Information & Communications Technology Performance Standards

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Review and approved by:

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Schedule of Revisions

Rev	Date	Author	Description
0.1	07/04/2023	T.S.	Initial Draft Issue for Comment
0.2	18/04/2023	T.S.	Revised Draft Issue for Comment
0.3	01/05/2023	T.S.	Revised Draft Issue for Comment
0.4	05/05/2023	T.S.	Draft Issue for Director level Review
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0.8	29/09/2023	T.S.	Draft Issue for DoE review
0.9	22/03/2024	T.S.	Final Issue for DoE review

Definitions

Language

Term	Meaning
“Shall”	The term "SHALL" means that the item is an absolute requirement of the standard. Omission of this item from the deployment would mean that the desired objectives would not be met. Objectives include availability, specific functions or technical requirements, and dependent features.
“Shall Not”	The phrase "SHALL NOT", means that the item is absolutely prohibited in the standard.
“May”	“MAY” means that an item is truly optional. For example, you may choose to include the item because a particular objective or application/protocol requires it or because it enhances the deployment.

Table of Acronyms

Term	Meaning
8P8C	8 Position 8 Conductor (or RJ-45) modular plug
ACMA	Australian Communications and Media Authority
AFFL	Above Finished Floor Level
AFILS	Audio Frequency Induction Loops
AMS	Asset Management System
AMU	NSW DoE Asset Management Unit
AS/NZS	Australian and New Zealand Standard
AV	Audio Visual
BCA	Building Code of Australia (part of the National Construction Code)
BCR	Building Communications Room
BD	Building Distributor (BCR)
BEP	Building Entry Point
BOM	Bill of Materials
BMS	Building Management System
CCTV	Closed Circuit Television
DGPO	Dual General Purpose Outlet

Term	Meaning
DoE	NSW Department of Education
DTO	Dual Telecommunications Outlet
EACS	Electronic Access Control and Security
EFSG	Educational Facilities Standards and Guidelines
EMS	Energy Management System
FOBOT	Fibre Optic Break Out Termination enclosure
GLS	General Learning Space
GPO	General Purpose Outlet
GUI	Graphical User Interface
ICT	Information and Communications Technology
IEEE	Institute of Electrical and Electronics Engineers
IoT	Internet of Things
IP	Internet Protocol
ITD	Information Technology Directorate (Agency of NSW Department of Education)
LAN	Local Area Network
LSZH	Low Smoke Zero Halogen
MAC	Media Access Control
MCR	Main Communications Room
MFC	Multi-Function Copier
MLD	Main Learning Display
MMC	Modern Methods of Construction
NBN	National Broadband Network
NTP	Network Time Protocol
PABX	Private Automatic Branch Exchange
PDU	Power Distribution Unit
PM	Project Manager (external to SINSW)
PoE	Power Over Ethernet
PSTN	Public Switched Telephone Network

Term	Meaning
RCDD	Registered Communications Distribution Designer
SCS	Structured Cabling Standard
SINSW	School Infrastructure NSW
SFP	Small Form Factor Pluggable
SPL	Sound Pressure Level
SSL	Secure Sockets Layer
SSU	School Security Unit (Agency of NSW Department of Education)
STEM	Science, Technology, Engineering and Mathematics
STI	Speech Transmissibility Index
STIPA	Speech Transmissibility Index for Public Address
STO	Single Telecommunications Outlet
S/FTP	Shielded, Foil Screened Twisted Pair
TO	Telecommunications Outlet
UHF	Ultra-High Frequency
UPS	Uninterruptible Power System
USB	Universal Serial Bus
U/FTP	Unshielded Foiled Twisted Pair, where each pair of cables is twisted and wrapped with metal foil
VLAN	Virtual Local Area Network
VoIP	Voice over IP
WAN	Wide Area Network
WAP	Wireless Access Point (also referred to as AP)
WHS	Work Health and Safety
WLAN	Wireless Local Area Network
XLR	A type of industrial audio connector

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1 Preface

1.1 Overview

These Performance Standards have been produced to provide NSW Government schools with guidance on the establishment of information & communications technology (ICT) infrastructure servicing the school environment. Equitable access to ICT resources across the State are crucial for realising modern pedagogical practice. These Standards are therefore applicable to:

- Planning of capital works for new and existing schools.
- Planning of minor works and upgrades for existing schools.
- Assessment of existing school ICT resources for future planning of ICT upgrades outside of capital works.

The Performance Standards are written to assist all internal and external parties involved in the design, construction and maintenance of ICT services in NSW Government schools. It includes references to systems that are managed by different groups across the NSW Department of Education, including but not limited to the Information Technology Directorate (ITD), Asset Management Unit (AMU), and individual schools.

1.2 Vision[1]

Accessible devices, extendible learning spaces and modern teaching approaches supported by robust ICT infrastructure and services will support teaching and improve learning outcomes in NSW Government schools.

The NSW Department of Education's ability to deliver its vision relies on each school's capacity to access online resources and virtual learning environments to foster collaboration and communication in the classroom and beyond. All learning spaces shall be equipped with reliable, fast and highly available network capability to facilitate student and teacher access to the internet, core education applications and libraries.

Technology and its use in the classroom has increased. This trend will continue for the foreseeable future as new technologies integrate with classroom teaching and learning. The Department's information technology directorate (ITD) is committed to meeting this growing need, providing the ICT infrastructure that enables flexible, future-focussed learning and teaching, and meets the needs of a growing population.

In addition, with the transition to modern methods of construction, implementing ICT services in new and refurbishing schools requires a standardised yet flexible approach to ensure that schools are provided with a supportable, fit-for-purpose ICT environment.

1.3 ICT Components

ICT components in NSW Government schools, covered in this Standard can be defined as 'Infrastructure' or 'Device'. Infrastructure items (listed in Table 1) are critical pieces of equipment and cabling which enables ICT access throughout an entire school. Device items (listed in Table 2) are appropriately selected systems which are configured to enable staff and students to undertake digital learning, teaching and administrative tasks.

[1] This Vision Statement is derived from the Practice Note for Delivery of ICT in NSW public schools.

Table 1: List of 'Infrastructure' Systems

Infrastructure
Lead-in Carriage & Data Services
Passive Structured Cabling System
Uninterruptible Power Systems
Firewalls, Routers, Servers and Switches
Wireless Access Points
Copper Patch Cables
Fibre Patch Cables

Table 2: List of 'Device' Systems

Device
IoT Systems (BMS, EMS etc)
End-User Compute (PCs, Laptops, Tablets)
Audio Visual – Learning Displays
Audio Visual – Video Conferencing
Audio Visual – School Hall & Specialist
Digital Signage Systems & Televisions
Hearing Augmentation
Public Address / Period Bell System
Security, CCTV & Access Control
Charging Carts
Telephony
Multi-Function Devices
EFTPOS

1.4 Special Circumstances

All ICT works are to comply with the requirements as set out in these Performance Standards. By exception, where the Project Consultant believes this is not possible, an exception needs to be raised to the SINSW Project Manager in order for it to be evaluated.

The Project Consultant is to provide sufficient supporting details of the proposed exception to the SINSW Project Manager who will liaise with the ITD working group, the School Network Solution Design Authority (SNSDA) to evaluate the request.

The following references are used throughout this document to denote actions requiring specific attention:

A **blue box** refers to key information or notes that requires the reader's attention.

A **red box** indicates actions to take relating to a departure or deviation from this Standard or other general standard practice.

2 Planning, Design and Construction

2.1 Roles and Responsibilities

ICT equipment for school projects must be designed, specified, procured, installed, delivered, and commissioned by numerous specifically nominated stakeholders. The purpose of this section is to clarify the requirement for ICT equipment and who is responsible for providing it.

The matrix of roles and responsibilities in Table 3 identifies the design, coordination, supply and installation responsibilities for each Infrastructure and Device ICT component, for each key project stakeholder.

These roles and responsibilities provide guidance on project management and are applicable to capital works and minor works of all sizes. This section is a guideline and specific requirements may be adjusted to suit individual project needs. Specific obligations during all works processes are detailed throughout this Standard.

The SINSW Project Manager is required to provide overarching guidance and monitoring of project deliverables across all stakeholders. Furthermore, specific responsibilities borne by SINSW include:

- For all components in Table 3 where DoE ITD has a 'coordination/review' responsibility, SINSW Project Manager is to ensure that DoE ITD is provided with all relevant documentation produced by non-ITD stakeholders for review a minimum of four weeks prior to the planned conclusion of the associated Phase. Endorsement by ITD shall be provided one week prior to the closure of the Phase.
- To maintain a Departure Schedule in accordance with the Capital Consultants' scope of services to document all proposed deviations from the guidelines set in this Standard, any of the Specifications, or EFSG clauses. The Departure Schedule shall include references to clauses and detailed evidence explaining the reasons behind each deviation.

It is noted that the 'Project Consultant' is an overarching term that describes the relevant design consultant(s) engaged at the relevant stage of the project. It is typical for a project to pass through more than one design consultant for a particular discipline.

It is noted that 'Supply' also determines the funding allocations for each component:

- Supply under 'Building Contractor' means the item is funded under the project cost and procured by the Principal Contractor or associated sub-contractor (Sub-contractors are responsible for procuring equipment from SCM0020 approved providers, per NSW Government policy).
- Supply under 'DoE IT Directorate' means that the item is procured under an approved IT budget within the project cost, either by ITD themselves or by an approved, ITD-engaged SCM0020 provider.
- Supply under 'Facility' means that the item is funded and procured by the end user (typically the School's management).

Responsibility Categories

D	Design
C	Coordination/Review
S	Supply
I	Installation

Responsibility Definitions

Project Consultant	Architect and Electrical/ICT/AV Engineer
Building Contractor	Principal Contractor, MMC integrator and/or associated sub-contractors (e.g. Cabler, Electrician)
DoE IT Directorate	ITD Project Representative, ITD Field Team and ICT Suppliers (engaged by ITD)
Facility	School funded and supported

Table 3: Matrix of Design, Coordination, Supply & Installation Responsibilities

Component	Project Consultant	Building Contractor	DoE IT Directorate	Facility
Infrastructure				
Lead-in Carriage & Data Services	C	C	D S I	
Passive Structured Cabling System	D	S I	C	
Uninterruptible Power Systems	C	I	D S	
Firewalls, Routers and Switches	C	I	D S	
Wireless Access Points	C	I	D S	
Copper Patch Cables		S I	C	
Fibre Patch Cables		I	S	
Device				
IoT Systems (BMS, EMS etc)	D	S I	C	
End-User Compute (PCs, Laptops, Tablets)			D S I	
Audio Visual – Learning Displays	C	C	D S I	C
Audio Visual – Video Conferencing	C	C	D S I	C
Audio Visual – School Hall & Specialist	D	S I	C	C

Component	Project Consultant	Building Contractor	DoE IT Directorate	Facility
Digital Signage Systems & Televisions	D	S I	C	C
Hearing Augmentation	D	S I	C	
Public Address / Period Bell System	D	S I	C	C
Security, CCTV & Access Control*	D	S I	C	
Charging Carts	C	C	D S I	
Telephony	C	C	D S I	
Multi-Function Devices	C		C	S I
EFTPOS	C		C	S I

* DoE School Security Unit is to provide endorsement of Security, CCTV & Access Control designs. – through the Technical Services Group (TSG) governance.

2.2 Capital Works Delivery Process

Capital works projects require consideration of ICT components throughout the entire design process, including inputs from all stakeholders at an early design stage. Table 4 is a summary of the required ICT activities aligned with all phases of the standard SINSW capital works delivery process, including specific hold points and actions/checks.

Table 4: Summary of ICT Activities in Capital Works Projects

Phase	Required ICT Activities
Phase 0 – Project Initiation	• The Project Manager is required to develop a scope of works/briefing of the intended building works, including nominating the likely extent of ICT works to be completed. • The Project Manager is required to oversee the engagement of Project Consultant(s) and DoE ITD representatives to on-board the project.
Phase 1 – Master Plan	• The Project Consultant(s) are required to: - Compile all information in **Form P1: Consultant Master Planning Survey** and submit to the Project Manager. This will require the Electrical Consultant to attend site and undertake a physical ICT due diligence exercise as part of their scoped obligations. - Provide indicative ICT spatial planning requirements and site reticulation layouts to the architect for inclusion in Master Planning documentation. - Request Dial Before You Dig plans to indicate availability of, and coordinate impacts to surrounding carrier infrastructure. - Complete ICT component of **Master Planning Report** detailing proposed design strategy for relevant Infrastructure and Device ICT components. • DoE ITD is required to: - Review completed **Form P1**. ITD will be required to discuss the results of the survey with the Project Consultant(s) to clarify required information. - For brownfields schools, information provided in the current Managed Networks survey documents should be provided to ITD to minimise any discovery work required. - Using the outcomes of **Form P1**, compile all information in **Form P2: ITD Master Planning Survey**, inclusive of preliminary active equipment requirements, and submit to the Project Manager. • The Project Manager is required to collate the input from both Project Consultant(s) and completed DoE ITD checklists to review the budget to adjust or allocate project funding and DoE ITD budget estimate as required.
Phase 2 – Concept Design	• The Project Consultant(s) are required to: - Complete ICT component of **Concept Design Report** detailing proposed design strategy for relevant Infrastructure and Device ICT components. - Locate and size equipment room(s) including Main Communications Room and

Phase	Required ICT Activities
	Building Communications Room(s). - Design site external cable reticulation system, coordinated with other services, including pits and conduits. • DoE ITD is required to: - Review and endorse relevant Project Consultant documentation.
Phase 3 – Schematic Development	• The Project Consultant(s) are required to: - Complete ICT component of **Schematic Design Report** detailing proposed design strategy for relevant Infrastructure and Device ICT components. - Complete the structured cabling design drawings to Schematic level inclusive of line diagram(s), layouts of equipment rooms, detailed internal and external cable reticulation systems. - Complete designs to Schematic level of IoT systems, Audio Visual, Digital Signage, Hearing Augmentation, Public Address & Period Bell, and Security. - Complete and submit NBN New Developments application for lead-in conduit, pit and pipe/pathways, if applicable. • DoE ITD is required to: - Complete **Form A1: Application for DoE WAN Service** (if applicable) and submit to Telstra. - Review and endorse relevant Project Consultant documentation. • The Project Manager is required to: - Complete **Form P3: ITD Schematic Design Survey** and submit to the Project Manager. - Collate the input from both Project Consultant(s) and completed DoE ITD checklists to reconcile the budget to adjust project funding and DoE ITD budget as required. The Project Manager shall also coordinate statutory requirements, such as ensuring the Schematic Design is compliant with NCC and DDA requirements.
Phase 5 – Contract Documentation	• The Project Consultant(s) are required to: - Complete all scoped design drawings to Tender level, inclusive of Specifications. • DoE ITD is required to: - Review and endorse relevant Project Consultant(s) documentation. - Complete **Form P4: ITD Contract Documentation Survey** and submit to the Project Manager. - Complete draft bill of materials, inclusive of cost estimate, for Active Network Equipment, Main Server UPS, Wireless Access Points, Learning Displays, Charging Carts and Telephony.

