CPS Specification for Data Cabling Installations

With Electrical and Structural Requirements relating to Data Cabling for New and Refurbished Buildings

(Version 1.0)

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1. Conventions Used in This Document

The CPS or the Crown Prosecution Service means the agency commissioning the installation from the Installer.

Most terms relating to structured cabling are as defined in the ANSI/TIA-568-D standard.

The term “Frame” in the contexts of Intermediate or Main Distribution Frame (IDF, MDF) is used strictly in its logical sense in structured cabling architecture and does not refer to the hardware implementation, which may be open frame, cabinet or other apparatus facilitating an aggregation of cabling equipment.

2. Introduction, Scope, and Intended Audience

This document sets out a contract framework and the minimum specification to which any new data cabling for the CPS must conform, regardless of who commissions it. It applies also to data network cabling infrastructure to be managed or operated by the CPS on behalf of third parties. Sanctions’ clauses, to the extent permitted by law, may be incorporated in installation contracts for failure of an implementation to meet the minimum specification, these will be generally a requirement to perform such extra work as shall be required to make the installation meet the mandatory standards and reasonable compensation for the CPS’s expenses. The scope of cabling covered by this document includes:

- UTP/FTP wiring from a cabinet or frame to local work area outlets
- Fibre optic cabling as uplinks and between cabinets or frames
- Telecommunications grade coaxial cabling between cabinets or frames
- Provision and installation of the physical infrastructure of cabinets or frames
- Testing, certification, and documentation

The document is therefore intended for both installers and anyone intending to let a contract for the installation of data cabling over which electronic signals for the CPS will be transmitted and whose operation and management will be the responsibility of CPS or its agents or subcontractors. Sections 6 and 7 of this document specify particular additional electrical and structural requirements associated with the provision of structured cabling in new and refurbished buildings. The audience will therefore include, but not be limited to the Digital and Facilities functions of the CPS, architects, engineers, contractors, and subcontractors.

In the case of buildings where work requires Listed Building consent, additional special conditions shall apply.

3. New Cabling and incremental enhancement to Existing Cabling

Existing copper cabling is ANSI/TIA Category 5e and Category 6. Fibre cabling is typically 50/125 with SC termination, although 62.5/125 fibre may be present in some areas with SC or ST termination,

Copper cabling is used for transmission of data to IEEE802.3-1992, 802.3u and 802.3ae standards for Ethernet over unshielded twisted pairs with 10BaseT, 100BaseT and 1000BaseT signalling.

Cabling in new developments and significant refurbishments must be Class Ea / Category 6 Augmented (Cat6A). Incremental installations may be Cat 5e, Cat6 or Cat6A. Unless otherwise

specified, an incremental installation must be of the same Class/Category as the existing installation, using the same vendors' products and adhere to the same layout, schematic, and labelling conventions as those in the area in question. The term 'area' here is defined according to location; where appropriate when an area is clearly demarcated, Cat6A is required. Exceptionally, if the Category is not specified, Cat6A should be assumed. In incremental Cat5e installations where the original vendor's products are no longer available, of where it is not desirable to supply these products, a nearest equivalent must be proposed and explicitly approved by the CPS.

4. Specification Framework

If a separate cabling specification is required for a new installation, it should contain the following elements. In the absence of such, Sections 5 to 7 shall be construed as the default Specification.

1. A brief statement of purpose and expected lifetime
2. Reference to prevailing fire regulations with which cables (and poss. other) must comply
3. Details of routes and agreed cable support methods
4. Termination details, such as types and sizes of patch panels, wall, floor and possibly ceiling boxes (to address for example, depth issues)
5. Labelling scheme to be adopted
6. Testing procedures and reports
7. Acceptance criteria, including permitted tolerances on all measured parameters
8. Agreed warranty terms, including statements of commitment to pass on to the CPS component warranties
9. Access and safety arrangements during installation, safety procedures' compliance, etc.
10. Deadline for response to the Specification
11. Request for estimate of time to install and any penalty clauses for overrun
12. Time limit on presentation of results and report and sanctions for default
13. Required Contents of Report
14. Standards and standards conformance
15. Where component type and/or vendor is unspecified, then statements of conformance and description of what will be supplied
16. Details relating to layout of wiring closets, communications rooms or any communications cabinets

