AIRPORTS COMPANY
SOUTH AFRICA

Annexure G – IT Standards

Tel: +27 (0)11 723 1400 Fax: +27 (0)11 453 9353
The Maples, Riverwoods, 24 Johnson Road, Bedfordview, Gauteng, South Africa, 2007
PO Box 75480, Gardenview, Gauteng South Africa, 2047

www.airports.co.za

Airports Company South Africa SOC Ltd Reg No. 1993/004149/30 VAT no. 4930138393

Contents

TABLES

Glossary of Terms

ACSA	Airport Company South Africa
ASIC	Application-Specific Integrated Circuit
EA	Enterprise Architecture
GDR	Geographically Dispersed Resiliency
GDPS	Geographically Dispersed Parallel Sysplex
HBA	Host Bus Adapter
HSRP	Hot Standby Router Protocol
LAP's	Lightweight Access Points
IT	Information Technology
ITAC	Information Technology Architecture Committee
ITIAS	Information Technology Infrastructure Architecture Standards
IT MANCO	Information Technology Management Committee
ISL	Inter Switch Links
NPIV	N-Port ID Virtualization
NVMe	Non-Volatile Memory express
OS	Operating System
QoS	Quality of Service
LAN	Local Area Network
WAN	Wide Area Network
WLAN	Wireless Local Area Network

1.0 Purpose and Objective

The purpose of this document is to define and specify sets of Information Technology Standards for Airports Company South Africa (ACSA) to be adhered to by Potential Service provides. This is done to ensure a compatible, integrated and standardised environment and the optimisation of the technology.

Only the Standards, Technologies, Products and compilation of products described in this document may be purchased, installed, used and supported within the organisation.
Any other products, upgrades and enhancement to the current accepted standards must be approved via Information Technology Architecture Council (ITAC) and noted by Information Management Committee (IT MANCO).

All IT equipment and software maintenance and warranties must be handed over to the current incumbent maintenance service providers of ACSA where a existing contract exists. This is not applicable to completely new services. Costing for this maintenance and warranties must be included into the bid.

2.0 General

2.1 Connectivity to ACSA

Connectivity to the ACSA on-premises systems will be facilitated through either a Site-To-Site or a Point-to-Site VPN.

Point to Site VPN
VPN product:Checkpoint Mobile client for laptops and Checkpoint Capsule for mobile devices
Version: 88.10+

Site-to-Site IPsec VPN
Encryption
Phase 1
IKEv2 only
Encryption Algorithm AES-256 or higher
Data Integrity SHA-255 or higher
DHG Group 14 or higher
Phase 2
Encryption Algorithm AES-256 or higher
Data Integrity SHA-255 or higher
DHG Group 14 or higher

2.2 Authentication and Authorisation

ACSA uses Microsoft Active Directory for User identities. This is a hybrid implementation; therefore the on-premise directory is integrated with Microsoft EntraID.

Any proposed IT system must integrate with ACSA's Active Directory for authentication, ensuring a single identity for each user across the organisation.

Authorisation can be done via Security groups in Active Directory or within the Proposes system.

2.3 Resilience

Resilience should be built into the proposed system to satisfy the SLA/availability requirements as per the Scope of Work.

The relevant resilience for existing infrastructure is described in this document under the various sections. Should the Potential service provider need to expand any of these systems/infrastructure, it should be designed according to the information provided herein.

2.4 Maintenance

Maintenance is a key factor in ensuring the reliability of IT services. IT is of utmost importance to ensure that proper maintenance plans are in place for any newly introduced IT systems/Software/Infrastructure.

Existing systems are usually covered by maintenance contractors already in place. Should there be any expansion of existing IT systems/Software/Infrastructure, the Potential service provider must engage these contractors for the maintenance **handover** of the new hardware/software. The costs should be included in the submitted bid, except when otherwise requested in the Scope of Work.

2.5 IT Security

IT security is to be considered in all aspects of newly installed system. As a minimum ACSA IT security personal to be issued with the master system passwords and long details. ACSA IT administrator to have access to the operating systems and servers (not the system itself)

2.6 Data Sharing

Any Data or information to be shared or saved should be stored in industry-standard formats. Data should be shared in the best resolution possible, where applicable.
E.g.(not limited)
Images: Jpeg, png,Tiff,BMP etc
Documents: Ms Word, PDF etc.
Spread Sheets : Microsoft excel etc.
Video: Mp4, Avi etc
Audio: Mp3, flac etc.

2.7 Deviation

Deviation from any of the listed information requires **approval** and guidance from the ACSA IT division **and must be obtained during the questions and clarifications phase of the RFP**

2.8 Approval

All designs and Bill of materials must be approved by ACS before ordering any equipment or software.

3.0 Existing Standards and Architecture

3.1 End User Computing Platform Standards

Below id the current **minimum** Specification for standard Laptop and desktop devices. Should any **specialised** hardware be required, it should be noted to ACSA during the Questions/Clarifications phase of the RFP.

3.1.1 Desktop

- A 13th Gen i7-13700 (8+8 Cores/30MB/24T/2.1GHz to 5.1GHz/65W)
- 16GB (1X16GB) DDR5 M.2 2280 512GB PCIe NVMe Class 40 Solid State Drive
- M.2 2280 PCIe NVMe Class 40 Solid State Drive as Boot Drive
- Intel Integrated Graphics
- No Optical Drive
- Intel(R) AX211 Wi-Fi 6E 2x2 and Bluetooth
- System Power Cord C13 (South Africa (Red Top Plug))
- Wired Keyboard
- Optical Mouse
- WLAN
- Intel vPro Enterprise
- Trusted Platform Module (Discrete TPM Enabled)
- Dell Additional Software
- Windows 11 Pro
- Warranty - Next Business Day Onsite repair + Accidental Protection - 48 Moths Service
- 20” Screen