Phase	Required ICT Activities
	• The Project Manager is required to collate the input from both Project Consultant(s) and completed DoE ITD checklists to reconcile the budget to adjust Principal Contractors' and DoE ITD's component of project funding as required.
Phase 6 – Tender, Evaluate, Award	• The Project Consultant(s) are required to: - In conjunction with the Project Manager, review returnable schedules for quality and compliance issues. • DoE ITD is required to: - Review preferred tenderer's documentation to endorse ICT equipment listed in returnable schedules.
Phase 4 – Design Development	• The Project Consultant(s) are required to: - Complete the structured cabling design drawings to Developed Design level inclusive of coordinated electrical/data outlet allocations, line diagram(s), layouts of equipment rooms, detailed internal and external cable reticulation systems. This shall include a port count of horizontal cabling allocations, separated per MCR/BCR. - Complete designs to Developed Design level of IoT Systems, Specialist Audio Visual, Digital Signage, Hearing Augmentation, Public Address & Period Bell, and Security. • DoE ITD is required to: - Review and endorse relevant Project Consultant(s) documentation. - Finalise active network equipment allocations based on consultant supplied port count. • The Project Manager is required to collate the input from both Project Consultant(s) and completed DoE ITD checklists to reconcile the budget to adjust project funding and DoE ITD budget as required.
Phase 7 – Construction Administration	• The Project Consultant(s) are required to: - Undertake periodic site inspections and audits as per their Agreement to ensure that the cabling is all compliant with Technical Standards, NCC/BCA, and the scope of works, inclusive of set-out and plan layouts. • The Principal Contractor and Subcontractors are required to: - Complete **Form C1: Equipment Sample Approval forms** for all supplied equipment prior to procurement. - Facilitate a meeting with DoE ITD and complete **Form C2: Cabling Pre-Installation Checklist.** - Design as required, supply and install all scoped requirements as per Table 3. - Assign a single point of contact for receiving DoE ITD equipment. Receive and

Phase	Required ICT Activities
	appropriately store equipment on site. - Fit-off and install all DoE ITD 'supply only' equipment as per Table 3. • DoE ITD is required to: - Place orders in accordance with standard ITD policy (provide quote to SINSW Project Manager for endorsement) to commence procurement of all ITD scoped equipment. Raise purchase order and confirm delivery details with SINSW Project Director. Orders shall be placed to ensure delivery to site six weeks prior to scheduled practical completion. - Supply and install all scoped requirements as per Table 3. - Complete coordination with Telstra, NBN and any other relevant carriers to facilitate the installation of lead-in cabling. - Supply and configure all DoE ITD 'supply only' equipment physically installed by the Principal Contractor and Subcontractors as per Table 3. - Undertake periodic site inspections and audits on a regular ad hoc basis as the MCR/BCRs are constructed and the cabling rough ins are occurring. Prior to sheeting is a mandatory site inspection of cabling rough ins. • The Project Manager is required to: - Raise quotes furnished by DoE ITD in T-Reign for approval, noting that no Purchase Order is required.
Phase 8 – Commissioning and Handover	• The Project Consultant(s) are required to: - Undertake a detailed site audit of the installed systems under their design scope. Complete a defects assessment and return results to the Project Manager. • DoE ITD is required to: - Complete commissioning and handover of all ITD-supplied equipment. - Complete functional acceptance testing and user acceptance testing for all DoE ITD supplied and installed equipment. - Undertake a detailed site audit of the installed systems under their remit. Complete **Form P5: ITD Commissioning & Handover Survey** and attend commissioning and handover meetings, and defect walkthroughs. • The Principal Contractor and Subcontractors are required to: - Complete all commissioning of all scoped requirements as per Table 3. - Complete **Form C2: Cabling Post-Installation Checklist** and submit to the Project Manager. - Rectify any installation defects identified by the Project Consultant, the Project Manager and/or DoE ITD.
Phase 9 – Post Completion	• The Principal Contractor and Subcontractors are required to:

Phase	Required ICT Activities
Warranty Period	- Rectify any identified latent defects.

2.3 Standards and References

All parties contributing to the design and construction of ICT infrastructure and devices in NSW Government schools shall follow the latest revision of all standards listed in Table 5**Error! Reference source not found.**. In addition, all NSW DoE Construction Specifications referenced in Section 2.4 shall be followed and included with all NSW Government school construction documentation.

Table 5: Standards Defining ICT installations in NSW Government schools

Standard	Description
NCC	National Construction Code (incorporating the Building Code of Australia)
AS/CA S008	Requirements for Customer Cabling Products
AS/CA S009	Installation Requirements for Customer Cabling (Wiring Rules)
AS/NZS 3084	Telecommunications Pathways and Spaces for Commercial Buildings
AS/NZS 11801 series	Generic Cabling for Customer Premises
AS/NZS 3000	Electrical Installations (Australian/New Zealand Wiring Rules)
AS/NZS 3085.1	Telecommunications Installations – Administration of Communications Cabling Systems
AS/NZS 14763.2	Information Technology – Implementation and operation of customer premises cabling planning and installation

2.4 Construction Specifications

This Standard provides a performance based guideline on how to approach ICT design. Specific technical requirements are required to be followed by designers/project consultants and constructors.

The following Specifications are mandatory for constructors to adhere to for the construction of NSW Government school projects, and shall be bundled with all project consultant documentation:

- Specification for Structured Cabling Systems
- Audio-Visual Specifications for School Learning Displays
- Audio-Visual Specifications for Video Collaboration Systems[2]

[2] The Audio-Visual Specifications for School Learning Displays and Video Collaboration Systems are scheduled to be combined in a new document.

- Audio-Visual Specifications for School Communal Halls

The designer and constructor are reminded that each of these specifications contains individual forms and checklists to verify design and construction compliance. It is mandatory for these forms to be completed.

3 ICT Adoption

3.1 Minimum & Benchmark Requirements

It is important for schools to have equitable, appropriate and targeted strategies for adopting ICT to support improved teaching and learning.

Table 6 has been produced to determine the requirements acceptable to the NSW Department of Education for ICT adoption in a school.

'Minimum Requirement' defines the minimum standard of ICT adoption deemed acceptable for meeting current educational objectives. All DoE schools currently operating in NSW should meet or exceed Minimum Requirement in all relevant categories.

'Benchmark Requirement' defines the optimal standard of ICT adoption for meeting educational objectives, providing a strong level of technology suitable for future educational objectives.

3.1.1 Assessment of Requirements in Capital Works Projects

New schools shall be designed to meet the Benchmark Requirement.

New buildings on existing school sites shall be designed to meet the Benchmark Requirement. Where there is a requirement to implement new services into existing ICT environments, such as existing communication rooms or the expansion of existing systems, it is not a requirement to retrofit or upgrade the environment to the latest standards provided the environment has the additional capacity to accept the uplift in services.

Thus, existing schools with capital works projects being undertaken are to be initially assessed against the Minimum Requirement:

- Capital works projects are not intended to upgrade existing ICT infrastructure or devices if Minimum Requirement is already being met.
- Any parts of the existing school not meeting Minimum Requirement are to be assessed on a case-by-case basis to determine if an upgrade is required to support the integration of the capital works project. Should such a shortfall be identified, it is the responsibility of DoE ITD to nominate these shortfalls during Phase 1 (Master Plan) of the delivery process. Such requests of upgrades will be processed through the SINSW governance system for endorsement and subsequent inclusion in the capital works scope.
- Several building specific systems may be provided by the Services Consultant. Planning for each of these systems must always consider:
  - Compatibility with existing equivalent systems, especially those that will not be replaced as part of the project.
  - Operational issues of disparate systems.
  - Ongoing support and maintenance, including skills required and responsibility.
- The implementation of any new services to existing environments must adhere to any relevant standards.

Threshold for Site-Wide System Upgrades

Applicable to: *Switches, Wireless Access Points, Public Address and Period Bell, and Telephony*.

If the project increases an existing school's net usable area by more than 50% or student population by more than 20% (whichever is greater), and the systems do not meet Benchmark Requirements, the project scope should include upgrades of all these systems to provide the equivalent of a new school installation.

3.1.2 Assessment of Requirements in Minor Works Projects

Projects categorised as minor works on existing school sites are not subject to any assessment against Minimum or Benchmark Requirements. The ICT project scope shall be localised to the immediate site works area, and generally integrate with existing school ICT services. An assessment should be undertaken to document potential incompatibilities and outline the impacts to all stakeholders.

The new minor works shall be designed and built to Benchmark Requirement guidelines.

Table 6: Minimum and Benchmark Requirements for ICT adoption in schools.

	Minimum Requirement	Benchmark Requirement
Infrastructure		
Lead-in Carriage & Data Services	• All schools are provided with DoE WAN link over dedicated fibre Ethernet under the NSW Government's enterprise Contract.	
Passive Structured Cabling System	• OS1 single-mode or OM3 multi-mode fibre-optic backbone cabling, capable of supporting 1 Gbit/s between distributors. • Category 5e horizontal cabling capable of supporting 1 Gbit/s to the work area. • Communications distributor(s) may be located in a dedicated communications room, or a secured cupboard separated from learning areas or clutter.	• Single-mode fibre-optic backbone cabling, capable of supporting 40 Gbit/s between distributors. • Screened horizontal cabling capable of supporting 10 Gbit/s to the work area. • Communications distributor(s) shall be located in a dedicated communications room compliant with Section 4.2.3 of this Standard.
Uninterruptible Power Systems	• Not assessed for Minimum Requirement.	• UPS provided to Main Communications Room, with 30 minutes backup for all core ICT services.
Firewalls, Routers, Servers and Switches	• 1 Gbit/s uplink to edge switches. • No remote management of local area network. • Managed switches up to 10 years old. • Edge switches with PoE enabled on ports serving WAPs.	• 10 Gbit/s uplink to edge switches. • Remote management enabled across network. • Modular, stackable core and top-of-rack switches. • Edge switches with 100% of ports capable of PoE+ • Any uplift of systems requiring VLANs require Layer 3 switching (e.g. security, telephony, BMS, public address, etc).

	Minimum Requirement	Benchmark Requirement
Wireless Access Points	• Controller-free or wireless controller based architecture • Singular site-wide managed network preferred • WAPs to support n-3 transmission standard. • Maximum 1 WAP per 30 users. • For further detail, refer to Section 4.5 of this Standard.	• Controller-free architecture • Singular site-wide managed network with sufficient coverage across all areas of the built environment. • WAPs to support n-1 transmission standard. • Maximum 1 WAP per 30 users.
Copper Patch Cables	• As per 'Passive Structured Cabling System'	• As per 'Passive Structured Cabling System'
Fibre Patch Cables	• As per 'Passive Structured Cabling System'	• As per 'Passive Structured Cabling System'
Device		
IoT Systems (BMS, EMS etc)	• Not assessed for Minimum Requirement.	• Building & Energy Management system, including Solar PV, provided and integrated with School network. • IoT systems to be assigned dedicated VLANs.
End-User Computer (PCs, Laptops, Tablets)	• Not assessed for Minimum Requirement.	• Majority of fleet less than 3 years old • Operating system and application software to be receiving current feature and security updates.
Audio Visual – Learning Displays	• Not assessed for Minimum Requirement.	• As per Audio-Visual Specifications for School Learning Displays
Audio Visual – Video Conferencing	• Not assessed for Minimum Requirement.	• As per Audio-Visual Specifications for Video Collaboration Systems
Audio Visual – School Hall & Specialist	• Not assessed for Minimum Requirement.	• As per Audio-Visual Specifications for School Communal Halls and Section 5.4 of this Standard.

	Minimum Requirement	Benchmark Requirement
Digital Signage Systems & Televisions	• Not assessed for Minimum Requirement.	
Hearing Augmentation	• Not assessed for Minimum Requirement.	• Permanently installed hearing augmentation infrastructure in all learning areas, compliant with Section 5.7 of this Standard and the current National Construction Code.
Public Address / Period Bell System	• Not assessed for Minimum Requirement.	• Combination audio over IP Public Address and Period Bell system compliant with Section 5.8 of this Standard.
Security, CCTV & Access Control	• Not assessed for Minimum Requirement as this component is under School Security Unit jurisdiction.	• IP-based Security & CCTV infrastructure compliant with School Security Unit requirements. • Security & CCTV systems to be assigned dedicated VLANs.
Charging Carts	• Not assessed for Minimum Requirement.	• Provided to suit entire portable compute fleet, with dedicated power provisions.
Telephony	• Digital telephones in staff and learning areas, connected using structured cabling or analogue cabling. • Digital PABX to ISDN/NBN.	• Voice over IP (VoIP) handsets in staff and learning areas. • Unified Communications (UC) accessible via staff PCs. • Cloud hosted Voice over IP.
Multi-Function Devices	• Server based printing support.	• Print Management System with consumable control.
EFTPOS	• EFTPOS terminals to be used over mobile data network and not to be connected to ICT data network. Exceptions may apply for schools with limited or no mobile data access.	

3.2 Services Requiring Telecommunications Outlets

Telecommunications outlets (TO) shall be designed and installed to service all Device items in the installation, and consider future outlet provisions for network-based devices.

Minimum requirements for general TO allocation in all typical spaces are detailed in the SINSW KoP Catalogue Hub Datasheets available for download from the EFSG.

These are in accordance with Table 7 which details the purpose and utilisation of TOs throughout common types of learning spaces.

Sections **Error! Reference source not found.**, 3.3, and 3.4 detail the purpose and utilisation of services requiring TOs throughout specific Hubs subject to architectural/engineering design per school. Thus, the location and quantity of services in a final engineered design may differ from those shown in the KoP Catalogue Hub Datasheets.

Table 7: Minimum Data Point Allocation for Learning Areas

Facility Name	Learning Space Requirement	Data outlets required	Rationale/Utilisation
General Learning Space, Seminar Room & Learning Commons	Room	4	Four (4) individual outlets shall be placed around the room to allow for printing, STEM and flexibility based on projected usage.
	AV	2	For fixed Main Learning Displays (MLDs), if incorporated in the design.
	AV	0	For mobile Main Learning Displays (MLDs), if incorporated in the design.
	WAP	2	A minimum of one (1) DTO shall be installed per learning space to allow for required wireless coverage.
	Phone	1	A minimum of one (1) TO shall be reserved for the classroom phone.
	IoT	1	A minimum of one (1) TO per space reserved for IoT systems.
Multi-Purpose Space	Room	2	A minimum of two (2) TOs shall be placed around the room to allow for printing, STEM and flexibility based on projected usage.
	AV	2	For fixed Main Learning Displays (MLDs), if incorporated in the design.

Facility Name	Learning Space Requirement	Data outlets required	Rationale/Utilisation
	AV	0	For mobile Main Learning Displays (MLDs), if incorporated in the design.
	WAP	2	A minimum of one (1) DTOs shall be installed per learning space to allow for required wireless coverage.
	Phone	1	Allowance to be made to allow for flexible layout design.
Additional Service requirements if installed	BMS	1	Essential per BMS controller if installed (generally in ceiling cavity)
	CCTV	1	Essential per camera if installed (SSU scope for building)
	External WAP	2	Essential per external WAP if installed.
Spaces requiring other densities of wall outlets	Admin, Staff & Library spaces	Variable	Based on accommodation requirements and usage, refer KoP Catalogue Hub for allocation.
	Ancillary Rooms	1 (min)	Based on accommodation requirements and usage, refer KoP Catalogue Hub for allocation.

