

# Imperial College London

## Information & Communications Technology Network Infrastructure Delivery

### Network Infrastructure Standards April 2020

#### Appendix B – CWC Fitout Requirements

Version 1.6

## Introduction

The international standards defining structured cabling for data systems dictate that the maximum length of a main link cable should not exceed 90m.

When installing structured cabling systems within buildings, it is necessary to logically divide the building into one or more individual cabling zones.

At the heart of each cabling zone is a CWC which contains equipment cabinets providing termination and racking space for cabling, voice, fibre optic and active data equipment services. **Maximum length of a main permanent link cable should not exceed 90m.** Typically it should not be more than 60m away from the furthest point to safely guarantee cable performance to allow for the routing of the cable.

Cabling zone can only be served by one CWC.

## Equipment Cabinet capacities

The design of horizontal cabling subsystem should provide for a minimum of two data outlets per work area as per EN 50173-2. However, each user / department in College will have different requirements, design **and final numbers will have to be agreed with NID Team at design stage.**

The main user types and number of data outlets per device and space type have been defined in the main standards document that accompanies this appendix as the minimum requirements for outlet concentration.

Cabinet should be sized to allow for extra 40% capacity for future expansion.

This specification will enable the initial calculations for the number of cabinets needed per floor and therefore the size of the CWC required.

## Room construction and fit out

These are strict specifications for size and construction of College CWCs and any deviation should be approved by Network Infrastructure Delivery Team.

**Complete fit out and official project handover of CWC is required for ICT to approve install of any active equipment.**

**CWC fitout and handover should be scheduled before commissioning of BMS and Security Services.**

The room must be cleaned prior to handover. Any subsequent work will imply cleaning the CWC at contractor / project cost.

Construction Specifications	
Construction	To provide a minimum 1 hour fire rating. (Imperial College Regulations = 30mins)
Access	Access to the CWC must be from a corridor and completely unrestricted.
Room Height	Minimum 2.4m throughout. No raised floor or false ceiling to be installed.
Wall Covering	Painted / low dust, anti-static
Floor covering	Low dust and Anti-static finish. No carpets or bare concrete screed will be accepted.
Wet Services	No wet services within or running through room. If there are wet services in the vicinity appropriate measures must be taken to prevent water ingress in the room. Data cables will not run in the same risers as wet services.
Dado Containment	No dado containment within CWC. All power services to be provided on standard back-boxes (Wall Mounted, Floor or Sub-Floor).
Door(s)	Minimum opening per door 840mm (W) x 2200mm (H).
Security	Aperio E100 or L100 Access Control to be fitted with an ICT override cylinder as per the Building Engineering Services Particular Requirements (BESPR's).  Keypad combination locks shall not be fitted.  Room designation on doors will be CWC XXX (where XXX is a number allocated by ICT) and room number. No further description should be written on the door. Contact ICT for CWC ID information.  "Permit to work area" notice is also required, provided by ICT.
Other:	The room should not be located in a location accessible from the outside through a window. If no other suitable location is found and such solution is sanctioned by ICT some actions should be taken:  Secure the window against external access. Make the window weatherproof so that: <ul style="list-style-type: none"> <li>- There is no temperature gain from sun exposure</li> <li>- No water or humidity can ingress</li> <li>- No condensation can accumulate</li> <li>- UV coating or film to prevent UV damage to cabling</li> </ul> The room cannot have a door to the outside of the building.  A hard plastic pouch for documents should be placed within the room.  4 no. J-Hooks to be installed on the wall for patch cables storage. See Appendix E – Ordering.