3.1.2 Laptop

- 13th Gen Intel Core i7-1365U vPro (12 MB cache, 10 cores, 12 threads, up to 5.2 GHz Turbo)
- Intel 13th Generation Core i7-1365U vPro,Intel Integrated Graphics,TBT4
- Intel vPro Enterprise Technology Enabled
- 16 GB, 2 x 8 GB, DDR4, 3200 MT/s, dual-channel, Non-ECC
- 512 GB, M.2 2230, PCIe NVMe, SSD, Class 35
- 14.0" FHD (1920x1080) Non-Touch, FHD IR Cam,
- WLAN/WWAN(4G)
- FHD/IR Camera, Temporal Noise Reduction, Camera Shutter, Mic
- Single Pointing, Finger Print Reader
- English International backlit keyboard, 79-key
- Intel(R) Wi-Fi 6E (6 if 6E unavailable) AX211, 2x2, 802.11ax, Bluetooth Wireless Card
- E4 Power Cord 1M with red top plug for South Africa
- Latitude 5440 BTO Configuration
- Windows 11 Pro,
- Warranty - Next Business Day Onsite repair + Accidental Protection - 48 Moths Service

3.2 Operating Systems

Operating Systems	
Back end (Servers)	**Linux:** Red Hat Enterprise RHEL 8.10 or better, Ubuntu22.x LTS or better
	Wintel: Windows 2022 64-bit or better
Front end (End-user)	Windows 11 Latest Current Branch

Table 1 – Operating System Standards

3.2.1 Network Cable Specifications

Network (Cabling)	
<100M @ 100MBs	CAT7 plus Patch Lead 1.5m or latest equivalent
<100M @ 1000MBs	CAT7 plus Patch Lead 1.5m or latest equivalent
<412m	Fibre (Multimode)
<2km	Fibre (Multimode)
<20km	Fibre (Single Mode)
>1.5m and <30m	LC-LC Fibre Patch Lead LC-SC Fibre Patch Lead LC-ST Fibre Patch Lead SC-SC Fibre Patch Lead SC-ST Fibre Patch Lead ST-ST Fibre Patch Lead

Table 2 – Network cable specs

3.2.2 Protocols Standards

The following standard protocols are deployed at ACSA.

Protocols	
Application Protocol	Transmission Control Protocol/Internet Protocol (TCP/IP), SSH, IPsec, SSL/TLS
Database Protocol	Transmission Control Protocol/Internet Protocol (TCP/IP)
Data link Protocol	Border Gateway Protocol **(BGP),** Routing Information Protocol (RIP), Open Short Path First **(OSPF),** Enhanced Interior Gateway Routing Protocol (EIGRP), Intermediate System to Intermediate System **(IS-IS**) and Multiprotocol Label Switching **(MPLS)**
Wireless Protocol	IEEE 802.11a, 802.11b, 802.11g, 802.11d, WMM/802.11e, 802.11h, 802.11k,802.11n, 802.11r,802.11u, 802.11w, 802.11ac, 802.11ax
Wired/Switching/Routing	IEEE 802.3 10BASE-T, IEEE 802.3u 100BASE-TX specification, 1000BASE-T. 1000BASE-SX, 1000-BASE-LH, IEEE 802.1Q Tagging, and IEEE 802.1AX Link Aggregation.
Storage connectivity protocols	Fibre Channel over Ethernet (FCoE) FCoE Initialization Protocol (FIB)
System Protocol	SNMP v3.x, RFC 3411 or latest equivalent
Network Protocols	TCP/IPv4, UDP, IPSec, SSLv3 or latest equivalent
Authentication protocol	LDAPS, Kerberos, SSH, NTLM v2.x, EAP-TLS, TACACS+ or latest equivalent
Remote Access protocol	TLS 1.x, VPN Protocol: IPSEC, VPN (UDP/TCP modes)
All servers should have Gig connectivity, preferably 10 Gigs per connection for interface Fibre	

Table 3 – Network protocols

3.3 Physical infrastructure and Data Centres

3.3.1 Categorisation and Rating

IT facilities are categorised into 3 types depending on functionality

	1 - WIRE CENTRE	2 - CORE CENTRE	3 - DATA CENTRE
	Wire Centre / Fibre Distribution Centres	**Core Equipment**	**Primary Data Centre / Disaster Recovery Centre OR Secondary Data Centres**

	1 - WIRE CENTRE	2 - CORE CENTRE	3 - DATA CENTRE
Note	Low Heat Generating Equipment	High Heat Generating equipment	High-heat-generating equipment
Function	Copper Distribution	Data Distribution/ Copper Distribution	Data Distribution
Function	Fibre Distribution	Fibre Distribution/ WC backbone distribution	Data Processing
Function	End User connectivity	End User connectivity	Data Storage
Function			Disaster Recovery
TIA ref	Floor Distributer	Building Distributer	Campus Distributer
Cables	Cat7 SFTP Cables	Cat7 SFTP Cables	Cat7 SFTP Cables
Cables	RF Cable	RF Cable	
Cables	Co Axial Cables	Co Axial Cables	
Cables	Fiber Cables	Fiber Cables	Fiber Cables
Network	Access layer switches	Access layer switches	Access layer switches
Network		Distribution Layer	Distribution layer
Network		Core Layer	Core Layer
Network			Routers
Network			Firewalls
Servers			Blade Enclosures
Servers			Rack Mount Servers
Servers			
Storage			SAN
Storage			Backups
Storage			DR
Radio	RF Boosters	Repeaters	
Radio	Base Stations	Base Stations	
Equipment	Fiber / Copper Distribution/panels	Fibre / Copper Distribution/panels	Fibre / Copper Distribution/panels
Equipment	CCTV: field/end components	CCTV: field/end components	
Equipment	Access Control: field/end components	Access Control: field / end components	
Equipment		Audio/Visual: field/end components.	
Equipment		Parking systems: field/end components	
Equipment		Telecoms: Analogue Gateways	
Equipment		National Radio system field end devices	
Equipment	Fire Systems: field/end components	Fire Systems: field/end components	Fire Systems: field/end components
Equipment	BMS: field/end components / Sensors / Door contacts		BMS Server : field / end components / Sensors / Door contacts
Equipment		PABX	

3.3.2 **IT Facility Ratings**

Rooms are rated into 8 types, focusing on the availability and expectation of the infrastructure

