Technical Codes Programme *2020*

Awareness & Adoption of Technical Codes

Radiocommunications Network Facilities – In Building

MCMC MTSFB TC G011:2017

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21st October 2020

Outline

1. Introduction
2. From the Earliest days
3. The Evolution
4. Challenges
5. RNF – Technical Code Overview
6. Benefit & Technical Codes Implementation
7. Conclusion

1 Introduction

Radiocommunications Network Facilities In-Building

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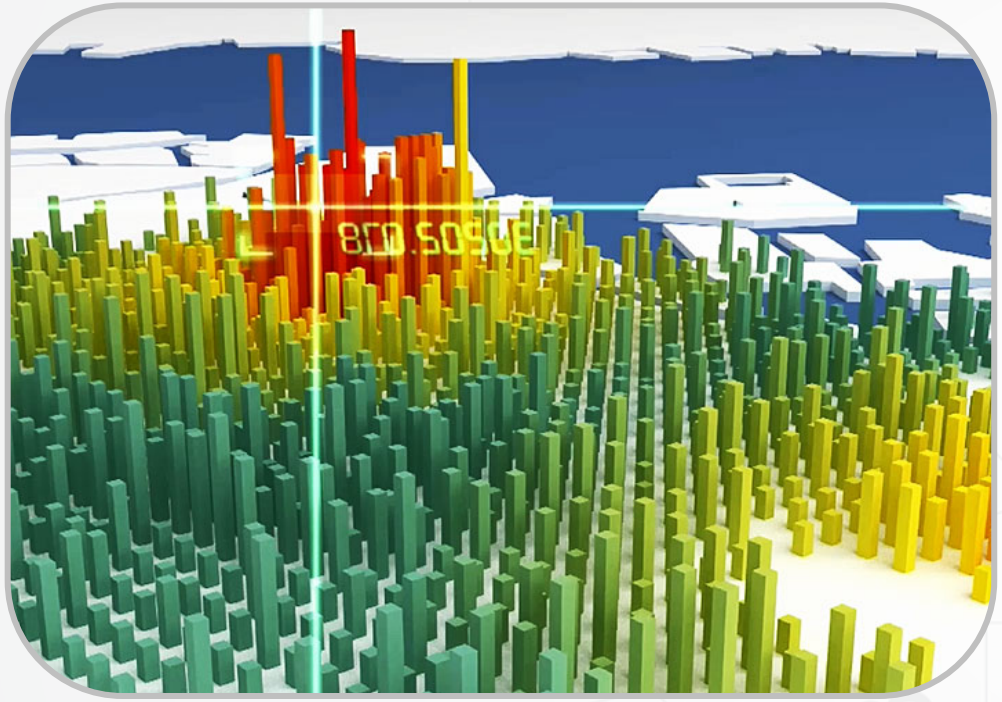
Radiocommunication/ Mobile

No	Title of Technical Code	Working Group	Status
1.	International Mobile Telecommunications-Advanced (IMT-Advanced) System and Specifications	IMT & Future Network	Registered as MCMC Technical Code, MCMC MTSFB TC G003:2015 on 18 Dec 2015
2.	Radiocommunications Network Facilities – In-Building	Radio Network Facilities	Registered as MCMC document, MCMC MTSFB TC G011:2017 on 15 Nov 2017
3.	Technical Standards and Infrastructure Requirements: Radiocommunications Network Infrastructure (External)	Radio Network Facilities	Registered as MCMC Technical Code, MTSFB 001:2009 on 21 May 2010
4.	Radiocommunication Network facilities - Smart Pole	Radio Network Facilities	Registered as MCMC document, MCMC MTSFB TC G010:2017 on 15 Nov 2017
5.	Radiocommunications Network Facilities – Street Furniture	Radio Network Facilities	Registered as MCMC document, MCMC MTSFB TC G026:2020 on 20 May 2020