3.2.1 Outlet Positioning and Types

TOs installed in DoE sites shall be protected to discourage access and damage. TO installation shall include a shuttered outlet, be tamper-proof, and generally mounted outside the reach of children, to prevent the insertion of fingers or foreign objects.

3.3 Specific Requirements for Secondary Schools

3.3.1 Specialist Classroom ICT Services Allocation

Typical general learning spaces (GLS) are the most common type of classroom configuration in the DoE portfolio. Generally, a GLS comprises a main learning display at a teaching location, with varying configurations of student desk layouts, warranting a data layout equal to Table 7. However, most secondary schools house 'specialist' classrooms which require differing levels of ICT adoption that must be considered.

Requirements noted in the allocations below are **in addition** to the requirements in general learning spaces (including MLDs, which are required in all learning spaces, both general and specialist).

Spaces requiring specialist AV systems need to be considered as part of the AV integrator's contract with the Principal Contractor.

Only Hubs that contain specific ICT Infrastructure and Device requirements are detailed below. Refer to KoP Catalogue Hub Datasheets for ICT Infrastructure allocations for general learning and administrative environments.

3.3.1.1 HS204 Library Hub

Specific ICT allocations in HS204 Library Hub are as per Table 8.

Table 8: HS204 Library Hub ICT Allocations

Learning Space	Infrastructure Services Required	Device Services Required
HS204.02 Library Main Area	• TOs as required by the AV design to service specialist AV over IP or HDBaseT equipment.	• May contain a **Main Learning Displays (MLDs)**. OR a **Specialist Presentation system.** • **Specialist Audio System:** to enable voice amplification and audio reinforcement for visual presentations. • **Hearing Augmentation:** Adult Hearing Augmentation system in conjunction with Student Hearing Augmentation system. • **Specialist AV Cabinet:** To contain AV equipment for the above specialist systems
HS204.06 Computer Learning Space	• One (1) STO per PC workstation • One (1) STO per IoT device • One (1) STO per print device	• **IoT:** Minimum two (2) network connected 3D printers. • **End-user Compute:** Fixed desktop PCs or laptop docks with monitors per workstation. • **Print:** Minimum one (1) MFC device.
HS204.10 System Administrator's Office	• Minimum six (6) STOs with associated GPOs for admin use throughout room.	N/A

3.3.1.2 HS302 Visual Arts Learning Hub

Specific ICT allocations in HS302 Visual Arts Learning Hub are as per Table 9.

Table 9: HS302 Visual Arts Learning Hub ICT Allocations

Learning Space	Infrastructure Services Required	Device Services Required
HS302.07 Dark Room	• One (1) STO per PC workstation • One (1) STO per IoT device	• **IoT:** Network connected scanner capable of scanning photographic negatives. • **End User Compute:** Minimum one (1) workstation PC.

3.3.1.3 HS303 Wood + Metal Technology Learning Hub

Specific ICT allocations in HS303 Wood + Metal Technology Learning Hub are as per Table 10.

Table 10: HS303 Wood + Metal Technology Learning Hub ICT Allocations

Learning Space	Infrastructure Services Required	Device Services Required
HS303.07 Laser + 3D Printer Room	• One (1) STO per PC workstation • One (1) STO per IoT device	• **IoT:** Minimum two (2) network connected 3D printers. • **IoT:** Minimum one (1) network equipped laser cutter. • **End User Compute:** Minimum one (1) workstation PC.

3.3.1.4 HS305 Health/PE Learning Hub

Specific ICT allocations in HS305 Health/PE Learning Hub are as per Table 11.

Table 11: HS305 Health/PE Learning Hub ICT Allocations

Learning Space	Infrastructure Services Required	Device Services Required
HS305.02 Fitness Laboratory	• TOs as required by the AV design to service specialist AV over IP or HDBaseT equipment.	• May contain a **Main Learning Displays (MLDs)**. OR a **Specialist Presentation system.** • **Specialist Audio System:** to enable voice amplification and audio reinforcement for visual presentations. • **Hearing Augmentation:** Student Hearing Augmentation system. • **Specialist Wireless Microphones:** Loose vocal wireless microphone set comprising minimum two (2) headworn 'Madonna' microphones for instructor use. • **Specialist AV Cabinet:** To contain AV equipment for the above specialist systems.

3.3.1.5 HS306 Performing Arts Learning Hub

Specific ICT allocations in HS306 Performing Arts Learning Hub are as per Table 12.

Table 12: HS306 Performing Arts Learning Hub ICT Allocations

Learning Space	Infrastructure Services Required	Device Services Required
HS306.02 Performing Arts Workshop / HS306.03 Multi-Purpose Space*	• TOs as required by the AV design to service specialist AV over IP or HDBaseT equipment.	• May contain a **Main Learning Displays (MLDs)**. OR a **Specialist Presentation system.** • **Specialist Audio System:** to enable voice amplification and audio reinforcement for visual presentations. • **Hearing Augmentation:** Student Hearing Augmentation system. • **Specialist Wireless Microphones:** Loose vocal wireless microphone set comprising minimum two (2) headworn microphones for instructor use. • **Specialist Performance Lighting:** Performance lighting system if required by curriculum, compliant with Technical Standard 0951 - Lighting. • **Specialist AV Cabinet:** To contain AV equipment for the above specialist systems.

*Typically, a single 'main' performing arts classroom is provided with specialist audio visual equipment. Outside of the main classroom, general learning spaces in the Performing Arts Learning Hub may require a specialist audio system connected to the main learning displays.

3.3.1.6 HS602 Movement Studio

Specific ICT allocations in HS602 Movement Studio are as per Table 13.

Table 13: HS602 Movement Studio ICT Allocations

Learning Space	Infrastructure Services Required	Device Services Required
HS602.01 Movement Studio	• TOs as required by the AV design to service specialist AV over IP or HDBaseT equipment.	• **Specialist Audio Visual:** Movement Studios can be built as splitable/combinable rooms. Where this is the case, the AV design must follow the operational intent. • May contain a **Main Learning Displays (MLDs)**. OR a **Specialist Presentation system.** • **Specialist Audio System:** to enable voice amplification and audio reinforcement for visual presentations. • **Specialist Audio Visual:** Performance lighting system if required by curriculum, compliant with Technical Standard 0951 - Lighting. • **Hearing Augmentation:** Adult Hearing Augmentation system in conjunction with Student Hearing Augmentation system.
HS602.03 Control Room	• Minimum four (4) STOs servicing AV equipment rack, additional per specific AV requirements.	• **Specialist Wireless Microphones:** Loose vocal wireless microphone set comprising minimum three (3) headworn 'Madonna' microphones. • **Specialist AV Cabinet:** To contain AV equipment for the above specialist systems. • If deployed, **Specialist Presentation system:** Wall input plate/s
HS602.04 Stage	• Two (2) DTOs on either side of stage, co-located with AV wall plates.	• **Specialist Audio System:** Wall input/output plates. • If deployed, **Specialist Presentation system:** Wall input plate/s

3.3.1.7 HS603 Multimedia Learning Unit

Specific ICT allocations in HS603 Multi Media Learning Unit are as per Table 14.

Table 14: HS603 Multi Media ICT Allocations

Learning Space	Infrastructure Services Required	Device Services Required
HS603.01 General Learning Space (Music Classroom)	N/A	• **Specialist Audio System:** should be provided with an audio system suitable for reproduction of high quality audio to enhance the learning experience. Typically, stereo 'studio monitor' speakers or amplified stereo loudspeakers mounted near the main learning display are sufficient.
HS603.02 Workshop	• One (1) STO per PC workstation	• **End-user Compute:** Minimum one (1) workstation PC with high specifications (inclusive of dedicated graphics and sound card) suitable for video and audio editing.

Learning Space	Infrastructure Services Required	Device Services Required
HS603.04 Multi Media Studio (Recording Room)	• One (1) STO per PC workstation	• **Specialist Audio Visual:** Music recording studios should include: - Rack-mount audio interface for digital audio recording - DAW or MIDI controller - High quality studio microphones suitable for a variety of vocal, instrument and percussive capture - Monitor headphones and/or studio loudspeakers • **Specialist Audio Visual:** Video/TV recording studios should include: - Wireless hand-held and lavaliere microphones - Monitor headphones - Teleprompter system (e.g. iPad) - Box lights - Green screen / green painted wall • **End-user Compute:** Minimum one (1) workstation PC with high specifications (inclusive of dedicated graphics and sound card) suitable for video and audio editing. (Note – specialist software including digital audio workstations or video editing shall be the responsibility of the School, via T4L).

3.4 Specific Requirements for Schools for Specific Purposes

3.4.1 Protection

Schools for Specific Purposes (SSP) require ICT infrastructure and devices to be protected against a heightened risk of impacts or damage. When designing systems for SSPs, the following guidelines should be followed by architects and engineers:

- ICT devices such as learning displays that carry a level of built-in impact protection are preferred. An 'IK' (impact kinetic) rating is an ideal method of determining level of impact protection.
- Equipment that could become loose, such as personal computer peripherals, which in certain situations such as Support Classes, should be anchored to surfaces with Kensington locks.
- Where impact protection is not feasible or practical for fixed equipment, protective cages, lockable boxes or enclosures should be incorporated to protect sensitive ICT equipment from damage. This may be applicable to audio-visual equipment, wireless access points, compute devices, switches/control panels or wall plates.

- Interior design should consider balancing accessibility/maintainability of ICT equipment and concealment to protect against damage. As the focus is to develop a learning environment that fosters responsibility and respect, the level of protection applied to equipment should not elicit a negative or overly harsh aesthetic.

3.5 Specific Requirements for Alternate School Designs

Alternate school designs include facilities atypical to DoE's standard kit of parts design. Usually, alternate school designs incorporate the requirements of a third party, which could include:

- Projects where DoE shares facilities with another organisation, such as shared sports and library facilities with a local council.
- Projects where DoE shares facilities with other educational institutions, including Vocational Education providers, TAFE NSW, or Out of School Hours care providers.
- Projects where DoE facilities are constructed within a non-DoE owned site, such as a vertical school built in a commercial base-building.

A combined DoE primary/secondary education campus does not constitute an alternate school design. The requirements for primary schools and secondary schools are to be followed in each component of the works.

Alternate school designs may require parts of this Performance Standards document to be omitted, amended or expanded to suit the requirements of the third party. Generally, the co-existence of DoE and third party ICT requirements is handled as follows:

- Separate infrastructure is maintained for the DoE and non-DoE portions, e.g. separate communications rooms, designated areas, separately labelled ports.
- Additional cybersecurity measures may be required to protect DoE IT assets, such as the incorporation of zero-trust/whitelisting networks.
- Shared infrastructure is to be limited in scope to non-DoE provided assets. Examples would include a shared main distribution frame room to be used as a termination point to DoE WAN (Telstra) lead-in and other third-party lead-in services.

The ITD SNSDA process is to be followed for all alternate school designs. In capital works projects, this shall be raised at Concept Phase, and endorsed at SNSDA's discretion.

4 Infrastructure Component

4.1 Lead-in Carriage and Data Services

The NSW Department of Education network consists of a wide-area network (WAN) encompassing all school and administrative sites, each supporting its own local-area network (LAN).

For all DoE sites, incoming carriage services comprise a fibre-optic ethernet multi-protocol label switching (MPLS) service which is used to connect to data and SIP (telephony) carrier services. The service shall be terminated in the Main Communications Room. To facilitate these connections, the electrical design for a lead-in connection shall be:

- 1 x 50mm diameter Telco Grade conduit for DoE WAN lead-in carriage service, and
- 1 x 50mm diameter Telco Grade conduit for common-carrier service (e.g. NBN), and
- 2 x 50mm diameter Telco Grade spare conduit.

A small number of rural and regional schools may connect to the DoE MPLS network via methods other than fixed ethernet, such as satellite, fixed wireless or National Broadband Network (NBN). DoE ITD representative is to allow for the establishment of any alternative networks where required by geographical limitations.

The lead-in carriage service is provided by Telstra. For any establishment, addition or change to the lead-in carriage service, the DoE ITD representative shall complete **Form A1: Application for DoE WAN Service** and submit to Telstra a minimum of 16 weeks prior to the date the service is required. Confirm with the building program, as this date may be prior to the site works' contract completion (e.g. service is required for commissioning). In capital works projects, this must be completed during **Phase 3 – Schematic Development**.

Existing schools may be using National Broadband Network (NBN) to deliver legacy PSTN telephony services. These systems are to be maintained if the telephony system is still functional.

4.2 Passive Structured Cabling System

The ITD Specification for Structured Cabling Systems defines the design principles plus the minimum quantity and quality of the components within the system. All communications cabling works performed for the NSW Department of Education shall comply with the ITD specification.

4.2.1 Network Topology

The Master Planning of a site shall take into consideration all current and future buildings.

All DoE sites shall comprise a Main Communications Room (MCR). The MCR will ideally be centrally located within the site. In greenfield sites, the MCR will be sited based on site centrality and cost, ideally within or close to the Administration Hub.

It is commonplace for the MCR in existing schools to be located in the Library, or outside of dedicated rooms in staff/administration areas. For capital works in existing schools, an existing MCR should not

require relocation in most circumstances, generally alterations and refurbishment should be allowed to bring the room to current standards. Generally, the MCR may only be relocated if:

- The building containing the MCR is to be demolished.
- There is no physical space to accommodate alterations and additions caused by the capital works.

All buildings are to be provided with a minimum of one Building Communications Room (BCR), interconnected in a hub-and-spoke (star) topology back to the MCR. Multi-storey buildings typically comprise a BCR on each floor.

Generally, at least one BCR is required on each floor. SNSDA may approve a building communications room to service an adjacent floor that is not heavily populated and if all the requirements for security/horizontal cabling can be met. In capital works projects, this shall be raised at Concept Phase, and endorsed at SNSDA's discretion.

BCR positioning should be:

- Repeatable and buildable, so that horizontal cabling runs to data outlets are simple and predictable.
- Located centrally to buildings to ensure that minimum cable lengths are respected. Architects are to ensure that the furthest internal wall of a building (that could be serviced by a TO) is no more than 75 metres as linearly measured from the centre of the proposed MCR/BCR. It is inadvisable for BCRs to be located along building perimeters.

4.2.2 Reticulation

4.2.2.1 Pit and Conduit

An underground pit and conduit network is used to reticulate ICT services cabling between buildings. For all capital works projects, the Structured Cabling Specification shall be followed to inform the technical design and construction parameters, including trench depths, conduit quantities and dimensions, pit locations and types.

The general design principles are applicable for the design of all new pit and conduit networks to facilitate cable passthrough and ease future alterations and additions:

- Locate pits at the beginning and end of all conduit runs, including against the building fabric.
- Locate pits at all changes in direction, and otherwise every 50 metres.
- Pits and cable junction points shall be located outside the earth potential rise (EPR) zones caused by electrical power systems, per AS/CA S009.
- All conduits are to be provided with draw wires.
- The pit and conduit system elevations shall be designed to ensure that water cannot enter a communications room due to backflow or surcharging water.
- Conduits are to slope downwards, away from buildings, to drain into pits.

4.2.2.2 Ceiling Space, Access Panels and Service Risers

Building designs are to incorporate sufficient space, cavities, voids and risers to allow the facilitation of segregated cable tray pathways for major cable runs. A major cable run would include:

- All fibre-optic backbone cabling that runs through a building.
- Any horizontal cabling run exceeding 10 cables.