	Availability	Recommended for Room Category	Room Function	Hosted System Description	Location
A	99.999%	DATA CENTRE	Disaster Recovery Centres. Primary Data Centres and Secondary Data Centres	Business Critical Systems. Core Network Devices. Backups. Storage. Primary Virtual hosting. Independent server hosting. Data Recovery systems.	Secured Facility on Landside
B	99.98%	CORE CENTRE	Regional Core Rooms Functions as a Campus Distribution	Campus Distribution Business Critical Systems. Core and Distribution Devices. Cute / Baggage / Comms	Secured Facility inside the terminal building
C	99.67%	WIRE CENTRE	Data Distribution Centres	Access Devices. Data Distribution to end devices	Secured Facility inside the terminal building
D	99.67%	WIRE CENTRE	Data Distribution Centres	Access Devices. Data Distribution to	Landside OUTDOOR – Outside the terminal buildings Inside Parade Areas (MSP)

The above ratings are guided by the TIA942 & the Uptime Institute standards for physical infrastructure, but not confined to all specifications, as it is suited to and defined by ACSA. Availability considers maintenance schedules.

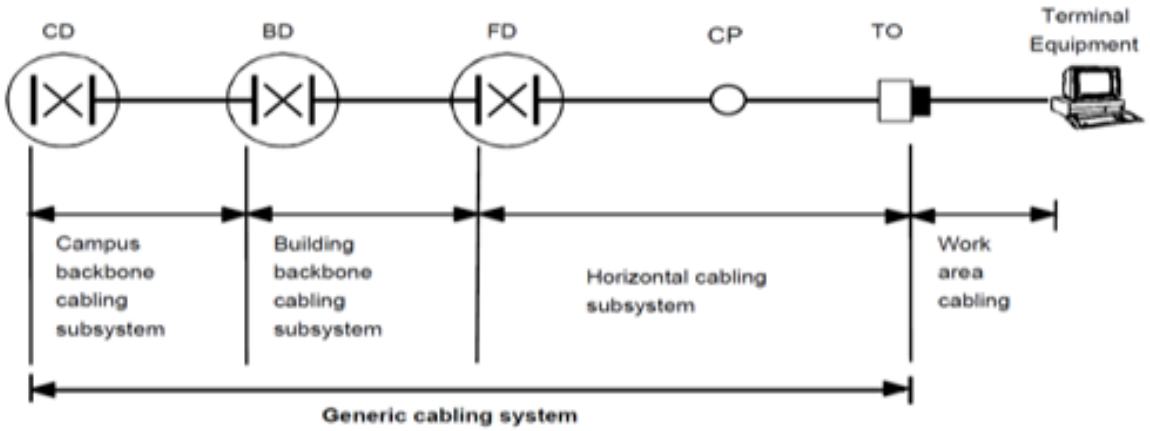
3.3.3 Cabling Standards

3.3.3.1 Network Cabling Schema

The functional elements of generic cabling are as follows:

- campus distributor (CD)
- campus backbone cable
- building distributor (BD)
- building backbone cable

- floor distributor (FD)
- horizontal cable
- consolidation point (CP)
- consolidation point cable (CP cable)
- multi-user telecommunications outlet (MUTO)
- telecommunications outlet (TO)