Radiocommunications Network Facilities In-Building



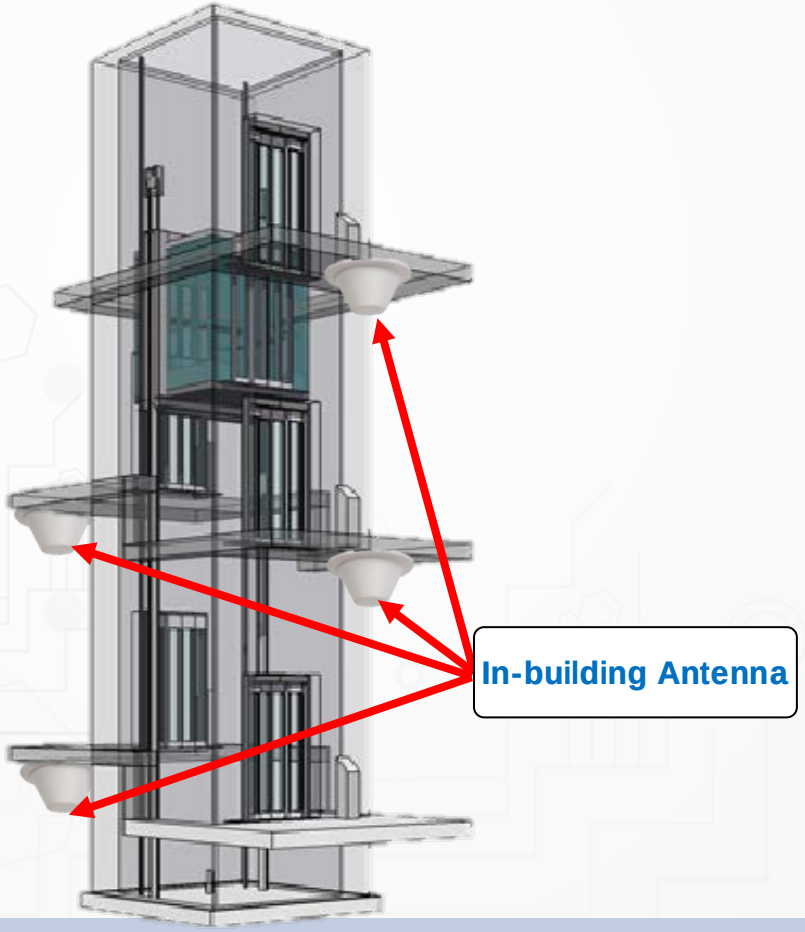
A telecommunications solution which is used to extend and improve the building cellular mobile **coverage** indoor wherever desire. The in-building cells are covering small area compare to the macro cells and can thus provide greater **capacity** than outdoor cells. It also provides low interference levels resulting in good mobile coverage **quality**

Coverage → Capacity → Quality

2 From the Earliest days

Radiocommunications Network Facilities In-Building

- In Building coverage idea– Publish in IEEE in 1987
- Adopted in Malaysia mid of 90's
- Initial Stage – IBC deploy for in elevator coverage
- Lift enclosure material (Metal)