## Power, Light & Temperature

<p>Electrical:</p>	<p>Each CWC room shall be provided with a dedicated distribution board, complete with type C miniature circuit breakers (MCB's). The final circuit provision from this distribution board shall be as follows:</p> <p>2No. 16amp unswitched BS EN 60309-1 (BS 4343) socket outlets per cabinet. (Location to be confirmed by ICT). Socket outlets to be as manufactured by MK Electric, selected from their `Commando` range.</p> <p>1No. 13amp 2 gang switched socket outlet. (Height and location to be agreed with ICT).</p> <p>An earth bar complete with a test link connection. Number of connections available to equal number of cabinets installed plus an allowance for future cabinets, as agreed with NID Team.</p> <p>All cabinets to have their frame connected to the earth bar.</p> <p>All socket outlets to be labelled with a circuit reference.</p> <p>1No. 32 or 63 amp switched interlocked BS EN 60309-1 (BS 4343) socket outlet to be provided <b>per router location</b> (it is recommended that this supply is served from the distribution board in the CWC room). Socket outlets to be as manufactured by MK Electric, selected from their `Commando` range.</p> <p>At least 2 to 3No. of the spare ways in the DB should be wired to fused connection units located adjacent to the DB for future connections of equipment's without the need to turn off the DB.</p> <p>Each cabinet to be provided with 2 no. 16 amp commando-type socket outlets to B EN 60309 on dedicated circuits, to be protected by 16A Type C MCBs. They will be connected to power bars inside cabinets with 12 no. 13 amp sockets (leads to be fed overhead).</p> <p>During a construction of a CWC power will be installed considering the maximum number of cabinets possible to be installed in the space.</p> <p>1 no. wall-mounted dual 13 Amp switched gang for dirty power requirements, provisioned from standard electrical ring.</p> <p>Sockets supplying CWCs to be mounted at high level above cabinets.</p> <p>All electrical work to be completed as per Estates Building Engineering Services Particular Requirements.</p>
<p>Earth:</p>	<p>High integrity earthing will be supplied as per IEEE 18<sup>th</sup> edition specifications and Estates Technical Policies Specifications.</p>
<p>Lighting:</p>	<p>500 Lux at floor level, locally switched&amp; Emergency lighting. This will be in line with the Estates BESPR's.</p>
<p>Temperature:</p>	<p>Minimum 18 degrees C to Maximum 24 degrees C. To be monitored</p>

	<p>with a Trend temperature sensor via the BEMS and displayed appropriately on the Trend building management system server. Appropriate alarms are to be generated if the conditions drift from the above-mentioned parameters.</p> <p>An air-conditioning unit should be provided to maintain environment, run and fault signals should be monitored and displayed via the BEMS to ensure good functioning at all times.</p> <p>The air-conditioning unit will be resettable via the BMS system.</p> <p>All Air conditioning units should operate 24/7 and be programmed to resume after any failure (either the unit's or power).</p> <p>A Router locations CWCs require resilient air-conditioning unit due to location criticality. These are to be controlled / monitored via the BEMS and displayed appropriately on the Trend building management system server. Appropriate alarms are to be generated for fault condition.</p> <p>Any condensate pumps to be sited outside the CWC.</p> <p>The alarms will be sent via email to the FM team and to the Network Infrastructure group on <a href="mailto:ictns-infra-dl@imperial.ac.uk">ictns-infra-dl@imperial.ac.uk</a></p>
Humidity:	30% to 60% non-condensing.
Heat Generation:	<p>Currently Juniper EX4300-48P switches should be considered <a href="http://www.juniper.net/assets/us/en/local/pdf/datasheets/1000467-en.pdf">http://www.juniper.net/assets/us/en/local/pdf/datasheets/1000467-en.pdf</a> , with estimated requirement maximum of 10 units per cabinet should be considered when calculating loads and requirements of the CWC.</p> <p>In each router location an installation of SRT5KRMXLI (5kva) UPS to be considered.</p>
Other:	No heat exchange or other services that might influence room temperature may be within or running through the room. Other than the local CWC Distribution Board (DB) no other DB should be within the room. No water services should be routed in or through the CWC.
<b>Fire Detection &amp; Suppression</b>	
Fire Detection	Appropriate Fire Detection is to be installed within the room, and connected to the Fire Detection and Alarm System.
Fire Suppression	No wet automated fire suppression to be installed.
Cable Entries	<p>All cable entry holes are to be appropriately fire stopped in accordance with the appropriate standards. EZ-paths to be used where possible. All new CWCs will be fitted with Ez-Path cable routes for data cables. This will be done taking into consideration future capacity for expansion, meaning that on all comms rooms the first installation of EZ-Paths will be sized to enable the installation of cables for the full capacity of the room. This will prevent further drilling and dusty works. Legacy CWCs will be fitted with these when they are part of the building strategy (please contact NID Team for information).</p> <p>Ez-Paths are to be installed by accredited Contractors</p>

Miscellaneous	
Cable Entries	All cable entry holes to be sleeved.
Containment	Minimum 600mm cable tray from room entry point to the cabinet(s).

