Queensland Government Enterprise Architecture

ICT cabling infrastructure technical standard

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Introduction

Purpose

A Queensland Government Enterprise Architecture (QGEA) standard provides information for Queensland Government departments on the mandatory and recommended practices for a given topic area. They are intended to help departments understand the appropriate approach to address a particular issue or to do a particular task. Unlike a guideline, which is best practice advice, a QGEA standard is mandatory. For further information on QGEA document types, go to QGEA Document governance.

This standard provides mandatory requirements, recommended best practice, background information and guidance.

Applicability

This standard is mandated under the ICT cabling infrastructure policy. This standard shall apply to:

- all Queensland Government core departments, and is recommended for all Queensland Government publicly funded entities
- all accommodation and properties occupied by Queensland Government departments, including
- buildings which are completely owned or occupied by the government or leased by the government on a multiple tenancy or single tenancy basis
- campus style sites under the control of a single department, such as schools, TAFE colleges or hospitals
- data centres, computer rooms, and telecommunications rooms (although specialised higher performing solutions will generally be used in these circumstances)
- all ICT infrastructure cabling used for voice, data, video and building services (this includes building vertical and horizontal cabling, and campus cabling)
- all ICT infrastructure cabling used for internet protocol (IP) based building systems, such as monitoring systems, bell systems, access control systems, and surveillance systems (this includes building vertical and horizontal cabling, and campus cabling)
- cabling infrastructure projects completed as part of:
  - the implementation of cabling infrastructure during the construction of new buildings (owned or leased)
  - the implementation of cabling infrastructure during the fit out of existing buildings (owned or leased)
  - the implementation of cabling infrastructure used to interconnect between new and/or existing buildings
  - the implementation of new or additional cabling in heritage listed buildings
  - upgrades to existing cabling infrastructure.

Definition of keywords for mandatory requirements contained in this standard

This technical standard contains normative and informative elements. Normative elements (mandatory requirements) are indicated by the words “shall” or “shall not”.

All other elements are informative.

Audience

This document is primarily intended for:

- Queensland Government employees or sub-contractors who are Australian Communications Media Authority (ACMA) registered cablers.
- Queensland Government technical staff involved in activities associated with cabling infrastructure. These activities include management, planning, system design, purchasing, implementation, testing, documentation, compliance audits, and operational support.
- Queensland Government employees who are responsible for the cabling infrastructure across their department's building portfolio.
- Queensland Government employees who are responsible for the cabling infrastructure within buildings under the conditions of lease agreements in place for tenancy (i.e. where the cabling infrastructure is deemed to be a tenant responsibility).
- Building industry architects, building designers and engineers.

Scope

In scope

The definition of cabling infrastructure includes the horizontal and vertical cabling distribution system based on copper and/or optical fibre cabling, plus the supporting equipment such as racking, panels, patch leads, conduits, pathways and traying. It also includes the documentation, audits, records, diagrams, as-built drawings, schematics, labelling, management packages, test results, certifications and warranty details.

It is applicable to general building cabling infrastructure and is reliant on each department having a more detailed cabling standard in place.

Out of scope

The following are considered to be out of the scope of this standard (except for the conditions contained in note 1 below):

- temporary cabling requirements where legitimate temporary cabling is required (e.g. trade shows, exhibitions, conferences, emergency repairs)
- temporary buildings such as site offices, huts, classrooms, exhibition buildings, short term accommodation arrangements, where these buildings will be removed following use (typically these will be onsite for 12 months or less including options)
- specialised applications/services which have specific non-standard cabling requirements
- overseas sites which would be subject to the legislation and regulations of that country.

Note 1: Queensland Government cabling work undertaken under these conditions, **shall** still comply with the mandatory safety requirements stipulated under federal legislation and regulations.

Issue and review

This QGEA standard is published within the QGEA and is administered by the Queensland Government Chief Customer and Digital Group (QGCDG

Requests of exception from requirements contained in this standard

This standard details specific requirements intended to specify the technical requirements for Queensland Government ICT cabling infrastructure. Where a proposed implementation is not consistent with the requirements in this standard, this **shall** require prior approval for exception from the Queensland Government Chief Customer and Digital Group. Requests to deviate from technical standards will be considered on a case-by-

case basis by the Queensland Government Chief Customer and Digital Officer or their delegate. Any request to deviate from regulatory compliance requirements **shall not** be accepted.

Note: It is not anticipated that any exceptions will be required. The exception process is provided if technology changes at a rate faster than this standard can be updated.

