherwise specified in writing by the PLIE)

b. Where a vendor offers Medium Density or Low Density faceplates only Medium Density will be used. For example, if a 1RU FOBOT being used to terminate a 24 core fibre and the vendor has faceplates that will present this as:

1. 12 cores in the left half and 12 cores in the right half, or

2. 24 cores on the left with a blanking plate on the right (or *vice versa*),

Specific requirements exist for any fibre terminating in the Prentice Building (Data Centre 1) and GPN3 (Room 110) Fibre Node cabinets. These will require the use of the ADC Krone Quareo product. For each 48 core fibre to be terminated the contractor will supply:

Qty	Part Number	Description
1	QUCH-1RU	1RU un-managed QUAREO empty PA
2	QUFB-48FDLCMSMHR	Singlemode ultra polish LC-MPO elite blade
4	FST-DRS24-NT	24 Position heat shrink fusion Splice Wheel with Splice Chip
4	1-2160137-0	Patch Lead SM OS2 MPO/MPO Female STR 10m

Note: UQ is aware that the above BoM is capable of terminating 96 cores. Unless otherwise specified, all items above, in the quantities shown, will be supplied for each 48 core.

15.3 Earthing

a. All metal structures shall be earthed in accordance with AS/NZS 3000.

b. Yellow/green building wire (minimum size 6 mm^2) shall be used for earthing metal structures (cable tray, distributors, equipment cabinets etc.)

c. The earth conductor shall be terminated at the earth bar of the electrical distribution board or main switchboard.

d. Connections to cable tray or other metal structures shall be via a suitably sized closed hole terminal lug, and serrated washer or manufacturer's accessory, ensuring that any paint is scraped back to bare metal.

15.4 Fire Rated Barriers

a. Fire protection for the TR shall be provided in accordance with the NCC, where required.

b. Cableways shall not pass through fire rated barriers unless approved by the PLIE.

c. Approved installations of cables through fire rated barriers shall be co-ordinated with the PLIE and an inspection of completed works requested prior to restoration of the fire barrier.

d. The cabling contractor will provide a certificate from an approved inspector attesting the efficacy of the fire stopping barrier. This certificate will be provided electronically and as a hard copy to the PLIE.

15.5 Raised Floor Penetrations

Where penetrations are required in Raised Access Floors the floor tiles shall be fitted on one edge with a Chatsworth KoldLok Split Integral Raised Floor Grommet (or equivalent) to minimise air spillage from the UFAD plenum. Two KoldLoks will be supplied per cabinet – one for power and one for data cabling.

Penetrations will preferably be made on the tile edge and shall allow for the tile to be lifted and removed without disturbing the SCS. Where the penetration cannot be made on the tile edge the tile shall be cut into two pieces and the penetration made on a cut edge.

15.6 Materials

All materials supplied shall comply with the relevant standards and those specified in this document. To ensure the consistency of the installation, all cabling, connectors, network support or any other equipment/hardware supplied by the contractor shall be sourced from the one vendor.

All materials supplied by the contractor shall be delivered to site new and in sealed packaging.

15.7 Tools

At all times the correct tools shall be used to carry out all works. This applies to all power and hand tools and includes any specialised tools or instruments that are specified by manufacturers in the installation of their equipment of accepted industry standards.

15.8 Maintaining a Clean Work Environment

The site is to be kept clean at all times.

Maintaining a clean work environment includes:

a. Cleaning the work area (before commencement of works, during works at regular intervals or as required, and on completion of works).

b. Taking necessary precautions to minimise dust.

15.9 Working near active equipment

Wherever possible cutting and drilling work shall not be done near active equipment. For example, cable trays shall be removed from the building and cut outdoors.

Where it is not practical for this to occur then the work shall be undertaken with a view to minimising airborne particulate matter by using, for example, a vacuum extraction system.

All active equipment shall be shrouded with clean cotton covers placed in such a manner as to provide the maximum protection whilst minimising disruption to cooling air flow. Covers shall be removed in a manner which contains any debris. Covers shall be removed from the building and cleaned outdoors before re-use.

15.10 Minimising and Rectifying Damage

The installation contractor is responsible for repairs to any finished surfaces damaged by his team. In order to minimise damage the following work practices are mandatory:

15.11 Ceiling Tiles

Where ceiling tiles need to be removed to allow for installation works the contractor will:

1. Cover and protect all adjacent UQ property prior to handling any ceiling tiles,
2. Completely remove the tiles from the ceiling grid
3. Stack the tiles flat on a clean area of the floor. Tiles will be stacked like surface to like surface.
4. After replacing tiles ensure the surrounding areas are clean and free from debris

Persons handling ceiling tiles shall wear clean, white, cotton or other non-marking gloves.

16 TELECOMMUNICATIONS RACKS

16.1 General

All racks will be black and, rack height will be specified on a per project basis.

The contractor will supply and assemble all racks including fitting of all shelves, PDUs, cable management.

16.2 Cable management

All cabinets and racks will have a minimum 200mm vertical cable management area on both sides.

16.3 Racks

UQ's preference is for the RT line of products. Sample BoM's are given in Annex B.

Open frame lab racks will be fixed to the floor as strongly as possible (eg: dynabolts, chemsets, etc). The top of the rack will be fixed to the ceiling or wall using 50mm unistrut extended at least 150mm down the channel of the frame from the top of the rack. Sample BoMs are given in Annex B – RACK .

