IT Infrastructure Standards

Owner:	Information Services
Status:	Approved
Date of Issue:	10 August 2016
Version:	V2.1
Date of last revision:	20 May 2019

CONTENTS

REVISION HISTORY

Version	Date	Author	Description
0.1 DRAFT	18 Dec 2015	George Leonowicz	Initial draft
0.2 DRAFT	14 Jan 2016	George Leonowicz	Workflow references removed. References to associated documents added. Updates from Bill Buyers (section 3) Updates from Architects (section 2) Updated from John Girdwood (section 2)
0.3 DRAFT	18 Jan 2016	George Leonowicz	Document retitled to make it specific for Argyle House New section 1.5 added to show variations from the generic document
0.4 DRAFT	22 Feb 2016	Elaine Wighton	Updates from George Robertson Glossary added Workflow reference removed
1.0 APPROVED	9 Mar 2016 15 Mar 2016	Elaine Wighton	Incorporated comments from sign off meeting held with contributors 7/3/16 • C.I.S to CIS (Communications Infrastructure Services) • Add last page 'End of Document' • Replace E&B with Estates • Amend structured cabling wording (Section 7) • Amend footer on front page • Review references to 'you' and 'we' • Correct spelling - Alan Rae • Review variations section with relevant contributors • Superscript $10m^2$ - section 2.3.1.3 • Amend wording in section 2.3.3.3 • Remove reference to the document being specific to Argyle House on the front cover
1.1 DRAFT	3 Jun 2016	Elaine Wighton	Updates from George Robertson
1.2 DRAFT	1 Jul 2016	David Watson	Formatting
1.3 DRAFT	5 Jul 2016	Elaine Wighton	Include reference to Workflow
2.0 APPROVED	5 Jul 2016 4 Aug 2016	Elaine Wighton Elaine Wighton	All comments received have been incorporated and final approval meeting held with project team members. Amendments following presentation to Estates staff
2.1	20 May 2019		Minor updates and corrections. Update of required structured cabling specification.

CONTRIBUTORS

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1. Introduction	George Leonowicz	
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3. Network Provision (Wireless LAN)	Bill Byers, George Robertson	
4. Telephony (VoIP)	Alan Boyd, Alan Rae, Ian Christie	
5. Telephony (analogue)	Alan Boyd, Alan Rae, Ian Christie	
6. Telephony (mobile)	Alan Boyd, Alan Rae, Ian Christie	
7. Audio Visual Equipment	Euan Murray, Stephen Dishon	
8. Access Control Doors	Hugh Fraser	
9. Digital Signage	Euan Murray, Stephen Dishon	
10. Standard Desktop Provision	Graham Newton	
11. Printing (Shared MFDs)	Mark Skinner	
12. CCTV	Peter McGrath, Myles Ewen	

OWNERSHIP

Overall ownership and responsibility for amendment of this document has been assigned to Dave Graham, Head of Communications Infrastructure Services (dave.graham@ed.ac.uk).

1 INTRODUCTION

Please ensure that you are working with the latest version of this document. If the date of issue is more than 6 months ago, please check with Dave Graham, Head of Communications Infrastructure Services (dave.graham@ed.ac.uk) that you have the latest version.

Some of the information contained within the document is of a sensitive nature. Every effort must be taken to ensure that it is accessed only by valid users and is not openly shared without good reason for doing so.

Please note, at the time of this update (May 2019), Information Services are in the final stage of procuring a replacement network. Any references to network equipment in this document are accurate at the time of writing but should be checked before finalising any design requirements or making any decisions based on the content of this document.

1.1 PURPOSE

Information Technology Infrastructure (ITI) is comprised of more than just voice and data. ITI embraces all wired and wireless means of conveying information within buildings and between sites.

The purpose of this document is to provide provisioning guidelines and standards, and technology for IT Infrastructure.

Note: This is a generic document. Please be aware of specific standards and guideline variations for your project and ensure that these are documented in Section 1.6 Schedule of Changes.

This document provides enough information for successful, cost effective delivery of the included services.

Each section of this document contains:

- An overview of the service
- Details of the service
- Workspace (if applicable)
- Equipment
- Responsibilities
- Any other relevant information

This document contains information relating to the provision of the following:

- Network (Cabled and Wireless)
- Telephony (VoIP, Analogue, Mobile)
- Audio visual equipment
- Access control doors/Alarm monitoring
- Digital signage
- Standard desktop provision
- Printing (shared MFDs)
- CCTV

Specific workspace requirements for the following workspaces will be added later:

- Lecture theatres
- Open office
- Meeting rooms
- Video-conference rooms
- etc.

The University of Edinburgh's (UoE) policy is one of continuous development and improvement. This information will be re-issued when the upgrading of products, specifications or installation techniques requires it. Please make sure that you have the latest version of this document.

Whilst every care has been taken to ensure that the information is correct we submit the following as an advisory guide only. For clarification, the relevant standard, specification, manufacturer's instructions or code of practice must be consulted at all times.

Although the information in this document is correct at the time of writing, third party equipment manufacturer's specification and guidelines can change at any time. Please refer to equipment manufacturer's data sheets for any revisions to specifications listed in this document.

1.1.1 Change Control

This document provides Architects, Consultants, Contractors and the University with a single reference point for the IT Infrastructure guidelines, standards and technology, and supersedes the separate documentation that has been used previously.

This section provides a summary of the differences that exist between this newly formatted standards document and the individual documents that are being replaced.

Change	Description	Section(s)
Relaxation of environmental conditions	The environmental conditions within telecommunications rooms and equipment rooms are more relaxed than in previous versions of the ICT Guidelines	2.3.3.3. Telecommunications Rooms 2.3.4.2. Equipment Rooms
CAT6A cabling	CAT6A U/UTP Cca cabling to be installed on ALL new installations	2. Network Provision (cabled) 5. Telephony (analogue) 7. Audio Visual Equipment 12. CCTV
Complete wireless coverage	Design and installation personnel to carry out a site/wireless survey and install WAP's as required to achieve complete wireless coverage	3. Network provision – wireless LAN

1.2 IN SCOPE

This document provides specifications and outlines the responsibilities of Architects, Consultants, Contractors and the University.

Typically, the technology to be provisioned into the IT infrastructure is, but not limited to:

- Network provision (cabled)
- Network provision (Wireless LAN)

- Telephony (VoIP)
- Telephony (analogue)
- Telephony (mobile)
- Audio/visual equipment
- Access controlled doors/Alarm monitoring
- Digital signage
- Standard desktop provision
- Printing shared MFDs
- CCTV

1.3 INTENDED AUDIENCE

The intended audience for this document is Estates Project Staff, and others, tasked with a refurbishment, new build or other project which requires installation of IT infrastructure. It is hoped the information will prove useful to:

- Architect
- Electrical Consultant
- Data Consultant
- Telecommunications Consultant
- Main Contractor
- Sub-Contractor
- Supplier
- Installer
- Anyone else responsible for the equipment rooms specifications
- Anyone else responsible for the telecommunications rooms specifications

1.4 COMMUNICATIONS PROJECT MANAGEMENT

It is essential UoE, Information Services, IT Infrastructure Division and Communications Infrastructure Services (CIS) input is requested at the feasibility stage of a project to assess current and future ITI requirements. At the very latest consultations should take place at Stage 2, RIBA Plan of Works 2013 (previously stage C).

Close liaison between CIS, Estates, Architect, Electrical/Data/Telecommunications Consultant, Main Contractor and Installer is imperative for the successful completion of the project to the relevant British Standards.

On large projects, meetings between the Electrical/Data/Telecommunications Consultant and the CIS Project Manager shall be held at least once a month to discuss planning and progress of the project. The Electrical/Data/Telecommunications Consultant is responsible for setting up such meetings.

1.5 ASSOCIATED DOCUMENTATION

1.5.1 IT Infrastructure Workflow

The IT Infrastructure Workflow document is intended to be used in conjunction with this IT Infrastructure Standards Document. It provides a generic description of the process and assists in outlining the roles and responsibilities for each new build/refurbishment project.

1.6 SCHEDULE OF CHANGES

This section details all variations from the generic IT Infrastructure Standards and Guidelines document.

Section	Title	Variation	Variation Details
1.	Introduction	No	
2.	Network provision (cabled)	No	
3.	Network provision (wireless LAN)	No	
4.	Telephony (VoIP)	No	
5.	Telephony (analogue)	No	
6.	Telephony (mobile)	No	
7.	Audio visual equipment	No	
8.	Access control doors	No	
9.	Digital signage	No	
10.	Standard desktop provision	No	
11.	Printing (shared MFDs)	No	
12.	CCTV	No	
13.	Glossary	No	
Appendix 1	Cable installation standards	No	
Appendix 2	Access doors	No	

2 NETWORK PROVISION (CABLED)

2.1 OVERVIEW

This section does not include information for data centres. For further information on the design of data centres; please refer to ANSI/TIA 942-A and BS EN 50600 series.

This guideline does not include diverse building entrance points. For further information on the design of telecommunications facilities in a campus environment refer to ANSI/TIA-758-B.

The importance of a structured cabling infrastructure is similar to that of other fundamental building utilities such as heating, water and electricity. As with other utilities, interruptions to service can have a serious impact. Because of this, and the additional fact that the useful life of a building may span several decades, it is essential that the planning, design and construction of a new or refurbished building be done with due care and attention given to structured cabling. Poor quality of service due to lack of planning can threaten the UoE's effectiveness.

Structured cabling is a vital component in today's information-based environment. The use of structured cabling, using high performance components, can offer long-term support for the delivery of the most demanding network solutions.

The following information provides sufficient information for the successful delivery of a structured cabling solution which has high reliability, is easy to maintain and can support the applications and services of today and the future.

To ensure a high-spec installation, Architects, Electrical/Data/Telecommunications Consultants, Main Contractors, Sub-Contractors, Suppliers, Installers, or anyone responsible for the design, specification, planning or installation of structured cabling infrastructure should have a thorough working knowledge of, and must adhere to, the three main British Standards associated with data/telecommunications cabling:

- BS 6701: Telecommunications equipment and telecommunications cabling - Specification for installation, operation and maintenance
- BS EN 50173 series: Information Technology - Generic Cabling Systems
- BS EN 50174 series: Information Technology - Cabling installation

Note: The latest edition of British Standards (including any amendments) applies.

For further information about other standards relevant to structured cabling infrastructure see Appendix 1.

A telecommunications room is an enclosed area for:

- Telecommunications equipment
- Cable terminations
- Cross connect cabling

Correct specification of telecommunications rooms is vital during the preliminary architectural design phase of a project and will ease the implementation and operation of both the cabling and the applications supported.

Experience shows, the design and location of telecommunications rooms is very often a last minute thought, resulting in telecommunications equipment being housed in inadequate, unventilated,

overpopulated spaces, without allowing room for future expansion. To avoid this the following must liaise with, and seek advice from the CIS Project Manager as early as possible in the project.

- Architect
- Electrical Consultant
- Data Consultant
- Telecommunications Consultant
- Main Contractor
- Sub-Contractor
- Supplier
- Installer
- Anyone else responsible for the equipment rooms specifications
- Anyone else responsible for the telecommunications rooms specifications

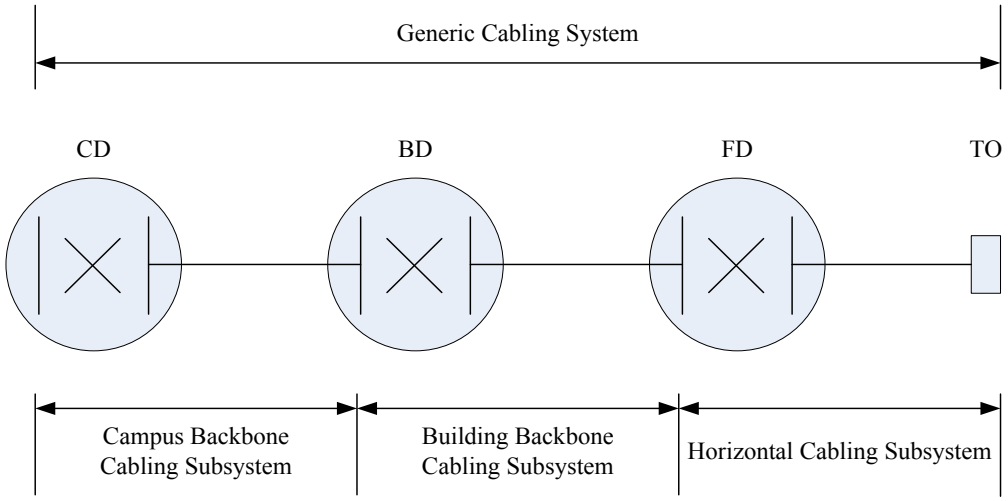
Note: For reference, the above list will be shortened to design and installation personnel throughout the rest of this document.

2.2 GENERAL STRUCTURED CABLING SYSTEM - BUILDING DESIGN

Each item of a building's generic cabling system can be broken down into:

- Campus Distribution (CD)
- Building Distribution (BD)
- Floor Distribution (FD)
- Telecommunications Outlet (TO)

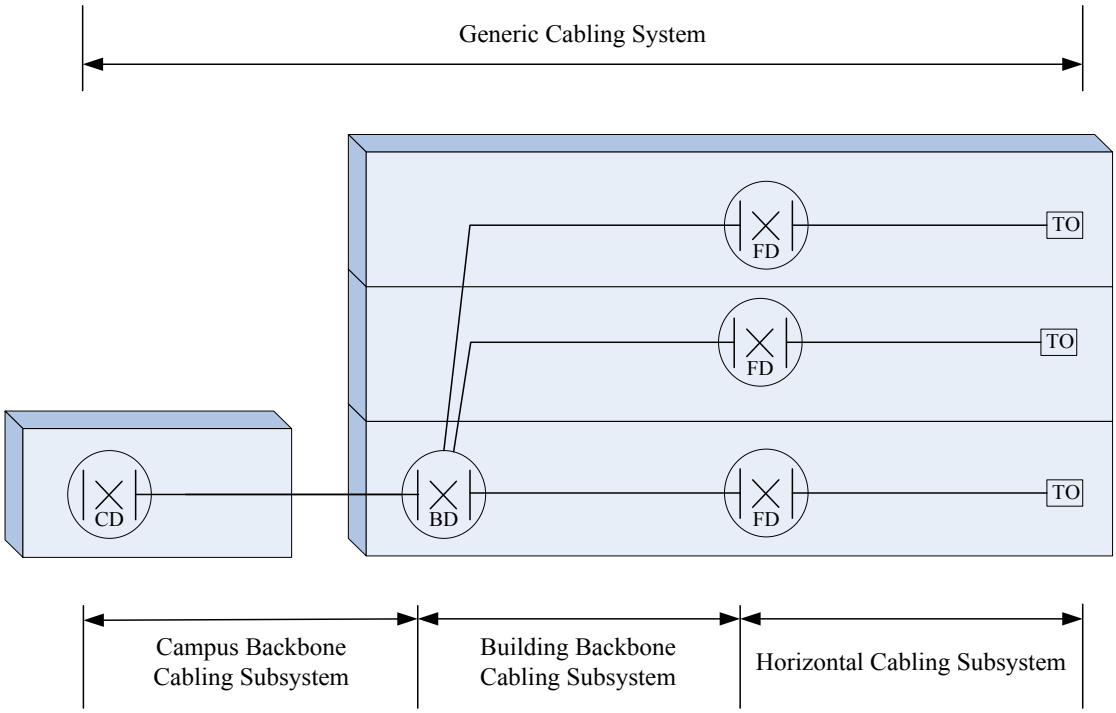
CDs, BDs and FDs must be located in telecommunications rooms or equipment rooms.



Please see Clause 4, BS EN 50173-1 and Clause 4, BS EN 50173-2 for further information.

The number and type of subsystems included in a structured cabling system is dependent on user requirements, geography and size of the campus or building. There is normally one CD per campus, one BD per building, and at least one FD per floor.

Note: Cabling resilience is not included in this version of the document, however it will be added in later revisions.



Basic construction of a typical building

2.2.1 Campus Backbone Cabling Subsystem

The campus backbone is the cabling system that provides data and/or telecommunications services between buildings. It connects two or more BDs and will nearly always be fibre optic cabling. Occasionally for very remote sites, a suitable wireless technology may be required or alternatively a leased circuit.

2.2.2 Building Backbone Cabling Subsystem

The building backbone is the cabling system that provides telecommunications services between floors or areas within a building. It connects the BD to the FDs and is normally fibre optic and copper links.

2.2.3 Horizontal Cabling Subsystem

The horizontal cabling provides telecommunications services from the FDs to the TOs. It will nearly always be copper cabling, sometimes fibre optic may be required.

During the ITI project the CIS Project Manager shall issue a schematic drawing detailing the campus backbone, building backbone and horizontal cabling.

Note: Please see Appendix 1.F for an example of a typical schematic.

2.3 GENERAL DETAILS

CDs, BDs and FDs shall be located in telecommunication rooms or equipment rooms.