Compliance requirements – laws, standards and policies

Under this standard, decisions on any conflicting information **shall** be governed by reference to the following documents in descending rank order:

1. Australian Government legislation and regulations
2. Queensland Government legislation and regulations
3. QGEA ICT cabling infrastructure QGEA technical standard (this document)
4. internal departmental standards (i.e. departments shall develop cabling standards which complement this standard and whose purpose is to provide more detailed information specific to their operational requirements)
5. relevant Australian Standards
6. relevant International Standards.

Regulatory compliance (mandatory compliance with legislation and subordinate legislative instruments/standards)

Registered cablers and cabling system designers **shall** comply with federal legislation, subordinate legislative instruments/standards and **shall** possess (or have access to) up to date documents for reference purposes. All cabling work **shall** comply with the mandatory requirements contained in the following federal legislation and subordinate legislative instruments/standards (or updated versions and amendments):

- the Telecommunications Act 1997
- the Professional Engineers Act 2002 (Queensland)
- the Telecommunications Cabling Provider Rules 2014 (CPRs)
- AS/CA S009:2020 – Installation requirements for customer cabling (wiring rules)
- Telecommunications Technical Standard (AS/CA S008:2020) 2020 - requirements for customer cabling products (supersedes AS/ACIF S008:2015)

AS/CA S009:2020: Installation requirements for customer cabling (wiring rules) requires cabling providers to comply with the relevant Commonwealth, State and Territory occupational health and safety requirements including, but not limited to, building code requirements. Queensland Government cabling **shall** therefore comply with the Building Code of Australia, and the Queensland Workplace Health and Safety requirements.

Reference standards

Australian standards are generally considered to be advisory unless a standard is regulated by legislation or specified as a mandatory requirement in a contract or tender document. In addition to those standards listed in section 2.1, the following standards fall under this arrangement, and **shall** be included in cabling specifications where applicable:

- AS 11801.2:2019: Information technology - Generic cabling for customer premises, Part 2: Office premises (ISO/IEC 11801-2:2017, MOD)
- AS/NZS 3084:2017: Telecommunications Installations Telecommunications Pathways and spaces for Commercial Buildings. It is a complementary document to AS/NZS ISO/IEC 14763.2:202
- AS/NZS 14763.3:2017: Telecommunications installations – Implementation and operation of customer premises cabling – Acceptance testing of optical fibre cabling; (ISO/IEC 14763-3:2014, MOD)

- IEC 61935.1:2019: Specification for the testing of balanced and coaxial information technology cabling - Part 1: Installed balanced cabling as specified in ISO/IEC 11801-1 and related standards
- IEC 61935.2:2022: Specification for the testing of balanced and coaxial information technology cabling - Part 2: Cords as specified in ISO/IEC 11801-1 and related standards
- AS 3085.1:2020 Telecommunications Installations - Administration of communications cabling systems – Basic requirements
- AS 11801.3:2019: Telecommunications installations - Generic cabling – Industrial premises (Incorporating Amendment 1:2012), Part 3: Industrial premises (ISO/IEC 11801-3:2017, MOD)
- AS 11801.4:2019 Information technology - Generic cabling for customer premises, Part 4: Single-tenant homes (ISO/IEC 11801-4:2017, MOD)

Purchasing requirements

Queensland Information Technology Contracting (QITC) framework

The Queensland Government utilises a common contracting framework for ICT procurement known as QITC. These conditions are used for the procurement of ICT products and/or services. Further information can be obtained from QITC Services (qitc@qld.gov.au). Contact is via the above QITC link.

Requirement for suppliers of ICT cabling infrastructure

Suppliers of ICT cabling infrastructure can provide these services to customers through the execution of either a QITC General Contract (for low risk/low value contracts), or a QITC Comprehensive Contract with Module Order 1 – Hardware (for anything other than a low risk/low value contract).

Requirement for procurement of ICT cabling infrastructure

The procurement of ICT cabling infrastructure is included under QITC products and services whereas other building works (e.g. electrical) are not included. The design and installation of ICT cabling infrastructure systems is also a specialised field. For these reasons, the procurement of ICT cabling infrastructure **shall** be undertaken separately from other building works, including the Electrical works.

Warranty and site certification requirements

General information

One approach that increases the level of confidence in the installed cabling infrastructure is the inclusion of site certification. Site certification was initially offered by some larger manufacturers of connecting hardware as a means of demonstrating to the customer the manufacturer's confidence in the product. Site certification is now offered by all of the major cabling system manufacturers. The site certification can be provided in many forms but the most common certification is 20 years full parts and labour warranty for the cabling and connecting hardware and 20 years applications assurance (or protocol assurance) warranty. Twenty-five year certifications are also available.