Typical Rack elevations for 45RU and 52RU racks are presented for reference in ANNEX C – TYPICAL RACK ELEVATIONS

16.4 Power

There are two options for power for Telecommunications Racks. The type to be used will be specified on a case by case basis. If nothing is specified then the 32A option will be installed.

The options are:

16.4.1 15A Option

For each rack the cabling contractor will install two 15A single phase, captive outlets comprising:

Qty	Description	Part Number
2	Clipsal 15A 250V 1 gang 3 pin combination surface switched socket outlet	56C315-GY

For each rack the cabling contractor will supply the following items:

Qty	Description	Part Number
2	Rack Technology 15A, 10 Way Horizontal PDU	9003-RB-CAP15F

16.4.2 32A Option

For each rack the cabling contractor will install two 32A single phase, captive outlets comprising:

Qty	Description	Part Number
2	Clipsal Combination Switched Socket Enclosure	56E2 GY
2	Clipsal 32A 250V 1 gang surface rotary switch	56SW132LE GY
2	Clipsal 32A 250V 1 gang 3 pin surface socket outlets	56SO332-GY

For each rack the cabling contractor will supply the following items:

Qty	Description	Part Number
2	Rack Technology UQ Custom 32A PDU	PH113-RTPDU- PH113-013008320833-2T0-02

The outlets will be installed at the same height above the finished floor as the highest point of the cabinet/rack.

One of the pair of power outlets will be on general power and the other on UPS. Where UPS is not available one of the outlets will be on the essential circuit.

Each outlet will be on a dedicated circuit breaker in the power distribution board.

17 ADMINISTRATION

17.1 Labelling

17.1.1 General

Unless otherwise specified the cabling contractor will supply all of the labelling detailed below.

All fixed cables shall be labelled at each end (behind the patch panel or TO) with self-laminating wrap around labels. Labels shall be affixed approximately 20mm from the stripped end of the cable sheath and shall comprise C-LOO (as per information below).

All cabinets and racks shall be labelled.

All patch panels shall be labelled.

Hand written labels will not be accepted.

17.1.2 Telecommunications Outlets

All TO's shall be labelled.

All TO labels shall be 7mm Arial black text on a white background (9-12mm tape) and clearly legible from 1.8m.

TO labels shall be in the following format:

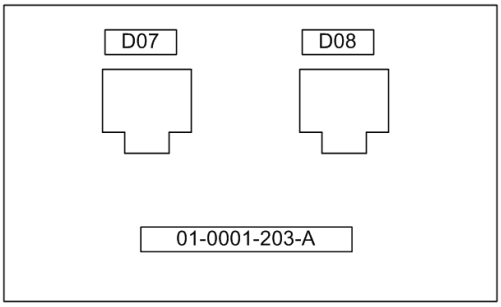
SS-BBBB-NNnnnn-C-LOO where:

	Description
SS	Site Number
BBBB	Building Number
NNnnnn	Telecommunications Room Number
C	Cabinet / Rack ID (alphabet)
L	Patch panel ID (alphabet)
OO	Outlet number

The NNnnnn component can be variable length. The two uppercase NN indicates a minimum of 2 alphanumeric characters. The four lowercase nnnn indicates a maximum length of 6 alphanumeric characters.

The SS-BBBB-NNnnnn-C portion of the address needs to be done only once per faceplate or MUTOA.

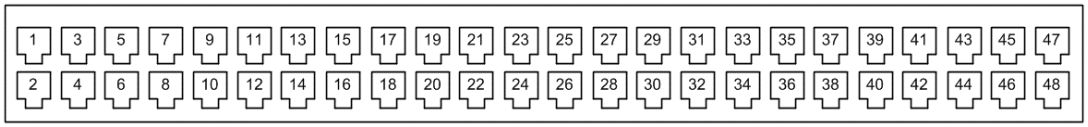
Example:



Outlets 7 and 8 on the patch panel labelled D of Cabinet A in TR number 203. The outlet is in Building 1 (Forgan Smith) at St Lucia.

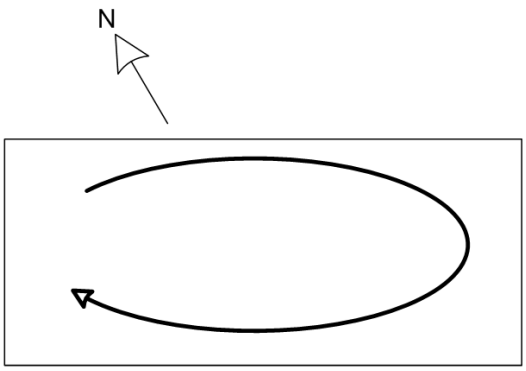
17.1.3 48 Port Patch Panels

All 48 port in 1RU patch panels will follow the numbering scheme shown below:

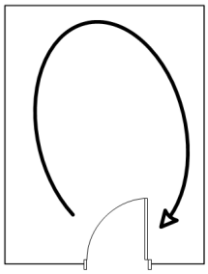


17.1.4 Order of Labelling

Outlet numbering will start from the corner of the building closest to North West and shall be done in a clockwise direction.



Within each room of a building the first outlet will be to the left of the lowest numbered door and shall be done in a clockwise direction. The outlets numbering shall be sequential either left to right or top to bottom.