Telecommunications rooms must have detailed specification in terms of location, space and environmental aspects for a smooth transition from installation to operation.

Telecommunications rooms should provide all the facilities for passive components, active devices, and external network interfaces. Each telecommunications room must have direct access to the backbone cabling system.

An equipment room is an area within a building where telecommunications equipment is housed and may or may not contain distributors. If a telecommunications room houses more than one distributor (e.g. a BD and an FD) it should be considered an equipment room.

Equipment rooms are treated differently from telecommunications rooms because of the nature or complexity of the equipment (e.g. PBXs, Servers, A/V services, CCTV, Door entry controllers, etc). They are larger and more complex than telecommunications rooms and require a more detailed specification. They are often referred to as 'main communications rooms'.

Appendix 1.G shows typical telecommunications room layout.

2.3.1 Telecommunications Room - General

2.3.1.1 Location

Each floor must have at least one telecommunications room.

Telecommunications rooms must be designed with expansion and maintenance as the foremost thought, taking into consideration:

- Telecommunications outlet capacity of the building
- Available cable routes
- Permissible cable distances

Other considerations are:

- Power requirements
- Earthing
- Ventilation/Air conditioning/Cooling
- Lighting
- Raised access floor

Locate telecommunications rooms as close as possible to the centre of the served area.

2.3.1.2 Locations to Avoid

Avoid locating telecommunications rooms in areas that limit expansion, such as outside walls, lift shafts etc.

Telecommunications equipment may be endangered or adversely affected by other services or conditions which may be obvious or hidden within the fabric of the building. In particular, water/waste/steam pipes should never be installed directly above or in the same room as telecommunications equipment, as per BS EN 50174-2 8.3.8.3.1.

Telecommunications rooms should be located away from sources of electromagnetic interference or designed to mitigate the effects of this interference. Special attention shall be given to:

- Electrical power transformers
- Electric motors
- Generators
- X-ray equipment

- Radio or radar transmitters

2.3.1.3 Sizing Guidelines

Telecommunications rooms shall be sized to meet the present and future requirements, taking into account the function of the room, the number of TOs it will serve and type and numbers of equipment required.

Telecommunications rooms shall be a minimum of 3.2m and of sufficient length to house the required number of communication cabinets.

The footprint of telecommunications rooms is dependent on the number of communication cabinets being installed, which is largely dependent on the number of TOs being installed. For number of communications cabinets likely to be used see 2.3.2 (telecommunications room communications cabinets (racks or units)).Where the requirements are not known, the following guideline may be used:

- Provide 3 x TOs per person/work area and one person/work area per 10m²
- The telecommunications room minimum footprint is 3.2m x 2.4m

Note - This allows one communications cabinet plus one spare with enough space to access the back of the communications cabinet.

- The telecommunications room design and installation personnel must be aware of and not exceed the 90m rule for the horizontal cabling subsystem, this is the distance from the FD to the TO
- The minimum clearance height in the telecommunications room shall be 2.5m without obstructions, if this is not possible due to restrictions with the existing structure it must be discussed with the CIS Project Manager

2.3.1.4 Parameters

Physical telecommunications room parameters:

- Minimum door width 926mm
- Alternatively, a double door arrangement, 826mm/413mm, may be used in some areas
- Maximum door height 2040mm
- The door must be hinged to open outward
- If the door must open inwards the size of telecommunications rooms (floor space) should be increased accordingly
- The walls, floors and ceilings must be light in colour, and be pre-treated to reduce dust
- The floor must have anti-static properties
- Lighting should not be lower than normal office level
- A safe route with suitable access to the telecommunications room must allow access for personnel with necessary apparatus and equipment

Note: Telecommunications rooms shall only contain equipment directly related to the structured cabling infrastructure, associated electronics and its environmental support systems. Equipment and services not directly related to the support of the telecommunications room or structured wiring system shall not be installed in, pass through or enter the telecommunications room. It is not permissible for other parties to store or install equipment in these rooms.

Note:

Telecommunications rooms shall not be shared with electrical installations except for directly

related structured cabling infrastructure, associated electronics or its environmental support systems.

- Should 'alien' equipment be required in telecommunications rooms then the location of such equipment must first be agreed with the CIS Project Manager
- During the ITI project the CIS Project Manager shall issue a telecommunications room layout

Appendix 1.G shows typical telecommunications room layout.

2.3.2 Telecommunications Room Communications Cabinets (Racks or Units)

Communications cabinets contain the backbone and horizontal subsystems terminations and associated electronics.

2.3.2.1 Location

Communications cabinets must be housed in telecommunications rooms or equipment rooms and not installed in:

- Direct sunlight
- Toilet facilities
- Boiler/plant/switch/machine rooms
- Emergency escape ways
- Ceiling or sub-floor spaces
- Areas subject to flooding
- Areas containing fire hose reels or other fire-extinguishing equipment

The location of the communications cabinets must provide physical and environmental protection for the telecommunications equipment. This protection may be achieved either by choice of appropriate location or by specific design and should address the following aspects:

- Temperature
- Humidity
- Vibration
- Exposure to ultraviolet radiation
- Contamination
- Physical damage
- Security
- Electromagnetic interference
- Presence of other hazards

Communications cabinets must have adequate access, illumination and temperature conditions suitable for installation and maintenance of a structured cabling system and associated electronics.

2.3.2.2 Recommendations

Recommendations for all communications cabinets:

- Communications cabinets shall be located such that subsequent measurements, repair, expansion or extension of the installed cabling can be undertaken in safety
- The minimum clearance on all faces of the communications cabinets where access is required, i.e. front and back, shall be 1.2 metres, in accordance with BS EN 50174-1: 4.2.5.1
- To allow access from front of the communications cabinet to the back, there shall be a minimum of 0.8m space to the side of the communications cabinet

- Cable terminations and electronics must be set at a safe working height, between 0.5 and 2.0 metres to allow measurement, repair and reconfiguration
- Cables in the communications cabinets must be supported to provide strain relief and prevent kinking, and in such a way that mechanical damage is avoided during later access to the patch panels or electronics
- Install vertical cable management between each pair and at ends of every row of communications cabinets, taking into account maximum calculated fill, and should extend form the floor to the top of the communications cabinets
- Install horizontal cable management; one 1u management strip per 2u patch panels (48 TOs)
- When installed side-by-side, communications cabinets must be fitted in bays using the appropriate kits
- Fitted with adjustable vertical mounting rails (front and back). The front rails must be recessed by at least 100mm for cable management clearance

Note: The UoE use the term 'Unit(s)' refers to one or more communications cabinets.

- The CIS Project Manager shall issue a cabinet layout during the ITI project that details unit ID, subsystem terminations, equipment locations, etc

Note: Do not use wall mounted communications cabinets on UoE premises as they limit the type, size and weight of the electronic equipment, and restrict airflow. Should the design and installation personnel wish to install a wall mounted communications cabinet, they should first consult with and seek advice from the CIS Project Manager.

Generally, the structured cabling infrastructure and the active electronics are housed in separate communications cabinets. However, where there is a small concentration of TOs, the structured cabling infrastructure and the active electronics may be housed in the same communications cabinet.

The number of communications cabinets required is dependent on the number of TOs.

If there is no detailed information the design and installation personnel of the structured cabling infrastructure should allow the following;

- 001 to 100 TOs, requires one 42u communications cabinets
- 101 to 300 TOs, requires two 42u communications cabinets
- 301 to 600 TOs, requires four 42u communications cabinets
- 601 to 900 TOs, requires six 42u communications cabinets

During the design phase of a contract the design and installation personnel for the structured cabling infrastructure, should allow 50% expansion when deciding on cabinet sizes.

2.3.3 Telecommunications room detail

Depending on the type of equipment in the telecommunications room, a clean room environment in accordance with BS EN ISO 14644 series should be seriously considered.

2.3.3.1 Power

The telecommunications room must have a dedicated distribution board. It must be fed from the nearest essential services distributing board.

Communications cabinets that have active equipment must be provided with power. At least two 16A CEEform (commando) sockets, refer to BS EN 60309, must supply each active communications cabinet.

In certain circumstances, e.g. switches associated with iSTARs, a UPS shall be installed. The UPS can be free-standing or rack-mounted. If rack-mounted approximately 12U of rack space shall be allowed for within the communications cabinets. The UPS shall be equipped with an SNMP card, by-pass switch and 6 way PDU.

2.3.3.2 Earthing

- A suitable main earthing busbar must be installed in the telecommunications rooms
- A single direct earth connection must be made from the main earthing busbar to each of the communications cabinets in the telecommunications rooms. The connection must be as short as possible, low impedance and at least 16mm, in accordance with BS 6701: 5.2.2.4
- Equipotential bonding must be maintained throughout the ITI installation to BS EN 50310 and BS 7671

2.3.3.3 Ventilation, Air Conditioning, Cooling, Humidity

General guidelines:

- Potential heat dissipation per communications cabinet:
  - Up to 1500 watts
  - Up to 5000 BTU/hour
- The temperature and humidity of telecommunication rooms must be controlled to provide continuous operating ranges of 18 to 27°C, in accordance with ASHRAE Class A2 recommendation, and 20% to 80% relative humidity in accordance with ASHRAE Class A2 allowable range
- In smaller telecommunications rooms, with three or fewer communications cabinets, extractor fan or vents in the telecommunications room door could be sufficient for ventilation and cooling
- Where there is a risk of electrostatic discharge, the design and installation personnel responsible for the design of the structured cabling infrastructure, should refer to BS EN 50174-1: 4.5.3

2.3.3.4 Lighting

The luminance must be at least 400 lux. Diffusers must be used for an even spread of light in the telecommunications room. Lights should not be placed directly above the communications cabinet.

For further information, please refer to BS EN 12464-1.

Telecommunications rooms must have emergency lighting.

2.3.3.5 Water Ingress

To prevent water ingress, if telecommunications rooms are located below water level, they must have preventative measures against water ingress such as a floor drain with back flow preventer.

2.3.3.6 Raised Floor

Telecommunications rooms with a raised floor must have at least a 200mm void. The raised floor structure must give unrestricted access to the void.

Optional: a water detection system in the floor void.

For further information, please refer to BS EN 12825.

2.3.3.7 Fire protection

Telecommunications rooms must have a smoke alarm in a central ceiling location. The alarm must be the same type and manufacture of the building fire detection system. The alarm must be linked into the existing building fire detection system.

For further information, please refer to BS 6266.

Measures must be taken to safeguard the lives of CIS personnel and provide a means of escape in the event of a fire.

2.3.3.8 Sprinklers

Do not install wet pipe sprinklers in telecommunications rooms. If this is unavoidable then install wire cages over the sprinkler heads to stop accidental operation. Also install drainage troughs under the sprinkler pipes to prevent leakage on to the equipment within the room.

2.3.3.9 Security

Access to telecommunications rooms shall be restricted to authorised personnel only, as specified by the CIS Project Manager, thus maintaining a degree of network security and minimising the risk of damage which could threaten the integrity of the network. Also, some active equipment is essential to teaching, and any downtime would have a detrimental effect.

Security requirements must be assessed during planning. Guidance on the implementation of physical security is found in BS 7799 and BS 8220: Part 2.

Doors with direct access to telecommunications rooms must be fitted with University of Edinburgh supported card access controls or have security lock ASSA 9EA1734A 1-3 fitted. These locks are reserved for CIS telecommunications rooms and are available from Estates.

All telecommunications room windows must have opaque glass with level 5 obscurity. Security bars must be fitted to the inside of the windows.

2.3.3.10 Surface Finish

The surface finish must be smooth and resistant to dust collection. Surfaces beneath raised floors and above suspended ceilings should be sealed with resin or other suitable sealant to aid cleaning and reduce the amount of contamination.

2.3.4 Equipment Room (Main Communications Room) Detail

Due to recent developments, more and more equipment is becoming IP based, e.g. VoIP telephony, security equipment, CCTV, A/V kit, etc.

As pressure on building space increases, the UoE should be looking at housing ALL network connected infrastructure devices in a shared location, i.e. an equipment room.

Other equipment may also be housed in equipment rooms, e.g. door controllers, CCTV recording equipment, etc. The location and housing of such equipment must first be agreed with the CIS Project Manager.

In addition to the telecommunications rooms requirements mentioned above, new building and refurbishment projects should take into account the following minimum requirements for equipment rooms:

- 2 x 42U communications cabinets required for network services core equipment - plus any communications cabinets required for FDs
- 1 x 42U communications cabinet required for telephones
- 1 x 42U communications cabinet required for security, CCTV etc
- 1 x 42U communications cabinet required for future

Note: When a suitable location for the equipment room has been identified, the position of the communications cabinets should be carefully planned and agreed with the CIS Project Manager.

Appendix 1.F gives an example of the number of communications cabinets required in an equipment room.

2.3.4.1 Power

An uninterruptible power supply (UPS) and/or back-up generator must be supplied and installed.

2.3.4.2 Ventilation, air conditioning, cooling, humidity

Accurate temperature and humidity control is required. At the early stages of a project there must be an assessment of current and possible future ventilation, air condition and/or cooling requirements.

General guide:

- Potential heat dissipation per communications cabinet:
  - Approximately 2500 watts maximum
  - Approximately 8500 BTU/hour maximum

The temperature and humidity of equipment rooms must be controlled to provide continuous operating ranges of 18 to 27°C, in accordance with ASHRAE Class A1 recommendation, and 20% to 80% relative humidity in accordance with ASHRAE Class A1 allowable range.

2.3.4.3 Raised Floor

- A raised access floor is essential in an equipment room and will have a void height of at least 300mm
- Layout of floor tiles to suit cabinet positions to ensure full tile below each cabinet
- 400 x 400 cut-out to be provided in each floor tile below cabinet

2.3.4.4 Security

- Doors to the equipment room must be self-closing
- University Access control is essential in equipment rooms

2.3.4.5 Surface Finishes

- Air-borne dust levels must be carefully controlled
- A clean room environment, in accordance with BS EN ISO 14644 series, is vital in equipment rooms

2.3.5 Backbone Cabling – Campus Building Distribution

The backbone distribution is split into two areas; the campus and the building distribution. They are interconnected to form a basic hierarchical topology, as described in Clause 4, BS EN 50173-1.

It is critical the backbone distribution is designed correctly, with consideration given to:

- Current and foreseeable application requirements
- ITI media choice
- Cable routing
- Cable management
- Communications cabinet layouts
- Raised floor
- Ceiling void

Backbone cables are routed using pathways. Various cable management systems can be used to support the cables in the pathways including ducts, conduits, tray and basket. Requirements for the pathways and the cable management systems are in the BS EN 50174 series of standards.

Where backbone cabling serves multiple buildings, the use of optical fibre cabling is essential to avoid transmission problems associated with:

- Earth potential differences between buildings
- Lightning strikes (BS EN 5468)
- Power surges
- Etc.

Unless otherwise stated, all fibre installations must use Bloduct/Blolite products or Brand Rex connectivity equivalent.

Power and signal lines including fibre-optics in metallic protection may need protection against lightning-induced surges and rises in earth potential. Where this is the case, voltage limiting devices may need to be employed together with disconnection or protective devices such as barrier boxes. Avoid using overhead cables between buildings. Separation of different types of cables entering the building will significantly reduce coupling effects. Refer to BS EN 62305 for guidance on the protection of power and data cables.

Where the locations of CDs, BDs and FDs require backbone channel lengths less than 300m, the cabling must comprise 8 x OM3 multimode optical fibre.

Where the locations of CDs, BDs and FDs require backbone channel lengths more than 300m, the cabling must comprise:

- 8 x OM3 multimode optical fibre, and
- 8 x OS1 singlemode optical fibre

All fibre cores must terminate with LC duplex pigtails by fusion splicing. It is not acceptable to use mechanical splicing techniques.

When the backbone cabling is in the same building, an additional 6 x CAT6A from BD to FD copper links must be installed.

Please refer to Appendix 1.F for a typical schematic.

2.3.6 Floor Distribution General

The horizontal cabling subsystem extends from FD to the TOs. The subsystem includes:

- Horizontal cables
- TO(s)

- Mechanical termination of the horizontal cables at the FD and TO, together with associated equipment cords at the FD

The horizontal cabling subsystem must be designed to support all current and future applications within the environmental conditions defined in Clause 5, BS EN 50173-2, and therefore provide the longest operational life. This minimizes disruption and the high cost of re-cabling in the work area.

The horizontal cabling subsystem must be continuous from the FD to the TO and conform to the Interconnect - TO Model, as specified in BS EN 50173-2.

The total length of the horizontal cabling subsystem must not exceed 90m and the total length of the patch cordage must not exceed 10m. The total combined end-to-end length must not exceed 100m and must contain no more than two connectors. CIS does not allow the use of consolidation points (CPs) or any form of joint.

If a potential work area is not adjacent to a wall, facilities for under floor or above ceiling distribution (floor boxes or power poles) that provide cable protection will be installed to enable TOs to be deployed at every potential work area.

All TOs must be easily accessible and shall not be installed in inaccessible ceiling areas, such as lock-in type ceiling tiles or behind plasterboard.