Non-major cable runs, which do not meet the above requirements, may be reticulated using catenary wires.

The building designer should consider how horizontal cables are run through completing their cabling design. A good, cost effective cabling design keeps cables together for as long as possible, and is run parallel to other services pathways with sufficient separation (e.g. low voltage electrical, security) to minimise maintenance impacts.

Consultants must consider coordination of the design with non-Communications disciplines/trades at every stage of the design. Ceiling height and beam depth must provide clearance space for horizontal cable trays to pass under the beam, in between the beam and the ceiling. Proximity to the underside of the roof sheeting should be considered, to avoid overheating of cables.

Where space does not exist, a beam penetration (with sleeves) should be considered by the structural engineer to allow a pathway for cables between sections of a ceiling space.

All pathways must be accessible. If a cable tray is installed above a suspended T-bar ceiling, a 75mm clearance shall be allowed for below the tray for tile removal, and coordination between services should allow 100mm clear working space above the cable tray. If a cable tray is installed above a plasterboard set ceiling, allow for access panels at all changes of direction where cables are hauled around corners of pathways.

4.2.3 Communications Rooms

In capital works, spatial allowances for MCRs and BCRs shall be completed during Concept Design. The subclauses of this section will inform the designer of the standard MCR/BCR allowances to maintain an equitable, safe and effective approach across new and refurbished school buildings.

4.2.3.1 Design Principles

The following general design principles are applicable to the location of MCRs and BCRs:

- All communications racks in new constructions shall be installed only in dedicated, purpose designed rooms.
- Cabinets, with side panels intact, shall be located centrally in the room.
- Cable pathways into cabinets shall be through cabinet top entry points via ceiling mounted cable trays from side walls or ceiling, installed above 2300mm, to provide full access to all sides of the cabinet row.
- No cabling or services shall connect to the cabinets below the 2300mm level so as to allow 360-degree access to the cabinet installation row.
- The minimum dimensions of the Communications rooms shall be internal and free of columns, ducts or other intrusions into the space. The communications riser, and other services risers or equipment shall be outside the required minimum cabinet clearances.
- Inter-cabinet pathways shall be through cabinet top entry points.

- To prevent the ingress of moisture and the entry of rodents, all penetrations shall be suitably sealed. Where required by NCC, penetrations need to be fire-stopped by qualified contractors after cable reticulation. Approved fire-retardant materials shall be used where sealing is deemed necessary, and all fire stopping shall comply with the Building Code of Australia (BCA). Note: Sealing and fire stopping shall not impede access to cabling pathways.
- If the BCA determines that the school building is required to be sprinkler protected, a fire engineered performance solution shall be considered to avoid the placement of fire sprinklers inside MCRs and BCRs. A typical performance solution may require communications rooms to be of 120/120/120 fire rated construction, combined with appropriate dry fire detection and alarm provisions in the room.
- Communications rooms shall house only communications, network, security, telephony, building monitoring systems and IT related equipment. Access to communications rooms shall be restricted to authorised technicians and school staff.
- Only split system air conditioning units are to be installed in communications rooms. Cassette type air conditioning units are not permitted to be installed, and air conditioning fan coil units that service the building are not permitted to be installed in Communication rooms.
- The ceiling space above the racks shall be clear of any services to allow for the suspension of cable trays and pendant power.
- Communications rooms shall not be used to store any un-used equipment or items. Using communications rooms as a storage space represents an OH&S hazard to technicians and school staff requiring access to the equipment housed within. No other services (e.g. electrical risers/boards/cupboards, water, mechanical) shall travel through or be installed in these rooms.
- All communications rooms shall have anti-static vinyl floor covering. Sealed, concrete floors are also acceptable.
- In the MCR a 4 step fibreglass ladder, with a minimum 120kg load rating is required.
- A telephone is required per MCR.
- A KVM with a fold out monitor must be used for any non-DoE managed services located within racks.
- No wet areas or wet services (e.g. water, sewage) to be located directly above, to minimise risk of water ingress.
- Communications rooms shall be designed to minimise risk of dust ingress. Methods used could include appropriate sealing, raised flooring and/or positive pressure mechanical ventilation.
- Where an existing room/space is to be repurposed, any existing windows to be removed/blocked-out.
- Where access is provided off a main circulation corridor (exposed to the elements), an air-lock is to be provided for security reasons and to mitigate dust / water ingress.

Direct access off the main circulation corridor, without an air-lock, may be allowed subject to SNSDA approval. Raise as an EFSG Departure and mitigation measures to be put in place for dust / water ingress (eg. raised floor and perimeter dust seals to doors)

- It is critical for the minimum room and door dimensions in Figure 1, Figure 2 and Figure 3 to be followed to ensure equipment can be installed safely, and to facilitate maintenance.
- The minimum ceiling height in all communications rooms is 2700mm.
- All cable pathways into cabinets are to be via cable trays installed above 2400mm.

4.2.3.2 Work Health and Safety

The designers shall take note of the following Work Health and Safety requirements when positioning all communications rooms on a floor plate:

- Mixing of adults (access for maintenance, cleaning & servicing) and students in a confined and/or poorly supervised areas is not allowed in schools. This is because many DoE and external IT contractors are generally not required/expected to have Working with Children Checks.
- Access to communications rooms shall not require the operator to pass through the students' amenities block.
- Any of the abovementioned WHS risks must be added to the Safety in Design Register, Risk Registers and relevant reports for review, and included as items for discussion at Safety in Design Workshops.

Where mixing of adults and students is unavoidable (e.g. an MCR is accessed via the library), an operational management plan is to be developed in consultation with SINSW WHS Team & Operational WHS Team from the DoE's Health and Safety Directorate.

4.2.3.3 Main Communications Room

New MCRs shall be designed in accordance with the layout shown in Figure 1, without exception. This is applicable to traditional buildings, kit-of-parts buildings, and temporary buildings.

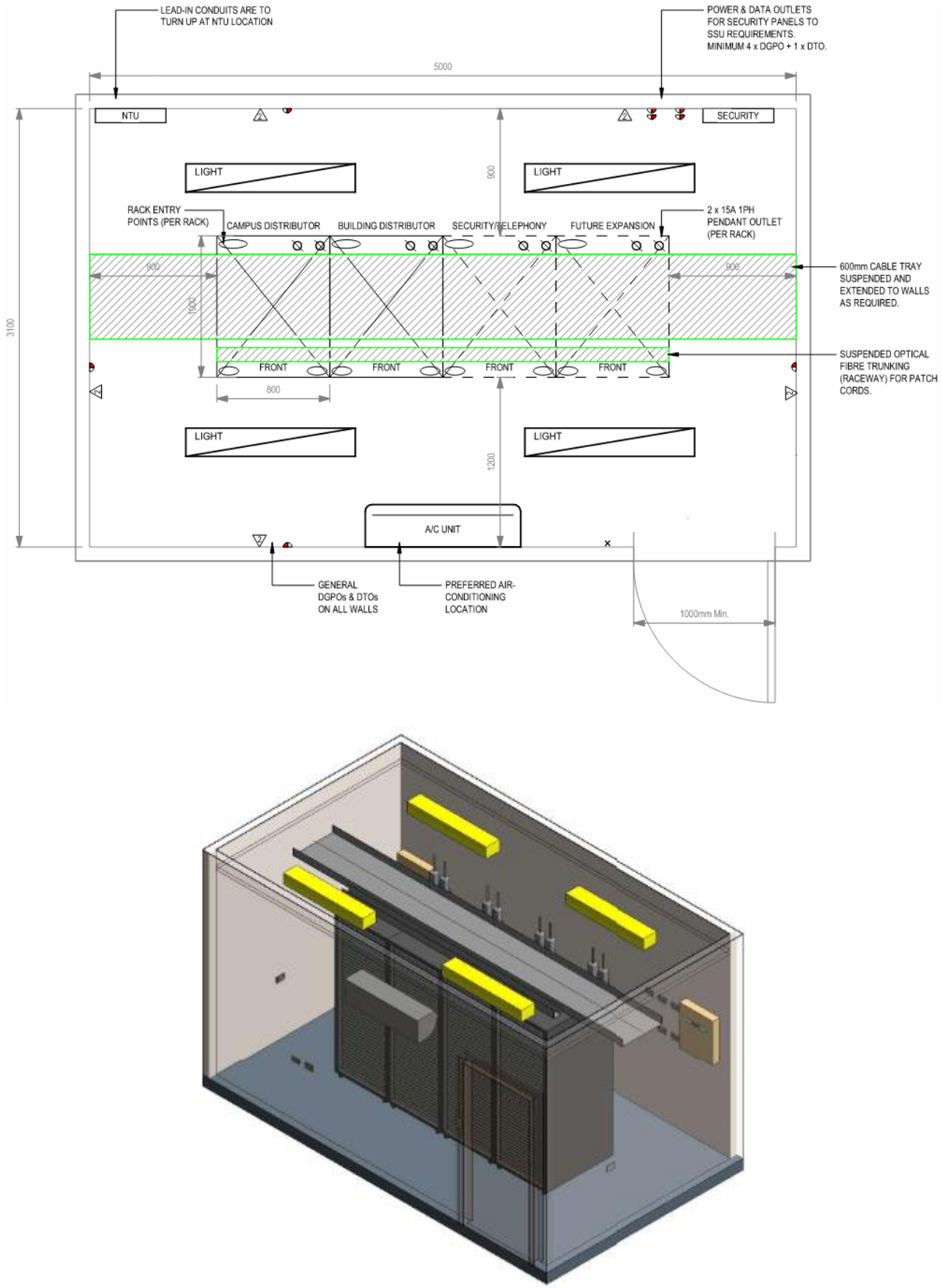


Figure 1: Main Communications Room Layout

4.2.3.4 Building Communications Room – Type 1 (Single Cabinet)

New BCRs projected to service fewer than 280 TOs throughout their design lifecycle shall be 5.2 m^2, and comprise a single 800mm x 800mm equipment rack. The BCR shall adhere to the layout shown in Figure 2.

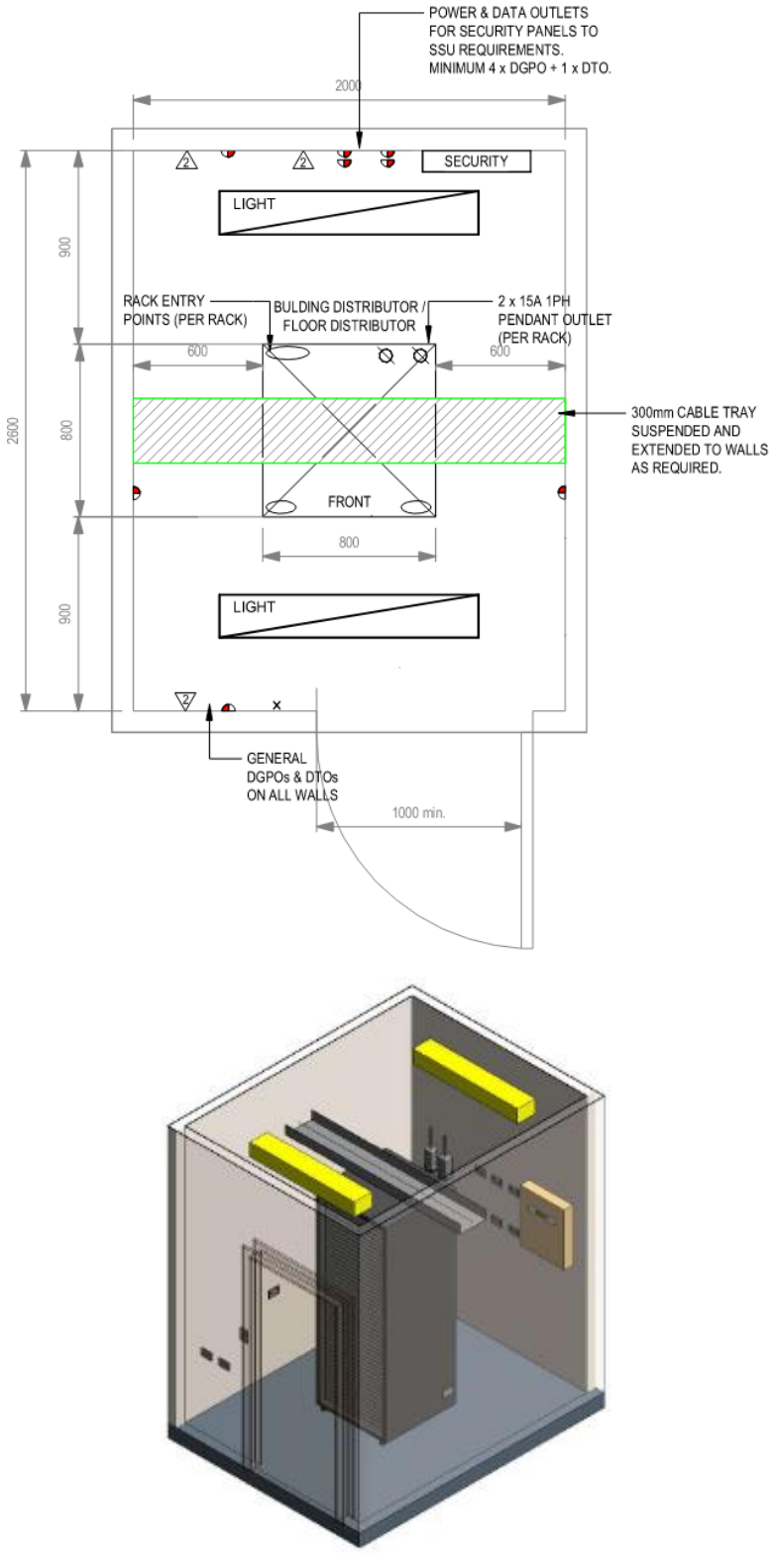


Figure 2: Building Communications Room - Type 1 Layout

4.2.3.5 Building Communications Room – Type 2 (Expandable Single/Dual Cabinet)

New BCRs projected to service 280 TOs or greater throughout their design lifecycle shall be 8.4 m^2, and comprise up to two 800mm x 800mm equipment racks. The BCR shall be sized to service two racks even if initially a single rack is proposed. The BCR shall adhere to the layouts shown in Figure 3.