Basically, under the terms of this certification the manufacturer guarantees to replace, free of charge to the customer, any part within the system that fails during a 20-year period from acceptance of the installation. This generally covers manufacturing faults and poor installation practices but not damage caused by misuse or accidents. Additionally, the manufacturer guarantees that any system (or network) protocol, both current and emerging, will operate successfully over the certified cabling system (provided it has been endorsed by the 'standards bodies' for operation on the customer's installed class of system).

The site certification carries with it a number of benefits in addition to the parts and systems assurance guarantee. To offer this certification, manufacturers must be confident that the installation will be effected in a manner which follows best practice. This is accommodated through the certified installer base. Subcontractors

seeking certified installer status with a manufacturer must satisfy a number of criteria to qualify. This is likely to include previous experience, product knowledge, satisfactory previous installations, a formal training course and commitment to ongoing training. For the customer, this usually translates to an installation performed by an experienced contractor, with extensive product knowledge, who closely follows the installation best practice 'rules' and is audited by a representative of the manufacturer. Generally, this is a win-win situation where the customer wins because the installation performs as required, and the manufacturer wins because future work at the site is generally based on continuing with that manufacturer's product.

Appropriate warranty and site certification level

All ICT cabling infrastructure **shall** be covered by an appropriate level of warranty and site certification, provided by the manufacturer of the infrastructure connecting hardware. Warranty and site certification **shall** be provided directly to the department by the manufacturer of the infrastructure connecting hardware, and not by the vendor supplying the cabling system, unless these are one and the same.

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.

A department wishing to move into an existing premise shall obtain all documentation such as warranty, as built drawings and patching information for any existing cabling systems. The department shall submit justification for the use of existing systems without any documentation. It is recommended that functional testing be performed on all systems before moving into an existing premise.

Single system sites

To ensure there is a well-defined custodianship of warranty related issues for both copper and optical fibre based cabling systems, a single system which is certified by the manufacturer of the infrastructure connecting hardware, unless deemed as unsuitable, **shall** be used in:

- any building which, for all intent and purpose, is completely owned or occupied by the Queensland Government
- any leased building with multiple Queensland Government tenancies within the same leased building
- any leased building with a single Queensland Government tenancy within the leased building
- any Queensland Government campus style site such as a school, TAFE college or hospital.

Copper and Fibre systems can be treated as separate systems and can be sourced from different Manufacturers. That is that the copper system can be from one manufacturer and the fibre system from a different manufacturer. This would be considered to be a Multiple System site. Please refer to section 4.4 for details.

The decision to extend a particular manufacturer's product within a building or campus, or to fully replace this product, is a complex issue which should be determined with a degree of common sense, taking into account issues such as product suitability, lifetime costs and public accountability. As a general guideline, continuing with existing products is not recommended where:

- the installed cabling infrastructure is over 10 years old (i.e. greater than half of the 20-year typical warranted life for cabling infrastructure)
- the cabling coverage is less than 10 per cent of the general accommodation floor area of the building (excluding car parks and large storage facilities)
- the existing cabling product cannot be upgraded to meet the minimum specification in this standard, and the existing cabling product will not meet the departments requirements over the next two years in terms of system performance

- the building is likely to be subject to a significant change in purpose (i.e. it is highly likely that there will be some substantial level of rework)
- the refurbishment (in terms of size) of a floor/building/campus within a facility, constitutes more than 80 per cent of the facility size
- a department has completed a thorough evaluation of the continued use of the existing product and has determined that this product does not meet the department's requirements (this evaluation shall be carried out under a documented process).

Multiple system sites

Although single system sites are preferred, it is recognised that multiple system sites may be a practical alternative. When considering the implementation of multiple systems, departments **shall** formally assess and accept the risk level that multiple system sites present. If multiple system sites are implemented, departments **shall** ensure that there is full warranty coverage and documentation in place for each system under their control. Departments **shall** also continually monitor and assess any issues arising from the use of multiple systems as part of the process to evaluate continuing with this approach.

Multiple system sites may contain either multiple manufacturers' solutions for copper cabling or optical fibre cabling, or a mixture of both.

In the situation where highly specialised optical fibre cabling requirements are necessary, it is recognised that these manufacturers may not have a copper cabling solution.