Radiocommunications Network Facilities In-Building

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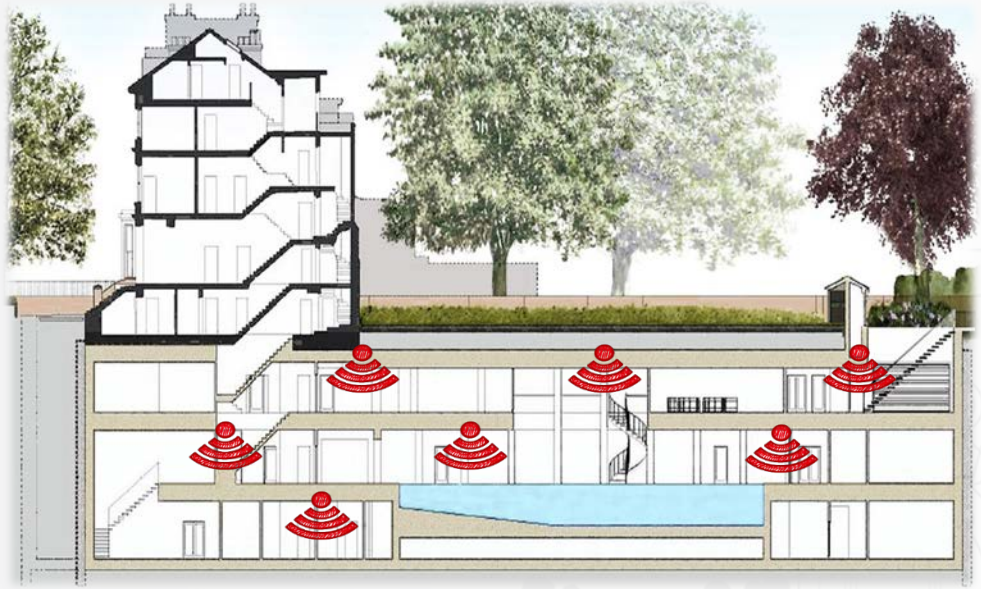
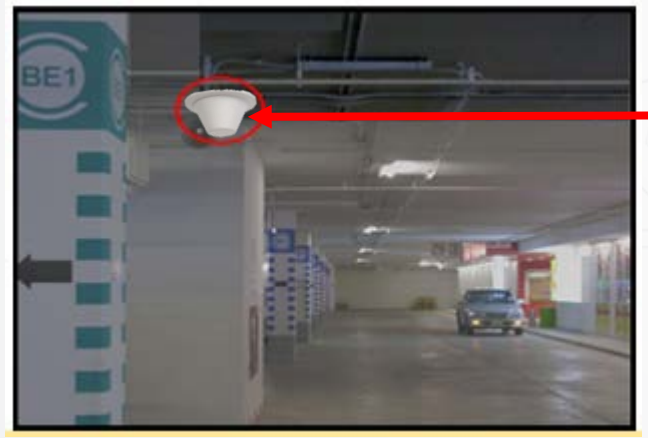
Initial Stage – IBC deploy for Basement area

Outdoor Coverage not able to penetrate underground





In-building Antenna

SAFETY

The Full Story Behind The Attempted Rape Case At Pavilion On 30 October

By Judith Yeoh — 02 Nov 2013, 11:45 AM — Updated almost 5 years ago · Short read

On the night of 31st October, the Facebook page of PJ Community Alert posted about an attempted rape case at Pavilion's basement parking a night before. The message quickly went viral, prompting a quick response from the Pavilion.

Share on Facebook | Twitter

#news #rape #pavilionmall #Malaysia

On the night of 31st October, the Facebook page of PJ Community Alert posted about an attempted rape case at Pavilion's basement parking

An anonymous person, claiming to be an eye witness to a case of an attempted rape at Pavilion Level B2 Parking on 30th October at about 8pm informed the Facebook page of PJ Community Alert via message.

Radiocommunications Network Facilities In-Building

- Low Penetration due to building material
- Blockage from surrounding buildings
- Capacity requirement (80% mobile usage indoor)
- Required full In-Building Coverage