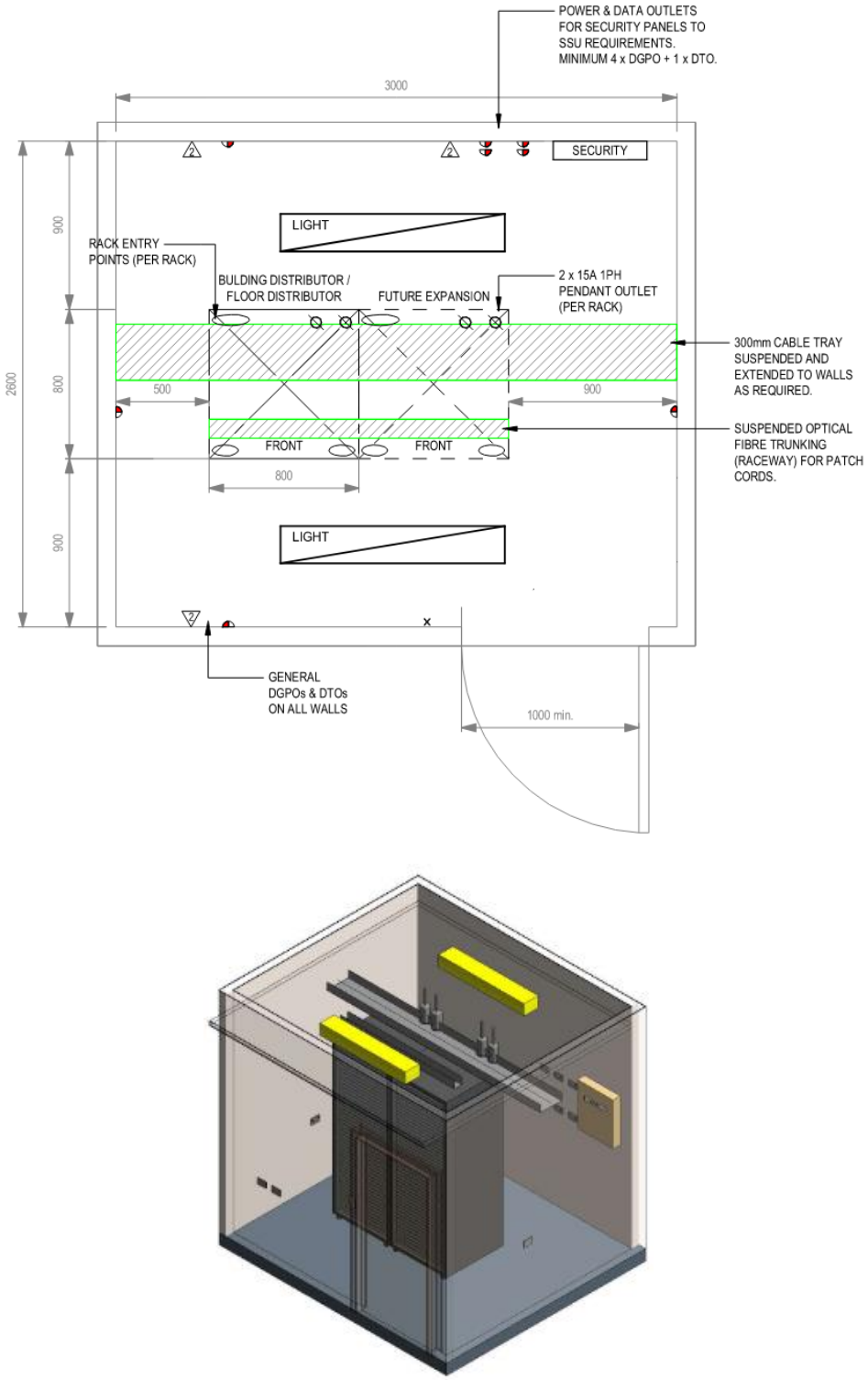


Figure 3: Building Communications Room - Type 2 Layout

4.3 Uninterruptible Power Systems

Stand-alone, rack-mounted uninterruptible power systems (UPS) are to be provided for core services in the main communications room. UPSs are typically 3 kVA single-phase units, providing a minimum of 30 minutes' backup at 100% operation to allow for protection of the core server(s) only. UPSs are to be connected to the power supply via a captive outlet connection. UPSs are required to be monitored to ensure that good running conditions are maintained throughout their working life. Monitoring is usually performed through a Simple Network Management Protocol (SNMP) interface with a BMS, or an in-built web-based interface. Prior to commissioning, it is expected that the system be configured to notify local and/or district IT staff for error conditions.

4.4 Firewalls, Routers, Servers and Switches

All schools are to be provided with active networking equipment that facilitates a single local area network (LAN) per school that is stable, resilient, secure, and is fit for purpose to meet the IT, telephony and multimedia requirements to support learning, teaching and administrative activities.

A network switching platform in a typical school LAN comprises a Core Switch, located in the Main Communications Room (MCR), and various Edge Switches throughout the site overall. Switches used in the DoE environment can be fixed-architecture or modular as required by project requirements. ITD is responsible for selecting the most efficient, cost-effective switching hardware to suit any given building and service requirements.

4.4.1 Platform

The DoE has standardised on Aruba (formerly Hewlett-Packard) as a network switching platform. Various generations of Aruba active networking equipment are in place across the DoE, which requires careful consideration if introducing changes or updates to a site, as different versions of ArubaOS, ArubaOS-Switch and ArubaOS-CX have different management characteristics and feature sets. Device type choices for each site are controlled and managed by DoE ITD.

4.4.2 Capital Works in Existing Schools

New school buildings supplied by new Building Communications Rooms (BCR) shall be provided with new network switches meeting Benchmark Requirements.

In general, the following scenarios may warrant the replacement of the core switch with new in a Capital Works project. Assessment will always be required to determine exact requirements on a per-project basis:

- The MCR is being demolished and re-established in a new location (Refer Section 4.2.1).
- The core switch cannot facilitate a 10Gbit/s link to the new building's Edge Switch(es), breaking Benchmark Requirements for the new building works.
- Compatibility with downstream edge switches is otherwise broken.

The following scenarios warrant the replacement of edge switches in existing buildings with new in a Capital Works project (which is to be raised as an extension of scope with SINSW when identified):

- An existing building's Wi-Fi access points (WAP) are being replaced in accordance with the departure noted in Section 4.5.1, **and** the existing switches are not capable of servicing the WAPs with a sufficient PoE power level, or a data transfer speed of at least 1 Gbit/s at the WAP.

4.5 Wireless Access Points

A robust and reliable wireless network is critical for enabling learners to access the benefits of mobile computing technology, including portable computers and flexible learning displays. Wireless networks should be developed to provide as consistent a user experience as is practical, and offer reliable levels of access across an entire site.

4.5.1 Capital Works in Existing Schools

It is mandatory that all schools are provided with a single, standardised, common network across the entire site. The standardisation of a wireless network ensures that users can roam across the site whilst remaining connected, and ensure a consistent level of technical support.

Capital projects works and general IT works warrant that the school's existing wireless network be assessed against Minimum Requirements prior to integration of new access points.

Some projects in existing sites may contain older generation wireless access point hardware, which may not be compatible with new access points. This assessment must be made early in the project's life cycle. If an existing network meets Minimum Requirements, but is incompatible with latest-generation access points:

- If the Major Upgrade threshold (Section 3.1.1) is met, ITD is to plan a site-wide replacement of all existing access points and associated active network infrastructure (refer Section 4.4.2) with new. This must take place during Phase 1 of the Capital Works Process to ensure this upgrade is incorporated in the overall project scope.
- If the Major Upgrade threshold (Section 3.1.1) is not met, the assessment for a site-wide replacement of existing access points and associated active network infrastructure shall be referred to the ITD School Network Solution Design Authority (SNSDA), per Section 1.4. The SINSW project manager is responsible for raising this requirement as an exception to the SNSDA for evaluation, with a final direction given by ITD.

4.5.2 Coverage

All learning spaces and serviced areas must be covered by a minimum level of signal strength and throughput (aggregated bandwidth) across all currently supported frequency bands. Coverage should be assessed against the WAP manufacturer's guidelines and recommendations. The final deployment of WAPs shall utilise network intelligence toolkits to ensure an optimised installation which minimises co-channel interference and provides the correct level and beamforming of signal power to achieve a consistent RSSI across the site.

4.5.3 Installation

WAPs are to be mounted in clearly visible, accessible, and centralised positions to provide optimal coverage. WAPs shall not be hidden or obstructed, to ensure that field staff are able to view status LEDs, perform fault analysis or easily replace hardware.

To guide the positioning of WAPs, the following guidelines should be followed when planning data (TO) layouts:

- **High Density:** Large learning spaces with a capacity above 50 learners, typically the library, hall, or open-plan learning areas. These spaces typically require a greater quantity of WAPs than other areas. Multiple WAPs are recommended to be provided to these areas, at least 12 metres apart, with a focus on servicing highly populated zones with higher levels of 5 GHz coverage.
- **Learning Spaces:** Predominately standard classrooms with a capacity of around 25-30 learners. These spaces typically require one WAP, to be installed in the centre of the ceiling underside.
- **Staff areas:** Predominately staff offices and corridors, with a variety of possible layouts. WAP layout will generally comprise one WAP per 12-16 metres, in a honeycomb pattern to obtain best coverage. Final positioning of WAPs may be subject to differences in the Admin and/or Staff Hub layouts, and may be affected by residual signals from WAPs outside the Hubs. It is imperative to ensure that interference tests are completed during on-site commissioning to calibrate WAPs.
- **Outdoor areas:** Outdoor learning spaces that require wireless signal. Weather rated IP68 WAPs are required for these spaces. Signal calculations should consider direction and adjustment of transmit power to combat airborne and distance losses.

4.6 Copper Patch Cables

The Consultant design of new ICT infrastructure shall take into consideration the provision of sufficient patch and fly leads for connection of equipment to TOs and activation of TOs.

The specification of patch and fly leads must be no less than the ISO Class of the permanent structured cabling installed in the works, to ensure a compliant end-to-end solution.

The design shall specify patch leads for 100% of active TOs contained in the MCR and/or BCR(s).

The design shall specify fly leads for 100% of the total number of TOs installed.

4.7 Fibre Patch Cables

The ITD scope of new ICT infrastructure includes the provisioning of fibre optic patch leads for the commissioning and operation of all active equipment being installed as part of the contract. The connector types on the leads may vary depending on the equipment supplied by DoE, and be coordinated with the FOBOTs specified in the Consultant's design.

The ITD design shall further ensure that the provision of sufficient SFP adapters (of type compatible with the new or existing fibre optic connectors and network switches local to the installation) are provided in the bill of materials.

5 Device Component

5.1 IoT Systems

Internet of Things (IoT) devices refer to 'operational technology' equipment which is designed and installed by the mechanical or electrical services trade, connected to the DoE ICT network, and does not usually have an interface with the end-user. Typically, IoT devices either produce, process or consume data from other IoT devices, therefore requires special and careful consideration in the DoE ICT network.

IoT devices typically installed in DoE schools include:

- Mechanical Services / Building Management & Control Systems (BMCS).
- Energy Management Systems (EMS) servicing electricity and water supply.
- Automated/Digital lighting control systems.
- Emergency lighting control and self-testing systems.
- Photovoltaic energy and battery storage control systems.
- 3D printers, laser cutters and other computer-controlled materials & manufacturing systems.
- Networked audio visual technologies.

5.1.1 Network Management

All IoT systems with a direct network interface must operate through the shared DoE ICT network, and not operate nor connect to the outside internet through standalone 'engineering services' networks. This is to ensure that the devices function in a controlled and secure environment, and do not cause nor be affected by cybersecurity threats unknown to DoE ITD.

IoT systems often operate using multiple endpoints and a head-end, thus shall be assigned dedicated virtual local area networks (VLANs) on the DoE network.

For schools operating modern managed networks, DoE operates a secured network standardised on Aruba Networks ClearPass Policy Manager, which determines the assignment of a network port based on the connected client.

Non-managed networks are generally unsuitable for facilitating IoT devices. Reconsider the need to incorporate IoT solutions in brownfields sites unless planning a major upgrade.

DoE ITD is required to provide the necessary network access controls for all candidate devices in an IoT installation. It is recommended IoT endpoint devices shall have native support for IEEE 802.1X.

Security and Technical Assessment Process

DoE intends to provide a list of IoT technologies and platforms which have been proven to work correctly on School networks and have been assessed for cybersecurity. In lieu of this being provided, or for any proposed technology that is not on the pre-approved list, the party (Consultant or Builder) proposing the installation of any IoT technology is required to provide a clear specification of the systems, including:

- Functional Description

- Network Requirements
- Who needs to access systems (e.g. vendor remote access, etc).

This information shall be provided to ITD prior to the procurement of any such equipment, and allow 20 business days for review.

All vendors or installers requiring network access must provide at minimum:

- MAC Address.
- Port numbers and routing (including source/destination).
- Physical item location.
- Connectivity type and requirements (e.g. PoE).
- Level of internet access required.
- Requirement for access to local servers, e.g. Active Directory.
- Special protocol support requirements (e.g. MRP).
- SSL/TLS certificate for any system requiring network access outside the DoE network. (Internal certificates can be sought through ITD/SNSDA).

5.1.2 IoT Head-Ends

IoT systems generally follow an architecture where endpoint devices report to a main head-end.

Head-ends for IoT systems should be cloud-based or appliance-based. DoE does not recommend the installation of on-premises platform servers running traditional Windows/Linux operating systems or hypervisors to manage IoT devices, as these carry stringent long-term maintenance requirements.

General requirements for IoT head-end systems include:

- All configuration should be via a web-based interface.
- Access to any graphical user interfaces served must be protected with encrypted username/password authentication at minimum. Integration with DoE's single sign-on procedure (Microsoft Active Directory) is preferred, and may be configured under the instruction of DoE ITD;
- Under no circumstances should the server's operating system user interface be accessible through the use of internet-based remote desktop software.
- Web-based access to the server shall be over HTTPS with valid SSL certificate from a verified, paid third party provider (no self-signed certificate or freeware SSL certificate shall be acceptable) with minimum 128-bit AES encryption. Access shall be limited to secure environments – e.g. insecure web browsers with known exploits shall be detected and not permitted to access the server.

5.2 End-User Compute

The design of spaces needs to consider the provision of end-user compute devices (fixed desktop PCs, fixed learning display PCs, portable computers and ultraportable computers) and ensure that the site-wide design can facilitate the user needs. Spaces should be built to facilitate the integration of technology, not the other way around – as learning paradigms frequently change with time.

For project managers, deployment of end-user compute devices in a capital works project needs to be managed and coordinated with the operators of the school. The devices shall be budgeted as part of

operational costs, and be purchased through Technology 4 Learning (T4L). All devices purchased and delivered through T4L must be deployed through the device management system, and sufficient time (minimum two weeks, depending on school size) should be allocated to allow all devices to be enrolled prior to the new school buildings opening to students and teachers.

For up-to-date information on the deployment of end-user compute devices across the DoE, https://t4l.schools.nsw.gov.au/resources.html .

5.3 Audio Visual (Main Learning Displays)

Main Learning Display (MLD) systems and end points are to be aligned with NSW DoE standards Audio-Visual Specifications for School Learning Displays.

In spaces identified for MLD the equipment size, quantities, locations, and installation methodology (fixed/portable) need to be considered for modern, configurable learning spaces.

5.4 Audio Visual (Video Conferencing)

Video conferencing systems and end points are to be aligned with DoE unified communications platforms and the Audio-Visual Specifications for Video Collaboration Systems.

In spaces identified for video conferencing additional power services should be provided for the room devices as detailed in the Specification, noting components of the system may be integrated within a single physical device.

5.5 Audio Visual (School Hall and Specialist)

Communal halls, gymnasiums and Audio Visual systems are specialist spaces that require a specialist design to be developed with consideration and alignment with the Audio-Visual Specifications for School Communal Halls.

Specialist Audio Visual systems that may be required for spaces as detailed in the schedule of accommodation/kit of parts.