Note: Multiple system sites **shall** only be used where the previous section, section 4.3, explicitly prescribes them.

Cabling requirements

Structured cabling

Building cabling infrastructure **shall** be based around structured cabling systems for copper and optical fibre cabling. In addition to providing network services, the use of structured cabling for other building services is recommended where this is technically feasible. If these services are to be delivered by structured cabling, then that cabling must be compliant to this standard. (Examples of these services include building management and control systems, security systems, paging and call systems.)

Minimum specification for copper cabling

The minimum balanced cabling performance class for copper cabling **shall** be ISO/IEC class E_A balanced cabling performance with category 6_A components, as per AS 11801.2 (ISO/IEC 11801-2). The use of a lower balanced cabling performance class (e.g. category 5 or 6) is not recommended unless compelling reasons exist.

Note: the use of a cabling class below class E_A **shall** be required to go through the exception process as described in section 1.8 above.

Voice cabling (multipair greater than 4 pairs for backbone applications or low pair count to meet specific needs such as pole mounted TDM outdoor emergency phones) shall be category 3 minimum. The decision to use low pair count voice only cabling shall be endorsed by a qualified designer.

Consideration **shall** be given to the use of a 'shielded' cabling solution for ISO/IEC class E_A balanced cabling performance with category 6_A components, as per AS 11801.2 (ISO/IEC 11801-2). It is considered acceptable practice that some departments may mandate the use of shielded cabling solutions.

Minimum specification for multi-mode optical fibre cabling

The minimum cabled optical fibre category for multi-mode fibre **shall** be OM3, compliant with AS 11801.2 (ISO/IEC 11801-2). The use of OM4 cabled optical fibre category, compliant with AS/NZS 3080 (ISO/IEC 11801) is

recommended. The use of a lower performance cabled optical fibre category (e.g. OM1 or OM2) is not recommended unless compelling reasons exist.

Note: the use of cabling below OM3 **shall** be required to go through the exception process as described in section 1.8 above.

Minimum specification for single mode optical fibre cabling

The minimum cabled optical fibre category for single mode optical fibre cabling **shall** be OS1, compliant with AS 11801.2 (ISO/IEC 11801-2). The use of cabled optical fibre category OS2, compliant with AS 11801.2 (ISO/IEC 11801-2) is recommended.

Installation requirements

General information

The introduction of cabling standards provides a common set of design parameters and reporting procedures for ICT cabling for commercial premises. However, this does not guarantee that the installed cabling and connecting hardware will provide the specified performance level. Appropriate testing will determine whether the final product meets the performance requirements but will not correct the problems identified during the testing. Therefore, another key element in the process is the quality of the installation. Australian Standard AS/ACIF S009 provides mandatory wiring rules with a focus on safety requirements and not the performance requirements such as maintaining twist rates, bend radius and sheath removal. It is therefore up to the specification writer to detail the required installation practices using Standards Australia Communications Cabling Manuals as reference sources. Assistance with these requirements is also available from the major manufacturers and vendors.

Cabling work completed by registered cablers

Under the Telecommunications Act 1997 (Cth), the ACMA is responsible for regulating persons who perform customer cabling work. Cabling work **shall** be performed or be directly supervised by a person with the appropriate cabling provider registration. It is a criminal offence under the *Telecommunications Act 1997* (Cth) for a person to perform 'cabling work' on the customer's side of the network boundary without cabling provider registration.

All cabling work performed on Queensland Government sites **shall** be carried out by registered cablers (or under direct supervision by registered cablers) with current ACMA 'open registration including any necessary endorsements'. This registration **shall** be authorised by one of the ACMA designated cabling registrars.

Queensland Government employees who request or arrange cabling work to be completed by non-Queensland Government personnel **shall** ensure that registration details are provided prior to any work being undertaken or authorised. Registrations can also be checked online via the Cabling Registrars on the ACMA website.

Queensland Government employees who undertake cabling work **shall** be registered cablers as per ACMA stipulations, or perform work under the direct supervision of a registered cabler who has current ACMA 'open registration'.

Queensland Government employees, particularly line managers, are accountable under the ACMA Industry Code, 'Cabling Requirements ('the code') pursuant to the *Telecommunications Act 1997* (Cth), volume 1, part 6, s121 and s122. The code of practice places obligations on line managers who contract or are otherwise engaged in cabling activities (where they are not covered by the CPA). These obligations augment the responsibilities placed on individual registered cablers by the CPA. To comply with the code rules, managers **shall** record specific information pertaining to the registered cablers under their control and the cabling work that they perform. There is also a responsibility to record information regarding the cabling work performed by unregistered cablers under direct supervision by a registered cabler. To comply with the code rules, managers **shall** record specific information pertaining to the unregistered cablers under their control and the cabling work that they perform. This information is subject to regular audit by the ACMA.