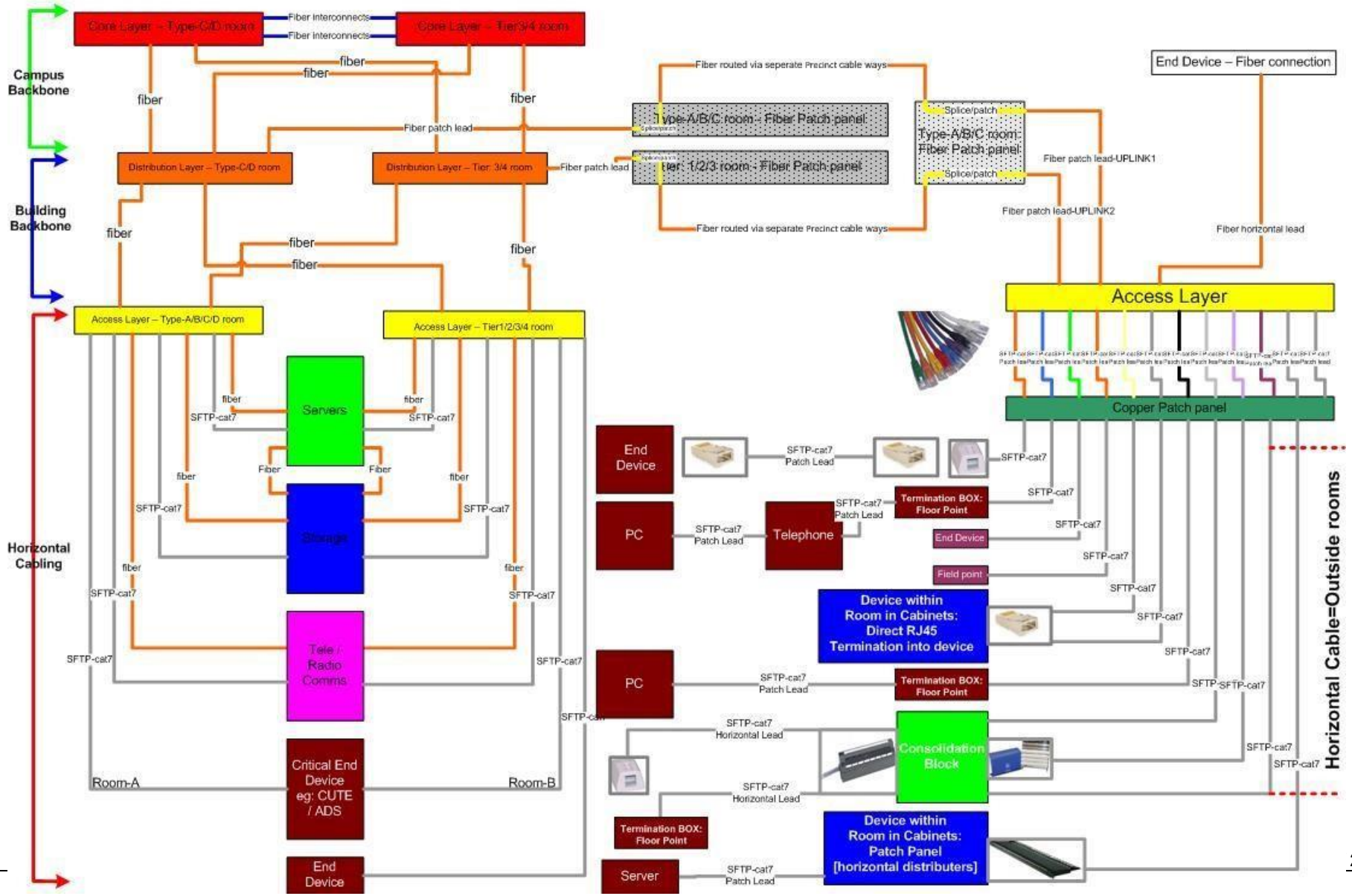


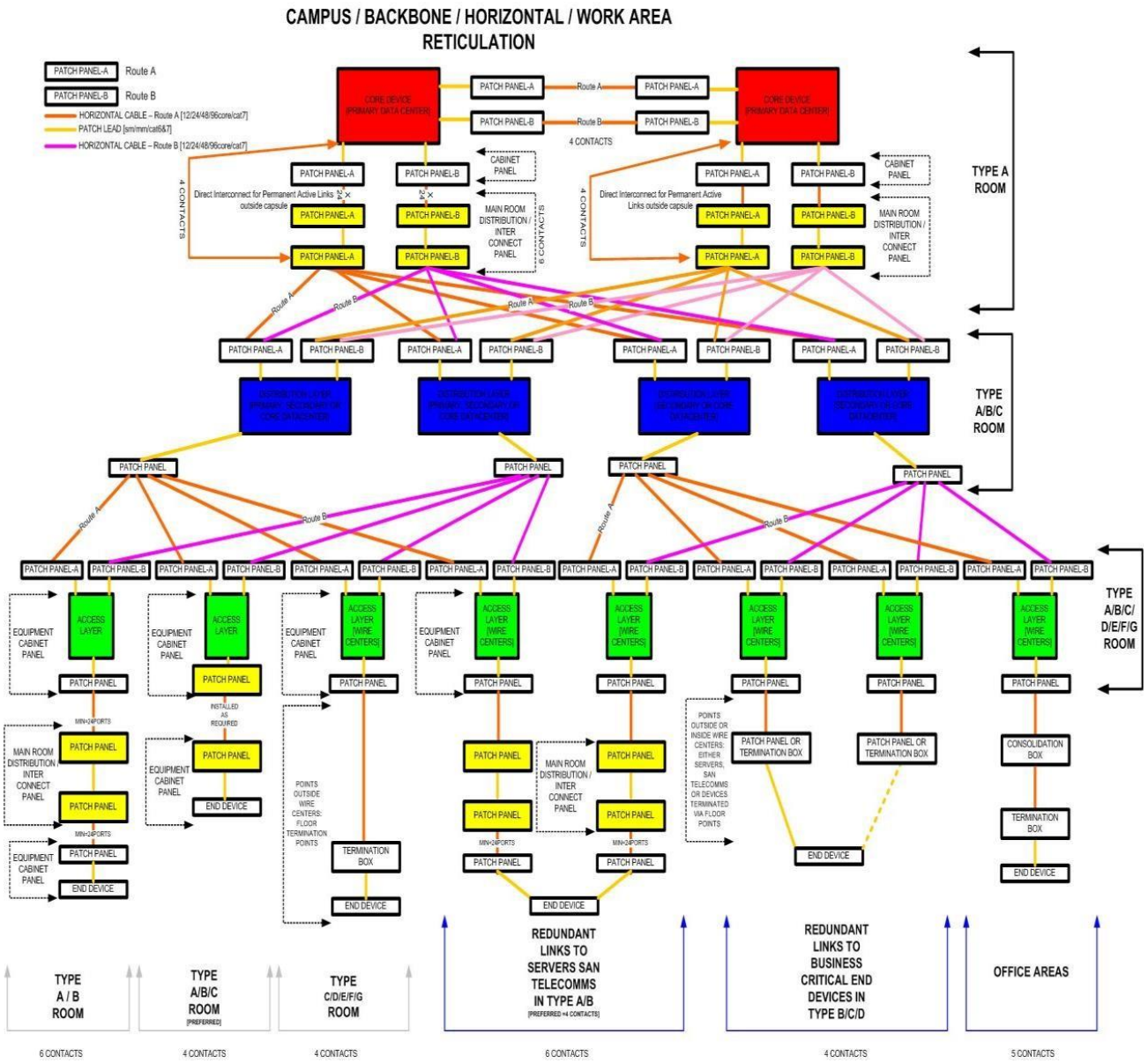
***Consolidation points:** Shall only contain passive connecting hardware and shall not be used for cross-connections. A consolidation point should be located in accessible locations [but not to the public]. The consolidation point shall be located so that there is at least 15 m from it to the outlet.

***The main distribution area (MDA)** is the central space where the point of distribution for the structured cabling system in the data centre is located. The data centre shall have at least one main distribution area. The core routers and core switches for the data centre networks are often located in or near the main distribution area.

***The horizontal distribution area (HDA)** is the space that supports cabling to the equipment distribution areas. The LAN, SAN, console, and KVM switches that support the end equipment are also typically located in the horizontal distribution area.