5.5.1 Specialist Audio Systems

Specialist spaces may require sound systems to playback amplified sound for a wide range of activities including:

- Assemblies, Presentations and Meetings
- Fitness training & learning
- Music, Dance and Drama rehearsals & performance
- High fidelity playback of content from MLD or other video display/s

Sound systems will require loudspeakers selected to optimise listening for all the audience in the space. The system can include a wireless microphone system as detailed below and should include:

- a connection from any main learning display or specialist presentation display
- a connection for a consumer device, such as a phone or laptop, via unbalanced 3.5mm or Bluetooth,
- a connection for a professional device, such as audio mixer or recording equipment via a stereo balanced XLR, if not already included in the system,

It will also integrate to the Hearing augmentation system. Spaces with a stage should also include a minimum of two wired microphone connection plates either side of stage for the overlay of wired microphones for performances.

Specialist audio systems should target the following benchmark requirements:

- Typical sound pressure level shall operate at 10-25dBA above the room ambient level when in normal operational use.
- A uniform frequency response and SPL measured across the audience area of ±3dB in Octave Bands between 250Hz and 8kHZ.
- Configured to ensure 6dB headroom without clipping.
- STI greater than 0.6 at 80% of the audience area, using the STIPA (Speech Transmission Index for Public Address Systems) measurement method.

All audio gain management, equalisation, filtering, dynamics, and other processing should be configured and optimised to achieve the above criteria. Depending on specific space size, acoustics and environment this can be achieved by various loudspeaker styles, locations, arrangements, power and size which should be developed by a specialist designer/contractor.

The exact equipment, topology and connectivity of the audio systems should be developed on a project specific basis.

5.5.2 Wireless Microphones

Specialist spaces may require wireless microphones to amplify voice in conjunction with the Specialist Audio system detailed above. Wireless microphones should be selected in a form factor to suit the intended wearer's usage.

Wireless microphones coverage should be optimised to suit the space and style of presentation, and in all cases wireless microphones should not "drop-out" or have interference under normal operation. To ensure reliable coverage antenna amplification, antenna distribution, spectrum analysis and spectrum management may be necessary on a project specific basis.

Table 15: Wireless Microphone form factor considerations

Space	Typical Form Factor Considerations
Fitness Laboratory	Hands free operation would require a head worn "Madonna" style microphone
Performing Arts Workshop	Hands free operation would require a head worn "Madonna" style microphone
Library	Handheld or Stand mounted to allow simpler transition of presenter/talker.

In addition to form factor, wireless microphones use various broadcast frequencies and technologies. These different broadcast signals are suitable for different purposes and environments and Wireless microphones should be selected by the designer to suit the application and specific project requirements.

Example: InfraRed is suitable for direct line of sight applications. UHF (470-952MHz) is suitable for high fidelity, long range and low latency applications. 2.4GHz is suitable for short range, high fidelity and medium latency applications.

5.5.3 Specialist Presentation Systems

Specialist spaces which are intended to provide visual display or presentation to a larger audience or area than a typical class/homebase will require a larger visual display. Visual displays should have connections for the school staff and guests to present visual content and some connection to a sound system.

Table 16: Key criteria of a Specialist Presentation system

Space	Benchmark requirement
Input Sources	Minimum of 2 input sources for portable devices. This can be achieved by 2 wired connection plates in 2 different locations OR 1 wired connection plate and 1 wireless presentation system with optimal compatibility with the school devices.
Visual Display Size	Minimum or 100" but following AETM guidelines for horizontal viewing distance.
Projectors	If a projector is selected then a minimum 15:1 contrast ratio on the screen*
Display resolution	Minimum 1920x1080 @60Hz (1080p), preferably with 3840x2160 @60Hz capability (4k)

**Contrast ratio on the screen is impacted by ambient light in the space, artificial lighting control/ operation, specialist ambient light rejecting screens and other environmental factors the designer will need to consider.*

In addition, the system should have a simple wired control panel so users can turn the system on/off, select the input source and adjust the volume. Some systems may need more complex control or automation beyond the base user operation set out above and this should be considered on a project specific basis.

5.5.4 Specialist AV Cabinet

Where required to house audio visual equipment associated with the above specialist systems a specialist AV cabinet may be required. AV cabinets will vary in size, arrangement and style and should be nominated to suit the specific system it supports. However, in all cases the key considerations for an AV cabinet are:

- Power and data services
- Cable access and management
- Heat load and ventilation
- Future maintenance and service of the cabinet and components within

Typical AV Cabinets are a similar 19" rack unit arrangement to communications cabinets. Where accepted by DoE ITD AV equipment can be located in a shared communications cabinet, however all communication cabinet guidelines and requirements will apply.

5.6 Digital Signage

Where required for the project digital signage would consist of a digital display and potentially a digital media player. The content should be able to be managed and updated by School staff via the School network or a local USB storage drive.

The display and/or media player should be configured onto a dedicated VLAN.

Digital signage in key locations should include as a minimum 2 electrical socket outlets and 2 DTOs as a minimum to allow future provision by the school.

5.7 Hearing Augmentation

Hearing Augmentation in schools is intended to serve not only students and educators, but to also allow staff and educators to communicate and interact with Parent, Guardians, and the public.

In all cases the hearing augmentation system should replay all inbuilt audio amplified within the space inclusive of any Public Address (PA), Main Learning Display (MLD), microphones or other sound reinforcements systems, except for Emergency warning systems. Design consideration should be made for adjacent rooms to be able to operate simultaneously without interference or overlap.

To serve these two different users, a different approach is required in different locations:

5.7.1 Adult Hearing Augmentation

An audio frequency induction loop system (AFILS) (commonly known as a hearing loop) should be provided in locations prescribed within the EFSG, where parents, guardians and the public interact with the school and staff. A microphone may be required to ensure the staff and educators verbal communication is equally accessible to people of all hearing abilities, such as at Reception Counters/Desks.

Induction loops designs can include counter, perimeter, figure 8 and various array configurations. The designer should consider the project specific requirements and develop a design to ensure compliance with NCC, the EFSG and the specific project parameters.

5.7.2 Student Hearing Augmentation

Student systems are required by the EFSG to provide a system with compatibility directly to students hearing assistance devices. This should be achieved by a 3.5mm audio output connection with an adjacent power outlet. This will allow the design and provision of an NCC compliant solution, a performance solution, or a student portable system to be connected into the room audio system. The EFSG specifies areas where this is required.

Where possible, the preference is to seek a performance solution that will allow students to connect their own devices to these locations and provide a (1) spare hearing augmentation kit to the school for deployment if students do not have personal transmitter device. This portable system shall have compatibility directly to students hearing assistance devices.

5.7.3 Both Adult and Student Hearing Augmentation

In locations which are shared for both Adults, Visitors, Public, Staff and Students an Induction loop shall be provided for Visitors, the Public and Adults and a sound field system with compatibility directly to Students hearing assistance device shall be provided for Students.

Both systems shall be linked with any Main Learning Display, Specialist Audio System, Public Address, Specialised presentation system, Hall or other AV systems within those spaces to ensure all Students, Visitors, Staff and Adult receive the amplified audio signals.

5.7.4 Benchmark Requirements

The summary of the different hearing augmentation system requirements is as follows.

Table 17: Hearing augmentation systems mapped to types of spaces.

Space	Benchmark requirement
All learning spaces	Two (2) Double GPO's and 3.5mm Audio output for the support of a system. See Student & Staff areas for systems.
Library Unit(s)	AFILS (Induction Loop) & Sound Field system
Hall and/or Gymnasium Units	AFILS (Induction Loop) & Sound Field system
Performance/Movement Units	AFILS (Induction Loop) & Sound Field system
Admin Public Reception	AFILS (Induction Loop) & Sound Field system
Admin 1 x No. Interview Room	AFILS (Induction Loop) & Sound Field system

Note: Specific projects may have specific requirements above and beyond the above benchmark criteria nominated above including National Construction Code, Disability & Access code and guidelines. However, this represents the base level required by DoE NSW within the EFSG and Technical Standards.

5.8 Public Address and Period Bell

It is strongly recommended that all schools are provided with a single, central and common Public Address and Period Bell system across an entire site. This will ensure users can manage and control the system and ensure a consistent level of technical support.

Capital projects works should consider the existing Public Address and Period Bell system be assessed against the thresholds of requirement prior to expansion or replacement of the system.

5.8.1 Works on existing Public Address/ Period Bell systems

Public Address and Period Bell technology has evolved considerably over the last few decades; therefore DoE operates a multitude of different systems from Electric bells to Networked PA. A common approach has been devised to capture the typical actions to take with each type of system – refer to Table 18

Table 18: Approach for works on PA/ Period Bell Systems

System	Approach
Electric Period Bell Systems	Where the Major Upgrade Threshold (Section 3.1.1) is met, the existing Period bell headend should be replaced with a new Hybrid Public Address headend as if it was a new school. Existing buildings and locations across the school buildings, not within the project scope, shall generally remain in place and be back fed from the new headend, where feasible. Where the Major Upgrade Threshold is not met, and the existing Period Bell headend has sufficient capacity, the new building/s shall be added to the existing headend as public address speakers with an IP audio amplifier local to the building and appropriate interface/trigger and tones from the Period bell headend. Exceptions to the above would be, where the existing Period bell headend is in an area being demolished or relocated. In those cases, the existing headend should be replaced and a new Hybrid Public Address headend provided as if the Threshold were being met.
Analogue (100V) Distributed Public Address	Where the Major Upgrade Threshold (Section 3.1.1) is met, the existing analogue Public Address headend should be replaced with a new Hybrid Public Address headend as if it was a new school. Existing buildings and locations across the school buildings not within the project scope shall generally remain in place and be back fed from the new headend, where feasible. Where the Major Upgrade Threshold is not met, and the existing Public Address headend has sufficient capacity, the new building/s shall be added to the existing headend as public address speakers with an IP audio amplifier local to the building and appropriate interface from the existing headend. Exceptions to the above would be, where the existing Public Address headend is in an area being demolished or relocated. In those cases, the existing headend should be replaced and a new Hybrid Public Address headend provided as if the Threshold were being met.
Hybrid Public Address System	Where an existing Hybrid headend system has sufficient capacity, it is to be retained and extended as required for the works. The new building/s shall be added to the existing headend as public address speakers with an IP audio amplifier local to the building and reconfiguration of the existing Hybrid headend.

System	Approach
IP Public Address	Generally, fully IP public address system are not deployed in DoE schools due the increased port count and switching costs over the Hybrid systems. However where these headend systems are already deployed they shall be expanded and extended for the new works, where possible. If the existing IP PA system is not expandable or is an area being demolished and cannot be relocated, it should be replaced with a new Hybrid Public Address headend as if it was a new school. Existing buildings and locations across the school buildings not within the project scope shall generally remain in place and be back fed from the new headend, where feasible.

In rare circumstances, it is possible for existing Hybrid or IP head-end systems to have been obsoleted and incompatible with new speakers and endpoints. In these circumstances, ITD and project designers are to provide special recommendations and direction on the proposed solution. Some solutions in prior projects included sourcing refurbished handsets.

5.8.2 Benchmark Requirements

Public address and period bell system, or specific components of it, may not be a request or requirement of a specific school/ staff. However, the infrastructure and headend system should be capable of achieving the following minimum features to ensure the system meets basic DoE NSW safety and communications requirements.

- Audible period bell tone/s to dedicated, specific or all zones on a timed schedule. Both the schedule and tones should be configurable by school staff, not specialist programming, configuration or services.
- School Lockdown & Evacuate alarms aligning with school operational and DoE emergency management policies can be activated via a dedicated panel within the Reception or Administration area.
- Voice paging microphones with ability to "steer" announcements to dedicated, specific or all zones.
- Network Time Protocol (NTP) connection to eliminate time-drift or time updates at Daylight savings.
- Ability to expand in the future with additional 25% inputs and 50% outputs as a minimum.
- Audio amplifiers selected to drive loudspeakers should have 25% free capacity for additional loudspeakers in the future.

A typical Hybrid IP/Analogue Public address headend system is recommended for all Schools. This Hybrid public address system is capable of being distributed across the ICT network, between separate buildings, to a network audio amplifier local to each building. By utilising the shared ICT infrastructure between buildings and across campus there is reduced maintenance and duplication of sitewide cabling systems. Within the individual buildings copper speaker cabling such as 100V, is used to distribute signals to Public Address loudspeakers.

5.8.3 Coverage

All learning spaces and habitable areas (staff areas, etc) must have public address and period bell coverage to ensure announcements and tones are clearly audible. Sound levels will be dependent on several environmental factors and should consider neighbours and the wider community in addition to serving the school facility itself.

Specific strategies may be required per a project to ensure audibility, whilst aligning to project requirements and community guidelines. These strategies may include speaker directivity, locations, quantity and individual volume control or volume shading.

5.8.4 Loudspeaker Zoning

Speaker zoning should be as a minimum per a building internal. External areas shall be separate in all cases. Special consideration should be given to locations identified to be used for examinations and other student testing. Common examples are:

- Halls, Gyms, Movement Studios and the like
- Libraries

These locations should be zoned separately to the surrounding areas. Schools may have more specific requirements based on their operation and management of the students and site. As such speaker zoning should be discussed and clarified with key administrative staff to ensure it meets their operational and management requirements.

5.9 Security, CCTV and Access Control

All schools are provided with a level of physical and electronic security which is overseen and managed by the DoE's School Security Unit (SSU). The level of ICT integration for electronic security systems is increasing, therefore new and refurbished schools need to consider the effects of security systems on ICT site planning.

There are three main components to electronic security systems:

- Electronic Access Control and Security (EACS) systems
- CCTV/Video Surveillance Systems
- Intercom Systems

5.9.1 Electronic Access Control and Security (EACS)

There are various generations of EACS systems currently in use across the DoE footprint. SSU is standardising on the Integriti platform, which is a hybrid IP security platform that can be centrally managed across the WAN. This is the default provision for all Capital Works for new and existing schools.

Many existing schools are operating on the Concept platform, which is the predecessor to the Integriti platform. Generally, any works on a school with Concept require upgrading the head-end unit to Integriti, which will enable its transition to the SSU managed environment. Most of the existing Concept hardware can be retained, and is compatible with the new Integriti head-end. Where this type of upgrade is required, it is expected that SSU and the electrical consultant coordinate clear documentation to ensure the upgrade/migration takes place as part of the Capital Works.

Some Integriti installations use direct RS-485 cable between panels and other installations utilise the common IP network. SSU is to advise ITD on structured cabling/LAN requirements for Integriti devices to ensure sufficient outlets are provided and the network (e.g. VLANs) is appropriately configured.

Some circumstances exist where an Integriti upgrade is not feasible. For example, minor works may be proposed on a school that runs a pre-Concept ("proprietary") security system and no budget is available for a site-wide Integriti upgrade. In these circumstances, a custom solution needs to be worked out with SSU, such as a simple or temporary standalone Integriti/Inception installation.

5.9.2 Video Surveillance & Intercom Systems

Video surveillance and intercom systems operate over the IP network and thus are beholden to the same requirements throughout. Electrical consultants are to ensure that sufficient data outlets are provided to support these devices, coordinated with their locations. In particular, these outlets should be concealed in wall or ceiling spaces to prevent tampering. The architectural design should consider an access panel or plate to allow these connections to be made or upgraded.

5.10 Charging Carts

Charging carts are included in some schools to keep end-user compute devices including laptops and tablets safely stored and charged. Spatial arrangements should be made in store rooms or in joinery units in teaching hubs to suit the quantity of devices required for certain class arrangements or year levels.