5. Minimum (Default) Specification

5.1. Application and Lifetime

The predominant application of all channels of structured data cabling is for the exchange of telecommunications signals compliant with IEEE802.3u (Fast Ethernet) and IEEE802.3ab (Gigabit Ethernet) standards. The exclusive application of uplink(s) and backbone cabling is for transmission of signals compliant with the IEEE802.3ab and IEEE802.3ae (10Gbits/sec Ethernet) standard. (Note that for the latter 10 Gigabit Ethernet applications, OM3 or later standard fibre optic cable will be required). The expected lifetime of Cat5e-based infrastructure is 15 years; for Cat6/6A, and uplink cabling it is 25 years.

5.2. Mandatory Requirements

5.2.1. Standards Compliance

[MR00] Variations from any Mandatory Standard described in this document must be authorised in writing by the CPS. Variations from desirable standards may be agreed verbally with a contractor by the CPS.

[MR01] All structured cabling systems must conform to the ANSI/NECA/BICSI 568-2001 and ANSI/TIA 606A (2002) standards.

[MR02] Unless otherwise specified, incremental installations shall be of the same Category and performance rating as that prevailing for the area in question. This will be Cat 5e, Cat6 or Cat6A.

[MR03] All refurbished areas or buildings where a new structured wiring infrastructure is being installed will use LS0H (Low Smoke Zero Halogen) cable. Incremental installations must also use LS0H cable.

[MR04] All new socket outlets shall be permanently fixed either in floor boxed flush mounted in the floor, or in pattress sockets, or in dado rail attached to a wall, floor, ceiling or up-stand / down-stand board. Pattress or dado trunking shall not be mounted on doors, movable office screens or similar constructions.

5.2.2. Vendor Constraints

[MR05] Unless otherwise specified, incremental installations shall be implemented using the same vendor brand and product ranges of structured cabling products and communications racks respectively prevailing in the relevant wiring closets serving the area(s) in question. See also [DR03].

[MR06] Vendor-specific racking may be installed only in computer rooms for the purpose of housing servers. Approval must be obtained from the CPS to implement vendor-specific racking different from that already installed in existing communications rooms. See also [DR03].

[MR07] All installations must use components from an approved manufacturer as follows:

- Installations of Category 5e cabling shall be implemented from Cat5e compliant ranges of the following vendors only: ADC Krone, Commscope (inc. Netconnect and Systimax), Brandrex, Excel, Molex, Siemon, Panduit, Tyco (inc. AMP), Ultima. Alternatives may be approved by the CPS after evaluation.
- Installations of Category 6A cabling shall be implemented from Cat6A compliant ranges of the following vendors only: ADC Krone, Commscope (inc. Netconnect and Systimax), Molex, Siemon, Tyco (inc. AMP), Ultima. Alternatives may be approved by the CPS after evaluation.
- New cabinets should be manufactured by Lande, Netconnect, Netshelter, Prism, Siemon, Ultima or USystems. Alternatives may be approved by the CPS after evaluation.

[MR08] Passive components must be modular to permit single link repairs.

5.2.3. Cable type constraints within a vendor range

[MR09] Horizontal cabling in office environments shall be of the appropriate unscreened type depending on the installation as specified in other Mandatory Requirements. Horizontal cabling in electrical noisy and computer/network room and datacentre environments shall be screened Category 6A type.

5.2.4. Installer/Supplier Credentials

[MR10] To secure a comprehensive guarantee covering both workmanship and components only suppliers holding accreditation with the manufacturer of the structured cabling components proposed are permitted to undertake cabling installations. Installations may not be subcontracted without explicit approval from the CPS, such approval to be provided at the absolute discretion of the CPS.