Network Cabling Schema




CAMPUS / BACKBONE / HORIZONTAL / WORK AREA RETICULATION
PATCH PANEL-A
Route A
PATCH PANEL-B
Route B
HORIZONTAL CABLE – Route A [12/24/48/96core/cat7]
PATCH LEAD [sm/mm/cat6&7]
HORIZONTAL CABLE – Route B [12/24/48/96core/cat7]
CORE DEVICE (PRIMARY DATA CENTER)
4 CONTACTS
CABINET PANEL
MAIN ROOM DISTRIBUTION / INTER CONNECT PANEL
6 CONTACTS
Direct Interconnect for Permanent Active Links outside capsule
TYPE A ROOM
TYPE A/B/C ROOM
PATCH PANEL
ACCESS LAYER (WIRE CENTERS)
EQUIPMENT CABINET PANEL
INSTALLED AS REQUIRED
MIN=24PORTS
POINTS OUTSIDE WIRE CENTERS: FLOOR TERMINATION POINTS
TERMINATION BOX
END DEVICE
TYPE A/B/C/ D/E/F/G ROOM
POINTS OUTSIDE OR INSIDE WIRE CENTERS: EITHER SERVERS, SAN TELECOMMS OR DEVICES TERMINATED VIA FLOOR POINTS
PATCH PANEL OR TERMINATION BOX
CONSOLIDATION BOX
TYPE A / B ROOM
TYPE A/B/C ROOM [PREFERRED]
TYPE C/D/E/F/G ROOM
REDUNDANT LINKS TO SERVERS SAN TELECOMMS IN TYPE A/B [PREFERRED =4 CONTACTS]
REDUNDANT LINKS TO BUSINESS CRITICAL END DEVICES IN TYPE B/C/D
OFFICE AREAS
6 CONTACTS
4 CONTACTS
4 CONTACTS
6 CONTACTS
4 CONTACTS
5 CONTACTS

3.3.3.2 Fibre Cabling

- Covering Sheath Colour: ORANGE
- Flame retardant cables or Low smoke zero halogen protective outer casing.
- Installations to adhere to TIA/EIA568-B standards.
- UPC connectors are deployed in transport systems designed for digital signal transport, while APC connectors are preferred for RF video signal transport.
- For systems such as RF video and high fibre sensitivity applications, the APC connector is preferred because these particular systems are extremely sensitive to any back reflections from connectors within the network.
- Number of patches to be kept to a minimum at all times.
- Max number of connection points per permanent link on campus backbone[core – core]: 4
    - [core device→patch cable→patch panel→horizontal cable→patch panel→patch cable→distribution device].
- Max number of connections points per permanent link on campus backbone[core - distribution]: 4
    - [core device→patch cable→patch panel→horizontal cable→patch panel→patch cable→distribution device].
    - [core device→patch cable→patch panel→horizontal cable→patch panel→patch lead →patch panel →horizontal cable→patch panel→patch cable→distribution device].
- Max number of connections points per permanent link on building backbone[distribution – access – end device]: 6
    - [core device→patch cable→patch panel→horizontal cable→patch panel□patch lead →patch panel →horizontal cable→patch panel→patch cable□distribution device].
- Max number of splices/joints on a channel link before replacement: 3 [subject to confirmation of db loss on cable]
- Standard campus backbone/building backbone / horizontal cabling: Optical Single mode 2 (OS2) Orange Sleeve.
- Patch Leads: OS2 Yellow and Optical Multimode 4 (OM4) Purple and Aqua Blue only [less impurities in core].
- Indoor fibre must have warning labels every 15m along its route and at every cable entry and exit point.
- Outdoor fibre must have warning labels every 15m along its route and at visible points (i.e. Manhole & Junction box, cable entry and exit point) along its route.
- As a minimum standard, all campus distribution layers, the cabling must be as per the below Fibre Spec:

  Indoor Blown Fibre Standard:

    - Option A = 12 core single mode
    - Option B = 24 core single mode
    - Option C = 48 core single mode
    - Option D = 96 core single mode
    - Option E = 192 core single mode
- Standard duct size and Colour Orange:
    - Option A = 4 way Micro-duct

  - Option B = 7 way Micro-duct
  - Option C = 12 way Micro-duct

- As a minimum standard, all conventional fibre cores from distribution lay to the end point termination cabinet the cabling must be as per the below Fibre Spec:
  - Option A = 12 core single mode
  - Option B = 24-core single-mode
  - Option C = 48-core single-mode
  - Option D = 96-core single-mode
  - Option E = 192 core single mode
- Long runs indoor: Single Mode=9 micron core. Cladding diameter = 125um. Min supported length=5000m @1G / 10G
- Devices within a room: Multi mode = +50 micron core [OM4]. Multi-mode = 62.5 micron core [OM1]. Cladding diameter = 125um.
- Max 300m distance @10g. Orange jackets =OM1/OM2. Aqua Jackets=OM3/OM4.
- Open trenching: heavy-duty duct construction, cable and armoured cable required. Inner ducts [rodent-free] must be used for all fibre in open trenching. Use 3 x 32mm inner ducts hosted in a 110mm PVC duct [capable of carrying 3x96core cables].
- Covering Sheath: UV-resistant. High impact resistant. Flame retardant. Water resistant, rodent-free.
- Usage at Roadway crossings – 110mm Corrugated PVC Rodent-free.
  - Minimum of 250 depth and covered with concrete.
- Ceramic tip connectors, UV curable, <3Db loss with load on fibre axial. Ip44.
- Fibre-inter connections or distribution units: Preferably 40-degree angled connection panels (stress relief on bend). 24-port patch panels.
- Dust covers or dust caps for unused slots
- Operating temp: -40degrees to 70degrees
- Test docs: continuity and maintenance of polarity, length, propagation delay, optical attenuation of link (2 wave lengths/2 directions) using light source and power meters. Test to be performed at 10G ratings. Test results must be recorded by power meter and not handwritten [FLUKE
- meter required]. Using ODF's. (Fibre Frame)
- Return loss max: - 45db
- No incomplete splicing in Manholes where restriction of closing runways may affect works.
- Use bend control accessories during installation: min bend radius = 20 X cable diameter
- With Long run fibre Tank Dome Joints are required to be used.
- Dome Joints need to be fixed with a bracket/s inside Manholes.