3 The Evolution

Radiocommunications Network Facilities In-Building

Earlier stage - IBC Deployment

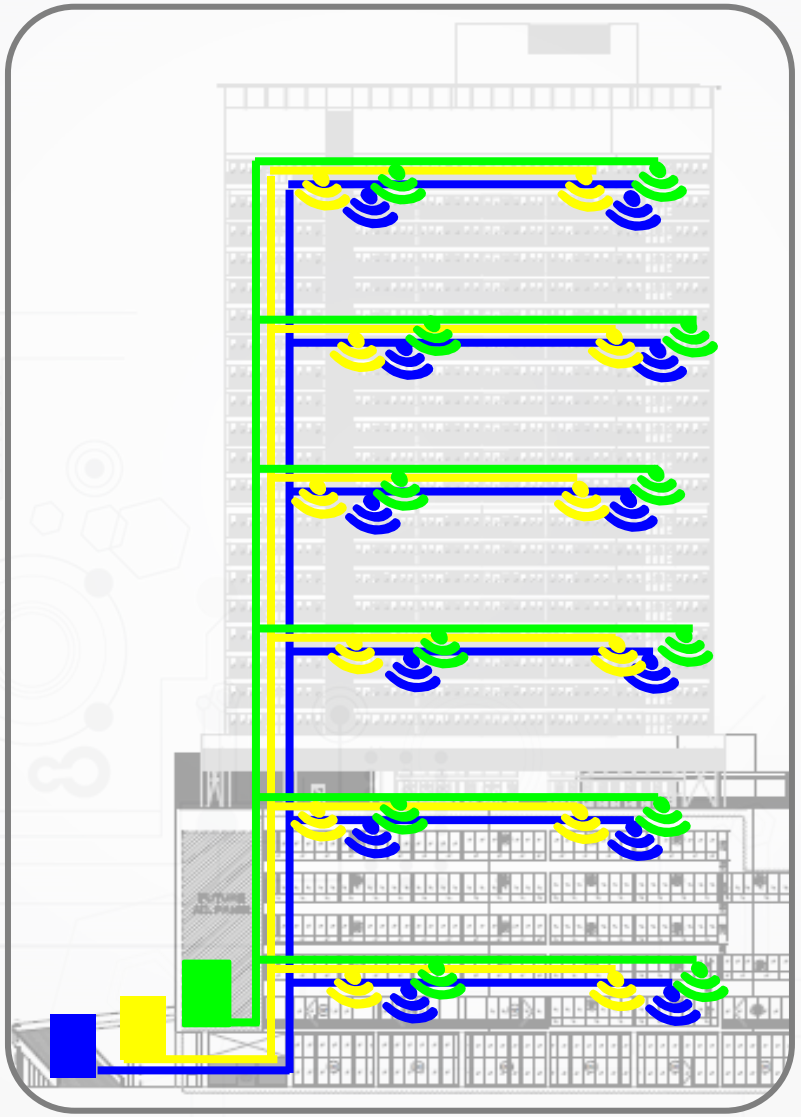
TELCO A ✓

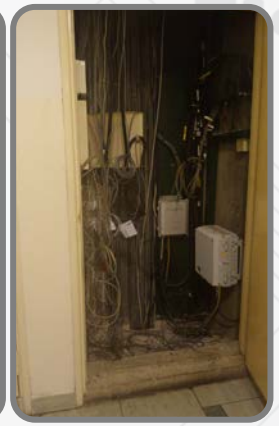
TELCO B ✓

TELCO C ✓

TELCO D ✗

- esthetic value
- Space in riser





Radiocommunications Network Facilities In-Building

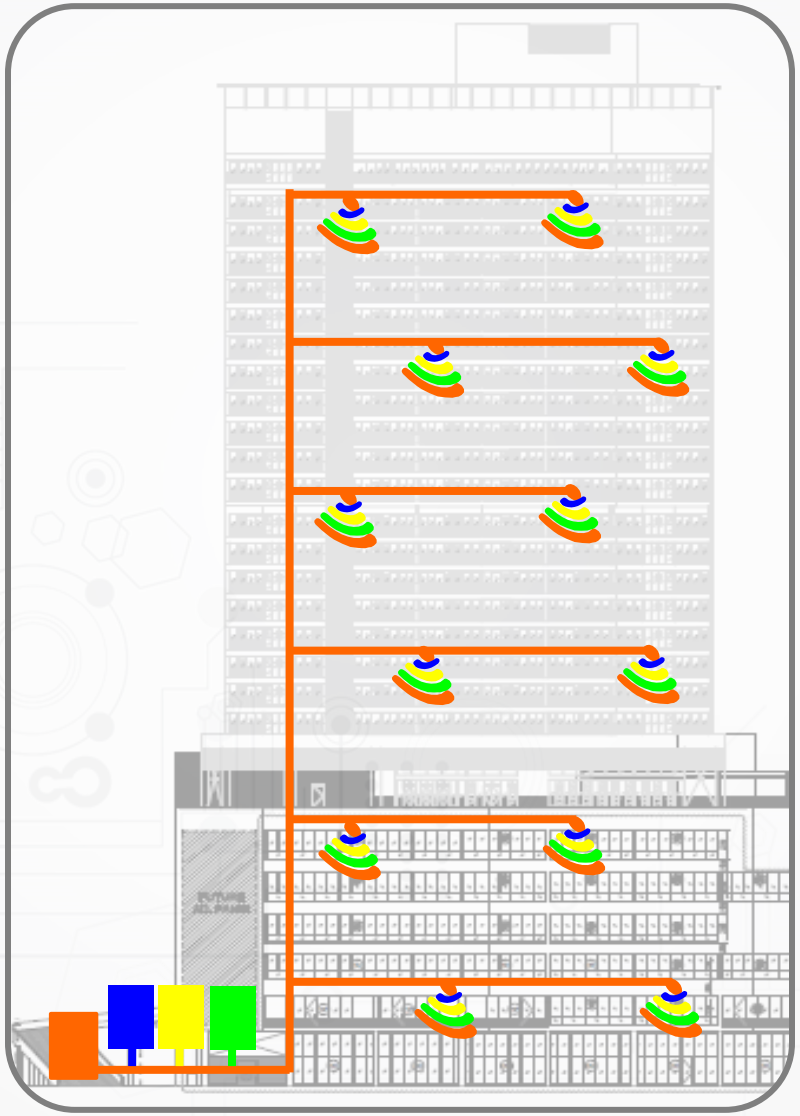
IBC DAS Sharing by Telco - IBC Deployment