Make sure the design minimises the equipment/work area cord length:

- Equipment cords cannot exceed 5m
- Work area cords cannot exceed 3m, although 5m can be used in exceptional circumstances

CIS do not support furniture with 'plumbed-in' data wiring or other types of m-f extension leads. They are unreliable and prone to faults.

FD locations must comply with cable lengths and channel performance requirements of Clause 5, BS EN 50173-2.

Each TO must have at least two power points.

2.3.7 User Outlet Concentration

Note: Regardless of the TOs designation (VoIP, data AV, CCTV etc.), the design and installation personnel must make sure that all data requirements are shown on one layer of the drawing.

The number of potential work areas in a workplace requiring ITI facilities will impact the number of communications cabinets required and, therefore the size and design of the communications rooms. A high density of TOs (flood wiring) will help the College, School or Support Service to accommodate changes.

BS EN 50173-2 states; ‘The design of horizontal cabling subsystem should provide for a minimum of two TOs per work area’. However, on UoE premises each user type will demand different requirements from the structured cabling infrastructure. The main user types and number of TOs per person/desk have been defined below as the minimum requirements for outlet concentration:

- General 3
- Computing Officer 6

Other TO requirements include:

- Wireless LAN access point 2

- Lecture Theatre (WAP) 6
- Printer 1
- Photocopier 1
- FAX 1
- Shared MFDs 2
- Back-up Telephone 2
- Door Controller (iSTAR) 2
- A/V Web Cam 1
- A/V Information Screen 1
- A/V Lectern 6
- Study Space 1
- SSP (smart service point) 1
- Till Point 1
- CCTV 2
- Metering 2
- BEMS 2

2.3.8 Metering and Building Energy Management System

Metering and Building Energy Management System (BEMS) normally requires two TOs per location.

TOs will be installed at locations specified by Estates.

Contact Estates for further information about metering and BEMS.

2.4 EQUIPMENT

The University of Edinburgh has chosen Commscope NETCONNECT Structured Cabling Solution for its reliability, quality and performance. By standardising on the Commscope product set a standard warranty for voice and data has been set for all buildings within the University of Edinburgh.

Unless otherwise stated, use CommScope NETCONNECT CAT6A, 100 ohm, 4 pair unshielded twisted pair (U/UTP) Cca cable.

2.4.1 Structured Cabling and Ancillary Components

The CommScope NETCONNECT Approved Contractor shall supply and install all structured cabling components, including but not limited to the following:

- CommScope NETCONNECT Networks Cable
- CommScope NETCONNECT Connectors
- Free standing racks - Cannon
- Two 10 way vertical sequential start PDU strips shall be mounted to the rear of each active Communications Cabinet, one each side. Each 10 way PDU shall be connected into a separate commando socket (http://www.olson.co.uk/seq_vert_13a.htm)

Unless otherwise stated, CIS shall supply all active network equipment.

2.4.2 Typical UPS Requirements for Essential Active Equipment

- Riello Sentinel Dual 3kVA UPS c/w;
  - By-pass switch

  - SNMP card and
  - 6 way PDU
- PDFs for UPS, by-pass switch and SNMP card are available from CIS Project Manager

2.4.3 Horizontal Cabling – Installation Guidelines

The following information covers the implementation techniques required for a successful installation of a structured cabling system.

2.4.4 Cable Installation

The installation of system components has a large impact on the final performance level of the network; therefore, design and installation personnel must follow the installation guidelines:

- Do not to stretch or abrade cables during installation; (do not exceed the maximum pulling tension for cables etc.)
- Use grommets and sleeves to protect cables that pass through the building infrastructure (walls and floors etc.) as appropriate
- Use grommets to protect cables that pass through metalwork or stiff plastic
- Use velcro cable ties for cable management, do not over tighten cable ties
- On vertical runs, dress and tie the cables from the bottom up, to put minimum strain on the cables
- Do not use staple guns
- Do not run cables behind radiators
- For maintenance purposes, allow free access to the cable, where possible
- Leave draw cords in ducting, piping etc. for future use
- During installation or maintenance, use dust sheets at all times
- The contractor is responsible for removing, and reinstating, any access tiles and panels to the original condition
- Take extra care in the proximity of dangerous materials (asbestos etc.), please report any concerns to Estates

2.4.5 Minimum Bending Radius

The internal radius of every bend in a cable shall be such as not to cause damage to the cable nor impair the characteristics of the cable, and shall be in accordance with manufacturers guidelines.

2.4.6 Cable Slack at Outlet Points and Patch Panels

During installation, make sure there is sufficient slack in the cable for re-termination of the outlets a minimum of twice and a limited scope for movement of the cabinets. Do not leave excess coils of cables underneath the cabinets.

2.4.7 Patch Panels and Cable Management

Install patch panels in the communications units from the top downwards.

- Do not use PCB patch panels
- Patch panels must be fully populated
- The contractor must supply and install horizontal and vertical cable management
- Do not exceed the capacity of cable management systems

2.4.8 Labelling

Label the cable clearly at both ends, as outlined in the documentation and/or drawings.

2.4.9 Electromagnetic Compatibility (EMC)

Structured cabling is a passive medium and does not need not comply with the European EMC directive, EMC standards and UK legislation. The Contractor has no legal EMC responsibility. However, please be aware that cabling, when connected to transmission equipment, could radiate, receive and conduct electromagnetic disturbances.

2.4.10 Minimum Distance from EMI Sources

High power electrical plant may produce switching transients and radio frequency emissions that may induce interference on the UTP cable. In addition to IEE Regulations, data cables shall not run parallel to power cables, especially where these cables may carry heavy switching loads. If this is unavoidable, cables must be kept as far apart as possible.

For 'standard' loads, use the following separation distances:

- MICC 2cm
- Earthed conduit 3cm
- Earthed trunking 3cm
- Twin and earth 7cm
- Fluorescent lighting 30cm
- Electric motors 100cm
- Transformers 100cm

Refer to Clause 6.2, BS EN 50174-2 in for more information.

Cross mains cables at right angles only.

2.4.11 Cable Routes

Do not route cable over pipes, conduits, other cabling, ceiling tiles, etc. Rest them directly on the supporting surface to minimise sharp bends, kinks etc. Make sure all cables used are supported so that they are not subject to excessive mechanical strain on the cables or terminals.

Do not use inaccessible ceiling areas such as lock-in type ceiling tiles or plasterboard for cable routes.

2.4.12 Cable Supports

The maximum distance between cable supports is 50cm (horizontal or vertical).

2.4.13 Future Expansion

Unless otherwise stated, all newly installed containment must provide at least 50% future expansion and be capable of supporting CAT6A cabling.

2.4.14 Wire Basket/Conduit

Where multiple cables are installed use wire basket in preference to other types of containment. When exiting the wire basket, install cables in 25 mm conduit, mated to the wire basket using appropriate gland plates.

Note: Do not install more than 2 CAT6A cables in a 25 mm conduit.

2.4.15 Conduit/Mini-duct/Dado Trunking

Enclosed exposed individual cables within plastic conduit, mini-duct or dado trunking.

Do not use flexible metal conduit.

A section of conduit cannot have more than two 90º bends or equivalent between pull points.

2.4.16 Trunking Lid

Install trunking so the lid of the trunking does not form the lower surface.

2.4.17 Earth Bonding

Bond each section of metal trunking, tray work and wire basket to the adjoining sections with a suitable earth braid to meet IEE Regulations.

2.4.18 Terminating

Contractors shall not work in communications cabinets which already house active equipment. However, in certain circumstances where this cannot be avoided, the CIS Project Manager must first give permission, and arrange a suitable time for the work to be carried out. Prior to the work starting the Estates Representative shall email CIS Network Support (network-support@ed.ac.uk) with details, times etc.

2.4.19 Pin-outs

Use an IDC punch tool fit for purpose to make all terminations. The incoming cables must have all 4-Pairs terminated at both patch panel and TO on CommScope NETCONNECT modular RJ45, 8 pin sockets, as follows (T568B):

- Pair 1 WHITE/blue Pin 5
  BLUE/white Pin 4
- Pair 2 WHITE/orange Pin 1
  ORANGE/white Pin 2
- Pair 3 WHITE/green Pin 3
  GREEN/white Pin 6
- Pair 4 WHITE/brown Pin 7
  BROWN/white Pin 8

2.4.20 Labelling

Label all RJ45 sockets. The label must include a unique identification, as outlined in the documentation and/or drawing, and must be indelible and placed behind a transparent cover. At the patch panels, label each socket according to its corresponding TO.

2.4.21 Testing UTP Cables

The Contractor must give adequate (usually five days) notice to CIS for testing the system so the CIS Project Manager can witness the testing (if required).

2.4.22 Minimum Test

Currently, CIS requires only that the permanent link must be tested (from the patch panel to the TO). New installations, refurbishments, etc. must meet the requirements of BS EN 50346 and BS EN 61935-1.

When testing, testers must ensure the Plot function is enabled before beginning any test.

2.4.23 Marginal Passes

As CIS only allow the use of high quality components and do not allow use of CPs marginal passes shall not be accepted, as per Clause 4.6.3c, BS EN 50346.

2.4.24 Saving the Test Results

The installer must save the results under the labelling scheme as specified by the CIS Project Manager.

2.4.25 Quality Assurance

For quality assurance, CIS will test 10% of the installation.

2.5 RESPONSIBILITIES

All installation work must be covered by a full TE Connectivity warranty; only CommScope NETCONNECT approved contractor will be used.

To minimise any ambiguity, the responsibilities of the design, specification, planning and installation of each ITI project must be clearly defined.

CIS recommends the design and installation personnel responsible for the design, specification, planning or installation of the structured cabling infrastructure use a template of the form shown in Table B.1., BS EN 50174-2.

CIS will appoint a Project Manager who will act as the ITI advisor during the design, specification, planning, installation and commissioning phases.

Unless otherwise stated, CIS will supply all active network equipment.

Building fabric and cable routes will be referred to University of Edinburgh, Estates.

2.5.1 Commissioning

Prior to commissioning by CIS, the Contractor shall supply the following CommScope NETCONNECT CAT6A equipment cords (grey), and leave them in the relevant telecommunications or equipment room:

- 1 x 2 metres (approx.) equipment cord for every CAT6A cable terminated in the FDs, i.e. one equipment cord per TO

In general and unless otherwise stated, the Contractor shall supply 1 x CommScope NETCONNECT CAT6A work area cord (grey) for every TO, and leave them in the relevant telecommunications or equipment room:

- one-third will be approximately 1 metre long
- one-third will be approximately 3 metres long
- one-third will be approximately 5 metres long

The Data Contractor will provide specialist cleaners for a final deep clean of the telecoms rooms and equipment rooms, communications cabinets and other ITI equipment including beneath raised floors and above false ceilings.

Note: Telecommunications rooms and equipment rooms must be clean, well-lit and lockable before commissioning can commence.

The CIS Technical Services Team will install the active network equipment required to make the network live and to make sure the structured cabling infrastructure performs to specification.

To avoid delays and ensure smooth transition from a passive to an active network, the CIS Project Manager must receive at least 20 working days' notice of handover and user's entry dates.

The CIS Project Manager must notify any critical dates to the Technical Services Team, who will schedule the work accordingly.

Any slippage on the contract will have a knock-on effect. In these cases the Technical Services Team will agree a target commissioning date with the CIS Project Manager, subject to the contract being complete, and will inform the user of that date.

Commissioning is usually completed within three weeks of the CIS Project Manager receiving the relevant documentation (refer to Appendix 1E). Delays can be caused when corrections by the contractor are required and if network faults occur. All delays and revised schedules must be reported to the user and the CIS Project Manager by the Technical Services Team.

2.5.2 List of CommScope NETCONNECT Approved Contractors

Approved local Edinburgh contractors (other CommScope NETCONNECT Approved Contractors can also be used). For further details contact CommScope .

- ACI Integrated Solution Ltd
- Arthur McKay & Co. Ltd
- Capita – IT Services
- Computer Links Ltd
- Electrocom Networks Ltd
- FES Ltd

3 NETWORK PROVISION (WIRELESS LAN)

3.1 OVERVIEW

The University Wireless service is primarily used to provide the **eduroam** service. Other wireless services such as **Central** are also currently provided.

Wireless standards to be used in new and refurbished buildings:

- 802.11a (legacy)
- 802.11g (legacy)
- 802.11n(legacy)
- 802.11ac (current)

As standards evolve, new deployed access points will be updated to support the new standards.

Wireless networking shall be provided in addition to generic telecoms cabling.

Where the ITI facilities and services are accessed occasionally (cafe, using mobile terminal equipment), wireless networking may be installed instead of generic telecoms cabling.

Note: Wireless networking is not functionally equivalent to hard-wired cabling, generally offering inferior reliability, security and data throughput. In situations where users regularly locate mobile equipment, e.g. a laptop, at a desk or meeting table, generic telecommunications cabling should be used.

3.1.1 Wireless LAN Access Points

The TOs and Wireless LAN access points (WAPs) must have easy access, wall mounted vertically, below ceilings and no higher than 2.4m from floor level, making sure the WAP bracket is mounted alongside the TO, and is the correct way up.

In some locations, e.g. Library, it is permissible to install the TO above the false ceiling and mount the WAP horizontally below the false ceiling, no higher than 2.4m from floor level. Where this is the case the installer shall drill or cut a cable access hole in the ceiling tile large enough for the equipment cord to pass through. If the ceiling tile is metal a suitable grommet shall be used. The equipment cord shall pass through the access hole leaving approximately 30cm of cable at the WAP. The equipment cord shall not exceed 3m.

3.2 STANDARDS AND GUIDELINES

All new and refurbished buildings must have complete wireless coverage from start of project.

Where wireless networking is required, CIS recommend the installation of a dual TO.

The number of dual TOs required depends on the wireless coverage, bandwidth required, and the building fabric.

During the design and specification phase of a contract, the design and installation personnel should perform a site/wireless survey (or use a planning tool) to determine the best location to site the (WAPs), taking into account the users current and future requirements.

Surveys shall ensure that a signal of better than -65db is obtainable everywhere in the working area.

If detailed information is not available or a wireless survey is impracticable at the design phase, the design and installation personnel shall allow at least one dual TO for every 100m^2 of floor space. Generally, one WAP is enough for up to eighty users.

During the installation phase of the contract, the data installer must carry out a thorough wireless survey and report the findings to the CIS Project Manager for any knock-on effects or considerations. The contractor shall provide floor plans detailing location of WAPs, complete with heat-maps of expected signal level for 2.4GHz and 5GHz.

3.3 EQUIPMENT

CIS has chosen the Cisco Aironet 2702i Series as its standard Wireless LAN Access unit (the make and model is likely to change as of June 2019). This access point has been chosen for its simple deployment, high-performance and energy efficiency.

All WAPs will be powered from power over ethernet (PoE) switches sited in the telecommunications room.

3.4 RESPONSIBILITIES

The CommScope NETCONNECT Approved Contractor will install all WAPs.

The installer will provide the MAC address of the WAP and the TO ID it is connected to for all WAPs installed.

The Installer will use CAT6A 1m patch leads for all WAP installations.

4 TELEPHONY (VOIP)

4.1 OVERVIEW

New and refurbished building will have voice over internet protocol (VoIP) telephony; it will use the structured cabling infrastructure.

Note: Exceptions to VoIP telephony are possible, please refer to Section 5.

4.2 PLANNING

For effective delivery of a project, there must be early engagement between IS, the users of the building and the design team. This early engagement will allow time for necessary planning activities, including:

- Clarifying requirements with users
- Determining implications for central telephone infrastructure
- Liaison with ITI Networks Team
- Understanding space requirements
- Costing
- Scheduling installation within overall programme

The time required to undertake these tasks and the follow on discussions should not be underestimated. Access to building plans is important. Large-format PDF is preferred.

4.3 USER REQUIREMENTS

Initiate the planning process by contacting the client (a user representative, often a senior administrator). The plan must include:

- Scale (approximate number of extensions)
- Timescales (when the extensions will be required)
- Numbering (existing or new numbers required)
- Fixed or DECT (handset model(s))
- Analogue telephony requirements (lift phones, fax machines, chip & pin machines) etc
- Special features or requirements
- Cost estimates (typically quote a cost per extension)

Note: Existing numbers cannot be incorporated outside the 0131 650 xxxx and 0131 651 xxxx ranges into the University's telephone system.

Note: TSS currently recommends two fixed handset models (a 'standard' model and a 'heavy user' model for receptionists/secretaries) and one DECT handset model.

4.4 EQUIPMENT AND INSTALLATION

4.4.1 Fixed IP Handsets

For fixed IP handsets, it is important that the planned locations are provided with (a) a 13A electrical power outlet with sufficient clearance around it to allow plug-mounted power unit to be inserted and (b) a data network port.

4.4.2 IP DECT Handsets

IP DECT handset location is not so critical, since these are inherently mobile units. However, they do have a charging cradle which requires to be plugged into the electrical mains somewhere. Furthermore, each handset is registered to a 'base' DECT Access Point (DAP), and while it will (obviously) function with any DAP on the DECT system, ideally it should be located near to its base DAP.

