ICT System

1.0 Introduction

Designing an ICT system is one portion of the workload in CKE. This chapter will discuss in general terms the procedure involved. However, this chapter will not discuss on the ICT technology since ICT technology changes rapidly, but will focus more on general terms and procedure.

2.0 Passive Design

The first portion in ICT design is looking into the passive aspect. Here the focus will be on structured cabling design. The general terms used are:

(a) External backbone

Refers to external cabling between buildings. The cable shall be of single mode (for length > 500 metre) outdoor/armored fiber optic type. The cable shall be installed through underground pipes and manholes, and cable trays and trunkings. Refer to diagram 1

(b) Internal / Vertical backbone

Refers to cabling between one switch to another in the same building which can be in different or in the same floors. The cable shall be of indoor multimode fiber type (for length < 500 metre). Refer to diagram 1

(c) Horizontal cabling

Refers to cabling from the equipment rack to the faceplate of the network port. These points shall be a minimum of UTP Cat 6 or latest (EIA/TIA Cat 6 or latest) c/w modular type RJ45 jack, faceplates, patch cords and RJ45 connectors. Down drop conduits shall be of uPVC Heavy Duty High Impact or Galvanized Iron (G.I) type and to be installed concealed. Refer to diagram 2

(d) Network point

Refers to interconnection point within the horizontal cabling. The network point performs a ‘straight-through’ intermediate interconnection between the horizontal cabling coming from the horizontal cross-connect and the horizontal cabling going to a multi-user telecommunications outlet assembly (MUTOA) or the telecommunications outlet in the work area.

3.0 Active Equipment

Active equipment refers to the hardware used for the system such as:

(a) Server

(b) Switch

Note: For more details refers to 'Nota Tambahan Kepada Panduan Teknik Chapter 14'

4.0 ICT Terminology

Some basic terminology to remember and to be considered when designing the ICT system:

a. Vertical Cabling = Internal backbone
b. External Cabling = External backbone
c. Fibre Optic – multimode (length < 500 metre) – for a and b, rack to rack and building to building
d. Fibre Optic – singlemode (length > 500 metre) – for a and b, rack to rack and building to building
e. Network Point / Port / Outlet
f. RJ45 Connector
g. UTP Cat 5E, Cat 6 = Horizontal Cabling
h. Hub (now obsolete) = Switch
i. Patch panel
j. Cable management
k. Fiber panel
l. Local Area Network (LAN)
m. Wide Area Network (WAN)

5.0 Design Procedure

Upon receiving the design brief from the architect, the DE first must study the client requirement and prepare a simple analysis of the requirement in order to plan the design works of the ICT requirement. At this stage, there is meeting, discussion and coordination with architect regarding the location of riser, TCR, server room etc.

As a norm / electrical design concept, the network point will follow the same route with S/S/O but in different riser and conduit or trunking. The minimum number of network point will be based on the number required by client. Take care that, for UTP cable, the length from network point tot the patch panel must not exceed 90 metre.

When all the network points have been placed onto the layout plan, the next step to consider is the Telecommunication Closet (TC) to be used.

TC refers to equipment racks where all cables (fiber and UTP) shall be terminated. TC consists of:

(a) Fibre Termination Unit = Fiber Panel
(b) Patch Panel
(c) Cable Management Unit
(d) Switch (24 or 48 port)
(e) 2 nos Ventilation Fans
(f) Power Supply
(g) UPS

Refer diagram 2.

5.1 Example calculation of Rack Sizing

Numbers of network points	= 220
Switch type	= 24 port
Total switch needed	= 220 / 24 = 9.2 ≈ 10 units
10 units 24 port switch	= 10U
10 units 24 port patch panel	= 10U
10 units cable management	= 10U
1 unit Fibre Termination Unit	= 1U
1 unit UPS	= 3U
Total	= 34U
30% - 40% Future Expansion	= 0.3 × 34 = 10.2 ≈ 10U
Thus, Rack Size	= 34U + 10U = 44U

Note: In market there is no 44U Rack size, the close size is 42U rack.

5.2 Standard size for rack

Wall mounted

- 9U
- 11U
- 15U

Floor Standing

- 15U
- 21U
- 27U
- 32U
- 37U
- 42U

6.0 More complex ICT system

This is normally where the ICT design works in UPR stops.

However the scope is usually further expanded and more complicated when the ICT works is handled by Unit Perunding ICT. This may include the integration of voice communication via the digital network.

Note: For more details refer to ‘Nota Tambahan Kepada Panduan Teknik’ Chapter 14.