TELCO D

Lets Share

TELCO A TELCO C

TELCO B



All Telco Mobile Coverage Transmitted from the Same Common Antenna

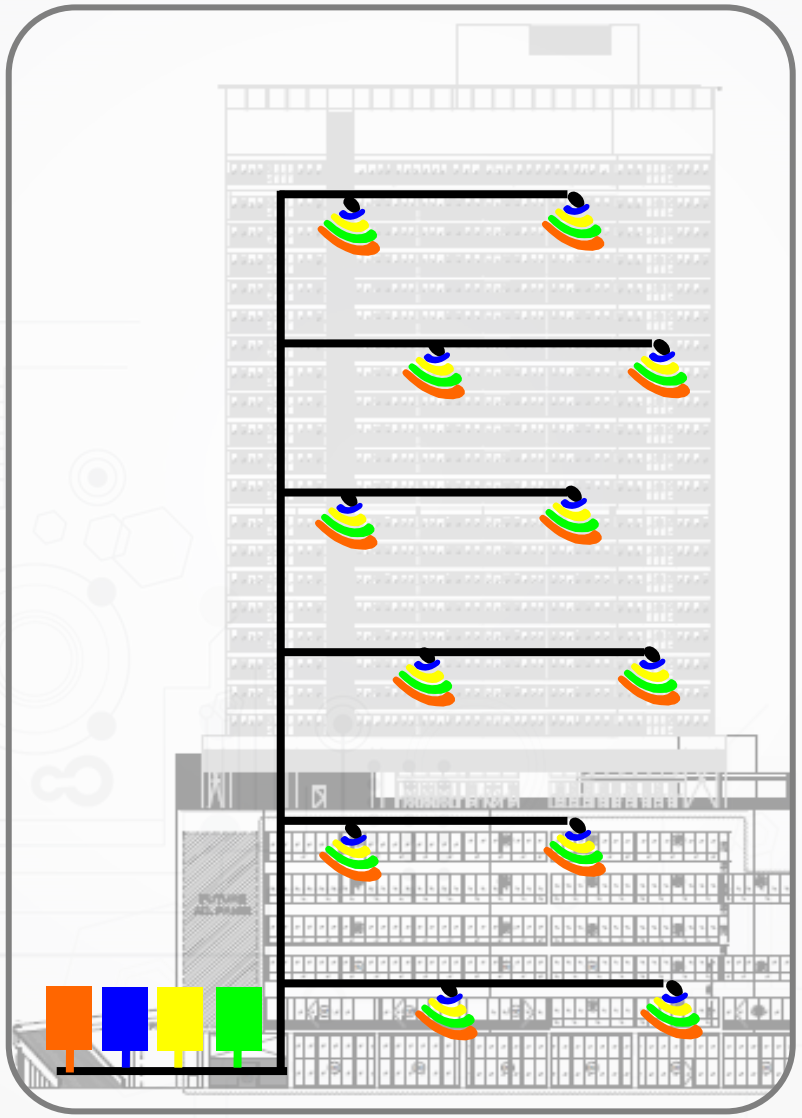
Radiocommunications Network Facilities In-Building