4.4.3 IP Handset Installation

IP handset installation depends on the following being completed:

- Data network installed and working
- Electrical power available
- Decoration complete (avoiding risk of damage to handsets)
- Furniture in place (so there are desks to put phones on)
- DAPs installed (IP DECT phones only)

Project Managers should note that installing telephones on site is not a trivial task. Each handset needs to be taken to its destination location, unpacked, checked, assembled, plugged in, configured, tested, and packaging disposed of. Allow about one week of elapsed time per 100 handsets (assuming two engineers are allocated).

4.4.4 Other Equipment Installation

If other equipment (e.g. an analogue-to-VoIP converter to support fax machines) is to be installed on the premises, CIS will liaise with the client regarding how and when this will be done.

4.4.5 DECT Access Points (DAPs)

If the client requires DECT telephony, a DECT survey will normally be required in order to identify the optimum number of and locations for DECT Access Points (DAPs). The survey may be carried out by NEC, and the cost will be included in the final charge which TSS makes to the project.

Each DAP must be provided with a dedicated data network port, which must provide PoE. A separate mains power socket is therefore not required for DAPs.

Note: DECT is the standard for cordless phones, be they analogue or VOIP. It uses frequency spectrum (1880 MHz-1900 MHz) which is distinct from Wireless Networking (2.4Ghz or 5GHz).

Note: The University has VOIP DECT telephony installed which uses separate cable free infrastructure - DAPs (DECT Access Points) - to integrate with the fixed-line VOIP telephony.

Note: Wireless LAN telephony is a separate category of technology and is not currently implemented in the University infrastructure.

5 TELEPHONY (ANALOGUE)

5.1 OVERVIEW

Analogue phones are used as backup only

5.2 DETAILS

Equipment rooms must have a double TO installed for back up (analogue) telephony. The TO's must be positioned central to the communications cabinets on the wall facing the front of the patch panels and active equipment.

Back-up phones are part of the structured cabling infrastructure but will not be IP based. Back-up phones will connect to the analogue telephone distribution.

Emergency phones, (lift phones etc.), are not part of the structured cabling infrastructure but will be wired in CW1308 cable from the local DP. The TO for any lift must be installed outside the lift shaft in a location easily accessible to allow testing of the TO.

Each BD will have a single 50 pair CW1308 fed from the building DP.

Each FD will have a single 20 pair CW1308 fed from the BD.

A dedicated telephones communications cabinet will house the analogue telephone distribution. This cabinet will usually be located in the equipment room.

Install the following links installed from BD to telephones cabinet:

- 24 x CAT6A
- 20 pair CW1308

For further information about telephones, please contact the CIS Project Manager.

6 TELEPHONY (MOBILE)

6.1 OVERVIEW

Design and fit-out of University buildings must ensure that mobile telecommunications are effective within the building.

Some University campus areas suffer from generally poor mobile coverage. In areas of otherwise good mobile coverage modern building materials used during construction often result in poor mobile signal within the building.

Solutions must support voice and data services for all UK mobile network operators and include an appropriate upgrade path to support emerging wireless technologies over time. This may include the installation of a Distributed Antenna System (DAS) within the building as part of the fit-out.

Note: Though needs to be given to when is appropriate to consider the installation of such a system due to the costs involved: as part of the 'standard' build, or a retro-fit when indoor mobile coverage can properly be assessed.

7 AUDIO VISUAL EQUIPMENT

7.1 OVERVIEW

Most teaching spaces will require audio visual (AV) equipment. Whether it's a full lecture theatre or a student study pod equipment is require to enhance the teaching experience, meet accessibility and equality requirements, allow student interaction with the lecture and facilitate collaborative study.

7.2 GENERAL DETAILS

Learning Space Technology (LST) have an internal, constantly changing standards matrix that allows Project Managers to keep equipment selection and design consistent. This controls what equipment is used after the R and D process. This helps with system stability and maintenance.

Much of the IP based audio-visual technology equipment installed at University of Edinburgh will be part of the structured cabling infrastructure.

Teaching areas will require TOs for web cameras, information screens, lecterns etc. TOs will also be required at study spaces.

If there is no detailed information, the design and installation personnel for the structured cabling infrastructure should allow TOs as section 2.3.7

Note: Industry 'best practice' guidance documents can be used as a reference.

http://www.aetm.org/wp-content/uploads/2014/10/AETM_Audio_Visual_Design_Guidelines_2nd_Edition.pdf

LST work closely with Estates to provide design, procurement and project management of all AV facilities within refurbishment, new build projects and rolling replacement AV upgrades.

Our Estates Projects are processed in three ways. This depends on the type of project it relates to:

- Large Capital: Projects initiated, led and funded by Estates Development - http://www.ed.ac.uk/estates/what-we-do/development
- Small Works: Projects initiated, led and funded by Estates Small Projects & Minor Works - http://www.ed.ac.uk/estates/what-we-do/small-projects
- Premises Teams: Projects initiated and led by LST, funded by IS or School / Support Group clients. LST engage with Estates to provide power, network, joinery and painting services - https://www.ed.ac.uk/estates/what-we-do/maintenancecontractservices Estates, External Architects and Consultants must not make assumptions and must contact the Learning and Teaching Spaces Technology Section (LTSTS) for further information and detailed requirements for AV distribution.

7.3 EQUIPMENT

Most spaces will have the following equipment. The actual make and model will change depending on the space size and use and this is detailed in LSTs standards matrix.

- **Displays** can range from a large projector onto a 6m electric drop down screen in a lecture theatre to a 42” LED screen in student study pod

- **Input Sources** include a UoE fixed PC, VGA and HDMI input cables, document camera, DVD or blu-ray player and a bring your own device (BYOD) wireless receiver

- **Signal Routing** takes in all the inputs and converts them to digital signals to transmit to the display device. In small installs this could simply be over a HDMI cable but in large installations covering distances greater than 7m this would be done using point to point screened CAT6A, and twisted pair senders

- **Audio System** can be a simple stereo left and right sound playback to full room voice reinforcement systems with multiple microphones and ceiling speakers. This would also include any hearing assistance system, usually an induction loop

- **Control System,** in most rooms the control system will be a small button panel allowing the displays to be switched on and off as well as input source selection and sound volume level selection. In theatres with dual projection, a touch panel would be used to select separate input sources to each display

8 ACCESS CONTROL DOORS

8.1 INTRODUCTION

This section describes the access control and central alarm monitoring system installed in the University. It provides a basic description of the system, and detailed descriptions of the infrastructure and interfaces required at access control points and alarm panels.

8.2 SYSTEM OVERVIEW

Door controllers (iSTARs) can be housed in telecommunications or equipment rooms. The door controller location(s) must first be agreed with the CIS Project Manager.

iSTARs may be either rack or wall mounted. The CIS Project Manager shall advise.

If rack mounted, the design and installation personnel responsible for the design of the structured cabling infrastructure shall ensure sufficient space is allocated within the communications cabinets to house the iSTAR and associated equipment – see also 2.3.2.1.

The access control system used is C*Cure 9000, supplied by Software House (a division of Tyco). Details can be found at www.swhouse.com.

The system has two main functions:

- Access control using the University's blue smart card.
    - Access control doors are used to control access for staff and students across the campuses, from whole buildings, areas within buildings down to individual rooms
- Monitoring of alarms including intruder, fire, freezers, radiation units, panic alarms etc. across the campuses.
    - Alarm panels are connected to the system and monitored at a central control station. Doors can be programmed to unlock on fire alarm activation

The system comprises of approximately 150 access controllers connected to a host computer across the university data network, and monitoring software used at two security control rooms staffed by University Security. All doors and alarms are configured with a unique identity and are programmed according to users' requirements. 'Events' (*e.g.* alarm activations, forced entry etc.) are configured in the system and displayed on the monitoring screen, enabling appropriate action to be taken when they are activated.

Some of the features of the system are:

- Automatic unlocking of relevant access control doors when a fire alarm activates
- Monitoring electrical supplies powering doors, controllers etc
- Activation of a sounder if a door is held open too long
- Locking and unlocking doors at specified times
- Two-factor authentication: requiring a card to be presented and a PIN to be entered
- Automatic recognition of new cards following overnight data transfer from Card Services
- Local 'Door Managers' able to control who has access

- Supports 'monitor only' doors (for example; fire exits)

Refer to Appendix 2.A.

A team of engineers and administrators in Communications Infrastructure Services (CIS) keep the system operational and see to new installations, faults, the day to running of the system, and out of hours cover.

The system is critical to the safe and secure operation of the University, and the University Security Department is heavily dependent on it.

8.3 EQUIPMENT

This section describes the main components of the system:

- Controllers
- PSU/junction box
- Card readers
- Locks
- Door contacts
- Request to exit
- Break glass unit
- MORAG switch
- External key switch

Basically, a controller is connected to a number of doors. At each door, a power supply unit / junction box links the controller and the door hardware – the card reader, magnetic lock, door contacts, request to exit button, break glass and key switch.

8.3.1 Wireless LAN Systems

There are various types of Wireless LAN reader/lock system available. Readers are built in as part of the door lock hardware and connect to the system using Wireless LAN technology. These systems offer differing solutions where a wired system may be impractical for various reasons. Door hardware can be configured to include mechanical lock barrels offering an alternative unlocking method using suited keys. Contact the CIS Project Manager for further details.

8.3.2 Controllers

iSTAR controllers, of which there are several sub-types, connect directly to the university data network, and can control several doors and monitor a number of alarms. All new controllers will be iSTARs.

The following iSTAR units are available:

iSTAR Pro		Wall mounted. Up to 16 readers, 32 supervised inputs and 16 relay outputs.

iSTAR Pro Rack Mount (2U and 4U variants) iSTAR Edge	 	Up to 16 readers, 32 supervised inputs and 16 relay outputs. Wall mounted. Available in one-, two- or four-reader models, with 4 or 8 inputs and 2 or 4 outputs.

The inputs can monitor alarms, door position (open/closed), power status etc. The outputs can control locks, sounders etc.

The input/output capacity of an iSTAR can be increased with the addition of input/output Modules. These can be installed adjacent to the iSTAR or remotely up to 1220m. This option can be discussed with the CIS Project Manager.

8.3.2.1 Location

The ideal location for a controller is in a communications room where there is adequate lighting, ventilation, power and access to existing cable routes.

Any other location must be agreed with the CIS Project Manager.

- In the case of the rack mounted iSTAR, adequate space around the rack (front and back) must be allowed for access to the unit
- In the case of the wall mounted types, the iSTAR and its associated PSU/battery box must be fitted with the base of the iSTAR enclosure at 1.2m, making it accessible for maintenance, board changes etc

8.3.2.2 Power

Wall mounted iSTAR Pros require a 12v DC supply. This is supplied by a power supply unit (PSU), supplied by CIS. Each PSU requires a 13amp un-switched spur. In addition, a 38Ah backup battery is mounted in a separate enclosure. Section Appendix 2.D illustrates this arrangement.

An ELMEDENE 1382FSA is used to power the iSTAR Pro. These are rated at 2A. A higher rated PSU may be required if multiple readers are powered from the iSTAR or APC. The 1382FS is supplied in a H205 W235 D85 enclosure and mounted adjacent to the iSTAR. **The CIS Project Manager will decide if a higher rated PSU is required.**

Rack mounted iSTARs have their own internal power supply which is fed from the local rack power.

The iSTAR Edge can be purchased as a PoE unit – in other words it can be powered directly from a suitable network switch. This may be appropriate in certain circumstances, however the normal approach will be to power it via a PSU and un-switched 13A mains spur, like an iSTAR Pro.

Provision should be made for the installation of a UPS to support rack mounted iSTARs and any network switches or other supporting equipment required to maintain alarm monitoring and access control functions in the event of mains power failure.

8.3.2.3 Network Connection

iSTARs are connected to the main server via the data network. Each unit requires a network connection via structured cabling (or direct patch cable to a network switch if rack mounted). For wall-mounted iSTARs, a TO is installed adjacent to the iSTAR.

A live network connection is required before an iSTAR can be commissioned.

In major refurbishments or new buildings, the data communications room(s) must be handed over before live equipment can be commissioned.

8.3.2.4 Reader, Input & Output Connections

The iSTAR should have suitable access to cable routes by means of tray, basket or trunking.

Connections to the iSTAR inputs and outputs are made using standard alarm signal cable type 92A (RS Spec). Maximum cable length is 430m.

Connections to the reader ports on the iSTAR are made using Belden 9844 cable. No other cable type will be accepted. Maximum cable length is 1200m.

A door will normally have its own power arrangements for locks etc. (see below), and the card reader will be powered from there. However, if there is no requirement for local power, readers can alternatively be powered directly from the iSTAR using a pair in the belden cable.

8.3.2.5 Alarm Monitoring

Any equipment that has the ability to operate a relay or switch as the result of a change of state (*e.g.* fire alarm, intruder alarm, panic button, high or low temperature warning etc.) can be monitored by the system. The system can be configured to display activation of the alarm on the monitoring station, together with the action required by the security control room.

When a fire alarm is activated, all access control doors in the area can be programed to unlock until the fire alarm is reset.

To monitor an alarm, the alarm contractor must provide a pair of volt free contacts configured as ‘closed, going open on activation’. They must be installed close to the alarm panel, and form a point of demarcation between the responsibility of CIS and that of the alarm maintainer. It is the responsibility of the electrical contractor to install the cabling between the alarm panel and the iSTAR. CIS will terminate the cable in the iSTAR; the contractor or alarm supplier must terminate the cable in the alarm panel.

8.3.2.6 Remote Switching

iSTARs have relay outputs with volt free contacts giving common, normally open, normally closed contacts. The relay can be used to control various devices such as sounders, lights, alarms etc.

8.3.2.7 Door Identification

Doors are identified on the system by their iSTAR number and their position on that iSTAR. For instance, door U015/12 refers to door 12 on iSTAR U015. This number is unique to the door and can be used to identify the door for any changes or faults. The reader and PSU will be labelled by CIS with the door's unique number.

8.3.2.8 PSU/Junction Box

The belden 9844 cable from the iSTAR terminates in a power supply unit/junction box (PSU/JB), which also contains a door sounder, 7Ah battery, an RM-4E circuit board and an Elmdene 1383FSB 12V 3A power supply, all within a H335 W350 D85 enclosure.

All cables from component parts of the door are terminated within the enclosure. Wiring from the PSU/JB to the component parts is normally multicore alarm cable Type 92A (RS Spec). Cable lengths from the PSU/JB to the door must not exceed 20m. The PSU/JB should be fitted as close as possible to the door it is associated with, in order to keep cable lengths to a minimum.

Note: The length of cables between various component parts and the PSU/JB may be an issue if they are excessive and a significant voltage drop is experienced. The voltage drop depends on many factors (type and numbers of locks, if the install includes a key switch, MORAG switch etc.).

The PSU/JB must be is fitted on the secure side and as close to the door as possible. For maintenance, the PSU/JB should be accessible (and easy to locate if not directly adjacent to the door). The PSU/JB must be mounted with the base of the enclosure no higher than 2.4m, and must have suitable access to cable ways or trunking containing wiring to other parts of the install.

Any other locations must be agreed with CIS Project Manager.

Positions above ceilings and below suspended floors are not acceptable, because the PSU/JB must be accessible 24/7 by one person.

A 13A un-switched mains spur is required adjacent to the PSU/JB.

If the PSU/JB is not mounted adjacent to the door the sounder may need to be removed from PSU/JB and moved to a position close to the door to avoid any confusion.

8.3.2.9 External Doors

For external doors, which form part of the security perimeter of a building, a larger 38Ah battery is required. This will energise the mag lock for a longer period in the event of a mains power failure.

The PSU/JB is too small to house the 38Ah battery, so a separate H295 W300 D205 enclosure is required. Consideration must be given to the combined size and weight when mounting the battery box. It is mounted adjacent to the PSU/JB, with the base of the box no higher than 2.4m from floor level. Standby batteries are tested annually by CIS, and **must therefore be safely accessible by one person**.

If (exceptionally) the mains supply to the PSU/JB is backed up by a generator, the larger battery is not required and the normal 7Ah battery will suffice.

8.3.3 Card Readers

Readers are connected directly to the iSTAR by dedicated wiring. The following HID Mifare proximity card readers are used:

Model RS10 (left foreground) has no keypad and is narrower than the RSK40 (right foreground) with the keypad.

The readers are suitable for interior or exterior use.

The reader can be directly mounted to the wall using its own back box, or mounted on a single gang back box, flush or surface mounted. The reader should be positioned at a suitable height between 400mm and 1.2m as per UoE disabled access standards.

The reader is not normally connected directly to the iSTAR. It is connected to an RM-4E 'personality' circuit board housed in the PSU/JB. The personality board controls communication back to the iSTAR, the door identity as well as some local functions.

8.3.4 Locks

A 12V supply of up to 3A will be provided from the PSU/JB to power the lock. The normal arrangement is that the supply is provided when the door should be locked, and is removed to allow the door to be opened, although this can be reversed if appropriate. The important point is that whatever lock is provided should be 'failsafe' – in that it should be possible to obtain egress if there is a power failure.