Cabling work compliance

As per section 2.2, regulation of customer cabling is articulated in a number of subordinate instruments, including the Telecommunications Cabling Provider Rules 2014 (CPRs). The major requirements of the CPRs are summarised by the ACMA and include the following:

- Cabling work **shall** comply with the AS/ACIF S009 (wiring rules), which states the minimum requirements for cabling installations to ensure that network integrity and the health and safety of end-users, other cablers and carrier personnel is protected
- A key requirement of the wiring rules is that telecommunications cabling **shall** be adequately separated or segregated as per AS/ACIF S009 (wiring rules) to avoid creating a dangerous situation
- Cablers **shall** only install cabling product (including cable) and customer equipment that complies with the requirements of the Telecommunications (Labelling Notice for Customer Equipment and Customer Cabling) Instrument 2015
- All customer cabling work in the telecommunications, fire, security and data industries **shall** be performed by, or be directly supervised by, a registered cabler

Certification of cabling work

Registered cablers **shall** complete the Telecommunications cabling advice (TCA1) form for their cabling work as per the ACMA requirements. Alternatively, the content from the TCA1 form can be included in invoice or business documentation. Importantly these TCA1 forms or equivalent documents, **shall** include a certification statement that states, 'I hereby certify that the cabling work described in this advice complies with the wiring rules (AS/CA S009:2020 Installation Requirements for Customer Cabling or its replacement)'.

A TCA1 form shall be completed by each registered cabler working on a cabling installation.

Queensland Government employees who are registered cablers **shall** retain copies of their TCA1 forms for at least 12 months and provide TCA1 forms to their employer to certify their work.

Queensland Government employees who request or arrange cabling work to be completed by non-Queensland Government employees or commercial companies, **shall** ensure that TCA1 forms are provided by the registered cabler or cabling provider and that these forms are retained for at least 12 months.

Where the standard TCA1 form will not adequately cover the scope of work that is being certified, it is recommended that this information should be provided as an attachment/s to this form. The work being certified **shall** be clearly listed on the form or on the attachment.

Notification of non-compliant cabling installations

When non-compliant cabling is identified by the cabler during a pre-work site inspection, or during the work activities, notification of this non-compliance **shall** be provided to the Queensland Government employee responsible for that site, and to the person arranging that work. The Telecommunications cabling advice form (TCA2) **shall** be used for this notification. Non-compliant cabling is pre-existing cabling that does not meet the wiring rules, and examples are included on the TCA2 form.

Auditing of cabling work

Departmental cabling standards **shall** include a process to cover the auditing of cabling work to verify that it has met the specified standard. This audit may be completed by suitably qualified cabling personnel from the department, or the audit may be completed by cabling personnel external to the department. The audit **shall not** be completed by the installation company that installed the cabling.

Accreditation and certification of cablers/installers

In order to obtain the warranty certification for the site, only the manufacturer's accredited installers **shall** install the system.

Cabling system manufacturers require that their installers undergo specific type training in order to maintain the quality and performance of their proprietary systems. These specially trained installers are known as accredited installers.

The accreditation is specific to the manufacturer's systems for which they have undertaken training, as manufacturers have differing approaches to ensuring that their equipment is properly installed. From a manufacturer's perspective using accredited installers enables them to provide their long-term warranties for product, system performance, and applications assurance, sought by government and other large customers.

Accordingly, the Queensland Government, in support of the requirement for manufacturer's warranties, requires that the installation of ICT cabling and connecting hardware **shall** be undertaken by registered cablers (or under the direct supervision of registered cablers) who have been accredited by the manufacturer. Certificates of accreditation **shall** be provided.

Accredited installers undertaking compliance and certification testing **shall** also be trained and certified for the test equipment used for this testing.

Compliance testing requirements

General information

There has been much discussion and criticism about testing of the installed cabling infrastructure to confirm compliance with the performance requirements of the standards and the specification. When the standards were first introduced into projects there was no adequate methodology to test the installation, and much of the early testing was confined to simple wire mapping testing such as short circuit, open circuit, split pairs and reversed pairs. In the absence of any standard, the manufacturers of test equipment developed hand-held field testers, which could be used to certify or qualify the installation. However, there was no guarantee that these testers were correctly calibrated or were able to measure the cable plant parameters with sufficient accuracy to be sure that a 'PASS' was in fact a pass.