IBC DAS by IBC Builders (NFP License Holder)- IBC Deployment

IBC Builders ✓

TELCO A TELCO B

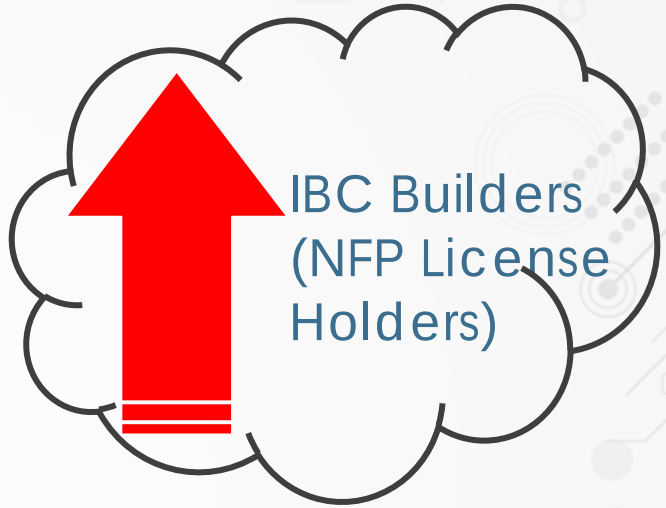
TELCO C TELCO D



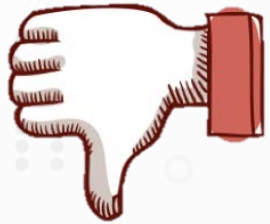
All Telco Mobile Coverage Transmitted from the Same Common Antenna

4 Challenges

Radiocommunications Network Facilities In-Building



- < Capex Investment
- > Building with Mobile Coverage
- Competitive Rental Rate



- IBC ✗ Standard
- IBC ✗ cover All area
- IBC ✗ meet Telco KPI

Radiocommunications Network Facilities In-Building

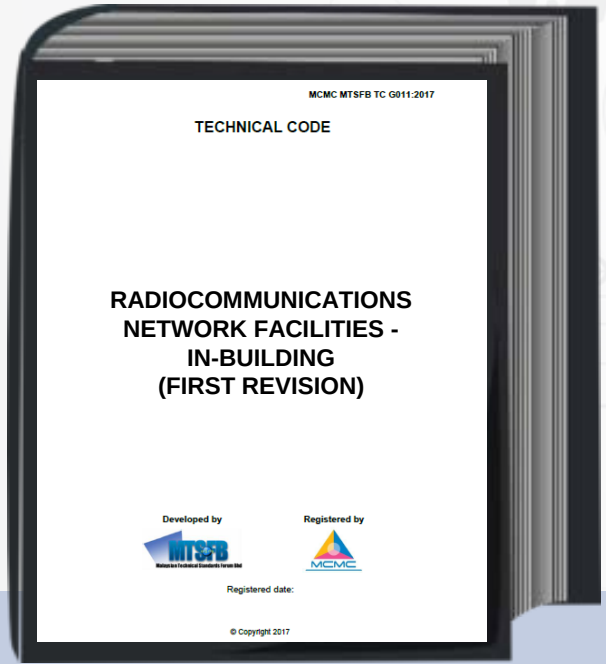
- IBC ✗ Standard
- IBC ✗ cover All area
- IBC ✗ meet Telco KPI

- Effect Telco Customer satisfactory

→ Complaint to Building Management

→ Complaint to Telco

→ Complaint to MCMC



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5 RNF – Technical Code Overview

Radiocommunications Network Facilities In-Building

Minimum requirements

Civil Mechanical and Electrical (CME)

- CME requirements for in-building wireless system, backhaul, GPS, mobile and Wifi

IBC Distributed Antenna System (DAS)

- Type of IBC design
- RF distribution KPI

Quality of Service (QoS) and Service Level Agreement (SLA)

- Mandatory standards imposed by MCMC QoS
- SLA for an in-building wireless system