The 12V 3A power connection is the boundary between the responsibility of CIS and the responsibility of Estates. CIS is not responsible for the adjustment or configuration of locks. This is the responsibility of Estates or their appointed contractors.

Magnetic locks or 'maglocks' have been the preferred type for use on the UoE system. The preferred unit is listed in https://www.specialized-security.co.uk/electro-magnetic-locks/midi-magnets.html. The magnet is energised when the door is locked. If power is removed, the lock will open; it is therefore 'fail open'.

Note: Using any other lock type must be agreed with the CIS Project Manager to make sure it is compatible.

Double doors may require a magnetic lock on each leaf. Doors intended to be highly secure, or which are susceptible to brute force attacks (e.g. with a sturdy handle allowing maximum force to be applied) may require two maglocks, or other arrangements.

The cable length from the lock to the PSU/JB must not exceed 20m to minimise voltage drop,

8.3.5 Door Contacts

Each door leaf must be fitted with door contacts (proximity switches), which the system uses to detect the state of the door (open or closed). This state information is used to re-power the lock(s) and to indicate situations such as door forced, door held open etc.

Locks with built in relays or door contacts may not be compatible with the system. **The CIS Project Manager will advise.**

8.3.6 Request to Exit

A push button or touch pad fitted close to the door on the secure side is used to signal the system to release the door lock for egress. This is called the request to exit (RTE) switch.

The RTE switch is mounted on a single gang back box either flush or surface mounted directly onto the wall or within trunking. The RTE unit must be mounted at a suitable height between 400 and 1.2m as per UoE disabled access standards.

Remote RTEs may be fitted at reception desks or operated from video entry systems. **The CIS Project Manager will advise on how they will be connected.** If remote RTEs are installed or an RTE signal is required from intercom/video entry systems, the cable length must not exceed 430m.

A pair of volt free open going closed contacts is required from any entry system or remote release to enable remote opening of the door.

8.3.7 Break Glass Unit

Every door must have a means of being opened from the secure side in the event of a system failure or emergency. Therefore, for single-reader doors, a green[1] break glass unit is provided on the secure side of the door. The break glass unit is fitted in the lock circuit, such that when operated, it disconnects the power to the magnetic lock allowing the door to be opened.

Multiple-pole break glass units are used to alert the monitoring station as well as de-energise the lock and sound a local alarm when the glass is broken.

The break glass unit can be mounted on a single gang back box, either flush or surface mounted directly onto the wall or within trunking. The break glass unit must be mounted at a suitable height between 400 and 1.2m as per UoE Disabled Access Standards.

8.3.8 MORAG Switch

It is sometimes necessary to disable a door completely for a period of time – e.g. if the door is being painted, or if the protected area is temporarily being opened for general access.

A MORAG switch is a simple key operated switch which overrides the lock circuit and disables the door contacts. The switch is fitted at a convenient position on the secure side of the door. An LED is lit when the switch is in the operated position.

The MORAG switch can be mounted on a single gang back box either flush or surface mounted directly onto the wall or within trunking.

[1] Green indicates that the break glass is associated with access control, rather than (*e.g.*) red for fire.

The MORAG switch allows local control of a locked door and is often fitted as an extra after the main install to suit the users' needs. It is preferable to fit it at the outset, if it can be determined that there is likely to be a requirement.

8.3.9 External key switch

When there is no other entrance to the area by means of a mechanically locked door, an external key switch will be fitted. This is a key operated switch with a similar function to the break glass unit. The switch is hidden out of sight, usually above ceiling tiles on the non-secure side of the door. This is essential to enable access to an area such as a laboratory or workshop in an emergency, in case failure of the access control system prevents the door from opening.

Many types of switches are available - as long as the switch can break the circuit and has a unique key, it should be suitable for use. Keys are typically securely held by Security or Building Supervisors.

8.4 DOOR VARIANTS

The system as described above is the most common type of installation. However, variants are possible, as described in the following subsections.

8.4.1 Dual Reader

This is where egress is controlled by a second card reader, not an RTE button. An accredited card (and possibly PIN) is required for both entry and exit. This system requires two reader ports configured to operate the door. A break glass unit is installed on the 'secure side', taking into account any emergency exit routes.

This variant requires two reader ports on the same iSTAR, and two RM-4E personality boards installed in the PSU/JB.

See Appendix 2C Dual Reader Door Layout and Cabling for further details.

8.4.2 Automatic Doors and Turnstiles

Automatic doors and turnstiles can be integrated with the access control system.

On a valid card presentation to the reader, a pulse is generated from the relay on the RM-4E circuit board in the PSU/JB. This is used to signal the control mechanism of the automatic door or turnstile. Once activated by the pulse, the door or turnstile control completes its cycle, powering down locks, releasing gates opening and closing doors etc.

Many automatic doors are disabled entrances. The opening and closing cycle must be controlled by the door controller to achieve the correct timings for disabled use. This is a standard 24/7 setup.

For additional control, relays in the iSTAR can be programmed to enable or disable locks, detectors or other parts of the door system to allow different open/closed combinations. To achieve this, additional cables will be required to the iSTAR.

8.4.3 Lifts

Lift call or floor selection buttons can be controlled to restrict access to the lift or to certain floors.

To achieve this, a relay in the iSTAR is wired into the lift or floor call button circuit and programed to operate on a valid card presentation.

The activated relay then completes the circuit to make the call button live allowing the user to call the lift or select the required floor.

8.4.4 Interlocking Doors

There may be a requirement for two access control doors to 'interlock'. This is where two doors into an area need to interact so when one door is open due to a valid access request or egress signal, the other door is secured and cannot be opened until the first is secure.

This may be a requirement in entrance areas or changing rooms where an 'air lock' effect is required.

The doors into the area must be access control doors on the main system and secured by maglocks only. Additional wiring is required to support the software setup required to make these doors operate as required.

MORAG switches must NOT be installed on interlocking doors.

8.5 RESPONSIBILITIES

This section outlines the responsibilities of CIS and of contractors when installing a new access control door. Any variation to these responsibilities must be agreed with the CIS Project Manager in writing.

1. CIS charges a monthly fee for the maintenance of new internal access control doors. All requests for internal doors, which do not form part of the security perimeter of the building, must be accompanied by a written agreement by the 'owning' department (usually the building occupier) to pay the maintenance fee, indicating the cost centre, job code and account code from which the fee will be paid.
2. All requests for doors must be accompanied with floor plan drawings showing the door and proposed location of associated equipment.
3. All cable routes, containment, back boxes and equipment positions must be agreed by the architect and design teams with the CIS Project Manager. The diagrams in Appendix 2.C, indicate typical configurations.
4. All card readers, break glass units, RTEs and other 'user interface' parts of the install must be positioned to comply with disabled access and use as per the UoE Disability Access Standards
5. The appointed contractor must supply and install all cables, and identify them at both ends. Suitable low smoke zero halogen (LSZH) fire retardant or resistive cables must be used. Cable between the PSU/JB and the iSTAR must be Belden 9844, and no other cable type will be accepted.
6. CIS will provide the PSU/JB, battery boxes and other equipment to be fitted by the appointed contractor. The Contractor will have the necessary risk assessments and method statements (RAMs) in place to install these.
7. Contractor will supply and fit locks.
8. CIS will make all final connections, program the necessary systems and commission the installations.
9. All installs must be done to the latest version of IEE and BSI regulations.

8.6 TYPICAL CABLE LAYOUT REQUIREMENTS

Please refer to Appendix 2 for cable requirements and variations.

8.7 DIMENSIONS

This table gives the typical sizes in mm of the access control equipment, they may change depending on supplies available and should only be used as a guide.

Location	Item	H	W	D
Controller	iSTAR Pro enclosure with external PSU	615	420	100
Controller	iSTAR EDGE enclosure	310	310	100
Door	Power Supply Unit/Junction Box (PSU/JB)	335	350	85
Door	External key switch	90	40	40
Door	MORAG switch	85	85	
Door	Break glass	85	85	
Door	Request to exit	85	85	
Door	38Ah battery box (external doors only)	295	300	205
Door	Reader without keypad, with back plate	105	48	23
Door	Reader without keypad, with back box	105	48	35
Door	Reader with keypad, with back plate	122	48	27
Door	Reader with keypad, with back box	122	48	52

8.8 List of Parts

Equipment	No per door	Supplied by	Fitted by	Spec
iSTAR Pro. Inc 1GCM+ 2 ACM boards and Cabinet	1 x 16 doors	CIS	Electrical Contractor	http://www.swhouse.com/products/iSTAR_Pro.aspx (Set up by CIS Technical services)
2A PSU ELMDENE 1382FSA	1 x iSTAR	CIS	Electrical Contractor	http://www.elmdene.co.uk/FS-Range.html
3A PSU ELMDENE 1383FSB 12v 3A and junction box includes, Sounder, RM-4 Personality board, 7Ahr battery, connections , resistors	1 x door	CIS	Electrical Contractor	http://www.elmdene.co.uk/FS-Range.html RM-4E http://www.tycoacvs.com/Ccure/CCURE_9_4/UM_RM-4Ee_quick_start_F0_0808_EN_LT.pdf
Break glass cover	1 x door	CIS	CIS	https://www.specialized-security.co.uk/exit-buttons-and-devices/break-glass-units-and-accessories/kgg200sg.html#
Break Glass unit	1 x door	CIS	CIS	https://www.specialized-security.co.uk/exit-buttons-and-devices/break-glass-units-and-accessories/mx03.html

Request to exit switch (internal door) Or Request to exit switch (external Door)	1 x door	CIS	CIS	https://www.specialized-security.co.uk/exit-buttons-and-devices/plastic-exit-buttons/dl09.html# https://www.specialized-security.co.uk/exit-buttons-and-devices/weatherproof-exit-buttons/spb004s-w.html
Proximity switches (surface) or Proximity switch (flush)	1 x door	CIS	CIS	http://uk.rs-online.com/web/p/security-alarm-door-window-switches/0333192/?origin=PSF_432255|fp&cm_sp=featureproducts-_-FeaturedProductsContent-_-0333192 http://uk.rs-online.com/web/p/security-alarm-door-window-switches/0333158/
Magnetic lock (EM01 type 600lb holding force) or Magnetic lock (EM10 type 1200lb holding force)	1 x door	Contractor	Contractor	https://www.specialized-security.co.uk/electro-magnetic-locks/midi-magnets.html
Z&L Bracket if required	1 x door	Contractor	Contractor	https://www.specialized-security.co.uk/electro-magnetic-locks/midi-magnets.html
External key switch. If required.	1 x door	CIS	Electrical Contractor	http://uk.rs-online.com/web/p/security-alarm-door-window-switches/0333164/?searchTerm=surface+pass+keyswitc
Card reader (iCLASS HID)	1 x door	CIS	CIS	http://www.hidglobal.com/products/readers setup by CIS Technical services
6 core alarm cable	As required	Electrical Contractor	Electrical Contractor	http://www.cqr.co.uk/professional-cable/
12 core alarm cable	As required	Electrical Contractor	Electrical Contractor	http://www.cqr.co.uk/professional-cable/ or http://www.cqr.co.uk/low-smoke-fume-cable/
Belden8944 cable	As required	Electrical Contractor	Electrical Contractor	http://www.belden.com/techdatas/english/9844.pdf

				or http://www.belcom.co.uk/downloads/FireFighter_Data_Cables/index.html#/34/
Mains flex 1.5mm	As required	CIS / Electrical Contractor	CIS / Electrical Contractor	Standard mains flex LSZH/Flame retardant type cable to be used
containment	as required	Electrical Contractor	Electrical Contractor	Trunking, conduit, back boxes to suit.
38 Ahr Battery box	1 x iSTAR	CIS	CIS	http://uk.rs-online.com/web/p/wall-boxes/7079126
38 Ahr Battery box	1 x external door	CIS	CIS	http://uk.rs-online.com/web/p/wall-boxes/7079126
38Ahr battery when required. 1 per iSTAR, 1 per external door	1 x iSTAR 1 x extn door	CIS	CIS	http://www.batterymasters.co.uk/Product-YUASA-NP38-12,-12V-38AH-20HR-(AS-40AH-42AH)-SEALED-LEAD-ACID-RECHARGEABLE-BATTERY_1768.aspx
7Ahr battery	1 x door	CIS	CIS	http://www.batterymasters.co.uk/Product-YUASA-NP7-12,-12V-7AH-20HR-SEALED-BATTERY-(AS-6AH,-7.2AH,-7.5AH-8AH)-with-4.8mm-0.187-WIDE-MALE-SPADE-CONNECTIONS_1758.aspx

9 DIGITAL SIGNAGE

9.1 OVERVIEW

The University of Edinburgh uses digital signage in two ways:

- Welcome screens
  - LCD screens between 42 and 70 inch (inclusive) that are mounted in reception and waiting areas
  - Used to display advertising & events information
- Room booking screens
  - LCD screens between 19 and 22 inches (inclusive) that are mounted outside each teaching/meeting room
  - Used to display room booking information

Although the above screen's primary function is defined above, they can show either set of information or a combination of both.

9.2 EQUIPMENT

The welcome screens comprise an LCD screen usually mounted on a wall bracket with a separate OneLan digital signage player mounted behind the screen.

The room booking screens have embedded players. The older system used IGEL screens with Linux PCs. LST are now installing OneLan screens running OneLan software on android operating systems.

Each type of display will require a TO responsibilities.

LST is responsible for organising the power and data through the premises teams. They will also arrange the purchasing and installation of the screens. If this is on behalf of a department, the department will pay the eIT for the power and data and send the PO for the screens.

LST will also monitor the hardware but local content will be provided and maintained by the department. Room booking screens simply get a feed from the web timetabling system.

10 STANDARD DESKTOP PROVISION

10.1 OVERVIEW

This section gives the guidelines and standards for provision a standard desktop PC to a new build or refurbished building.

Note: For PCs that are not of a standard configuration, please liaise with the local computing officer.

This section only deals with:

- Equipment
- Data cabling
- Power requirements

10.2 DETAILS

This is to provision a standard or custom desktop or laptop solution for new or upgrade buildings

10.3 EQUIPMENT

Select laptop or desktop model suitable for the job role.

Note: If additional PC components are required, (for example a graphics card upgrade) make sure the form factor is adequate to accommodate this.

- An ‘All-in-One’ desktop PC reduces the overall power consumption and the number of power sockets required
- A suitable monitor for the work when required at desk, typically 20” or above
- Sufficient power supply to support both PC and monitor, typically 2x13 AMP sockets
- A network data point with a bandwidth of at least 1Gb to backbone

11 PRINTING (SHARED MFDS)

11.1 OVERVIEW

This section gives the standards and guidelines for creating a print landscape in a new environment. It also details the steps required to integrate any new print devices into the current infrastructure.

11.2 INFRASTRUCTURE REQUIREMENTS

All print devices must be connected to Edlan through Ethernet. Use a non-routable IP range in areas where possible. The IS SelectPrint team will allocate the IP and DNS name before delivery (not locally).

If the print device has a facsimile, this shall be connected to an MC8 via the structured cabling.

Exceptions in the local firewalls (if present) must be configured. Inform local IT Support of the incoming printers and use the exceptions listed in the link. For more information or queries, please contact is.helpline@ed.ac.uk and mark the query for the attention of the SelectPrint team.

https://www.wiki.ed.ac.uk/display/ServiceDelivery/Firewall+Exceptions

When the device has picked up its own IP address and the firewall exceptions have been included, the IS SelectPrint team will configure the device for use and create user print queues where appropriate.

11.3 SPECIFICATION STAGE

Information Services follow and recommend a communal printing landscape where multiple users share a device or a bank of devices. Therefore specifying devices with various requirements for a user group results in machines with multifunction capabilities (MFD).

It also means creating print areas that are designed as ‘print pods’. These are typically sectioned off areas in the form of rooms, or alcoves that can house the bank of devices. Creating a dedicated print area is recommended for the comfort of the users, by removing them from the noise and heat that can come from heavy printing.

The Information Services SelectPrint scheme is used when printing is required, where the department can choose from devices on a contracted lease. The devices range from simple network printers to multifunction devices capable of supporting a large user base with varying needs including scanning, fax and complex finishing options. Within this range is 4 devices that are capable of cloud printing which is an effective way of managing printing for a large user base. Full details on devices available, the costs associated and how to order are detailed at:

http://www.ed.ac.uk/information-services/computing/desktop-personal/multifunction-devices/procedures

Assistance at this stage can be sought from selectprint@ed.ac.uk

12 CCTV

12.1 OVERVIEW

Much of the CCTV equipment installed at University of Edinburgh is now IP based and will be part of the structured cabling infrastructure.

Each project will be considered on an individual basis, this section sets out a generic background, and preferred specification for CCTV security systems installed across the campus.

CCTV installation is part of a broader and integrated security framework that serves to protect the university community and its estate.

12.2 REQUIREMENTS

Please use the following provisions and standards for installation, monitoring and maintenance of CCTV equipment fitted to university buildings.