17.1.5 Patch Panels

Patch panels will be labelled with a LETTER. Labels will comprise 10mm Arial white text on a black background on 12mm tape. Two labels will be affixed to each patch panel, one on the left hand edge and one on the right hand edge.

17.1.6 FOBOT Labelling

FOBOTS to be labelled according to the following format describing the fibre number, type and remote end.

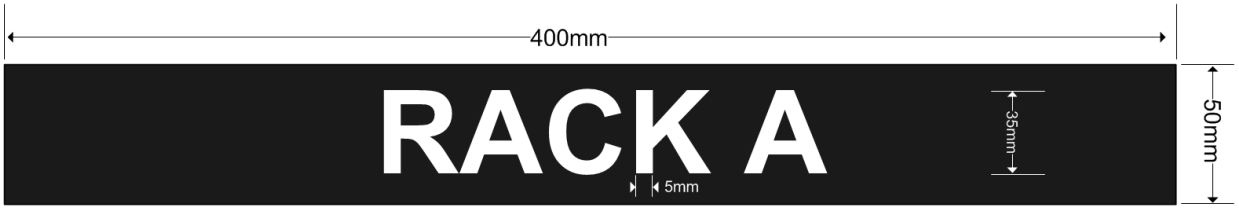
FFF – nnC-TTT-SS-BB-NNnnnn-C where.

	Description
FFF	Fibre number – assigned by PLIE
nn	Number of cores
C	Denotes Number of Cores (always ‘C’)
TTT	Type of fibre – OS2 or OM4
SS	Site Number
BBBB	Building Number
NNnnnn	Telecommunications Room Number
C	Cabinet / Rack ID (alphabet)

17.1.7 Racks

All racks will be labelled **front and rear** with a flexible magnetic strip label. This will be 50mm high and 400mm long comprising white text on a matte black background. The text shall be 35mm high and 5mm thick and all in uppercase. The label will be placed on the highest point of the cabinet/rack from which it can be easily read.

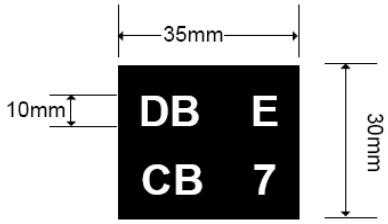
The label will show the word “RACK” followed by a letter.



17.1.8 Power Distribution Units

Every PDU will be labelled front and rear with a flexible magnetic rubber strip label. This will be 30mm high and 35mm wide comprising white text on a black background. The label shall have a matt finish. The text shall be 10mm high and 1.5mm thick and all in uppercase. The label will be placed on the highest point of the PDU from which it can be easily read. If the label will not magnetically adhere to the PDU it shall be glued using four small dots of cyanoacrylate adhesive (superglue) applied in such a manner that the label will not fall off inadvertently but may be removed using a small amount of force.

The label will show the descriptor “DB” followed by the Distribution Board designator. The second line will show the descriptor “CB” followed by the Circuit Breaker number.



17.1.9 Optical Fibre Backbone Cables

All fibre optic cables shall be labelled in every telecommunications riser, pit entry, exit of any conduit and shall be labelled within 1m of entry to the FOBOT. All labelling exposed to the environment shall be punched stainless steel.

Any exposed or above ground conduits that have copper or Fibre optic telecommunications cable inside must have a firmly affixed label on the outside of the conduit at a maximum of 5 metre intervals. Fibre cables traversing building risers will be labelled at least once in each riser at 1200mm AFF. The label on the conduit must match the cable that is inside the conduit reflecting the standard labelling method outlined in this document.

All fibre cable installed in pits will have a minimum of two labels affixed showing the fibre cable’s unique identifying number. Labels WILL NOT show the A and B end building names or numbers.

17.2 Documentation

The following documentation shall be provided and updated to reflect changes:

a. Marked up (as-built) documentation.
b. Performance Test Results.
c. SCS warranty and certification.
d. Third party verification of test results where applicable.
e. Electronic documentation shall be in Ms Visio, Ms Excel or PDF formats.

17.3 As-Built Diagrams

Upon completion of the installation the cabling contractor shall submit a hand-marked version of as-built drawing to ITS to facilitate the activation of outlets.

For outlet installation managed by ITS, the contractor is responsible to obtain the as-built drawing from P&F and update the newly installed outlets.

As-part of the as-built drawings submitted by the Principal Contractor the outlet locations and labels shall be marked in the AutoCAD format drawings in a separate layer.

18 TESTING

18.1 General

100% of cables will be tested.

Tests that report PASS* (marginal/star), FAIL* (marginal/star) or FAIL shall not be accepted.

18.2 Test Equipment

Only test equipment approved by the SCS vendor and correctly calibrated shall be used.

Test equipment shall only be used with the manufacturer's approved accessory cables provided for testing of permanent link models.

18.3 Test Environment

Tests should be done in an environment as close to operational conditions as possible.

Cabling infrastructure shall not be moved after testing has taken place unless it is subsequently retested.

Testing shall be undertaken after workstation or adjacent power has been commissioned and whilst the office lighting is functioning.

18.4 Test Results

Test result sheets will include:

a. Test equipment used (make/model).
b. Operator's name
c. Operators certification from test equipment vendor
d. Software / firmware revisions used during the testing
e. Date of calibration
f. A copy of a current manufacturer's or National Australian Testing Association (NATA) calibration certificate for all test equipment to be used, prior to the commencement of testing.