Responsibility matrix

- responsibility party to provide in-building wireless system

6 Benefit & Technical Codes Implementation

Radiocommunications Network Facilities In-Building

IBC Builder / NFP

- Type of IBC DAS
- Standard KPI
  - Coverage KPI
  - Quality KPI
  - Installation KPI
- Coverage area priority
- CME Requirement

CME Consultant

- CME Requirement for IBC
  - Electrical Power dimensioning
  - Cable Tray & ladder Size according to type of IBC DAS
  - Floor Loading – Equipment room

Architect,
Building Developer, Quantity Surveyor

- Allocation of Mobile Equipment space during planning stage
- Sufficient space for Radio Remote Unit – nearest to telco riser

This Technical Code addresses the **minimum requirements** necessary for the internal radiocommunications network facilities. This Technical Code also promotes the use of **standardised designs** and materials to leverage on economy of scale as well as the reuse of current available infrastructure. Apart from that, this Technical Code looks to **establish industry practices** that **meet international standards** and **comply with guidelines** issued by relevant authorities

Radiocommunications Network Facilities In-Building

IBC Builder / NFP

❑ Type of IBC DAS – pg15

5.1.1	Pure Passive DAS Technology
5.1.2	Active DAS Technology
5.1.3	Hybrid Technology
5.1.4	Leaky Feeder Technology
5.1.5	Others: Small cells Technology

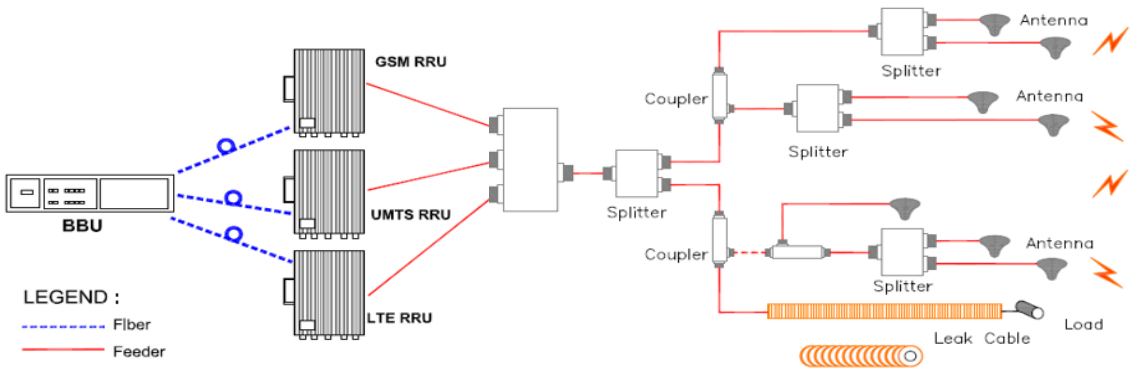


Figure: Schematic Diagram

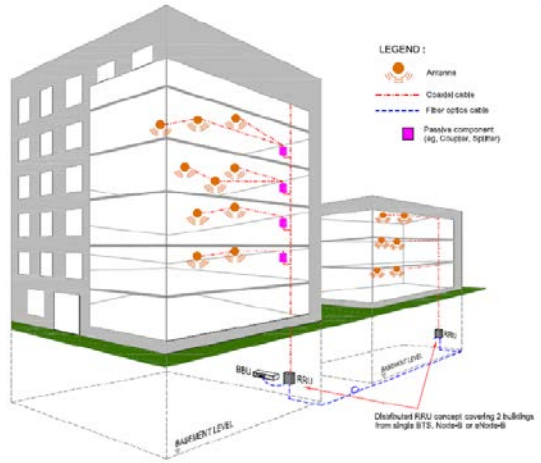


Figure: DAS Diagram

Radiocommunications Network Facilities In-Building

IBC Builder / NFP

- Coverage area priority – pg28

- **Coverage area based on Priority**
  - 5.3 Key Performance Index (KPI) – *Page 28*
  - 5.3.2.1 Coverage Area Definition – *Page 28*
- **Area defined based on Priority and the required coverage KPI at the desired area**
- **IBC to cover all desired area based on Mobile Network Operator (MNO) requirement – Align with MNO requirement**