3.3.3.3 Fiber Splicing And Termination

3.3.3.3.1 Indoor Fibre Requirements

- Arc fusion splicing.
- Splice loss = <0.03db.
- Loss per 200m = <0.07db.
- 30mm sheath visible past the end of the entry gland for the fibre patch panel.
- 925mm of removed outer sheath coiled in clockwise direction on spool.
- 300mm slack before the entry gland to allow the removal of the fibre panel.
- Pigtails to be wrapped counter clockwise.
- All splices must be covered by splice protection sleeves.

- Buffer lengths are per cable manufacturers' specifications.
- Fibres must be organised into a fibre splice chip by colours or numbers for future amendments. Chip cover to be labelled appropriately.
- Splicing done within a proof / external particle-free environment.
- All fibre joints to be enclosed within water-tight / air–tight housing. Housing to have durable labels.
- Sufficient slack in every manhole – mounted coil boxes at each manhole to coil up slack cabling.
- All ports to be cleaned by Isopropyl alcohol.
- Dome joint junction boxes are required for ring networks and outdoor usage. Fully updated documentation/legends per patch station.
- Termination boxes in office spaces: LC 6 port termination boxes. IP66 rated +-200mmX200mmX30mm
- Plug and play 12port termination LC OEM-4 units only acceptable. Rack mountable.

3.3.3.3.2 **Outdoor Fibre Requirements**

- No Through Splices at individual WC's or Termination Points
- Direct Splicing required on 2 separate Fibre panels (Route A & B)

3.3.3.4 **Copper Cabling (Cat7** ORANGE **SOLID CABLE)**

- Colour: Orange for horizontal runs within Type A/B/C rooms.
- Colour: Orange for patch leads.
- Within Type A rooms = Cat7 S-Ftp LSZH 10G 750MHZ
- Within Type B rooms = Cat7 S-Ftp LSZH 10G 750MHZ
- Within Type C rooms = Cat7 S-Ftp LSZH 10G 750MHZ
- Between Servers, Storage and network device uplinks to the network = Cat7 S-Ftp LSZH 10G 750MHz
- Horizontal Cables = Cat7-SFTP LSZH = Supportive of 10 000mb/s (10G)@>750MHz
- Current revision date – June 2011. Next revision – Jan 2014
- Meet or exceed ISO/IEC 11801 Cat6a or Cat7 component requirements.
- CAT7-SFTP = 4 pair-23 American Wire Gauge (AWG) copper cable wires, 100 ohms, shielded twisted pairs, RJ45 connectors. Foiled twisted Pairs – each pair enclosed in laminated aluminium foil, minimising crosstalk. Outer braiding minimises alien cross-talk.
- Cable properties to ensure maximum resistance against electromagnetic interference and alien crosstalk
- LSZH - Low smoke. Zero halogen cable properties. FRNC- Flame-retardant and non-corrosive cable properties.
- Max cable diameter: less than 7.5mm
- Outdoor Cabling must have UV protection and IP66-rated connections and junction points.
- Operating temperatures: -20degrees to + 60degrees
- Use conduit/trunking if exposed to sunlight or higher than 50-degree temperatures. Use conduit/trunking for all outdoor applications.
- Max number of connections between access layer switch and end device from a wire centre: 4
    - [switch→patch lead→patch panel→horizontal cable→termination box→patch lead→device].
- Max number of connections between access layer switch and end device within a secondary data center or core centre: 4
    - [switch→patch lead→patch panel→horizontal cable→patch panel→patch lead→device].

- Max number of connections between access layer switch and end device within a primary data centre: 6
    - [switch→patch lead→patch panel→horizontal cable→patch panel→horizontal cable→patch panel→horizontal cable→patch panel→patch lead→device].
- Max single copper run (between patch panel and termination box): 90m
- Max patch lead length for workspaces: 10m
- Max total distance for copper run = 100m, including patch and fly leads.
- Each cable run from the patch panel to the floor connectors must be continuous with no breaks or joints. No joints will be accepted.
- 7-strand patch leads will only be used in workspace areas [no more than 20%db loss on channel performance allowed].
- Solid Conductor patch cables [horizontal cables] to be used as patch leads in data rooms.
- Note: Possible 20% loss on permanent links. -4db =80% loss. 7 strand patch cable=20% dB loss.
- Test docs: wire map/length/attenuation / near-end cross-talk loss on permanent links and not channel links.
- Only “Permanent Link” test results will be accepted
- Avoid interferences like routing around air conditioning units.
- Patch leads loses 20% dB – made up of 7 cables only. Consider using Horizontal cables for patch leads only.
- Link Runner test is only for troubleshooting and to determine the VLAN and the Connection
- FLUKE Copper test results required for new installations and to be submitted with handover/sign-off.

3.3.3.5 Patching

- Leads to adhere to latest ANSI/TIA/EIA-569-B standards – with factory fitted 8 pin connectors.
- Each Cabinet will be represented by a patch panel with Primary and Secondary datacentres.
- Every Primary data centre must have a distribution interconnect cabinet. (Passive Cabinet) Dedicated Fibre and Copper Cabinet, e.g. ODF
- Wire Centres will run from the patch panel directly to the switch– single cross connections.
- Copper Patch leads to be factory terminated and distance specific – minimum slack.
- Factory-supplied patch leads to be used only at the work area cabling zones [user end].
- Fibre patch leads to be factory terminated - supplied with distances closest to requirements - min slack.
- Fibre patch runs will be above cabinets – 1st fibre panel will be mounted at the top of the cabinet.
- Patching: Overhead fibre trays for fibre cables between cabinets.
- Copper patch runs will be overhead, if possible, be under cabinets – 1st copper panel will be at the bottom of the cabinet.
- Should fibre and copper be in the same cabinet – Fibre panels will be mounted first from top, and the first copper panel will be mounted from bottom up.
- All cables to be patched downwards into brush panels below in wall mount cabinets and outdoor cabinets only.
- Labels on the patch panel to be visible as per labelling standards.
- Looms/ bundles of 24 to start from the patch panel. Jacket removal point to be kept to a minimum - not to compromise cable integrity. Jackets to remain up to connecting block – twists to remain up to connecting points [0mm untwist].
- Patch connectors to be positioned correctly into patch panels without any stress on the cable or additional twists– no forcing connectors to place.