Test results will be provided in Linkware format for xTP and LSPM, and *Bellcore Telcordia* (*.sor) format for OTDR

LSPM results for optical fibre cable will be provided as one *Fluke Linkware* (*.flw) file per fibre cable. The file name will be in the format "SS-XXX.flw" where SS is the Site Designator (as per 14.1.2) and XXX is the fibre number.

18.5 Independent Third Party Test Result Verification

UQ deems the Structured Cabling System (SCS) supporting the network to be critical for its effective operation.

In the interests of ensuring compliance to the performance requirements of the installed cabling system against Australian Standards and UQ requirements, the Contractor shall carry out all tests required to establish conformance. This applies to all installations irrespective of the communication contractor or structured cabling system vendor.

For installations of more than 50 outlets it is a UQ requirement that all test data associated with structured cabling be independently verified by a NATA Type A Inspection Body. This requirement applies to both twisted pair and optical fibre test data.

The contractor shall submit all SCS test results to UQ Approved NATA Inspection Body once the project is near completion.

The cost of test verification shall be borne by the installation company and should be included in any quoted price or tender response. Costs may include fees for resubmission of data to address non-conformance issues.

The Contractor shall pay for all expenditures incurred by UQ for re-inspection due to the Contractor's failure to complete the SCS installation after the date of practical completion.

No site will achieve practical completion until a "NATA Statement of Compliance" and associated NATA report has been received by UQ for all work forming part of the project.

It is a UQ requirement that a copy of all NATA reports will be sent directly from the Approved NATA Inspection Body to UQ on generation.

18.5.1 Approved NATA Inspection Bodies

The Approved NATA Inspection Body shall be

- NATA accredited for inspections and that the scope of accreditation includes AS/NZS3080, similar standards and requirements set out within this specification.
- A NATA Type A Inspection Body and shall be independent from any equipment or Service provider.
- Approval is based, in part, on the following

- NATA Scope of Accreditation including review of in-field testing results of LAN and telecommunications cabling covering optical fibre and copper cabling systems (balance pair systems)
- Ability to carry out High Level Analysis
- Active participation in performance based communication cabling standards (Australian Standards)
- Active participation in testing standards of communication cabling (Australian Standards)
- Active industry involvement
- Quality of reporting.

UQ Approved Inspection Bodies:

VTI Services (Inspection Body NATA Accreditation Number 15120)
16 Banbury Crescent
Chipping Norton NSW 2170
Australia
t: +61-2-98242412
e: office@vti.net.au

18.6 Minimum Test Standards

As a minimum the following parameters shall be tested and recorded.

18.6.1 Class E, E_A, F and F_A Links

All test results shall be reported using the Permanent Link model.

Compliance testing for Class E_A requires a level 3e or level 4 tester as defined by AS/NZS ISO/IEC 61935.1. Class E requires a level 3 tester. If uncertain, the contractor is to consult the cabling vendor about approved testers **before** starting the installation.

Electrical acceptance tests shall be carried out on all xTP cables in accordance with AS/NZS IEC 61935.1 in accordance with values set out in AS/NZS 3080 (ISO/IEC 11801). Test equipment must be calibrated and calibration certificates must be supplied. Accredited installers must also be trained and certified for the test equipment used for acceptance testing. Certificates must be provided.

18.6.2 Voice Grade links

a. Pair continuity/rotation
b. Date of test

18.6.3 Fibre Optic links

Compliance testing for MMOF and SMOF shall be in accordance with AS/NZS ISO/IEC 14763.3 and AS/NZS 3080 (ISO/IEC 11801).

Accredited installers must be trained and certified for the test equipment used for acceptance testing. Certificates of competence must be provided.

Test equipment must be calibrated and calibration certificates must be provided.

The following information will be provided:

a. UQ Fibre Cable Number
b. Date of test
c. Length in metres
d. Insertion loss measured at 1310nm and 1550nm in both directions with a
e. Light Source/Power Meter.
f. OTDR traces (as per below).

LSPM Test results will be provided electronically in the testers' native format along with *VTI Services* fibre reporting sheet completed (www.vti.net.au)

All fibre cores over shall be tested with an OTDR utilising a launch and a tail cable in both directions and at both wavelengths

All OTDR testing shall be presented in a *Bellcore* format

No mated connectors are to have an optical attenuation loss exceeding 0.75dB-Analysis by two point LSA method on the OTDR trace

No event other than a mated connector shall have a loss greater than 0.2dB. - Analysis by two point LSA method on an OTDR trace

The pass fail criteria will be that specified within AS/NZS ISO/IEC 14763.3.

Launch and tail cable associated with OTDR testing shall be of sufficient length to determine the optical return loss of the interface connectors of the link under test.

A loss budget shall be provided for each fibre run. An electronic copy of all test results shall be submitted and included in the As Built documentation.

The One Test Reference Cord (TRC) method will be used for testing all fibre links.

19 ACCEPTANCE AND COMMISSIONING

19.1 Acceptance Check-list

For installation of more than 24 outlets, the acceptance check list in Annex A will be used for final inspection and acceptance. It will be the builder / contractor's responsibility to organise handover meeting on site for inspection and handover. The builder / contractor shall rectify any non-compliant criteria in the check list before acceptance and commissioning by UQ ITS.