The electrical consultant must consider providing charging carts with dedicated electrical circuits. Charging carts are responsible for a higher than normal level of leakage current due to the quantity of switched-mode power supplies, which may risk tripping residual current devices on shared circuits.

5.11 Telephony

All school sites are to be provided with a telephone/unified communications system to facilitate standard phone calls throughout the school, across the DoE, and to the outside public switched telephone network (PSTN).

5.11.1 New Telephony Systems

New telephone systems are generally IP based, cloud hosted and deliver over the DoE wide area network as per current network standards. This requires no head-end to be located physically on the school site, easing management and allowing greater flexibility.

The telephone system will operate over the structured cabling system, allowing patching to operate on any outlet. Telephone system outlets accordingly to the correct voice services VLAN.

5.11.2 Works on existing Telephony Systems

Telephone technology has evolved considerably over the last few decades; therefore DoE operates a multitude of different telephony systems. A common approach has been devised to capture the typical actions to take with each type of system – refer to Table 19.

Table 19: Approach for works on Telephony Systems

System	Approach
Analogue / Digital PABX (non-IP) Phone System	Where the Major Upgrade Threshold (Section 3.1.1) is met, the existing PABX should be replaced with a new cloud SIP Trunk system as if it was a new school. Existing analogue telephones across the existing school buildings shall generally remain in place and wire back to a correctly configured analogue telephone adapter securely configured to connect to the SIP Trunk. Exceptions would be reception/switchboard type telephones which shall be replaced with IP handsets. Where the Major Upgrade Threshold is not met, and the existing PABX has sufficient capacity, an assessment should be made for upgradability and costed against a cloud SIP trunk alternative. If suitable for upgrade, the new building should be supplied with a 50 pair Cat 5 backbone cable from the MCR to the new BCR(s) each. New analogue/digital handsets similar to existing are to be provided to new handset locations. Use structured cabling for final phone runs from the BCR, not telephone cabling.
Hybrid Analogue / IP Phone System	Generally, where the existing system has sufficient capacity, it is to be retained in place, serviced by the same incoming lead-in as previous. The IP component of the Hybrid system is to be enabled on the LAN, with new IP handsets being provided to the new or refurbished building.
IP Phone System with IP Head-End	Generally, where the existing system has sufficient capacity, it is to be retained in place, serviced by the same incoming lead-in as previous. New IP handsets are to be provided to the new or refurbished building.

In rare circumstances, it is possible for existing Hybrid or IP head-end systems to have been obsoleted and incompatible with new IP handsets. This has occurred across some prior DoE projects. In these circumstances, ITD is to provide special direction on the proposed overall solution.

5.11.3 System Capability

The telephony system software shall be equipped with the following capabilities:

- Centralised call answering during normal school hours.
- Ability to enable each extension to be programmed with internal communication capability and access or barring to external exchange lines.
- Ability to enable exchange line access for each permitted extension, programmed for either direct access or via operator access.
- Privacy for all internal and external calls.
- Programmable for night mode operation.

- Ability to program numbers for abbreviated dialling.
- To be capable of future extension by at least 50% above the numbers of lines and working extensions tabulated above.
- Voice mail facility.
- Option for cordless extensions.
- Call forwarding facility.
- Provide one handset for each working extension.

The telephony system software shall further be programmed in the following manner:

- Program direct out-dial access to Principal, Clerical Office and Deputy Principal extensions and restrict all other extensions to exchange line access via the operator.
- Each extension to have access to emergency and school business numbers by abbreviated dialling to programmed locations.
- Night mode to restrict access to emergency and school business numbers only.
- All international direct dialling to be barred.

5.11.4 Handsets

IP handsets are to be SIP standards compliant and not locked to a particular provider or system. Handsets should at minimum contain the following features:

- Digital display with ability to display call logs, calendar, date and time, redial, caller/extension ID.
- Speed dial and directory facility.
- Transfer.
- Mute and hold.
- Headset connection (for desk phones).

The allocation of IP handsets for any given school project should follow these guidelines, and take into account individual school staff requirements:

- One handset per general learning space. (For open learning spaces or learning streets, a handset should be provided in every area expected to be occupied by 30 students, or every 20 metres, whichever is greater. Handsets are generally not required in learning commons/circulation spaces).
- One handset per workstation in **enclosed** administration offices dedicated to certain staff members (e.g. principal, careers adviser, IT sysadmin etc). Shared or open-plan offices, such as staff rooms and general admin, may be provided with handsets only at the school's individual request. Otherwise, the expectation is that staff use softphone systems for communication.

Where handsets are wall-mounted, wall plates are to be provided with an appropriate mount. These shall be mounted at 1200mm AFFL.

5.11.5 Emergency/Safety Phone Systems

Some safety systems installed as part of a building services scope require an emergency dial-out service. These may include:

- Lift/Vertical Transport emergency system
- Fire Panel auto-dialler
- Security system auto-dialler

These systems shall be provided with an industrial 4G wireless communications gateway device.Generally, the macro carrier is to be Telstra unless Telstra LTE reception is deemed insufficient, and an alternative carrier provides acceptable service. The SIM card for this service is to be provided by the School – it is the School's responsibility to ensure that the mobile plan remains active throughout the site's operation.

Where multiple emergency lines are required (e.g. more than one lift), aggregate systems so that a fewer quantity of gateways (i.e. one SIM per four lifts) can be provided.

The designer should ensure that the location of the gateway will receive adequate mobile reception from the nominated carrier. Generally, the gateway could be located in a Communications Room and be provided with an external antenna to receive the macro cell signal. The telephone lines between the gateway and the emergency lines may traverse the Structured Cabling System but not the DoE network.

5.12 Multi-Function Devices

Multi-functional devices support the production of educational resources through allowing staff and students to print, copy, and scan paper documents from a single, network-connected unit.

Good planning of administrative spaces should consider the location of multi-function printing and scanning devices evenly across learning areas in the school where they are likely to be used. Keeping printers easily accessible (e.g. in the Learning Commons) generally reduces interruptions in classrooms.

Consider arranging printing resources in a way that minimises walking between printers. Having more printers rather than a central printing hub also dramatically reduces the load on all printers, meaning they will last longer and have less downtime.

Planning should ensure that the model of multi-function device is consistent throughout the school to ensure that consumables are consistent, reducing overall wastage.

Print management application software is recommended to control the usage of multi-functional devices, particularly those accessible to students.

5.13 EFTPOS Terminals

EFTPOS terminals are required in parts of the school that are nominated as point-of-sale locations. These facilitate the payment of administrative or supply (e.g. school uniform shop) costs and are required to support contactless payments from current generation credit/debit cards and mobile devices.

Whilst point-of-sale equipment can comprise a standard-issue administrative compute device, EFTPOS terminals should not connect to any DoE network. EFTPOS terminals shall be sourced by the school's administration from their nominated bank, and connect using an internal 4G or 5G connection to transmit data back to the bank.

6 Governance

6.1 Certification

6.1.1 Warranty

All suppliers, installers or trades providing any element of ICT installation for NSW Department of Education projects must provide a warranty and support structure consistent with State and industry requirements for the projects' Defects Liability Period at minimum.

In particular, the manufacturer of the Structured Cabling component is required to certify that the cabling system meets specification, including the specified performance levels. The manufacturer is to provide a written warranty certification for a minimum period of twenty (20) years.

6.1.2 Statutory

The Structured Cabling installer is required to provide a TCA-1 certificate to SINSW upon completion of any new works or alterations and additions to customer cabling works.

6.1.3 Statement of Compliance

The Audio Visual installer is required to provide a statement of compliance to the National Construction Code (NCC) and any Disability Discrimination Act (DDA) directives upon completion of any new works or alterations and additions to hearing augmentation systems.

6.2 Pre-Qualification

6.2.1 Project Consultant (Designer) Requirements

The Project Consultant designing and specifying ICT systems for NSW Department of Education projects shall either:

- Be a Chartered Professional Engineer (CPEng) or equivalent in Electrical Engineering, and hold at least five years of verifiable telecommunications distribution design experience.
- Be a Registered Communications Distribution Designer (RCDD) currently in good standing with BICSI.
- Hold at least one (1) structured cabling vendor design certification.

6.2.2 Installer Requirements

Suppliers, installers and contractors for ICT works on NSW Department of Education projects shall meet all of the following criteria:

- Current NSW Government SCM0020 scheme accreditation. (Structured Cabling contractors in particular shall be pre-qualified for site cabling under category- F02 Network Operations including delivery "as a service".)
- Current, verifiable accreditation with vendors of equipment proposed, specified and installed on site, including continuing education requirements.
- Current, verifiable experience working on NSW Department of Education sites.

6.3 Inspections

6.3.1 Timing

Periodic inspections are required to be conducted by the party with design and coordination responsibility (inclusive of Project Consultants and DoE ITD officers, depending on scope) for the relevant ICT system during construction. During the construction of a main works project, the typical inspection responsibilities include:

- Cabling rough-in milestones
- Prior to sheeting of walls
- Testing and commissioning
- Practical completion / user acceptance testing

Prior to milestones being completed, the contractor is required to inform the designer through the Project Manager or Commissioning Manager with no less than 7 days' notice.

6.3.2 Purpose

The purpose of inspections is to ensure that the works are compliant with all NSW DoE technical requirements, the NCC/BCA, and that the scope of works has been correctly completed to an acceptable standard.

6.3.3 Methodology

Periodic inspections are usually coordinated between the main works contractor and the relevant designer directly. The Commissioning Manager is to coordinate defects, commissioning inspections and handover walkthroughs.

The ICT inspections are usually conducted by ITD, the main works contractor, the electrical sub-contractor, SINSW Construction Quality Specialists and Commissioning Manager.

6.4 User Training

Following the installation of a new ICT system installed as part of a capital works project, appropriate training must be provided by the ICT service provider, supplier or appropriate representative to complete handover.

An allowance of up to four hours of on-site training should be provided for each unique system. (For example, an audio-visual contractor needs to provide training for main learning displays, hall AV, public address and hearing augmentation, not just 'audio visual' in general)

Training sessions are to be accompanied by appropriate documentation and a demonstration of operation of the system and its components. Include explanation of detailed drawings left on site. A video may be generated from the on-site training for future use by DoE school staff.

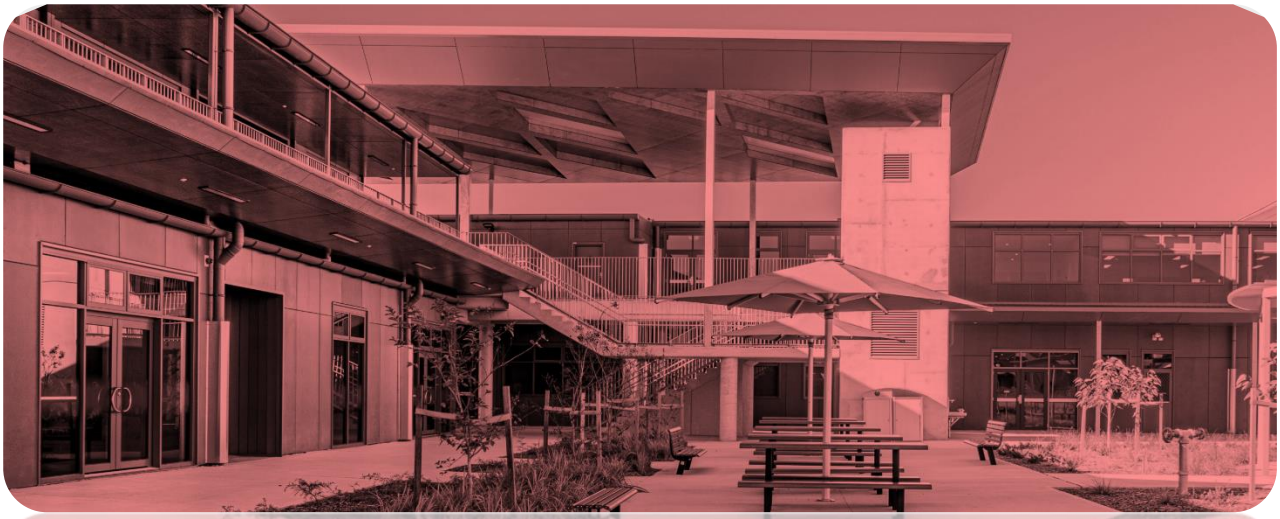
The SINSW Project Manager will, in consultation with the school Principal, nominate the timing of this session together with the number of attendees.

Manuals are to be handed to the school during the training session.

6.5 Updates to This Document

ICT is a perpetually changing topic, thus, it is imperative that the currency of ICT performance standards, specifications and guidelines be maintained. A Steering Group meets quarterly to review this document and provide updates.

When this document is applied to Capital Works projects, the version of this document current at the commencement of Phase 1 will be applicable across the entire project's timeframe. If the document is subsequently updated during the project timeframe, no change to the project scope is expected unless specifically communicated to all project parties by SINSW.



Forms

Form P1: Consultant Master Planning Survey

Project and Contact Details

Parameter	Description
School Name / SINSW Project	
Project Manager and Contact	
Architect and Contact	
Electrical Engineer and Contact	

New Building Infrastructure Survey

The Project Consultant is required to undertake a desktop review of the proposed Master Plan and provide preliminary ICT services design advice.

#	Category	Description	Response
1	General	Attach a copy of the site plan from the proposed Master Plan.	
2	General	What is the quantity of learning areas (general, open or otherwise) proposed across the new building works?	
3	General	What is the extent of administration areas (general, open or otherwise) proposed across the new building works? Provide either a quantity of rooms or a square-metre figure.	
4	General	What is the category of school? • Primary School • Secondary School • School for Specific Purposes • Combination Education Campus • Other	
5	Structured Cabling	What is the quantity of Building Communications Rooms proposed across the new building works?	

#	Category	Description	Response
6	Audio Visual	Does the new building works contain any non-typical audio visual installations? (e.g. hall, sports laboratory, flat-floor performance, drama studio). If so, define the proposed works.	

Brownfields Site Infrastructure Survey

The Project Consultant is required to undertake an on-site audit of the School's existing ICT infrastructure, including communications rooms and pit and pipe infrastructure, to assess the design requirements for the proposed new building works. This audit must be completed for all major and minor Capital Works on existing School sites. This section may be omitted for Greenfields sites.

#	Category	Description	Response
1	Lead-in Carriage & Data Services	Will any carrier services require relocation as a result of the proposed site works?	
2	Structured Cabling	Attach photographs of the interior of the Main Communications Room, including clear front and rear shots of all equipment racks.	
3	Structured Cabling	Attach photographs of the interior of all Building Communications Rooms that may be impacted by the works (i.e. in or near the footprint of the proposed works), including clear front and rear shots of all equipment racks.	
4	Structured Cabling	Will any MCR or BCR require relocation, resize or refurbishment as a result of the proposed site works? If so, list the affected BCRs.	
5	Structured Cabling	Will any backbone cable pathways require diversion or relocation as a result of the proposed capital works? Are existing pathways suitable for relocation or expansion of services?	
6	Structured Cabling	What is the standard of fibre-optic backbone cabling currently in use across the site?	