- Cable bending not exceeding 35mm radius in fibre and 65mm in copper. 10 x outer diameter for fibre.
- Strain relief boot clips must be used

3.3.3.6 Patch Panels And Consolidation Points

- Copper: 24 port panels. Shielded patch panels where applicable.
- Fiber: 24-port panels. Environment temperature: -40~+80° C. Insulated Resistance: ≥ 21χ 0MΩ /500V (DC). Fibre bending radius: ≥ 40mm
- Consolidation points: 8 / 16 / 24 blocks installed along cable route FOR OFFICE SPACES ONLY [horizontal cabling outside the room].
- Every consolidation block will have a unique number per site. Used for office spaces where 1 point for every 4m2.
- Horizontal Distribution Points: In a room, they must be centrally located between active equipment, allowing patch leads to be connected.
- 1rack unit (1U) rack-mounted patch panels.19-inch wide. > 1,000 repeated wire insertions without incurring permanent deformations.
- Fibre: Interchangeable adapter plates - LC adapter only.
- Copper: RJ45 patch panels. CAT 7 shielded sockets. Gold-plated contact elements.
- Cables to be routed from patch panels in bundles of 24.
- Panels to be mounted >150mm from the front door of the cabinet.
- Adequate label space above for each port
- Patch cables loop below/downwards from the patch panel into the brush panels
- Colour: Black Patch panels
- To be earthed. Gold contacts.
- Entry Glands/support guiders on the rear left and rear right sides of panels.
- Fibre panels will be above copper panels if in the same cabinets.
- Type-A Room: Passive Cabinets – shielded copper patch panels. Separate copper and separate fibre distribution cabinets.
- Type-B Room: Passive Cabinets – shielded copper patch panels. Separate copper and separate fibre distribution cabinets.
- Type-C Room: Active and Passive Cabinets - shielded copper patch panels where applicable if STP cables are used

3.3.3.7 Floor / Terminations Boxes / Plugs Or End Point Connections

Indoor Cabling Installations

- Offices: dual port recessed panels fixed against floor trunking [RJ45]. Blanking panels for unused ports.
- Ceilings/areas with no trunking: single port surface mount boxes [RJ45].
- Gold-plated contact elements.
- Shielded keystones where applicable – compulsory where SFTP cables are required.
- Termination Panels [1U patch panel – to be located centrally to active equipment requiring copper connectivity] required if devices are in the same wire centre as the access switch.

Outdoor Cabling Installations

- IP66-rated interchangeable keystones and connection joints for outdoor points.
- IP66 IP66-rated junction boxes to house Wall boxes and Keystones.
- All Wall boxes and Junction boxes to be fixed to permanent structure or pole with a Stainless-Steel Banded Strap to secure.
- All entry and exit points into junction boxes need to be installed facing down, with the holes facing the floor.
- All entry and exit points need to have entry grommets installed.

- Critical system termination points must be enclosed in a secure IP66 IP66-rated PVC box with entry and exit glands via bosal or PVC Piping [CCTV cameras/access control].
- Termination Panels [1U patch panel – to be located centrally to active equipment requiring copper connectivity] required if devices are in the same wire centre as the access switch.
- All Outdoor equipment and cabinets need to be properly earthed.

3.3.3.8 Brush Panels [All Rooms]

- To BE USED ONLY UPON APPROVAL IN Type E / F / G /H FACILITIES ONLY.
- To be located below patch panels and switches.
- Colour: White or black.
- 1.5mm thick metal framework.
- 1U height.
- 341mm x 21.5mm opening for brushes.
- 4 x mounting holes per panel.

3.3.3.9 Cable Management, Routing And Trenching

- Max bend - Fibre patch leads: 25mm
- Max bend – Co Axial leads: 50.5mm radius[Rj11]
- Max bend – Co Axial leads: 33 mm radius[Rj16]
- Max bend – Copper looms: 100mm radius
- Max bend – Fiber cased covered: 150mm radius
- Copper loom of 24 = 40mm diameter.
- PVC Conduit or Sprague for single cable: 25mm
- Trench Sleeve: >110mm (Material to be used, Dependent on Requirement).
- Distance for data cables from shielded electrical cables [greater than 5Kva] = 300mm.
- Distance for data cables from unshielded electrical cables [greater than 5Kva] = 600mm.
- Each U-space to be separately maintained/managed vertically and horizontally in the cabinet through the cable routing cycle.
- Velcro cable ties on all routes. No Plastic Cable ties. No glue guns/staples. Risks are too high when cutting cable ties locked around a cable. Only Velcro strips are allowed to be used in the Data Centre and Disaster Recovery Centre
- Velcro to be installed at every 500mm inside Wire Centres and Core Rooms. Velcro at every 3000mm in cable ways. Both must be finger tight.
- Avoid slack in cabinets. If required, then do not exceed 3m / 4 coils and maintain max bends.
- Cable bundles not to exceed 24 cables per bundle or loom.
- Cable managers in cabinets must NOT EXCEED HEIGHT OF patch panel: e.g. 1rack unit patch panel = 1 rack unit of a plastic cable manager. The cabinet cable manager must be plastic.
- Cables to be locked in place within a room and outside a room using Velcro.
- Cable routing to be guided as per building design, preliminary investigations and discretion of ACSA tender-approved/certified / qualified cabling teams.
- Shortest distance for routing must always be investigated, and capacity planning along routes must be considered.
- Preferred [Stainless Steel Bollard] Figure 10 – Figure 12.
- Sleeves: min diameter - 110mm to accommodate capacity planning as per cable tray / cable duct distribution routing diagrams.
- PVC sleeves [Concrete sleeves]: Rodent Free, UV resistant, weatherproof, accidental damage protection and self-draining.
- Min trench depth: 0.5m. Min trench width: 200mm (ensure safe distance between services). Special Requirements require formal approval from the Client.