[MR11] As a minimum, prospective suppliers must have full membership of the TIA established for at least one year before being considered for a CPS installation contract.

5.2.5. Guarantees

[MR12] Uplink cabling must be guaranteed for at least 25 years as a complete installation. The guarantee must be comprehensive covering both workmanship and components and be underwritten by the component manufacturer.

[MR13] Cat6 and Cat6A cabling infrastructure must be guaranteed for at least 20 years as a complete installation. The guarantee must be comprehensive covering both workmanship and components.

[MR14] Cat5e cabling infrastructure must be guaranteed for at least 15 years as a complete installation. The guarantee must be comprehensive covering both workmanship and components.

[MR15] Fibre optic cable installations other than backbone or uplink are required to have a guarantee of at least 15 years.

5.2.6. Performance

[MR16] For each Channel, both the Permanent (Basic) Link and unless otherwise specified, the Channel also, must be tested in accordance with ANSI/TIA TSB-67 with its Annexes (Annex E for Channel only) and summarised in Annex A of ANSI/NECA/BICSI 568-2001.

[MR17] For Category 6 copper cabling, instruments specifying at least ANSI/TIA 586-B.2-1 are required. For optical fibre cabling, the minimum instruments' requirements are specified in ANSI/TIA 526-14A for multimode, and in ANSI/TIA 526-7 for single mode

5.2.7. Wiring Closets and Other Intermediate Distribution Frames

[MR18] All wiring closets and communication rooms must be illuminated to prevailing standards for such a working environment.

[MR19] All cabinets must be secure and compliant with prevailing health and safety regulations relevant to their purpose and position while due consideration is given to easy access for maintenance work.

[MR20] Floor standing cabinets shall be placed securely on only level floor surfaces, and not mounted on any plinth or support unless it is supplied by the cabinet manufacturer specifically for the purpose. Where such a plinth or support is used it must result in a distance of no more than 300mm from the floor to the bottom of the lowest usable level of rack mount space.

[MR21] Wall mounted cabinets shall be secured only to solid walls suitable to bear the load of the cabinet and a full complement of equipment at an average of 5kg per Rack Unity.

[MR22] The positioning of all frames, cabinets and other distribution equipment shall be agreed in advance with the CPS.

5.2.8. Modular Patch Panels and Rack Layout

5.2.8.1. Presentation of fibre:

[MR23] Termination of single mode fibre must be of type FC-PC while that for multimode must be ST2 (notwithstanding the preference for SC in ANSI/TIA/EIA 586-B.2-1). Multimode fibre intended to link server and storage devices should be terminated in LC format connectors.

5.2.8.2. Segregation of screened and unscreened copper cable termination:

[MR24] Modular patch panels terminating screened and unscreened copper cabling in the same wiring closet must be clearly segregated.

5.2.8.3. Patch port and patch panel density and layout

[MR25] The number of ports on a single patch panel should not exceed 24 and there must be an allowance of 1U of cable management for every 24 patch ports, regardless of the number cabled. Brush strip type cable management must not be used.

[MR26] An allowance of 1U of cable management is required for every 24 ports of active network equipment, interleaved as frequently as switch model port density permits. It follows that for a 48-port switch, for example, 2 x 1U cable managers are required, sited typically one above and one below the switch unit. Brush strip type cable management must not be used.

[MR27] An allowance of 1U of cable management is required for fibre optic termination panels. Brush strip type cable management must not be used.

[MR28] If a rack is to hold one or more fibre optic cable trays, then these should be installed from the very top of the rack, starting with a tray and interleaving fibre optic cable management.

5.2.8.4. Provisioning

[MR29] In new communications rooms and wiring closets, rack mounting must be provided to accommodate active network hardware and cable management sufficient to enable a connection service on all outlets.