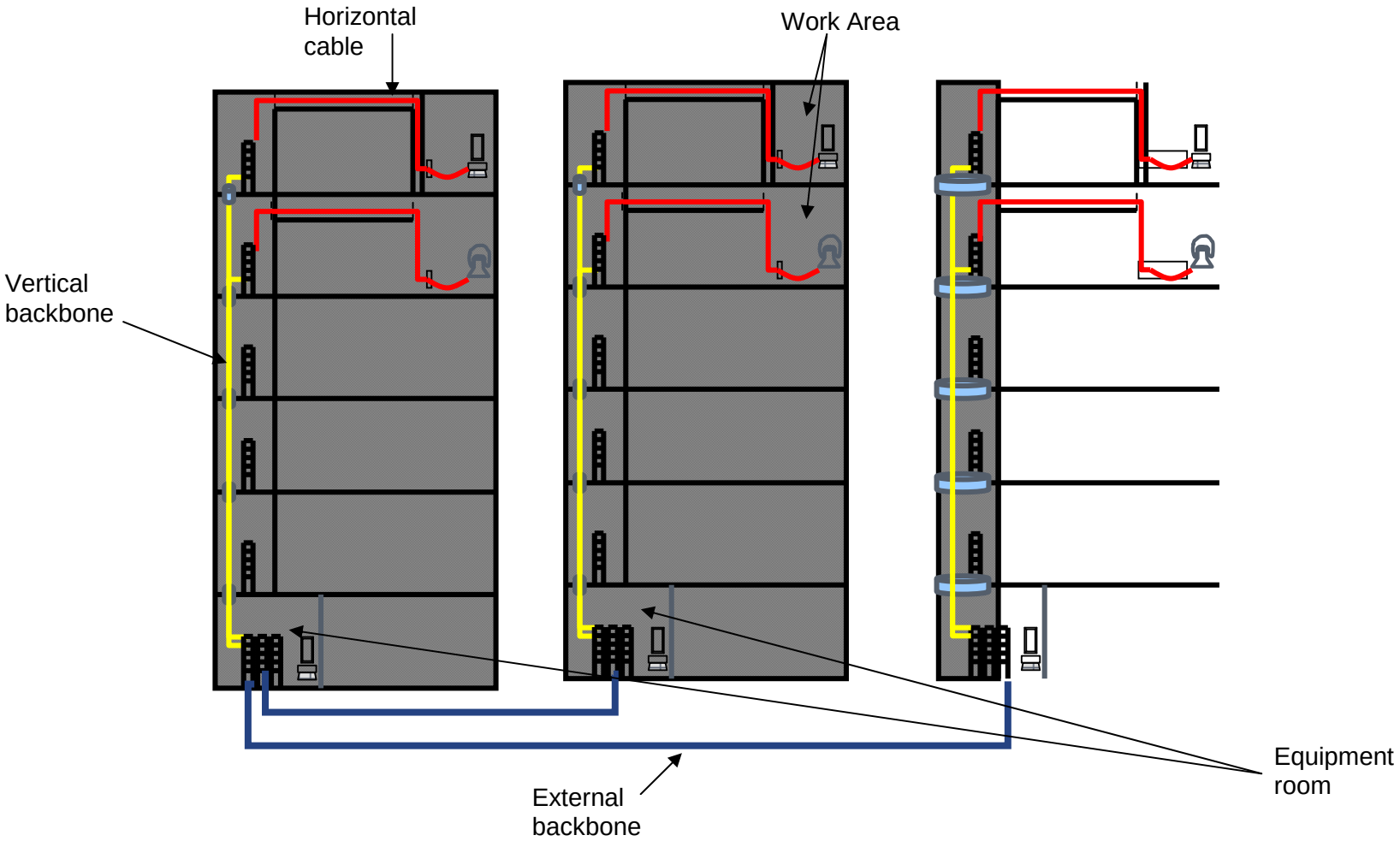
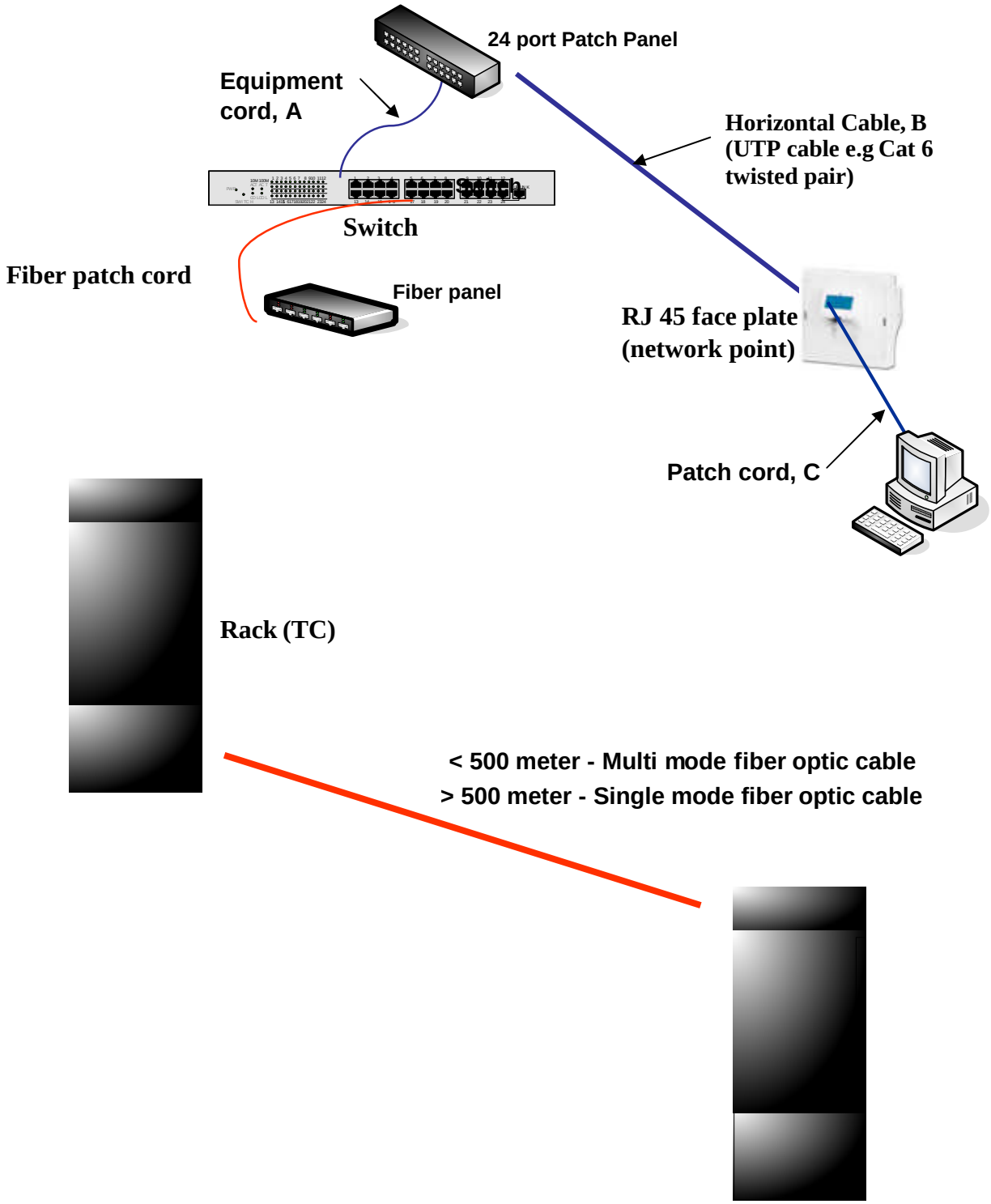