19.2 Documentation Inaccuracies

The site supervisor will personally confirm that all labelling is correct. If during the DLP any labelling is found to be incorrect then UQ will engage an independent third party (at UQs discretion) to conduct a full audit. The cost of this audit will be invoiced to the cabling contractor. The contractor will then remedy any defects.

19.3 Defect Rectification

On P&F projects, the contractor will provide a contact phone number and email address for logging defects with the SCS. Requests for rectification work will be attended to within 2 business days during the DLP.

19.4 Warranty

The contractor will provide a contact phone number and email address for logging warranty claims.

20 ANNEX A – TR ACCEPTANCE CHECKLIST

		Yes, No or N/a			
	TR Number:				
1	Cables are neatly reticulated on cable trays and secured				
2	Cable entry points are sealed / protected as per UQ Fire Protection Specification (check with P&F)				
5	Racks				
	All racks are labelled				
	All racks are bolted to the floor				
	All racks are earthed				
6	Horizontal cabling (for each floor)				
	Patch Panels are labelled				
	Wraparound labels – remote room number & outlet ID				
	All Cat 6_A patch panels are earthed				
	48 port patch panel outlet sequencing is correct				
	Test Results received and reviewed				
7	As-built Drawing				
	Drawings received (hand-marked drawings acceptable).				
	Outlet numbers marked				
	WAP locations with Device IDs marked				
8	Lead-in Cables				
	All cables terminated and labelled				
	Test results submitted and reviewed				
	Voice cable record books supplied / updated				
9	Power feeds				
	Socket types are correct				
	Sockets are labelled				
10	Air-conditioning				
	Installed and Functioning				
	Cooling adequate				
11	TR Access				
	UQ Common TR key works				
	Proximity card reader available and working				
12	All service installation in the TR have been completed				
13	Room is cleaned				

21 ANNEX B – RACK BILL OF MATERIAL

21.1 Type 1 – 1x 45RU Lab Rack

Qty	Description	Part Number
1	Rack Technologies IQ Open Frame 45RU	IQOF4501
1	Rack Technologies IQ 1RU Horiz CM 150mm Finger System	IQOF9509-150
1	Rack Technologies IQ 2RU Horiz CM 150mm Finger System	IQOF9502-150
4	Rack Technologies IQO-F Cable Manager 300W Long Fingers	IQOF4540-150
1	Rack Technologies Shelf	S-SHELF-MOD-300-BL
4	Rack Technologies pack 100 Cage Nuts and Screws.	9075
1	B&R Cable Hanger	BRQ-Q10600A/3
1	Nylex Safe-T-Step (or equivalent)	E739A
1	Bailey Ladder - FG Platform Step 3 (150kg)	FS10721
1	Bailey Castor Kit (to be fitted by contractor)	FS23120

21.2 Type 2 – 1x 52RU Lab Rack

Qty	Description	Part Number
1	Rack Technologies IQ Open Frame 52RU	IQOF5201
1	Rack Technologies IQ 1RU Horiz CM 150mm Finger System	IQOF9509-150
1	Rack Technologies IQ 2RU Horiz CM 150mm Finger System	IQOF9502-150

4	Rack Technologies IQO-F Cable Manager 300W Long Fingers	IQOF5240-150
1	Rack Technologies Shelf	S-SHELF-MOD-300-BL
4	Rack Technologies pack 100 Cage Nuts and Screws.	9075
1	B&R Cable Hanger	BRQ-Q10600A/3
1	Nylex Safe-T-Step (or equivalent)	E739A
1	Bailey Ladder - FG Platform Step 3 (150kg)	FS10721
1	Bailey Castor Kit (to be fitted by contractor)	FS23120

21.3 Type 3 – 1x 52RU 4 post Open Frame Rack

Qty	Description	Part Number
2	Rack Technologies IQ Open Frame 52RU	IQOF5201
1	Rack Technologies IQ 1RU Horiz CM 150mm Finger System	IQOF9509-150
1	Rack Technologies IQ 2RU Horiz CM 150mm Finger System	IQOF9502-150
4	Rack Technologies IQO-F Cable Manager 300W Long Fingers	IQOF5240-150
As rq'd	Rack Technologies IQO-F Cable Manager 400W Long Fingers	IQOF5250-150
1	Rack Technologies Shelf	S-SHELF-MOD-300-BL
1	Rack Technologies IQ Open Frame Joining Kit Adjustable (400-600mm)	IQOF9514
4	Rack Technologies pack 100 Cage Nuts and Screws.	9075
1	B&R Cable Hanger	BRQ-Q10600A/3
1	Nylex Safe-T-Step (or equivalent)	E739A
1	Bailey Ladder - FG Platform Step 3 (150kg)	FS10721
1	Bailey Castor Kit (to be fitted by contractor)	FS23120

21.4 Type 4 – 1x 45RU 4 post Open Frame Rack

Qty	Description	Part Number
2	Rack Technologies IQ Open Frame 45RU	IQOF4501
1	Rack Technologies IQ 1RU Horiz CM 150mm Finger System	IQOF9509-150
1	Rack Technologies IQ 2RU Horiz CM 150mm Finger System	IQOF9502-150
4	Rack Technologies IQO-F Cable Manager 300W Long Fingers	IQOF4540-150
1	Rack Technologies Shelf	S-SHELF-MOD-300-BL
1	Rack Technologies IQ Open Frame Joining Kit Adjustable (400-600mm)	IQOF9514
4	Rack Technologies pack 100 Cage Nuts and Screws.	9075
1	B&R Cable Hanger	BRQ-Q10600A/3
1	Nylex Safe-T-Step (or equivalent)	E739A
1	Bailey Ladder - FG Platform Step 3 (150kg)	FS10721
1	Bailey Castor Kit (to be fitted by contractor)	FS23120