12.2.1 Operational Requirements

For major new builds and refurbishments:

- Monitoring the exterior of the building
- Main access
- Egress points

For smaller projects, refer to the University of Edinburgh CCTV Policy and liaise with the Security Manager for advice and assistance.

CCTV normally requires two TOs per location

TOs will be installed at locations specified by the security section of the support services division within Estates.

A dedicated CCTV communications cabinet houses the CCTV recording and other security equipment. This cabinet may be located in the equipment room, at a location agreed with the CIS project manager.

The following links shall be installed from BD to CCTV communications cabinet:

- 24 x CAT6A
- 8 x OM3 multimode optical fibre
- 8 x OS1 singlemode optical fibre

Contact the security section of the support services division within Estates for further information about CCTV.

12.2.2 Equipment Requirements

The following points denote those aspects of camera installation that are seen as essential to effective operational requirements.

- All CCTV cameras must colour HD quality capable of being utilised in all weather conditions and variable lighting conditions

- Cameras must be fixed and stable platform or capable of Pan, Tilt or Zoom (PTZ) movement as required
- Cameras should be fitted so that repair and maintenance of the equipment can be carried out. This includes using of retractable poles if required
- CCTV cameras should be connected through PoE+ to an identifiable data point using copper cabling from the nearest switch. The data port must marked to show the camera details. The data point must be connected to a marked Geutebruck network video recorder (NVR) housed in a dedicated equipment rack in a secure communications room using the general shared Ethernet networking technology available within the building. A monitor, mouse and keyboard must be provided if any part of the system is a stand-alone element such as digital video recorder (DVR). CCTV footage is carried across the general network backbone and therefore would not allow for a specific cable to be identified as carrying this data alone
- Images from the Geutebruck NVR must be transferred using the network infrastructure to the server room in the security operations hub at 1st floor of 13 Infirmary Street, EH1 1LT. The images must be capable of being displayed in the security operations room itself (Room 1.03) 13 Infirmary Street

12.2.3 Power Requirements

The preferred power supply for CCTV assets is PoE+. This distributes power and data safely over an Ethernet cable to a targeted device(s) and where USB connections are unsustainable and standard AC power is inconvenient, expensive or not possible to supply (usage examples are wireless LAN access points, IP phones and surveillance cameras).

Advantages of PoE+:

- Transmits power over longer runs of cable than USB
- Fewer topology and cable limitations that USB

For future proofing PoE CCTV systems against higher power demands, consider PoE+ when determining the type of camera to be installed.

12.2.4 Primary Deployment Locations

Internal Cameras:

- Capture high quality image of persons who enter buildings at main access/egress points
- Monitor specified external doors / loading bays and areas of high risk such as cash handling areas and rooms storing high value equipment

External Cameras:

- Monitor cycle storage areas relative to the potential for theft from the location
- Cover ground floor external access to buildings including car parks
- Enable remote patrolling by security control room staff supporting building integrity and community safety
- Reduce the likelihood of deliberate damage of the equipment

12.2.5 Equipment Supplier/Installer

The successful supplier or installer will be instructed that all equipment provided will be fully open protocol and meets open network video interface forum (ONVIF) requirements i.e. It can be purchased off the shelf from any supplier without any pre-conditions being set and must be able to function and be operated

with equipment already in place, or that is later added to, and that it is also capable of connecting across an open network.

12.2.6 Engagement Processes

At relevant points in the installation / project timeline, consultation with the nominated liaison point from the University Security Section will take place and will serve as a marker of confirmed installation requirements to include location, type of asset, required connectivity, storage points, security stipulations and compliance issues.

12.2.7 Recorded Images

NVR hard drives should have capacity to store all images from cameras for a minimum period of 21 days from the date of recording. When the drive is full, automatic overwriting of recorded images should be possible.

12.2.8 CCTV Monitors

If CCTV monitors are to be located within buildings, steps are to be taken to ensure that images are not on public display to anyone other than security or reception staff.

12.2.9 System Commissioning

Following installation, all media access control (MAC) addresses of cameras are to be provided in writing to the security department who will register the devices on the EdLan database.

All CCTV assets must be commissioned onto the university monitoring system by the installer. This includes the demonstration of CCTV connectivity to the monitoring software and its functionality.

12.2.9.1 Training

Full training should be given to the appropriate university staff in the use of the system prior or at the time of the commissioning of the equipment. Training will include how to access the system (including usernames / passwords), use of cameras, viewing and downloading of images and contact and contract details for the system. Systems should be tested and demonstrated to all appropriate stakeholders to confirm serviceability.

13 GLOSSARY

ANSI	American National Standards Institute
ASHRAE	American society of heating, refrigerating and air-conditioning engineers
AV	Audio Visual
BD	Building Distribution
BEMS	Building energy management system
CCTV	Closed circuit television
CIS	Communications Infrastructure Services
CP	Consolidation point
DAS	Distributed antenna system
DVR	Digital video recorder
EMC	Electromagnetic compatibility
FD	Floor Distribution
ITI	Information Technology Infrastructure
LST	Learning space technology
MAC	Media access control
MFD	Multi-Functional Device
MICC	Mineral-insulated copper-clad cable
NVR	Network video recorder
ONVIF	Open network video interface forum
PBX	Private branch exchange
PCB	Printed circuit board
PDU	Power distribution unit
POE	Power over Ethernet
PSU	Power supply unit
RIBA	Royal Institute of British Architects
RTE	Request to exit
SNMP	Simple network management protocol
TIA	Telecommunications Industry Association

TO	Telecommunications outlet
UoE	University of Edinburgh
UPS	Uninterruptible power supply
UTP	Unshielded twisted pair
VoIP	Voice over internet protocol

Appendix 1 CABLE INSTALLATION

Appendix 1.A LIST OF BRITISH STANDARDS USED

Design and installation personnel for structured cabling infrastructure must have a thorough working knowledge of the following British Standards associated with data cabling:

- BS 6701: Telecommunications equipment and telecommunications cabling – Specification for installation, operation and maintenance
- BS EN 50173-1: Information technology – Generic cabling – General requirements
- BS EN 50173-2: Information technology – Generic cabling – Office premises
- BS EN 50173-3: Information technology – Generic cabling – Industrial premises
- BS EN 50173-4: Information technology – Generic cabling – Homes premises
- BS EN 50173-5: Information technology – Generic cabling – Data centres premises
- BS EN 50174-1: Information technology – Cabling installations – Specification and quality assurance
- BS EN 50174-2: Information technology – Cabling installations – Installation and planning and practices inside buildings
- BS EN 50174-3: Information technology – Cabling installations – Installation and planning and practices outside buildings
- BS EN 50310: Application of equipotential bonding and earthing in buildings
- BS EN 50346: Information technology – Cabling installations – Testing of installed cabling
- BS EN 61935-1: Specification for the testing of balanced and coaxial information technology cabling, installed balanced cabling as specified in the standards series EN 50173
- PD CLC/TR 50173-99-1: Cabling guidelines in support of 10 GBASE-T

During the design phase of a contract the Architect, Electrical/Data/Telecommunications Consultant, Main Contractor, Sub-Contractor, Supplier, Installer, or anyone responsible for the design of the structured cabling infrastructure, should refer to; BS EN 50173 series and BS EN 50174 series, which specify the structure and configuration of generic cabling systems.

During the specification phase of a contract the Architect, Electrical/Data/Telecommunications Consultant, Main Contractor, Sub-Contractor, Supplier, Installer, or anyone responsible for the specifying of the structured cabling infrastructure, should refer to; BS EN 50174 -1, which is concerned with specification, quality assurance, documentation and administration of information technology cabling to be installed. It sets out the responsibilities of cabling installers and premises owners or appointed representatives separately, and is intended to be referenced in relevant contracts.

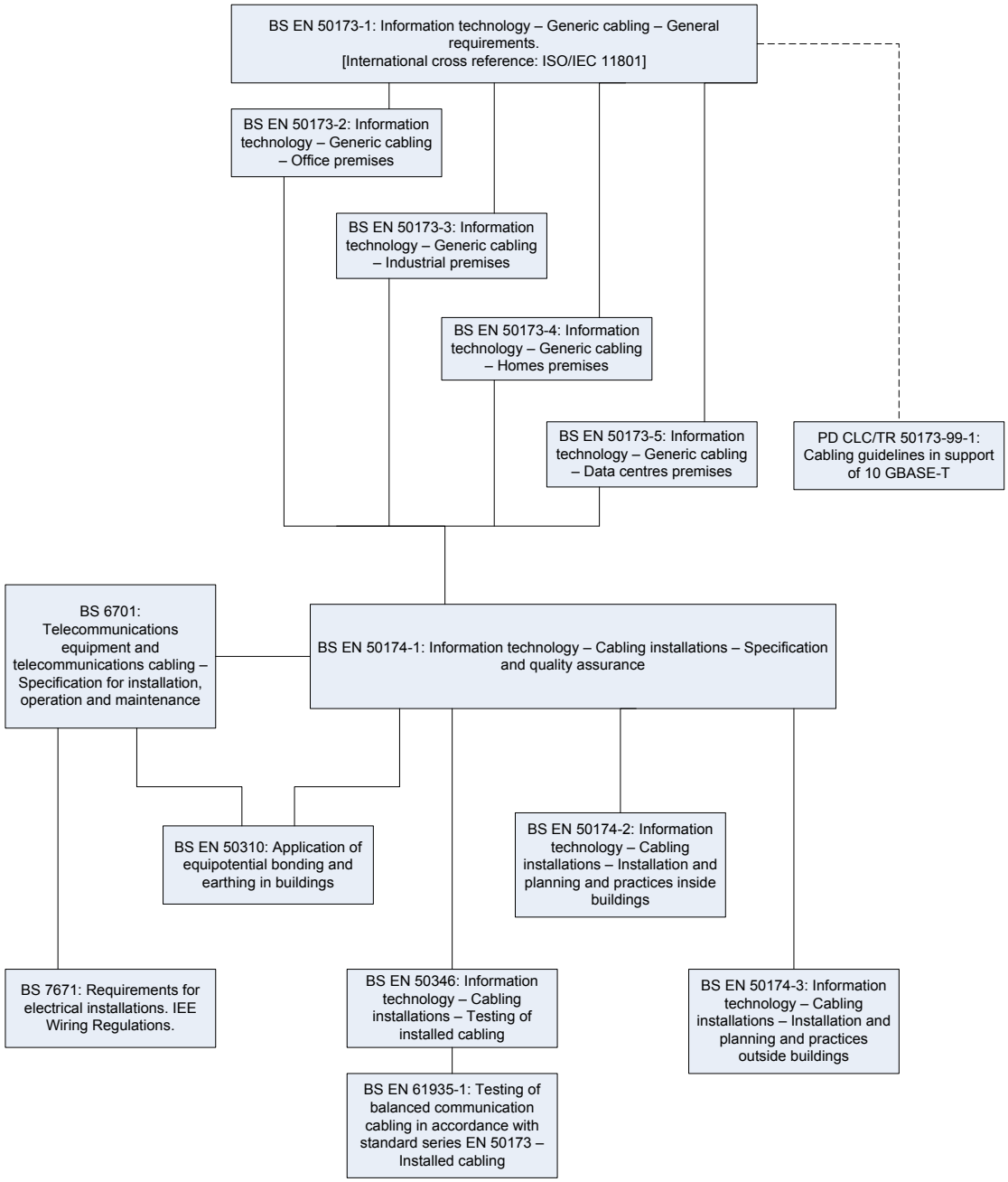
During the planning phase of a contract the Architect, Electrical/Data/Telecommunications Consultant, Main Contractor, Sub-Contractor, Supplier, Installer, or anyone responsible for the planning of the structured cabling infrastructure, should refer to; BS EN 50174 -1, BS EN 50174 -2 and BS EN 50174 -3 and BS EN 30310, which are intended to be used by the personnel directly involved in the planning aspects (of the specification phase) and installation phase of cabling for both inside and outside buildings.

During the installation phase of a contract the Architect, Electrical/Data/Telecommunications Consultant, Main Contractor, Sub-Contractor, Supplier, Installer, or anyone responsible for the installation of the structured cabling infrastructure, should refer to; BS EN 50174 -1, BS EN 50174 -2, BS EN 50174 -3, BS EN 30310 and BS EN 50346, which are concerned with the planning, installation and testing of cabling.

Appendix 1.B BRITISH STANDARDS RELATIONSHIP

British Standards
Information Technology

Schematic relationship between the BS EN 50173 series and other relevant standards



Appendix 1.C OTHER BRITISH STANDARDS RELEVANT TO DATA/TELECOMMUNICATIONS CABLING

- BS 6266: Code of practice for fire protection for electronic equipment installations
- BS 6396: Electrical systems in office furniture and educational furniture- Specification
- BS 7083: The accommodation and operating environment for Information Technology (IT) equipment
- BS 7671: Requirements for electrical installations. IEE Wiring Regulations
- BS 7799-1: Information technology - Security techniques - Code of practice for information security management. [aka BS ISO/IEC 27002]
- BS 7799-2: Information technology - Security techniques - Information security management systems - Requirements. [aka BS ISO/IEC 27001]
- BS 7799-3: Information security management systems - Part 3: Guidelines for information security risk management
- BS 8220-2: Guide for Security of buildings against crime — Part 2: Offices and shops
- BS 8492: Telecommunications equipment and telecommunications cabling. Code of practice for fire performance and protection
- BS EN 12464-1: Light and lighting - Lighting of work places - Part 1: Indoor work places
- BS EN 12825: Raised Floor Access
- BS EN ISO 14644-4: Cleanrooms and associated controlled environments. Design, construction and start-up
- BS ISO/IEC 14763-2: Information technology - Implementation and operation of customer premises cabling - Planning and Installation
- BS ISO/IEC 14763-3: Information technology - Implementation and operation of customer premises cabling - Testing of optical fibre cabling
- BS EN 50098-1: Customer premises cabling for Information Technology - ISDN basic access
- BS EN 50098-2: Customer premises cabling for information technology - 2048 kbit/s ISDN primary access and leased line network interface
- BS EN 50288-1: Multi-element metallic cables used in analogue and digital communication and control. Generic specification
- BS EN 50288-6-1: Multi-element metallic cables used in analogue and digital communication and control. Sectional specification for unscreened cables characterised up to 250 MHz. Horizontal and building backbone cables
- BS EN 50468: Resistibility requirements to overvoltages and overcurrents due to lightning for equipment having telecommunication ports
- BS EN 50600 series: Information technology. Data centre facilities and infrastructures.
- BS EN 60603-7 Series: Connectors for electronic equipment. Detail specification for 8-way, unshielded, free and fixed connectors
- BS IEC 61000-5-2: Electromagnetic Compatibility (EMC) - Installation and mitigation guidelines - Earthing and cabling
- BS EN 61000-6-3: Electromagnetic compatibility (EMC) - Generic standards - Emission standard for residential, commercial and light-industrial environments
- BS EN 61000-6-4: Electromagnetic compatibility (EMC) - Generic standards - Emission standard for industrial environments
- BS EN 61935-2: Testing of balanced communication cabling in accordance with series EN 50173. Patch cords and work area cords. Blank detail specification for class D applications
- BS EN 62305-1: Protection against lightning — Part 1: General principles
- BS EN 62305-2: Protection against lightning — Part 2: Risk management
- BS EN 62305-3: Protection against lightning — Part 3: Physical damage to structures and life hazard

- BS EN 62305-4: Protection against lightning — Part 4: Electrical and electronic systems within structures