## CWC Sizing

The size of the CWC will be directly linked to the number of floors served, total gross area, number of people using the services, type of CWC and space allocation.

The following sizing rules will be applied:

- All cabinets will be installed in a line.
- There will be 1,000mm of free space around the line of cabinets (front, sides and back).
- Cabinet size is 800(W) x1000(D).

College CWC locations can be as follows:

- **Standard**; location will be used for copper cable distribution.
- **Fibre aggregation**; location will be a point to which all standard CWC's link back to via backbone fibre. The fibre aggregation is usually done in 1 or 2 cabinets or an ODF depending on the size of the building and number of CWCs.
- **Router**, building or core router in the location. Extra cabinets might be required. Please consult with ICT NID Team.

## Cabinets

For detailed specification and part codes, see appendix E – Ordering.

- All cabinets should be of 42u with 800 x1000 footprint;
- The cabinet should be earth bonded in accordance with IEE 18th Edition.
- A cabinet baying kit to facilitate the baying together of multiple cabinets.

## Labelling

Each equipment cabinet should be labelled with ICT's CWC identification code in the format "CWC xxx Cabinet yyy" where xxx is the CWC number and yyy is the local cabinet designation A, B or C etc where multiple cabinets exist (or may exist) in the same CWC.

All cabinets will be labelled with trifoliate type laser engraved label.

## Patch Cable Management

**24-way angled panel** (1U 24) are used as standard. For part code, see appendix E – Ordering.

- One no. 1u horizontal cable management bar following each 4u of fibre patch panels;
- One no. 1u horizontal cable management bar following each 1u (48 ports) active data switch;
- One no. 1u horizontal cable management bar before each voice panels.

### 42U cabinet layout example

24C OS2 FIBRE BACKBONE																									
01	03	05	07	09	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47		
02	04	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48		
HORIZONTAL CABLE MANAGEMENT																									
01	03	05	07	09	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47		
02	04	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48		
ACCESS SWITCH 09																									
HORIZONTAL CABLE MANAGEMENT																									
01	03	05	07	09	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47		
02	04	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48		
ACCESS SWITCH 08																									
HORIZONTAL CABLE MANAGEMENT																									
01	03	05	07	09	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47		
02	04	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48		
ACCESS SWITCH 07																									
HORIZONTAL CABLE MANAGEMENT																									
01	03	05	07	09	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47		
02	04	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48		
ACCESS SWITCH 06																									
HORIZONTAL CABLE MANAGEMENT																									
01	03	05	07	09	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47		
02	04	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48		
ACCESS SWITCH 05																									
HORIZONTAL CABLE MANAGEMENT																									
01	03	05	07	09	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47		
02	04	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48		
ACCESS SWITCH 04																									
HORIZONTAL CABLE MANAGEMENT																									
01	03	05	07	09	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47		
02	04	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48		
ACCESS SWITCH 03																									
HORIZONTAL CABLE MANAGEMENT																									
01	03	05	07	09	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47		
02	04	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48		
ACCESS SWITCH 02																									
HORIZONTAL CABLE MANAGEMENT																									
01	03	05	07	09	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47		
02	04	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48		
ACCESS SWITCH 01																									
HORIZONTAL CABLE MANAGEMENT																									
01	03	05	07	09	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47		
02	04	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48		
ACCESS SWITCH 00																									
HORIZONTAL CABLE MANAGEMENT																									
01	03	05	07	09	11	AA		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	03	05	07	09	11	AB		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	03	05	07	09	11	AC		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	03	05	07	09	11	AD		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	03	05	07	09	11	AE		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	03	05	07	09	11	AF		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	03	05	07	09	11	AG		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	03	05	07	09	11	AH		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	03	05	07	09	11	AJ		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	03	05	07	09	11	AK		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	03	05	07	09	11	AL		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	03	05	07	09	11	AM		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	03	05	07	09	11	AN		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	03	05	07	09	11	AP		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	03	05	07	09	11	AQ		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	03	05	07	09	11	AR		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	03	05	07	09	11	AS		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	03	05	07	09	11	AT		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	03	05	07	09	11	AU		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	03	05	07	09	11	AV		13	15	17	19	21	23	02	04	06	08	10	12	14	16	18	20	22	24
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	VBB