Diagram 1: Typical ICT System



B	**≤ 90 meter**
A + B + C	**≤ 100 meter**

Diagram 2: Horizontal Cabling

Table 1: Guideline for IT Requirement and Criteria

(cross refer to chapter 11 table 3 - some of the spaces/rooms may be shared with telephone services depending on sizes location and other constrains)

NO	ROOM TYPE	PROPOSED SIZE (mm)	CRITERIA / GUIDE
1	SDF Room		May be shared with telephone services
2	MDP Room		May be shared with telephone services
3	Fiber Optic room		May be shared with telephone services
4	PABX Room		May be shared with telephone services depending on whether it is IP or web base type.
5	IT Riser Room		Best to be A/C or at least naturally ventilated
6	Telecommunication Closet Room	2000 × 2000	May be shared with IT riser room depending on number of switches etc. Floor, wall and ceiling must be dust free type finishes Ducted air cond outlet from central air cond 1 no. exhaust fan or enough air flow ventilation 2 no. utility switch socket outlet from essential supply
7	Floor Opening	Subject to size and number of trunking installed	Will be covered by approved 2 hrs fire barrier, by Elect. Contr. Door to follow UBBL 75mm kerb around the floor opening; 50mm kerb across the door
8	Server Room	7000 x 4000	Floor wall and ceiling – fire rated, semi glass wall, dust free finishes 400mm double leafed door (glass with alluminium frame) Air conditioning – total heat dissipated by equipment in the room: 50,000BTU* Operating temperature 20C +- 5% with temperature measured at remote corner Operating hours: 24 x 7 Alternate and Auto start Split Unit Aircond. Central Air-conditioning / return air not required.

NO	ROOM TYPE	PROPOSED SIZE (mm)	CRITERIA / GUIDE
	Server Room (continued)	*	Humidity 50% RH Fire fighting – no sprinkle system allowed. Use heat sensor / smoke detector with Argonite gas Independent grounding busbar not more than 1.0 ohm Power source - For central UPS: 60A Isolator 3 phase essential supply tapped directly from MSB 60A Isolator 3 phase normal supply tapped from MSB or SSB. Minimum 4 no. 13A SSO in general DB Power source -For standalone UPS: Minimum 8 no. 13A SSO dedicated DB in server room Telecommunication lines – 20 way DP box Card access security system Raised floor (250mm, unless specified otherwise) Material – Simen plaster sandwiched between steel top sheet and bottom steel pan Panel tile size – 600mm with pedestals and stringers Overall panel thickness -45mm Floor heights – 250mm to accommodate under floor IT/power cable trunking Floor finishing – smooth anti static and high pressure laminate Understructure – Rigid grid with stringer Concentrated load – 1000lb Maximum load per tile 2000lb Uniform load – 260lb/ft2 Rolling load – 600lbs load on a 6” diameter x 11/2” width wheel for 10,000 passes Impact load – 120lbs drop from a height of 12” Ramp slope – 1/10 Power source – all utility SSO 13A under the raised floor