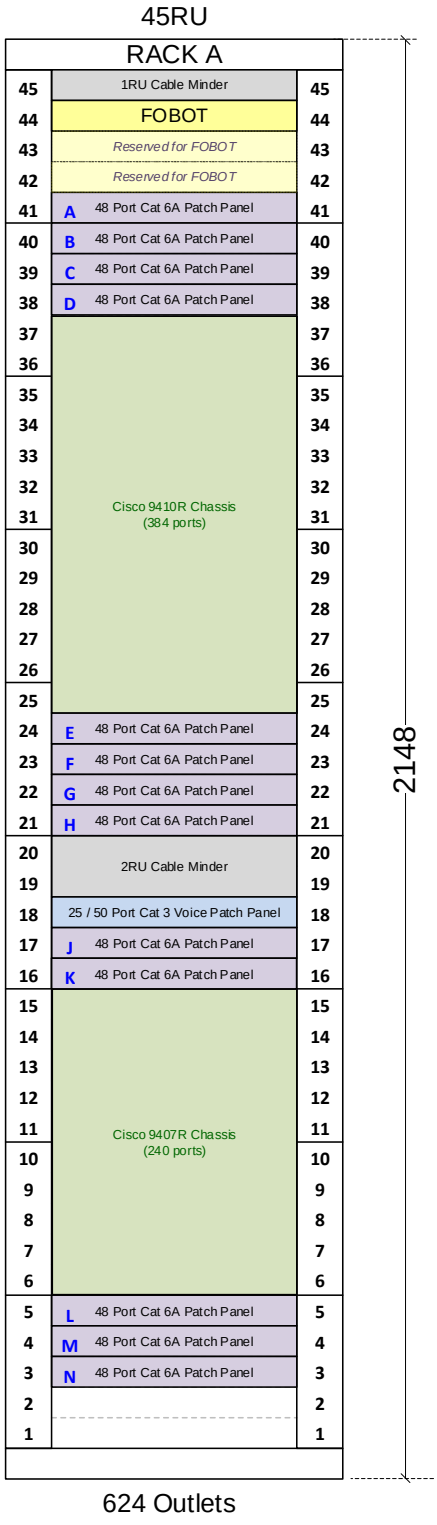
21.5 Type 5 – 2x 52RU 4 post Open Frame Rack

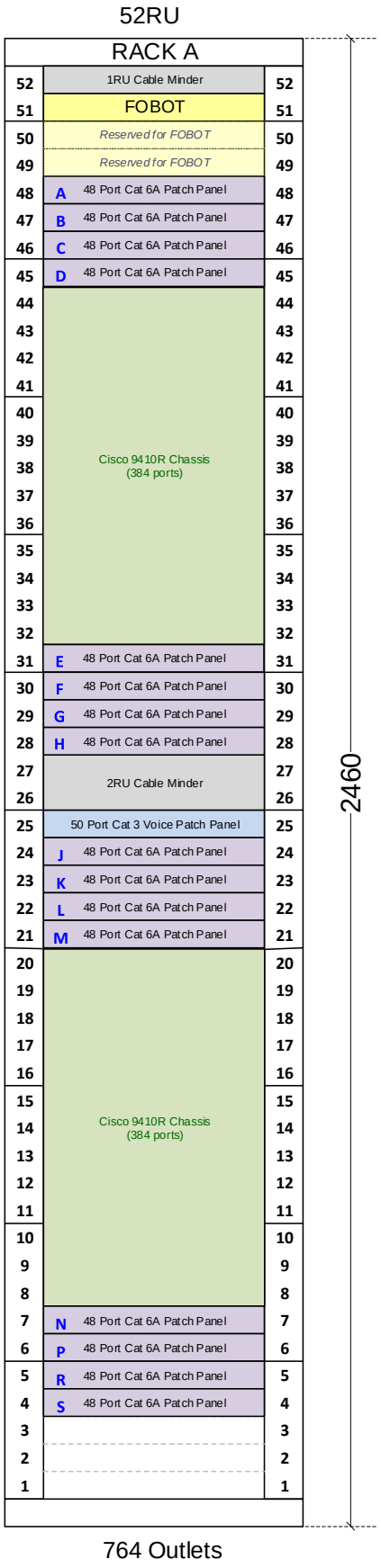
Qty	Description	Part Number
4	Rack Technologies IQ Open Frame 52RU	IQOF5201
2	Rack Technologies IQ 1RU Horiz CM 150mm Finger System	IQOF9509-150
2	Rack Technologies IQ 2RU Horiz CM 150mm Finger System	IQOF9502-150
4	Rack Technologies IQO-F Cable Manager 300W Long Fingers	IQOF5240-150
2	Rack Technologies IQO-F Cable Manager 400W Long Fingers	IQOF5250-150
2	Rack Technologies Shelf	S-SHELF-MOD-300-BL
2	Rack Technologies IQ Open Frame Joining Kit Adjustable (400-600mm)	IQOF9514
2	Rack Technologies pack 100 Cage Nuts and Screws.	9075
1	B&R Cable Hanger	BRQ-Q10600A/3
1	Nylex Safe-T-Step (or equivalent)	E739A
1	Bailey Ladder - FG Platform Step 3 (150kg)	FS10721
1	Bailey Castor Kit (to be fitted by contractor)	FS23120