Appendix 1.D AMERICAN STANDARDS

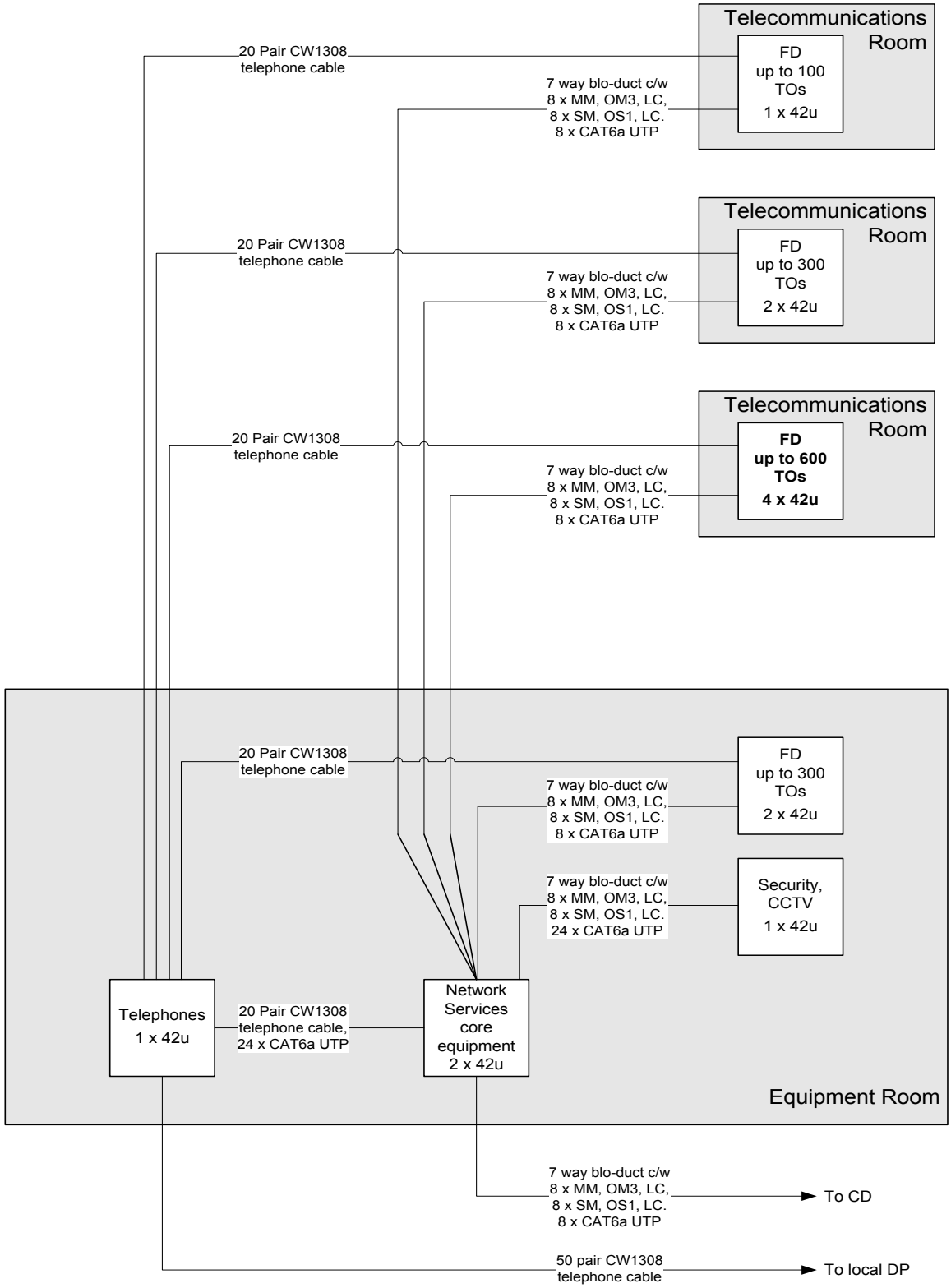
Design and installation personnel for structured cabling infrastructure who design and carry out work to American Standards should have a thorough working knowledge of ANSI/TIA-569-C, ANSI/TIA-568-C, ANSI/TIA-942-A, ANSI/TIA-758-B and other standards associated with ITI. Please note; where there is a conflict between American and British standards, written clarification shall be sought from CIS Project Manager.

Appendix 1.E DOCUMENTATION BEFORE COMMISSIONING BY CIS

On completion of the works and at least 15 working days before users occupy the site, the contractor must submit copies of the following to the CIS Project Manager:

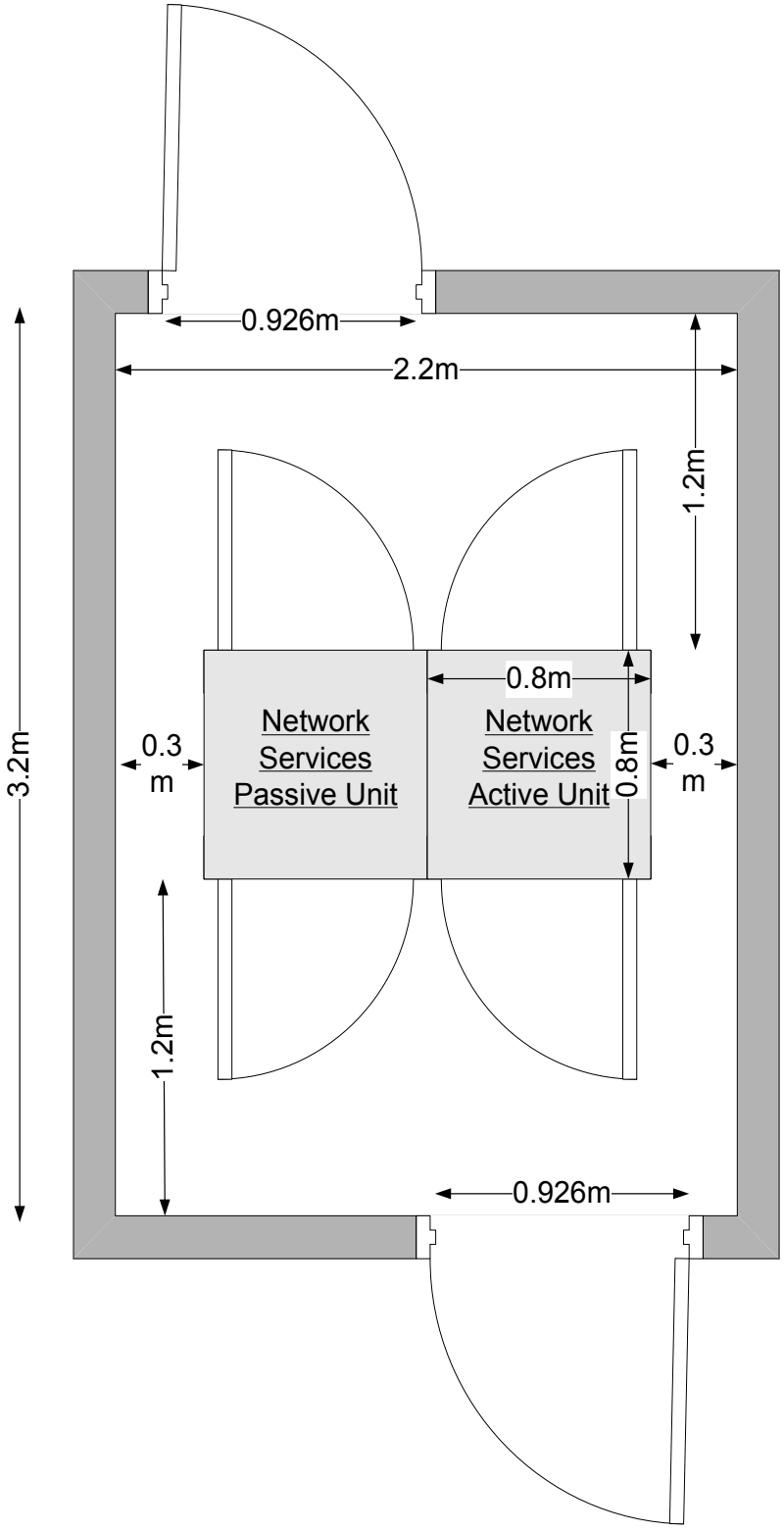
- Floor Plans, both hard copy (A1) and AutoCAD, suitably marked up to show location and I.D. of each and every TO, and detailing any deviation from the original plan. WAP TOs and other high level TOs shall be clearly identified
- Full structured cabling test results in .flw format, via email or compact disc
- Tester Calibration Certificate
- Commscope NETCONNECT Warranty Certificate

Appendix 1.F TYPICAL SCHEMATIC



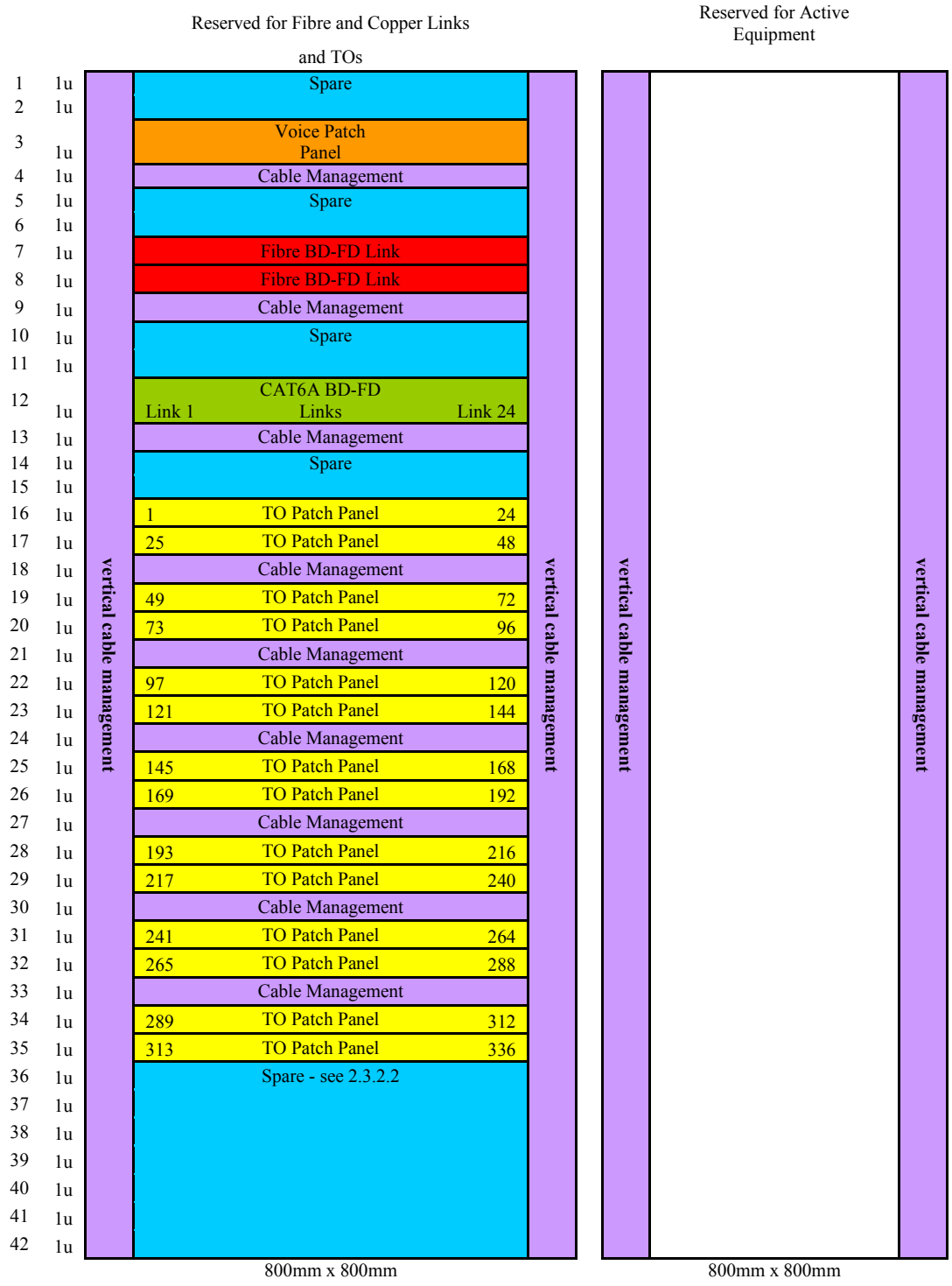
Appendix 1.G TYPICAL ROOM LAYOUT

Minimum requirements for FD telecommunications room, housing up to approx. 300 TOs



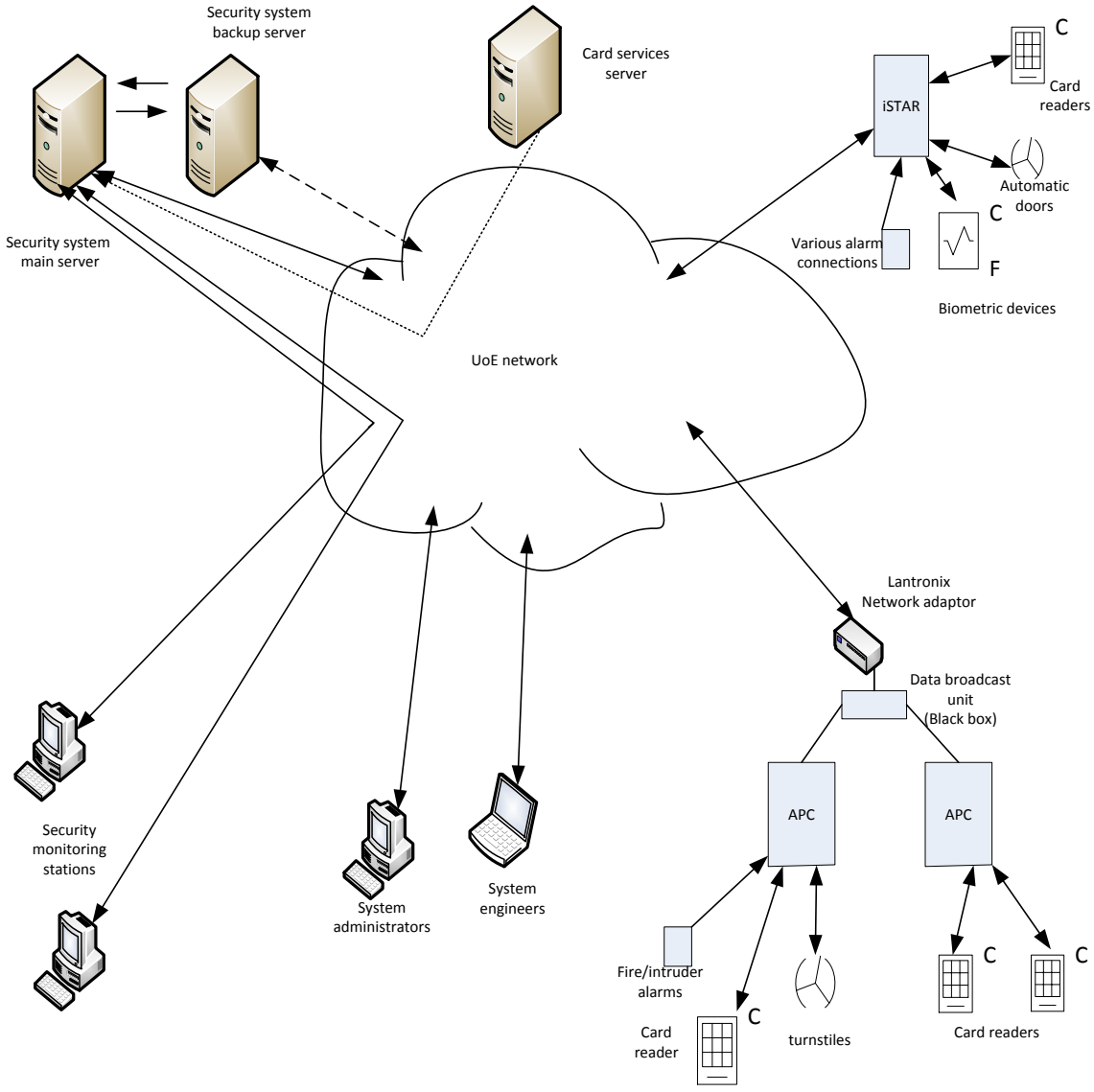
Appendix 1.H TYPICAL FD PASSIVE CABINET LAYOUT

Typical FD passive cabinet layout for 2 x 42u communications cabinet scenario, housing up to approx. 300 TOs