[MR30] Unless otherwise specified, in existing communications rooms and wiring closets, additional rack mounting must be provided to accommodate active network hardware and cable management sufficient to enable a connection service on all new outlets.

[MR31] Different floors must be wired to separate patch panels. Unless not practicable, the patch panel for outlets on a floor should be on the same floor, so there should be no occurrences of cables from two floors terminating in one cabinet.

5.2.9. Outlets

[MR32] Data network service outlets must be of modular of type RJ45 wired to ANSI/TIA/EIA 568B layout.

[MR33] Outlets in user areas should be shuttered or otherwise protected from the ingress of dust when unused.

[MR34] Outlets and cabling to the outlets must always be supplied in pairs. Single outlets and single cable runs are not to be used for any reason.

[MR35] In office environments, following standard EN50173, two Cat 5e/6/6A outlets should be provided for each workstation position.

5.2.10. Uplinks and Entrance Facilities

[MR36] If multimode fibre backbone or uplink cabling is implemented, grade OM3 of higher specification is required; for copper cabling, its Basic Link Performance should meet or exceed category (ANSI/TIA/EIA 568-B-2.1) in the ISO/IEC 11801-2002 (December), 3rd Edition standard.

[MR37] The presentation of entrance facilities (such as for installations in new buildings or refurbishments) at which a telecommunication carrier's services are terminated must facilitate connection to the CPS's Wide Area Network, or the internet, by uplink provision up to and including the carrier Network Termination Unit, Customer Edge equipment or similar, unless otherwise specified.

[MR38] Uplink(s) shall be capable of supporting the IEEE802.3ae transmission standard (10Gbits/sec Ethernet).

5.2.11. Labelling

[MR39] Unless otherwise specified, incremental installations must follow the prevailing labelling convention in the areas and communications rooms in question.

[MR40] The labelling scheme at user outlets and in communications rooms must correspond. The default labelling convention to be adopted is:

- Communications room or cabinet designator/floor designator/serial number
- a serial number must be uniquely assigned to the socket on that floor. See [IR02] for mandatory labelling information to be provided.
- floor designator may be omitted where the building only has one floor.

5.2.12. Cables Paths

[MR41] All proposed cable routes must be checked for obstructions before pulling.

[MR42] All cableways must be separated from other services in accordance with EN50174 part 2.

[MR43] All proposed cable routes must be agreed with the CPS before work commences and no variation or deviation undertaken without prior CPS consent.

5.2.13. Support and Containment

[MR44] The state of all existing trunking, tray-work, loom or other form of containment close to or part of proposed new cable paths must be checked before work commences, ensuring that it is fit for purpose and for any additional load that may be placed on it by the new installation.

[MR45] Minimum bend radius and other cable manufacturers' recommendations for installation must be adhered to at all times.

[MR46] The maximum bundle size into which cables may be loomed shall be stated in advance and agreed with the CPS.

5.2.14. Structural Constraints

[MR47] Where required, access holes must be fire stopped in accordance with fire regulations.

[MR48] The extent of interference with the fabric of a building must be determined and agreed in advance with the CPS. No variation or deviation may be undertaken without prior CPS consent.

5.3. Desirable Requirements

5.3.1. Installer/Supplier Credentials

[DR01] In addition to the Installer holding accreditation with the manufacturer of the structured cabling components proposed [MR07], membership of BICSI is desirable.

[DR02] It is desirable that the Installer employs the services of at least one BICSI Registered Communications Distribution Designer (RCDD).

5.3.2. Wiring Closets and Other Intermediate Distribution Frames

[DR03] Cabinet make, size and mounting should be agreed with the CPS in advance.

[DR04] Optical fibre terminations should be mounted with separate panels for single and multimode types.

[DR05] Implementation using bespoke system components should be avoided.

5.4. Informational Requirements

[IR01] Within the wiring closets, clear labelling and documentation is to be provided so that the port(s) in each room is/are clearly traceable back to the active network equipment that services those ports.