#	Category	Description	Response
7	Structured Cabling	What is the standard of horizontal cabling currently in use across the site?	
8	UPS	Are any systems protected by an uninterruptible power supply unit? If so, provide: • System/Brand/Model • Quantity of installed devices • Retain or Relocate? • Is it connected to ICT network?	
9	Wireless APs	Attach photographs of indoor and outdoor Wireless Access Points currently in use throughout the site. State the locations that the photographs were taken.	
10	IoT Systems	Does the site currently utilise a building management system (BMS)? If so, provide: • System/Brand/Model • Quantity of installed devices • Retain or Relocate? • Is it connected to ICT network?	
11	IoT Systems	Does the site currently utilise a photovoltaic solar energy system? If so, provide: • System/Brand/Model • Quantity of installed devices • Retain or Relocate? • Is it connected to ICT network?	
12	Audio Visual	Are there any existing digital signage or distributed AV systems that need to be expanded into areas impacted by the project?	

#	Category	Description	Response
13	Public Address & Period Bell	Is the existing PA and/or period bell system suitable (age and expandability) to be expanded across the whole site? Provide details of the existing public address and/or period bell system: • System/Brand/Model • Technology Type (Analogue/Digital/IP) • Retain or Relocate Head-End? • Is it connected to ICT network?	
14	Telephony	Is the telephone system suitable (age and expandability) to be expanded across the whole site? Provide details of the existing telephone system: • System/Brand/Model • Technology Type (Analogue/Digital/IP) • Retain or Relocate Head-End? • Is it connected to ICT network?	

Register	**Action**
Date of Endorsement:	
Signed:	

Form P2: ITD Master Planning Survey

Project and Contact Details

Parameter	Description
School Name / SINSW Project	
ITD Officer and Contact	

New Building Infrastructure Survey

ITD is to undertake a desktop review of the Master Planning documentation provided by the Project Consultant team. This survey is applicable to new building or major refurbishment footprint only. This survey is not applicable to minor works to brownfields.

#	Category	Description	Response	Budget Estimate
1	Lead-in Carriage & Data Services	Provide an estimate of new lead-in carriage & data services, if required.		
2	Firewalls, Routers and Switches	Provide an estimate of new equipment required to support new Main Communications Rooms, if required.		
3	Switches	Provide an estimate of new equipment required to support new Building Communications Rooms.		
4	Wireless Access Points	Based on the quantity of learning, outdoor and administration areas, provide an estimate of new wireless access points required to service the new building footprint.		

#	Category	Description	Response	Budget Estimate
5	Audio Visual – Learning Displays	Based on the quantity of learning, outdoor and administration areas, provide an estimate of main learning displays required to service the new building footprint.		

Brownfields Site Infrastructure Survey

ITD is to undertake a desktop review of the Master Planning documentation provided by the Project Consultant team. This survey is applicable to review the suitability of the existing school facility to support the proposed works.

#	Category	Description	Minimum Req. Met?	Response	Budget Estimate
1	Structured Cabling	Does the site's current structured cabling system meet Minimum Requirements? If not, detail areas of shortfall and inform the Project Consultant.			
2	Firewalls, Routers and Switches	Does the active equipment in the existing MCR meet Benchmark Requirements? If not, provide an estimate of alterations and additions required.			
3	Switches	Does the active equipment in the existing BCRs meet Minimum Requirements? If not, provide an estimate of replacement equipment required.			

#	Category	Description	Minimum Req. Met?	Response	Budget Estimate
4	Wireless Access Points	Does the site's existing WAP network meet Minimum Requirements? If not, provide an estimate of replacement equipment required.			
5	Telephony	Is the site's existing telephony system feasible to upgrade, or is an upgrade to Cloud systems required?			

Register	**Action**
Date of Endorsement:	
Signed:	

Form P3: Schematic Design Survey

Project and Contact Details

Parameter	Description
School Name / SINSW Project No.	
ITD Officer and Contact	

#	Category	Description	Response
1	Budget	Include budget estimate for provision of ICT into new and existing spaces.	
2	Requirements for existing security and CCTV	Have SSU been consulted on impacts to existing security and CCTV? Note CCTV installations will need to be unified to current standards with the structured cabling plant (no parallel networks).	
3	Site Constraints	Include Site Constraints plan: easements; flooding; bushfire; ecological; heritage, etc.	
4	Certification	All works are to comply to published standards, utilising procurement contract vendors where procurement contracts exist, providing warranty to established contract agreements.	
5	Schematic Design	Has a schematic design been produced detailing changes to existing buildings including additions, removals, replacements of existing infrastructure and its integration into new works?	
6	BOM	Has a bill of materials been produced by ITD as an indication of active equipment costs for existing buildings?	

#	Category	Description	Response
7	Heritage	Are there any Heritage building constraints that are associated with the site? If yes, please provide a copy of reports.	

Register	**Action**
Date of Endorsement:	
Signed:	

Form P4: Contract Documentation Survey

Project and Contact Details

Parameter	Description
School Name / SINSW Project No.	
ITD Officer and Contact	

#	Item	Description	Yes / No / N/A	Comments
1	Budget	Include budget estimate for provision of ICT into existing spaces.		
2	Staging	Will any of the ICT works for the existing buildings need to be staged to allow for continuity of service or access for other works?		
3	Decommissioning date	What is the required decommissioning date for any removals of ICT in existing spaces?		
4	Carrier Service Move Request	Has a request been made to move any impacted carrier services?		
5	Demolition	Has approval been provided post decommissioning for demolition of any existing ICT Infrastructure?		

Register	Action
Date of Endorsement:	
Signed:	

Form P5: Commissioning & Handover Survey

Project and Contact Details

Parameter	Description
School Name / SINSW Project No.	
ITD Officer and Contact	

#	Item	Description	Yes / No / N/A	Comments
1	Commissioning date	What is the required commissioning date for any changes to ICT in existing spaces? Has ICT Commissioning Document been provided to the Project team outlining general requirements and site specific requirements for the ICT commissioning phase?		
2	Equipment Installation	Has the cabling contractor installed all active equipment (this may need to be staged on the advice of ITD)?		
3	Network Outage	Has the school been notified of any outage windows required to complete the works?		
4	Commissioning	Have all services been verified as operational by ITD, Security and other stakeholders?		

Register	Action
Date of Endorsement:	
Signed:	

Form A1: Application for DoE WAN Service

Project and Contact Details

Parameter	Description
School Name / SINSW Project	
School Address	
Consultant Officer and Contact	
Project Manager and Contact	
AMU Officer and Contact	

Task	Responsibility	Yes/No	Date
Notification to be sent to DoE AMU Project Director that a new Broadband Service, or relocation of one, is required.	Project Manager		
Relocation of Service			
Notify DoE ITD Networks Operations Manager via email of the relocation **Forward Checklist/Order Form and other details to obtain a quote:** • **Site contact name and telephone number at the relevant facility** • **Estimated date of handover** • **Site plans showing complete site, existing service location and new service location (building and room numbers)** • **Send to broadband.orders@det.nsw.edu.au with a subject title of:** **<site-name> <site-code> new or relocation Broadband Service**	DoE AMU Project Dir.		
Provide to DoE AMU Project Director a budget for the relocation of the telecommunications service and installation instructions for the relocation of the telecommunications equipment (router)	DoE ITD Network Operations		
Confirm a provisional sum for the relocation of the service is in the project forms	DoE AMU Project Dir.		

Task	Responsibility	Yes/No	Date
New Service			
Forward Checklist/order form and other details to DoE AMU Project Director to obtain a quote : • **Site name, site code and street address** • **Estimated date of handover** • **Site plans showing complete campus, existing service location and new service location (building and room numbers)**	Project Manager		
Add to the school code and number of students and forward to DoE ITD Networks Operations Manager **Send to : broadband.orders@det.nsw.edu.au with a subject title of <sitename> <site-code> new or relocation Broadband Service**	DoE AMU Project Dir.		
Design the broadband service for the site and schedule the placing of the order. **Provide to DEC Asset Management Project Director a budget for the installation of the new Broadband Service and instructions for the installation of the broadband equipment (router).**	DoE ITD Network Operations		
Forward installation instructions to Project Manager to include installation instructions in the tender documents. **Confirm provisional sum for the installation of the new service in the project forms.**	DoE AMU Project Dir.		

Form C1: Equipment Sample Approval Form

Parameter		Detail
Number		
Subcontractor to Complete		
Subcontractor company name		
Subcontractor contact name		
Subcontractor contact phone number		
Site installation Name		
Site Code (4 digit)		
Location to be Installed (buildings, rooms)		
Item Description		
Manufacturer		
Product Model No. (specific part number)		
Specification Reference		
Supplied as specified [Y]/[N] Alternate Solution		
Sample Information Provided	Physical Sample	
	Tech Data Sheet/Product Manual	
	Certificates	
	Shop Drawings	
	Other	

Consultant endorsement		Name	Signature	Date
Electrical/Data (If Applicable)				
	Approved	Comments:		
	Approved with Comments			
	Resubmit as per comments			
	Rejected			

Client endorsement		Name	Signature	Date
School Network Solution Design Authority (Required)				
	Approved	Comments:		
	Approved with Comments			
	Resubmit as per comments			
	Rejected			

Foundations.T4L (Required)		Name	Signature	Date
Representative				
	Approved	Comments:		
	Approved with Comments			
	Resubmit as per comments			
	Rejected			

Form C2: Cabling Checklist

Pre-Installation Checklist

Cabling Contractor Details:	
DoE Project Manager:	
ICT Team Leader:	
SCSS Version:	

Item No	Description	Y / N or N/A	Comments
1	**General**		
1.1	Cabling Contractor is SCM0020 certified		
1.2	Cabling Contractor is accredited with the cable manufacturer as an approved Installer		
1.3	Cabling Contractor and the person(s) working on the cable plant have the required ACMA endorsements		
1.4	Cabling plans/drawings have been agreed to by all parties		
1.5	List of materials and fixings have been provided and approved		
1.6	Cabling contractor has read and agrees to abide by the SCSS		
1.7	Cabling contractor acknowledges the post-installation checklist		
1.8	Pre rough-in meeting arranged with ICT Team Leader		Date:

Post-Installation Checklist

School Name:		Address:	
Project Name:		Date:	

Cabling Contractor Details:			
DoE Project Manager:		SCSS Version:	
Checked By:		Signature:	

Item No	Description	Y / N or N/A	Comments
2	**Communications Rooms**		
2.1	MCR meets room dimensions as per SCSS and EFSG		
2.2	MCR/BCR is located in a suitable area		
2.3	MCR has air conditioning		
2.4	BCR has adequate cooling		
2.5	Comms rooms contain only IT related equipment		
2.6	Comms rooms have adequately sized doors, minimum 1m width		
2.7	Comms rooms have adequate access leading to it		
2.8	Comms room has a minimum DTO installed		
2.9	Comms rooms are adequately secured (i.e lock, swipe card)		
2.10	Comms rooms are clean and dust free		
2.11	All penetrations are adequately sealed, and fire stopped where required by NCC.		
3	**Racks/Data Cabinets**		
3.1	Racks in MCR meet spec (45RUx800x1000)		
3.2	Racks in BCR meet spec (45RUx800x800)		
3.3	Racks are all-metal construction		
3.4	Racks are installed properly		

Item No	Description	Y / N or N/A	Comments
3.5	Each racks have 2 x vertical cable managers		
3.6	Racks have adequate horizontal cable		
3.7	Each rack has 2 x dedicated 15Amp captive pendants above		
3.8	10 way vertical PDU installed in each MCR rack		
3.9	Each rack contains a shelf		
3.10	Racks are bonded to protective earth		
3.11	All racks doors and side panels are key lockable		
3.12	Rack doors are meshed		
3.13	All racks have RU markings front and back		
3.14	All racks are labelled as per the SCSS		
3.14	Front and rear rails are 'L shaped profile and are adjustable		
3.15	Racks in MCR have a raceway installed between them		
3.16	All cabling enters from the top of the rack		
4	**Pathways**		
4.1	Different pathways are used for structured cabling and electrical wiring		
4.2	Pathway is accessible throughout its length		
4.3	Cable trays are used where there is 10 or more cables		
4.4	Cable trays are adequately suspended		
4.5	Cable trays have no sharp edges		
4.6	Cable trays have adequate waterfall and bend components		
4.7	Estimated pathway fill is less than 40%		
4.8	Cables are adequately secured onto cable trays		

Item No	Description	Y / N or N/A	Comments
4.9	Velcro is used and not plastic tie cables		
4.10	Catenary wire has less than 10 cables		
4.11	Catenary wire is adequately secured		
4.12	Pit(s) installed are of adequate size as per SCSS		
4.13	Lids are of appropriate load rating		
4.14	All pits and cables are labelled as per the SCS		
5	**Fibre**		
5.1	Minimum of 12 core single-mode fibre is installed per BCR		
5.2	All fibres are terminated		
5.3	FOBOT is placed at the top of the cabinet		
5.4	Unused ports on FOBOT have cap covers		
5.5	Ports on FOBOT are labelled accordingly		
5.6	Fibre cable and components all belong to the same mode		
5.7	No visible kinks, crushed and tight bends in the cable		
5.8	The fibre cable leading into the FOBOT is labelled as per the SCSS		
5.9	The FOBOT is labelled as per the SCSS		
5.10	Fibre patch leads are of adequate number and length		
5.11	Spare fibre patch leads are available		
6	**4-Pair Copper Cabling**		
6.1	Cable is Low Smoke Zero Halogen (LSZH)		
6.1	Patch panels, patch cords and jacks used all match the category and construction of the cable installed		

Item No	Description	Y / N or N/A	Comments
6.2	Patch panels, patch cords and jacks used are all from the same manufacturer		
6.3	No visible kinks, crushed and tight bends in the cable		
6.4	Cables terminated into the rack are done in a neat fashion		
6.5	All cabling is more than 150mm away from power cabling		
6.6	All cabling enters through the roof space and into the designated roof corner of the cabinet		
6.7	24 port non-angular 1RU patch panels are used		
6.8	All cables are installed with unique outlet numbering sequence that is continuous across the entire installation		
6.9	No more than 24 cables in a bundle when in a cable tray or in the cabinet		
6.10	If shielded cable is used, then all components (cable, patch panel, rack etc.) are earthed as per the manufacturers recommendation		
6.11	Labelling of the patch panel is done as per the SCSS		
6.12	Telecommunications Outlets are installed in a appropriate location and at an acceptable height		
6.13	Telecommunication outlets have fixed mechanism that is self-closing.		
6.14	Telecommunication outlets require a tool in order to get to the jack.		
6.15	Telecommunication Outlet has adequate slack		
6.16	All ports in the patch panel are patched in a neat manner and are using the supplied cable managers		
6.17	Patch cables used are of adequate gauge size and match the colour patch guide		
6.18	External copper runs use external rated cables		

Item No	Description	Y / N or N/A	Comments
6.19	Surge protection installed at the distributor end for each external rated copper cable		
7	**Documentation**		
7.1	Fibre Optic Test results provided to DoE as per SCSS		
7.2	4-Pair UTP Test results provided to DoE as per SCSS		
7.3	Cable pathway diagrams provided by the contractor to DoE showing pits, risers, cable trays etc.		
7.4	Floor plans showing outlet locations and their associated identifier provided to DoE by the cabling contractor		
7.5	Patch records for each comms rack is provided		
7.6	Manufacturer's warranty certificate provided to DoE by the cabling contractor		
7.7	TCA-1 and/or TCA-2 form provided to the DoE project manager or ICT team leader		