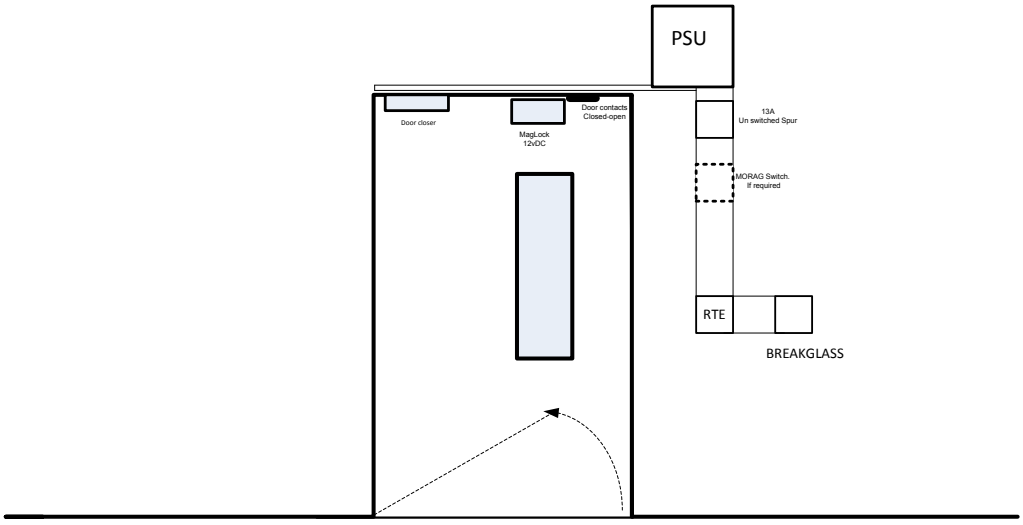


Appendix 2 Access Doors

Appendix 2.A Security System Schematic

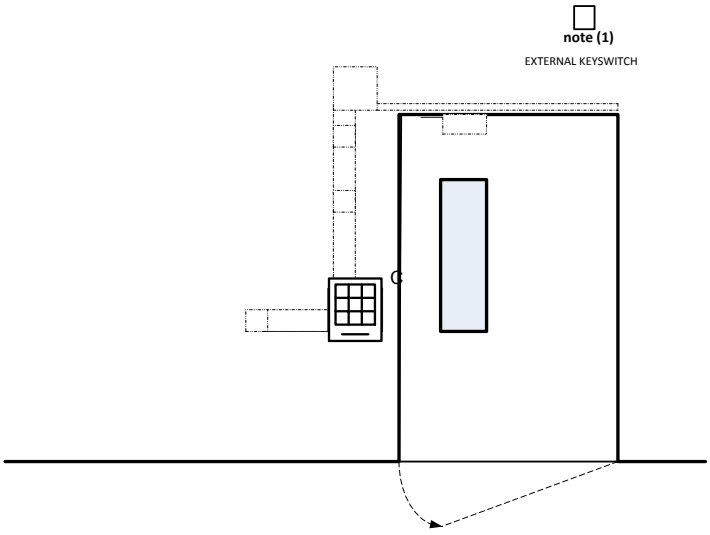


Appendix 2.B STANDARD DOOR LAYOUT AND CABLING



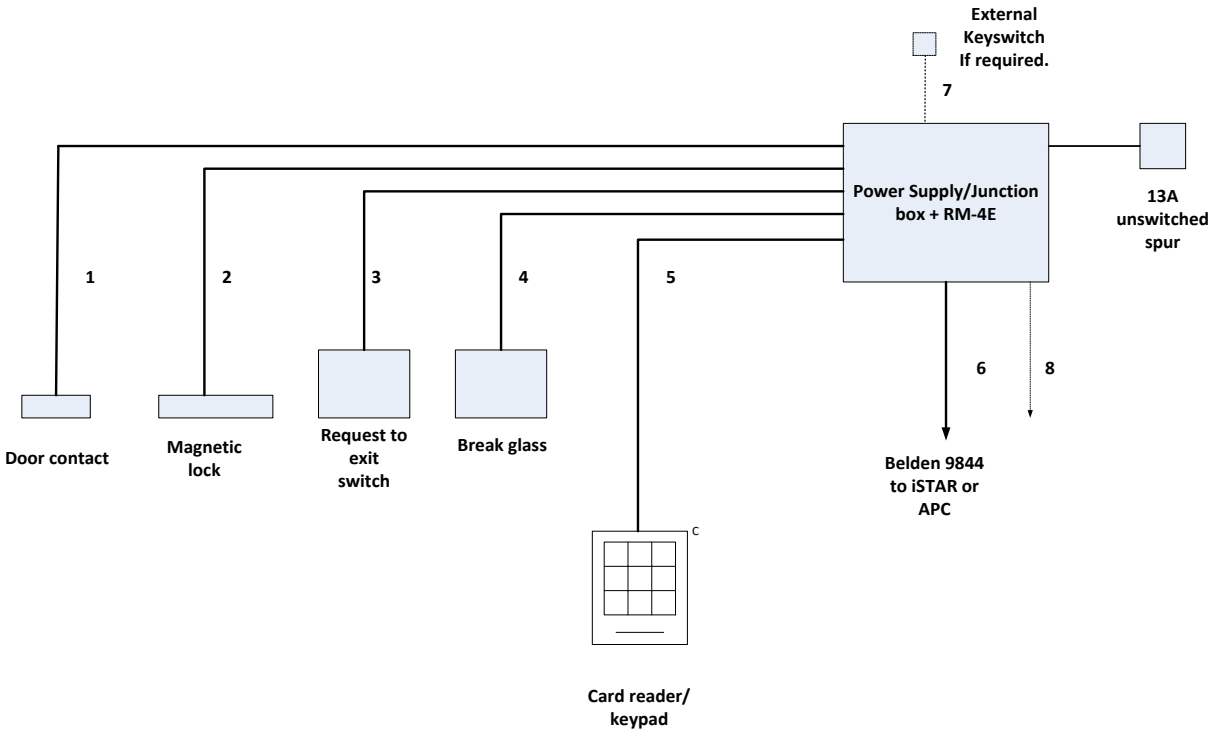
Access controlled door. Typical Secure side layout

Note: All equipment mounted at suitable working height, either surface or flush mounted. Cable installed within trunking or conduit.



Access Control Door, Typical non-secure side layout.

Note: External key switch if required. To be fitted discreetly possibly above false ceiling.

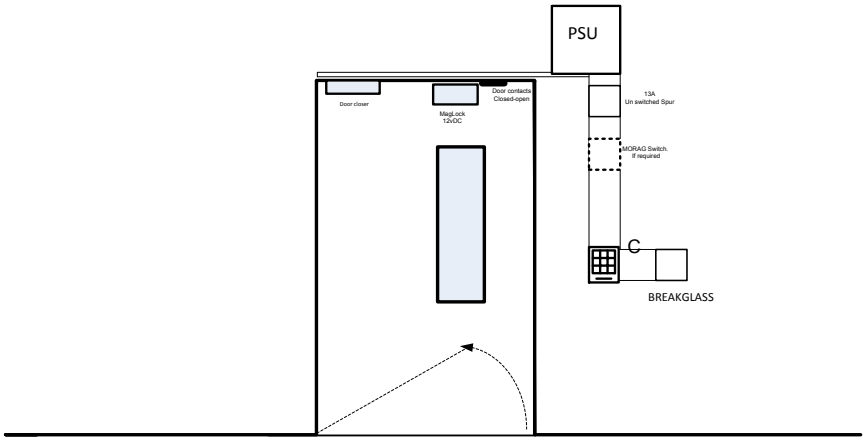


Standard Access Control Door Cable requirements.

1. 6 core type 92A cable from door contact to PSU/JB. 1 per door leaf <20m
2. 6 core type 92A cable from magnetic lock to PSU/JB. 1 per lock <20m
3. 6 core type 92A cable from RTE switch to PSU/junction box <20m
4. 6 core type 92A cable from break glass unit to PSU/JB <20m
5. core type 92A cable from reader to PSU/JB <20m
6. Belden 9844 cable from PSU/JB to iSTAR or APC <1200m
7. 6 core type 92A cable from external keyswitch to PSU/JB <20m, if required
8. 6 core type 92A cable from remote RTE/Intercom to PSU/JB <430m, if required

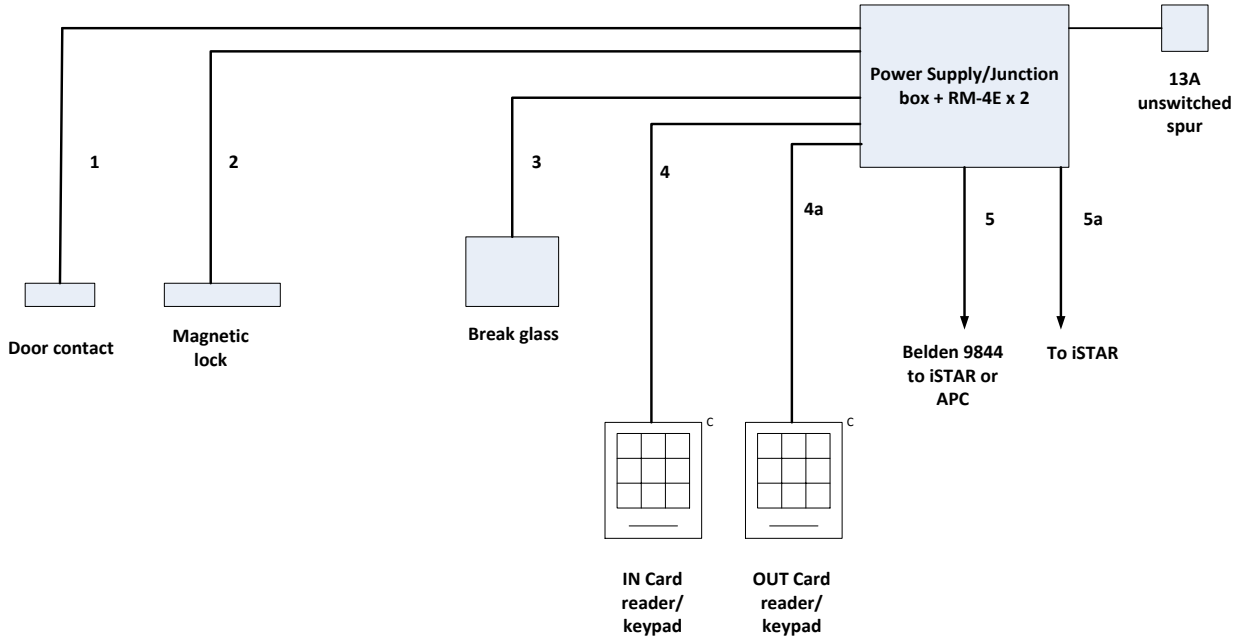
Cables to be installed as detailed. Any changes must be agreed with CIS Project Manager.

Appendix 2.C DUAL READER DOOR LAYOUT AND CABLING



Typical Secure Side Access Control Door Dual Reader

All equipment mounted at suitable working height, either surface or flush mounted. Cable installed within trunking or conduit.

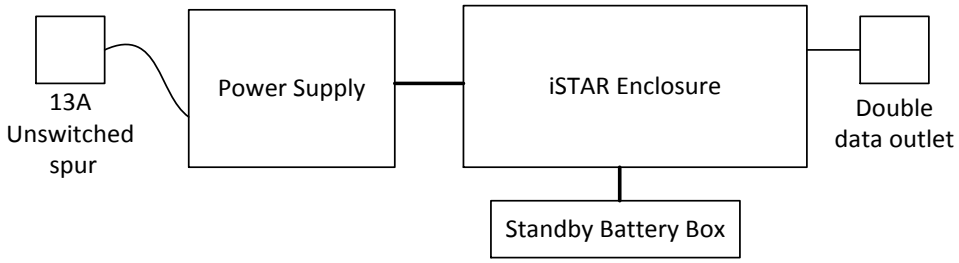


Dual Reader Access Control Door Cable requirements.

1. 6 core type 92A cable from door contact to PSU/JB. 1 per door leaf <20m
2. 6 core type 92A cable from magnetic lock to PSU/JB. 1 per lock <20m
3. 6 core type 92A cable from break glass to PSU/JB <20m
4 and 4a12 core type 92A cable from reader to PSU/JB <20m
5. Belden 9844 cable from PSU/junction box to iSTAR or APC <1200m
5a. Additional type 92A cable may be required if breakglass unit has to be monitored<430m

Cables to be installed as detailed. Any changes must be agreed with CIS Project Manager.

Appendix 2.D CONTROLLER LAYOUT



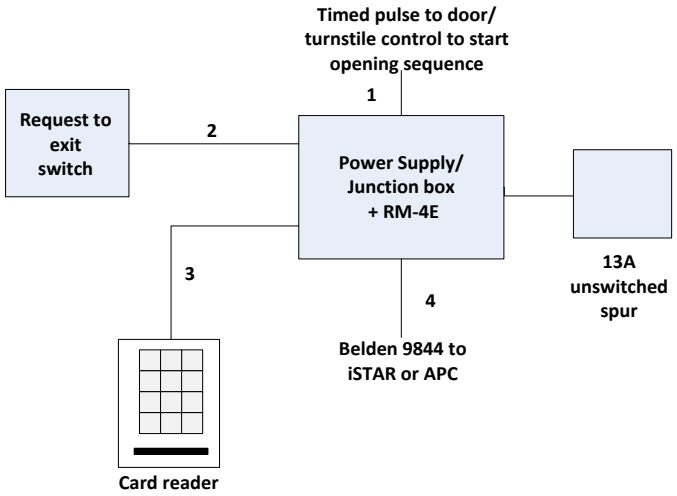
Typical iSTAR Layout Wall mount

iSTAR positioned at a suitable working height.

It should be possible to work on the iSTAR while standing on the floor & without having to use steps etc.

Physical connection of the iSTAR, PSU and battery may be by trunking, conduit/couplings or surface cables.

Appendix 2.E AUTOMATIC DOOR OR TURNSTILE CABLING



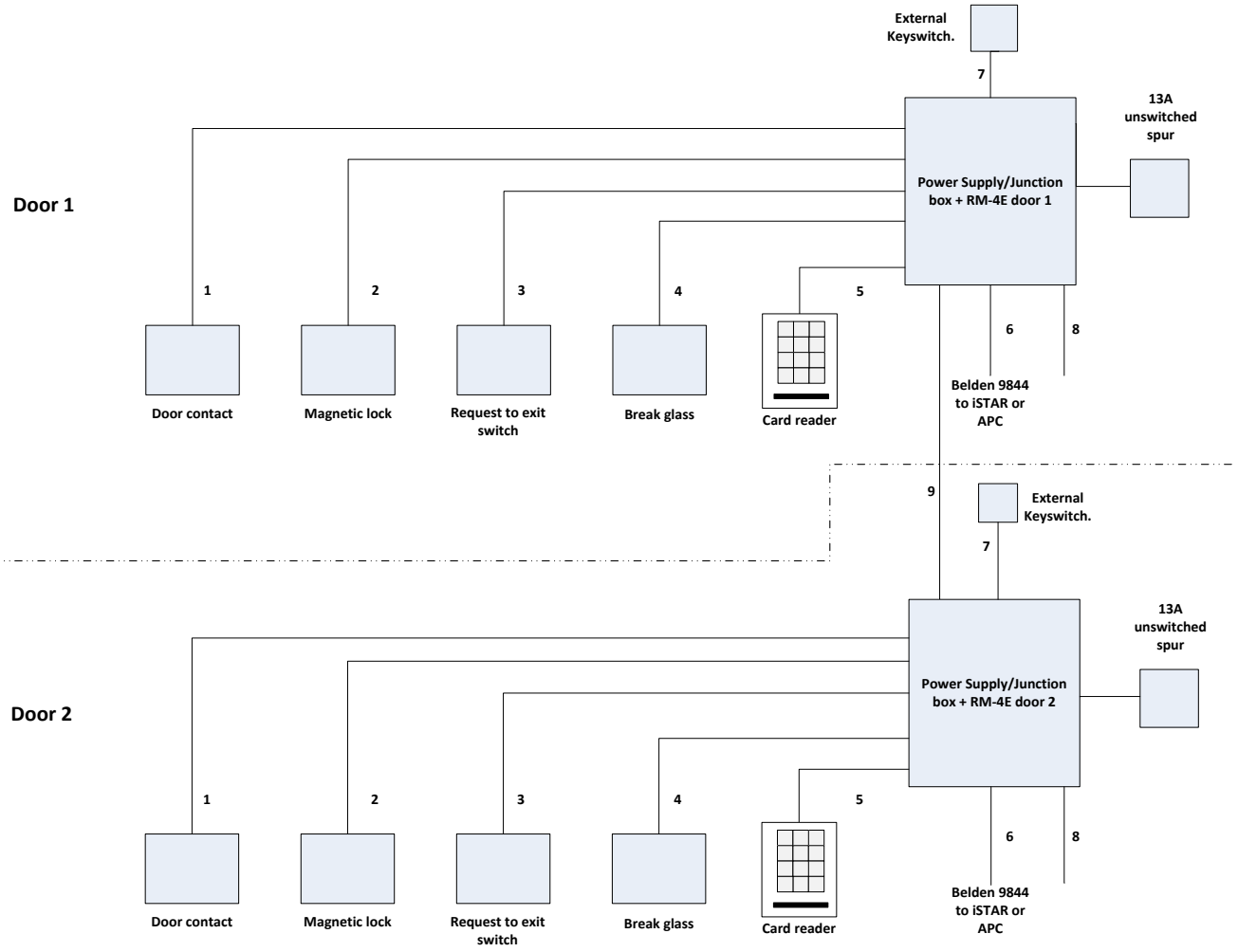
Cable schematic for automatic door, turnstile or lift call

Cable requirements

1. 6 or 12 core type 92A cable from door/turnstile/lift control to PSU/JB <20m
2. 6 core type 92A cable from RTE switch to PSU/JB <20m
3. 12 core type 92A cable from reader to PSU/JB <20m
4. Belden 9844 cable from PSU/JB to iSTAR or APC <1200m

Cables to be installed as detailed. Any changes must be agreed with CIS Project Manager.

Appendix 2.F INTERLOCKING DOORS



Cable schematic for interlocking doors

1. 6 core type 92A cable from door contact to PSU/JB. 1 per door leaf <20m
2. 6 core type 92A cable from magnetic lock to PSU/JB. 1 per lock <20m
3. 6 core type 92A cable from RTE switch to PSU/JB <20m
4. 6 core type 92A cable from break glass unit to PSU/JB <20m
5. 12 core type 92A cable from reader to PSU/JB <20m
6. Belden 9844 cable from PSU/JB to iSTAR or APC <1200m
7. 6 core type 92A cable from external keyswitch to PSU/JB <20m.
8. 6 core type 92A cable from iSTAR to PSU/JB for RTE control<430m
9. 12 core type 92A cable between door 1 & 2 PSU/JBs <430m

Cables to be installed as detailed. Any changes must be agreed with CIS Project Manager.

End of Document