[IR02] Sufficient data must be provided to trace a cable from end to end, starting in either direction. For the default labelling convention specified in [MR39] and [MR40] both forward and reverse mappings between floor/serial numbers and room numbers must be provided. See also [IR05] and [IR06].

[IR03] Reports on Link or Channel performance which fall only marginally within the accuracy of the testing instrument shall be flagged.

[IR04] The Installer shall furnish the CPS with a full electronic copy of all the test results in an agreed format. Presentation of these results is a prerequisite to completion of the contract. The test results should be based on end-to-end testing so that the labelling each cable or fibre is independently verified and tied to the correct test result.

[IR05] Conformance with ANSI/TIA/EIA-606A for documentation and administration of the installation is required. The Installer shall furnish the CPS with full copies of the documentation, in electronic form.

[IR06] The labelling convention adopted is to be unambiguous across all wiring closets and consistent throughout, following the conventions of TIA/EIA 606A and establishing a one-to-one correspondence between a room outlet and a modular patch panel socket.

[IR07] The serial number and date of last calibration of each testing instrument is to be provided along with the installation test results.

The intended audience for the following sections includes architects, planners and electrical contractors:

6. Electrical and Structural Requirements for New Wiring Closets

6.1. Mandatory Requirements

[MR49] All new buildings and refurbishments must provide communications rooms or wiring closets sited to enable all data service outlets in the area served to be positioned within the limitations of cable runs laid down in the relevant standards.

[MR50] No communications room or wiring closet should be situated in an area subject to flooding.

[MR51] Wiring closets (communications rooms) must be of adequate size to admit full standing maintenance access to all active and passive equipment. In the case of a room housing a single cabinet this means that access must be unimpeded by the entrance, by power distribution or other service facilities or storage that is to be situated there.

[MR52] No water supply or sink for any water related service shall terminate in any wiring closet, nor transit it from any aspect or direction.

[MR53] All wiring closets and communication rooms must be illuminated to prevailing standards for such a working environment.

[MR54] Wiring closets must have passive ventilation, forced ventilation, or air conditioning as needed to maintain, at all times, the specified environmental and ambient conditions for operation of all the equipment housed there, and with a safety margin of 10 Celsius. By default, this shall be a maximum ambient temperature (measured in the free air outside the cabinet) of 21 Celsius unless otherwise specified. The heat output of the proposed active equipment will be provided on request to enable suitable provision to be made.

[MR55] Every cabinet must be supplied with PDUs as agreed.

6.2. Desirable Requirements

[DR06] Wiring closets should be sited to minimise their number in individual buildings while respecting the cabling standards.

[DR07] Every wiring cabinet should have a minimum of 4 spare power outlets on the PDU after considering the equipment proposed for initial installation in that cabinet.

[DR08] Electrical circuits supplying active networking equipment should be surge protected and should be so labelled.

[DR09] In exposed locations, lightning protection should be provided if necessary.

7. Additional Electrical and Structural Requirements for New and Refurbished Buildings

7.1. Mandatory Requirements

[MR56] Telecommunications entrance facilities adequate to feed at least two independent uplinks must be provided in each new or refurbished building.

[MR57] Each cabinet must be supplied by a 20A unswitched fused spur protected by a dedicated Type C or Type D MCB and a suitable earth.

[MR58] All wiring closets must be equipped with a earth connection and each cabinet must be earthed to BS7671 in accordance with manufacturer's recommendations; earth continuity must be maintained to any metal cabinet doors by straps in accordance with manufacturer's recommendations.

[MR59] Where ducting is supplied to facilitate a cable run, particularly underground ducting, this shall be smooth walled and be made of either plastic of ceramic.

[MR60] Where ducting is supplied to facilitate a cable run, especially underground ducting, an adequate pull through of nylon rope shall be supplied with a minimum breaking strain of 300N (approximately 30kg).