Moreover, what was really lacking was a testing procedure, which would appropriately 'qualify' the end-to-end performance of the link or channel. That gap was filled by the release of Standards Australia AS/NZS 3087 (now superseded) and currently covered by AS/NZS IEC 61935.1 and AS/NZS IEC 61935.2 for testing in accordance with values set out in AS 11801.2 (ISO/IEC 11801-2). These standards identify the performance and accuracy requirements for testers used to test the performance requirements of the installed cable and connecting hardware.

Test requirement for balanced communication cabling

The recommended minimum performance level requirement is ISO/IEC class E_A permanent link, using performance class E_A cabling and category 6_A connecting hardware. This is the general recommendation unless compelling reasons exist to use a lower performance class (e.g. class D/category 5).

Compliance testing for class E_A installations requires a level III tester as defined by AS/NZS IEC 61935.1.

Compliance testing **shall** be carried out on all balanced communication cabling (U/UTP, F/UTP, S/FTP, SF/UTP) in accordance with AS/NZS IEC 61935.1 and AS/NZS IEC 61935.2, based on testing in accordance with values set out in AS 11801.2 (ISO/IEC 11801-2). Test equipment **shall** be calibrated, and current calibration certificates **shall** be supplied.

The person/s carrying out the compliance and certification testing **shall** have current certification for the test equipment used for this testing. Certificates **shall** be provided.

Compliance testing of multi-mode optical fibre cabling

Compliance testing for multi-mode optical fibre (MMOF) **shall** be in accordance with AS/NZS ISO/IEC 14763.3 and AS 11801.2 (ISO/IEC 11801-2). For all OM3 or OM4 testing, test equipment **shall** either**:**

- be encircled flux compliant (preferred)
- use encircled flux conditioning leads as the source launch lead when encircled flux non-compliant test equipment is used.

The person/s carrying out the compliance and certification testing **shall** have current certification for the test equipment used for this testing. Certificates **shall** be provided.

Test equipment **shall** be calibrated, and current calibration certificates **shall** be provided.

Compliance testing of single mode optical fibre cabling

Compliance testing for single mode optical fibre (SMOF) **shall** be in accordance with AS/NZS ISO/IEC 14763.3 and AS 11801.2 (ISO/IEC 11801-2).

The person/s carrying out the compliance and certification testing **shall** have current certification for the test equipment used for this testing. Certificates **shall** be provided.

Test equipment **shall** be calibrated, and current calibration certificates **shall** be provided.

Test results verification

Test result verification is a specialist filed, which can be very time consuming for individual departments to maintain suitably qualified personnel to complete. It may be more cost effective for departments to outsource this verification to third parties. It is recommended that all test results, copper and optical fibre, be sent to an accredited NATA certified testing company for verification. It is up to the individual department to determine which method is more cost effective and which method is best for them.

System design requirements

Building design

The building design process **shall** factor in the requirements for telecommunications and data services as these services constitute a core service in all buildings. In addition to covering the initial occupancy phase, the design **shall** include allowing for future requirements. The building infrastructure **shall** support the implementation of cabling systems that meet the mandatory requirements for cabling. A media release from the Australian Institute of Architects provides some guidance in this area for building designers, engineers and architects.

Cabling infrastructure system designers

The design of ICT cabling infrastructure systems is a specialised field and this **shall** be undertaken by cabling specialists with demonstrated experience in this field. For service works or moves, adds and changes the requirement for a specialised designer is not required where:

- the structure of the building does not require modification
- floors or firewalls do not require penetrations
- quantity of cables does not exceed the growth capacity of the cable support structure present
- only catenary from the primary cable support to the outlets is being installed (cable basket or tray is not required).

The complexity of ICT cabling infrastructure system design activities will range from the highest level of complexity (e.g. cabling for a new building or the refit of a complete building) to the lowest level of complexity (e.g. expansion of cabling based on the use of an existing/approved design). The skill sets and experience levels of cabling specialists in terms of ICT cabling infrastructure system design will also range from the highest level of

complexity to the lowest level of complexity. It is mandatory that the skill sets and experience levels of designers match the complexity of the design activities that they will undertake.