21.6 Type 5 – 2x 45RU 4 post Open Frame Rack

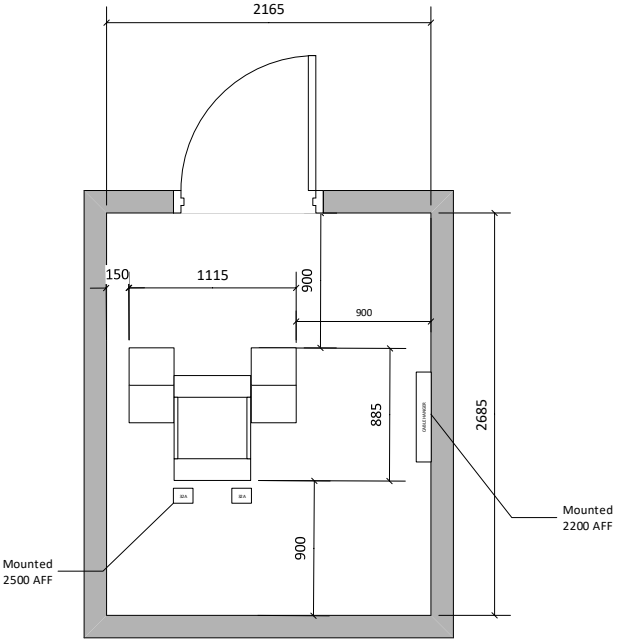
Qty	Description	Part Number
4	Rack Technologies IQ Open Frame 45RU	IQOF4501
2	Rack Technologies IQ 1RU Horiz CM 150mm Finger System	IQOF9509-150
2	Rack Technologies IQ 2RU Horiz CM 150mm Finger System	IQOF9502-150
4	Rack Technologies IQO-F Cable Manager 300W Long Fingers	IQOF4540-150
2	Rack Technologies IQO-F Cable Manager 400W Long Fingers	IQOF4550-150
2	Rack Technologies Shelf	S-SHELF-MOD-300-BL
2	Rack Technologies IQ Open Frame Joining Kit Adjustable (400-600mm)	IQOF9514
2	Rack Technologies pack 100 Cage Nuts and Screws.	9075
1	B&R Cable Hanger	BRQ-Q10600A/3
1	Nylex Safe-T-Step (or equivalent)	E739A
1	Bailey Ladder - FG Platform Step 3 (150kg)	FS10721
1	Bailey Castor Kit (to be fitted by contractor)	FS23120

22 ANNEX C – TYPICAL RACK ELEVATIONS

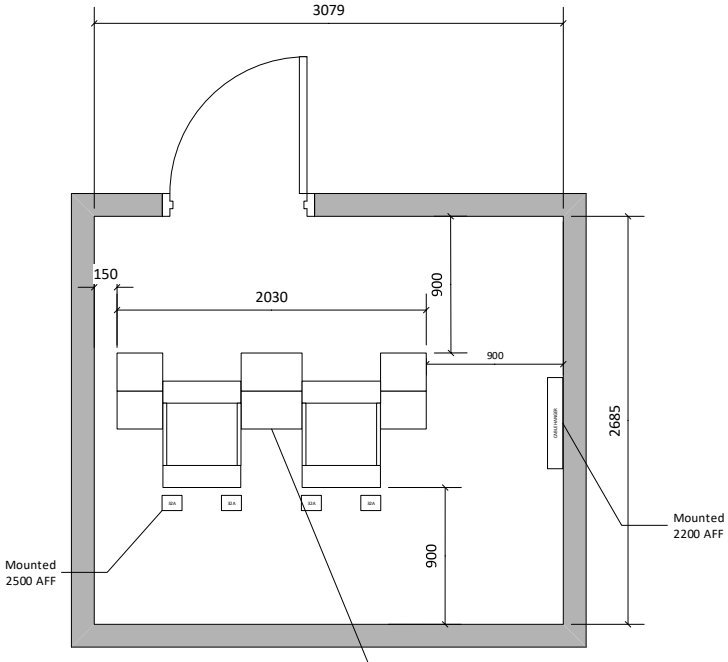




23 ANNEX D – TELECOMMUNICATIONS ROOM EXAMPLES



SINGLE RACK
Minimum Area 6m^2



NOTE: Where multiple racks are bayed together the end vertical minders are 300mm wide and the intermediate ones are 400mm wide.

TWO RACKS
Minimum Area 8.5m^2

24 ANNEX E – QGEA COMPLIANCE

24.1 General

UQ is bound by Queensland Government State Purchasing Policy and is obligated to comply with the Queensland Government Enterprise Architecture (QGEA), ICT Cabling Technical Standard.

Of particular note in this standard:

Paragraph 3.3 – …the procurement of ICT cabling infrastructure **shall** be undertaken separately from other building works, including the Electrical works.

Paragraph 4.2 – The minimum warranty provided by the manufacturer of the infrastructure connecting hardware **shall** be 20 years full parts and labour warranty for the cable and connecting hardware and 20 years applications assurance (or protocol assurance) warranty.