8. Health and Safety

8.1. Mandatory Requirements

[MR61] All installation proposals (or quotations, if these are the only form of proposal presented) must contain an explicit commitment to comply with all Health and Safety guidance and requirements of the CPS and of the Health and Safety Executive.

[MR62] Before work commences, familiarity with all Health and Safety practices and guidelines of CPS, including those relating to asbestos marking and hazard avoidance, is the responsibility of the Installer.

[MR63] When hazardous substances such as asbestos are encountered or suspected, work should be suspended in the area with risk of exposure. The incidence must be reported immediately to the CPS whose appropriate Health and Safety procedures must then be followed.

9. Tables of Requirements

9.1. Mandatory Requirements

Requirement	Description	Met?
MR00	Variation and incorporation of requirements	
MR01	Indication of standards	
MR02	Incremental installations	
MR03	Use of LS0H cable	
MR04	Socket mounting	

Requirement	Description	Met?
MR05	Matching product brand and ranges	
MR06	Vendor-specific racks	
MR07	Required manufacturers	
MR08	Modularity	
MR09	Screened vs unscreened cable	
MR10	Accreditation and subcontracting	
MR11	TIA membership	
MR12	Uplink guarantee	
MR13	Cat 6/6A guarantee	
MR14	Cat 5e guarantee	
MR15	Other guarantees	
MR16	Testing standard 1	
MR17	Testing standard 2	
MR18	Illumination	
MR19	H&S compliance	
MR20	Cabinet mounting	
MR21	Wall mounted fixing	
MR22	Agreed positioning	
MR23	Single mode fibre positioning	
MR24	Segregation of screened and unscreened cable	
MR25	Max. ports per U	
MR26	Cable management allowance	
MR27	Cable management for FO panels	
MR28	FO panels at top of racks	
MR29	Size of new racks in new rooms	
MR30	Size of new racks in existing rooms	
MR31	Patch panels on same floor as outlet	
MR32	Outlet physical form factor	
MR33	Shuttered outlets required	
MR34	Dual outlets required	
MR35	Two outlets per workstation	
MR36	Fibre grade required	
MR37	Entrance facilities	
MR38	$10Gbs^{-1}$ uplinks	
MR39	Following existing labelling convention	
MR40	Default labelling convention	
MR41	Avoidance of obstructions	
MR42	Separation from other services	
MR43	Agreement of proposed cable routes	
MR44	Checking containments	
MR45	Minimum bend radius	
MR46	Maximum bundle size	
MR47	Fire stopping	
MR48	Impact on building fabric	
MR49	Position of new wiring closets	
MR50	Avoidance of flooding	
MR51	Adequate size of wiring closets	
MR52	No water in the vicinity	
MR53	Adequate illumination	
MR54	Suitable ventilation	
MR55	PDU supply	
MR56	Entrance facilities in new buildings	
MR57	Electrical supply to cabinets	
MR58	Cabinet earth	

Requirement	Description	Met?
MR59	Smooth walled ducting	
MR60	Draw rope	
MR61	Commitment to H&S	
MR62	H&S familiarity	
MR63	COSHH requirement	

9.2. Desirable Requirements

Requirement	Description	Met?
DR01	BICSI membership	
DR02	BICSI RCDD	
DR03	Agreement on cabinet make	
DR04	Separation of FO types	
DR05	Avoidance of bespoke components	
DR06	Minimising number of wiring closets	
DR07	Spare power outlets	
DR08	Surge protection	

9.3. Desirable Requirements

Requirement	Description	Met?
IR01	Documentation	
IR02	Traceability	
IR03	Flagging of marginal test results	
IR04	Electronic copy of test results	
IR05	ANSI/TIA/EIA-606A compliance	
IR06	Unambiguous labelling convention	
IR07	Calibration of test instruments	

10. Change control and author

Changes:

Ver.	By	Date	Description
V1.0	Michael O'Connor	29/06/2022	Initial release

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