The Professional Engineers Act 2002 (Queensland) s115 states that a person who is not a registered professional engineer must not carry out professional engineering services, unless that person is under the direct supervision of a registered professional engineer who is responsible for the services. As ICT cabling infrastructure may be considered an engineering function it follows that, where design activities constitute classification as a professional engineering service, this **shall** be carried out by a registered professional engineer, or be directly supervised by a registered professional engineer. A professional engineering service is where:

- engineering principles and calculations must be applied above manufacturers specifications or prescriptive standards
- alterations to structural building components are required.

ICT cabling system design **shall** be carried out by cabling specialists with the following relevant qualifications and experience levels, namely:

- registered professional engineers who:
  - are registered with the Board of Professional Engineers Queensland as a Registered Professional Engineer Queensland (RPEQ) in one of the following areas of engineering practice:
    - building services engineering
    - electrical engineering
    - information, telecommunications and electronics engineering.
  - have a demonstrated level of experience (a minimum of five years) in the system design and implementation of ICT cabling infrastructure systems
  - will typically undertake ICT cabling infrastructure system design activities as part of the provision of a professional engineering service.
- qualified personnel who:
  - are registered with the Building Industry Consulting Service International (BICSI) as a Registered Communications Distribution Designer (RCDD)
  - have a demonstrated level of experience (a minimum of five years) in the design and implementation of ICT cabling infrastructure systems
  - may undertake ICT cabling infrastructure system design activities across a wide range of design complexity when directly supervised by a RPEQ in the provision of a professional engineering service
  - may undertake ICT cabling infrastructure system design activities across a limited range of design complexity where those design activities do not constitute the provision of a professional engineering service.
- cabling specialists not registered as a RPEQ or RCDD who:
  - are registered cablers and have completed the manufacturers cabling design course that is being designed, or alternatively, if a greenfield site is being designed, then at least two different cabling manufacturers design course
  - have a demonstrated level of experience (a minimum of five years) in the design and implementation of cabling infrastructure systems
  - may undertake ICT cabling infrastructure system design activities across a wide range of design complexity when directly supervised by a RPEQ in the provision of a professional engineering service

  - may undertake ICT cabling infrastructure system design activities across a limited range of design complexity where those design activities do not constitute the provision of a professional engineering service.

Departments **shall** assess their range of ICT cabling infrastructure system design activities and define these in the departmental cabling standard. Departments **shall** also have a process in place to cover the assessment of staff qualifications and experience across the defined range of design activities, and the authorisation of staff to undertake system design at the appropriate level.

Security

ICT cabling infrastructure may be able to be tampered with or tapped to provide access to the data flowing on the cable. It is possible to minimise and to ultimately remove the possibility of this occurring through a combination of measures including:

- incorporating physical security measures for facilities, rooms, pathways, risers, racking and enclosures;
- incorporating security measures in the standards for implementation of cabling; and
- the encryption of data.

Departments **shall** refer to the Queensland Government Data Encryption Standard (DES) for guidance on physical safeguards for networks. Departments **shall** also be familiar with the Queensland Government Information Security Classification Framework (QGISCF). These documents provide policy direction based around classification of data, and are relevant to determining the physical security requirements for the cabling infrastructure and for the housing of equipment. As outlined in the scope section of the DES, 'this framework is intended to apply to non-nationally security classified information. For information with a national security classification, the Australian Government's manuals and policies **shall** be applied directly'. Further advice regarding increased security measures may be obtained by contacting the Queensland Government Chief Customer and Digital Group.

Management requirements for cabling infrastructure

Departments **shall** ensure that their cabling infrastructure is managed on an ongoing basis as best practice. The use of computerised systems to assist with this management function is highly recommended. The management of cabling infrastructure **shall** include (but not be limited to) these areas:

- establishing and maintaining a departmental cabling standard or multiple standards
- establishing and maintaining a single cabling register for the department - this register can be split into sections or regions (based on functionality or structure) to assist with management of the register
- establishing and maintaining a cabling register for each site. As a minimum, each register shall list the standard of cabling at each site in terms of compliance to the AS/CA S009:2020 : Installation requirements for customer cabling (wiring rules)
- identifying and rectifying non-compliant cabling infrastructure
- recording Telecommunications Cabling Advice (TCA1 and TCA2) forms
- recording commissioning and test results
- recording site certification details and warranty details
- managing cabling records, as built drawings and diagrams
- managing the records for cable pathways, trays, pits, conduits, ducts, pipes, underground cabling, and aerial cabling
- labelling of backbone cables, panels, outlets, patch cables, cross connect cables, associated equipment

- recording and tracking defects, faults, claims, and rectifications raised under product warranty, system performance warranty, or applications assurance warranty
- managing cabling infrastructure moves, adds or changes
- managing cabling infrastructure capacity (capacity planning)
- auditing the installed base of cabling infrastructure against documentation records; and
- establishing and maintaining a plan to address the upgrading of cabling infrastructure at sites where that cabling will not provide two years cost effective service for the department.