Paragraph 4.3 – Single System Sites

Paragraph 4.4 - Multiple System Sites

A copy of the standard is available from:

https://www.qgcio.qld.gov.au/__data/assets/pdf_file/0018/4752/ICTcabling-infrastructure-standard-v400.pdf

24.2 Single System Sites

24.2.1 St Lucia, Gatton, Indooroopilly Mine, Pinjarra Hills and PACE Woollongabba.

A Commscope solution will be used (Tyco Electronics, ADC Krone, and AMP Netconnect). All refurbishment projects in existing buildings are to use the same system for new cabling. However UQ is willing to consider SCS solutions of alternate systems from Molex, Panduit, R&M or Siemon for new building constructions at St Lucia site.

24.2.2 Royal Brisbane and Women's Hospital, Herston.

Currently a Molex solution is used. However UQ is willing to consider SCS solutions of alternate systems from Commscope, Panduit, R&M or Siemon for new building constructions at Herston & RBWH site.

24.3 Multiple System Sites

24.3.1 Princess Alexandra Hospital.

- Queensland Health (QH) cabling specifications will be applicable for in all hospital buildings.
- TRI building - A Siemon solution will be used.

24.3.2 Other Queensland Health Sites.

Where the buildings are owned and managed by QH, the QH Cabling Specification will apply.

24.3.3 Other UQ Sites.

UQ will assess these on a case by case basis.

25 ANNEX F – TYPICAL PART LIST

The typical part list is available as a separate document to facilitate frequent updates as required.

26 ANNEX R – REVISION HISTORY DETAIL

2.3 Typos corrected. From version 2.2 – Sections 12.11 Special Instruction for Removing Floor Tiles in Data Centres, 11.3.4 Reference to Milliken Smart-Path, 4.1.6 Consolidation Point labelling specification and 11kW power option in 16.4 removed. In version 2.3 – heading numbers changed. New sections - 4 Audience, 5 Applicability, 6 Responsibility Matrix, 9.12 Acceptance Commissioning, 17.1.6 FOBOT Labelling and Annex A TR Acceptance Checklist added. 9.11 WAP updated. 14.2 (b) 900mm clearance around racks mandated. 14.2.(d) reference to door height removed. 14.3.4 Catenary Wire Support Systems updated. 17.3 as-built requirement updated. 26 Reference to TE (Tyco Electronics) changed

to Commscope. Annex B – reference to Panduit rack removed and Rach Technology 45RU Lab Rack added in place. Annex C Rack Elevations updated. Annex D TR Layouts updated. Annex E QGEA Compliance updated.

2.2 2. Updated abbreviations list. 7.3 Updated contact information. 11.2 Added floor and wall finishes. 13.4. No RCD on 32 A option removed. 15.5.4. Changed pulse width max. 19.3 Added 400W minders. 15.6.3 Removed testing for MMOF. Annex E changed intermediate minders to 400mm wide.

2.1 Changed all references to UTP to xTP. Removed references to CT Racks and CT Rack BoM. Added requirement for fire stopping to comply with NCC requirements. Added no RCDs on 32A circuits (13.4). Changed OTDR to both directions (15.6.3). Added prox readers, A/C, GM2 keys, and Sound Pressure levels (11.2). Added clarification to running cables for 48 port patch panels (12.1.3). Updated Typical Rack Elevation (Annex C). Updated Panduit BoM (19.1 Rack Type 1). 6.3 clarified all OF test results to be independently verified

2.0 Added patch panel density to summary (6.6). Added 48 port default patch panel to 12.1.3 (c). Changed 24 cables to 48 cables in 12.1.3 (f). Added requirement for Traffic Management Plan to 10.5. Modified Quareo table 12.2.4. Highlighted removal and installation of WAPs in Summary (6.10). Added 48 patch panel labelling (14.1.3)

1.3 updated link to QGCIO in para 23.1. Added 12.2.4 regarding FOBOTS. Changed 11.3.4 to specify Milliken Smart Path. Added QGEA to table in 8.1. Added 3rd party test requirements (15.5). Added GPN3 Room 110 (12.2.4).

1.2 added door height to 11.2. added 12.2.1 (i) – high density FOBOT faceplates. 12.2.1 (c) added transition to tight buffered.13.4 changed IEC leads from C13/C14 to C15/C14 (high temp). Added 608 to provide emphasis to 7.1 (p). Added para in 15.4 to get fibre results in separate files. Added 12.1.3 (e) and photo.

1.1 Section19.6 Added CT 52RU BoM. Changed 13.3 to specify either RT or CT 52 RU as default

1.0 Removed C-I-C header. Removed “DRAFT” watermark. Updated grammar and spelling.

0.7 Added section on power options (13.4) and removed power from cabinet BoM’s (Annex B). Updated labelling (14.1.2). Changed all general references to cabinets and racks to -> racks only (remove cabinet). Added Jayan contact details. Added progress payments schedule (17).

0.6 Clarified pit and pipe section.

0.5 Amended labelling from RU numbering to Letter. Tightened up fibre testing section. Changed testing method to 1 TRC.

0.4 Rewrote Work Health & Safety section on advice from George Nicholls

0.3 Added sample cabinet BoM. Added Annex F – QGEA compliance

0.2 Removed requirement to label all UTP leads

0.1 First draft