- Avoid interferences like routing around air conditioning units.
- Prior to any trenching, a full investigation of the route must be provided to stakeholders – to ensure that no services will be disrupted during trenching.
- Cabinet Cable Manager
    - A: 43U spacer (2x45mm=90mm wide, 12x45mm=540mm depth) o Cabinet Cable Manager
    - B: 42U spacer (2x45mm=90mm wide, 10x45mm=450mm depth) Cabinet Cable Manager
    - C: 20U spacer (2x45mm=90mm wide, 5x45mm=225mm depth) o Cabinet Cable Manager D: 16U spacer (2x45mm=90mm wide,

3.3.3.10 **Maintenance holes:**

- Min: 1000mmx1000mm wide.
- Min: 50mm exposed sleeves.
- Min: 400mm sleeve height entry
- Double brick construction hole facility. Preferably: Concrete.
- Lockable Metal (Preferably: high-density Plastic) manhole cover
- Maintenance holes to be sealed with bitumen inside and outside
- To be bag-washed with Cement slush before backfilling.
- Mounted coil boxes – hot galvanised dipped.
- Sleeve installations first, then bricking.
- Preferably: Ladder facility into the manhole
- Available at each site: Water Pump to remove water in manholes.
- External water seal to be above the regional water table.

3.3.3.11 **Cable Trays / Cable Ducts And Flooring**

- Suspended Ceilings / overhead fibre management trays made up of shatterproof lightweight plastic / PVC, maintaining a 50mm max bend radius.
- Overhead fibre management trays should be made up of lightweight Metal Material.
- Self-extinguishing or non-flammable. 100mm above cabinets – 100mm above the highest cabinet, maintained if cabinet heights vary.
- Cable bends in trays and ducts > 110degrees bend radius.
- Hot-dipped galvanised before fabrication. Zinc is electroplated after fabrication. Wire-mesh cable trays for exterior and corrosive environmental applications. Non-water retention. Welded at intersections – 50 x 50mm grid patterns. U-shaped with equal height side walls.
- All cable trays must be earthed.
- Supports attached to ceilings, walls or floors. Punched hole pattern that accepts tray attachment hardware. Steel supports.
- Cable Tray
    - Cable Tray SPEC1: width=100mm. height=40mm. support weight per 1000mm=40kgx2 o
    - Cable Tray SPEC2: width=200mm. height=45mm. support weight per 1000mm=60kgx2 o
    - Cable Tray SPEC3: width=300mm. height=50mm. support weight per 1000mm=80kgx2
    - Cable Tray SPEC4: width=400mm. height=60mm. support weight per 1000mm=100kgx2
    - Cable Tray SPEC5: width=600mm. height=60mm. support weight per 1000mm=120kgx2
- 3-layered ceiling suspended cabled tray systems preferred. (Power, Fibre, UTP). Formal approval required from the Client in special circumstances.

- All suspended ceilings / mounted or floor cable trays must allow for multi layered installations – first installation must start at lowest layer. (Power, Fibre, UTP). Formal approval required from the Client in special circumstances.
- Horizontal cable tray separations [data tray parallel to electrical] preferred over multi-layered tray systems in raised floors to minimise resistance and maximise air flow.
- All suspension nuts (if applicable) must be installed above the lowest layer to accommodate future cable tray installations above the lowest layer.
- Multi-layered cabled trays: min distance between trays = 60mm allowing air flow.
- Bend radius = width of cable tray (width of larger cable tray if two are interlinked).
- Max stacked height of cables in a cable tray: 120%
- Minimum height above ground for floor trays: 60mm for air flow
- Min distance from ceiling for ceiling suspended trays: 60mm
- Suspension bars: 1000mm apart. Dual support beams. Adjustable with butterfly lockable nuts (ceiling and floor trays for multi-tray installations and height adjustments). Wall L-shape brackets where applicable.
- Data Cable Trays: Preferred Overhead / under cabinets possible.
- Electrical Cable Trays: Rear of cabinets Overhead
- Incoming routes to be located furthest from air con locations – preferably the centre of rooms
- Cross-connect cable trays [trays linking rows] should run centrally through the room at an equal distance between cabinets.
- Min dist. bet electrical cables and copper data/telecoms cables: 300mm.
- Radio frequency transmission cables to be separated at a distance of 600mm from data cables.
- Radio frequency transmission cables to be separated at 300mm away from electrical cables
- Conduits in offices - preferably located on solid walls opposite doors/entrances - away from feet when seated. Data with voice to be separated from power. Separate conduits for power and data. (P801)
- No Cabling on ceiling tiles - ensure cables run through a conduit or cable tray to the termination point/end device.
- Copper cables must run in looms or bundles of 24 in cable trays.
- No sharp edging – Grommets and polishing required where applicable.
- Cable trays should not exceed 60% for the first installation for certification.
- Sleeves: min diameter- 110mm to accommodate capacity planning.
- Flexible PVC sleeves [Preferably: Concrete sleeves]: Rodent Free, UV resistant, weatherproof, accidental damage protection and self-draining.
- Min trench depth: 0.5m. Min trench width: 200mm (ensure safe distance between services). Special Requirements require formal approval from the Client.

3.3.3.12 Cabinet Specifications

- **Type-A Room:** External height=+-2200mm (with castors) External width=600mm. Internal height= 42U high / +-2000mm. 600mm x 1070mm. Support weight: 1400kg.
- **Type-B Room**: External height=+-2210mm (with castors) External width=800mm. Internal height= 42U high / +-2000mm. 600mm x 1070mm. Support weight: 1200kg.
- Type-C Room: External height=+-2200mm (with castors) External width=600mm. Internal height= 42U high / +-2000mm. 600mm x 1070mm. Support weight: 1400kg.
- **Type-D Room:** Indoor Environmental Cabinet - External height=+-1985mm (with castors) External width=600mm. Internal height=42U/42U high / +-1866mm. 600mm x 1070mm. Support weight: 1400kg.
- **Outdoor IP66 Rated Cabinet** – External height (Including Canopy) = 1400mm External Width = 1800mm Depth = 998,45mm / Internal Height = 25U Internal Width = 1200mm / Bottom Plinth Height – 200mm Support Weight = 850kg