Appendix A: Abbreviations and definitions

The below definitions are specific to the ICT cabling infrastructure technical standard:

Term	Definition
ACMA	Australian Communications Media Authority
BICSI	Building Industry Consulting Service International BICSI is a professional association supporting the information technology systems (ITS) industry.
Cabling infrastructure	The definition of cabling infrastructure includes the horizontal and vertical cabling distribution system based on copper and/or optical fibre cabling, plus the supporting equipment such as racking, panels, patch leads, conduits, pathways, and traying. It also includes the documentation, audits, records, diagrams, as built drawings, schematics, labelling, management packages, test results, certifications, and warranty details.
Cabling work	Cabling work is defined in the Telecommunications Cabling Provider Rules 2014 (Cth). 'Cabling work means cabling work of a kind that is declared by the *Telecommunications (Types of Cabling Work) Declaration 1997.'*
Communications Alliance	Communications Alliance Ltd (formerly Australian Communications Industry Forum Ltd) was formed in 2006 to provide a unified voice for the Australian communications industry and to lead it into the next generation of converging networks, technologies and services.
CPR	Cabling provider rules – Telecommunications Cabling Provider Rules 2014 (Cth)
F/UTP	Overall screened cable with unscreened twisted pairs (often referred to as FTP) as per ISO/IEC 11801.
ICT	Information and communication technology
ICT products and/or services	ICT products and/or services generally cover all types of technology (data, voice, video, etc.) and associated resources, which relate to the capture, storage, retrieval, transfer, communication or dissemination of information through the use of electronic media. All resources required for the implementation of ICT are encompassed, namely equipment, software, facilities and services, including telecommunications products and services that carry voice and/or data.
IP	Internet protocol
MMOF	Multi-mode optical fibre
Multiple system site	Cabling infrastructure consists of equipment from more than one manufacturer of infrastructure connecting hardware (includes both copper cabling and optical fibre cabling).
DES	Queensland Government Data Encryption Standard (DES)
OM1, OM2, OM3, OM4, OS1, OS2	Cabled optical fibre categories specified in ISO/IEC 11801. Four multimode categories (OM1, OM2, OM3, and OM4) and two single mode categories (OS1 and OS2).

Term	Definition
Professional engineering service	As defined in Professional Engineers Act 2002 (Queensland) 'means an engineering service that requires, or is based on, the application of engineering principles and data to a design, or to a construction, operation of maintenance or production activity, relating to engineering, and does not include an engineering service that is provided only in accordance with a prescriptive standard.'
QGEA	Queensland Government Enterprise Architecture
QGISCF	Queensland Government Information Security Classification Framework
QITC	Queensland Information Technology Contracting
RCDD	Registered Communications Distribution Designer – registered with BICSI.
RPEQ	Registered Professional Engineer Queensland – registered with the Board of Professional Engineers Queensland.
S/FTP	Overall braid screened cable with foil screened twisted pairs (often referred to as STP or PiMF) as per ISO/IEC 11801
SF/UTP	Overall braid and foil screened cable with unscreened twisted pairs as per ISO/IEC 11801.
Single system site	Cabling infrastructure consists of equipment from only one manufacturer of infrastructure connecting hardware (includes both copper cabling and optical fibre cabling).
SMOF	Single mode optical fibre
Supplier	As defined by QITC, 'supplier' means an enterprise known to be capable of supplying required goods and/or services. It includes manufacturers, stockists, resellers, merchants, distributors, consultants and contractors.
TCA1	Telecommunications cabling advice 1 form – available from Australian Communications Media Authority and required for certification of cabling work as per section 4.5 of Telecommunications Cabling Provider Rules 2000 (Cth).
TCA2	Telecommunications cabling advice 2 form - available from Australian Communications Media Authority. Designed for use by registered cablers to alert the customer or building manager to any non-compliant cabling installation that is outside of the contracted scope of works.
"The Code"	The collection of standards under the Telecommunications Act 1997 (Cth), published and overseen by Australian Communications Media Authority.
U/UTP	Overall unscreened cable with unscreened twisted pairs (often referred to as UTP) as per ISO/IEC 11801.

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