Coverage area definition	Simulation/ Walktest colour scheme	LTE FDD 2600 (RSRP)
Primary area (P1)	Green	≥ - 98 dBm
Secondary area (P2)	Yellow	≥ - 105 dBm
No access	Red	NA
Not covered	Grey	NA

Radiocommunications Network Facilities In-Building

IBC Builder / NFP

- Standard KPI - pg 28

- **Comply to Mobile Network Operator (MNO) RF Requirement**
  - 5.3 Key Performance Index (KPI) – *Page 28*
- **Standard KPI to be use by all IBC Builders**
- **To ensure Installation & execution done correctly**

5.3.2.2 Coverage area percentage *(Pg 29)*

- The desire coverage level at each intended area

5.3.2.3 Coverage Quality *(Pg 34)*

- The desire coverage quality at each intended area
- Interference level – internal & external

5.3.4.4 Installation KPI *(Pg 35)*

- Signal strength underneath antenna
- Signal Spillage to outdoor
- Call setup successful
- Drop call rate
- Handover successful
- VSWR
- PIM

Radiocommunications Network Facilities In-Building

CME Consultant

- CME Requirement for IBC
- Electrical Power dimensioning – Pg 8

- **Comply on CME requirement and Standards**
  - 4.0 Civil, Mechanical and Electrical (CME) requirement

Load description	Connected load (W)	Quantity	Total connected load (W)	Diversity	Max Demand (W)
Rectifier SP1	2 500	3	7 500	0.5	3 750
Rectifier SP2	2 500	3	7 500	0.5	3 750
Rectifier SP3	2 500	3	7 500	0.5	3 750
Rectifier SP4	2 500	3	7 500	0.5	3 750
Rectifier SP5	2 500	2	5 000	0.5	2 500
Rectifier SP6	2 500	2	5 000	0.5	2 500
Air conditioner	2 500	2	5 000	0.5	2 500
Ventilation fans	120	2	240	1.0	240
Room lighting	38	4	152	0.5	76
Switch socket outlets	250	2	500	0.1	50
Keluar sign	5	1	5	1.0	5
Emergency lighting	25	2	50	0.1	5
Sub-total load					22 876
Spare capacity 20 %					4 575
Grand total load					**27 451**
Current (amps)					**119**
TPN current at 0.9 PF					**42**

Radiocommunications Network Facilities In-Building

CME Consultant

- CME Requirement for IBC
- Cable Tray & ladder Size according to type of IBC DAS – Pg 7

- **Cable ladder and tray size according to the type of IBC DAS – Pg 7**

Network architecture	Cable type	Size of tray (mm)
Pure active DAS	Fiber	100
Distributed RRU DAS/hybrid technology	Fiber with coaxial	150
Pure passive DAS	Coaxial	150

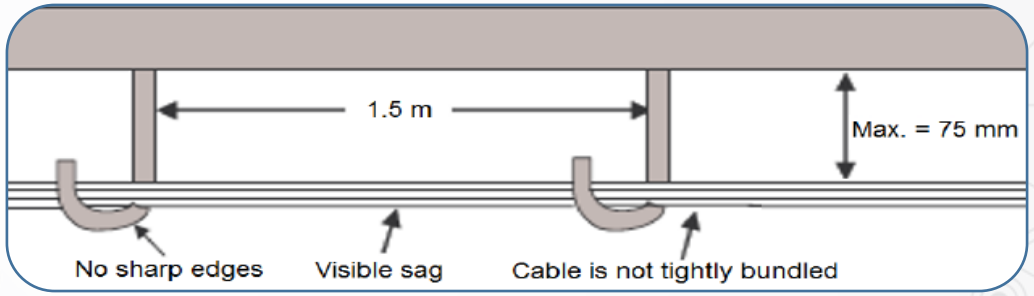
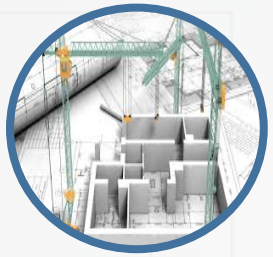


Fig: Hanging pathways for coaxial cables running above false ceilings

Fig: Ceiling collapse due to cable rest on false ceiling

Radiocommunications Network Facilities In-Building

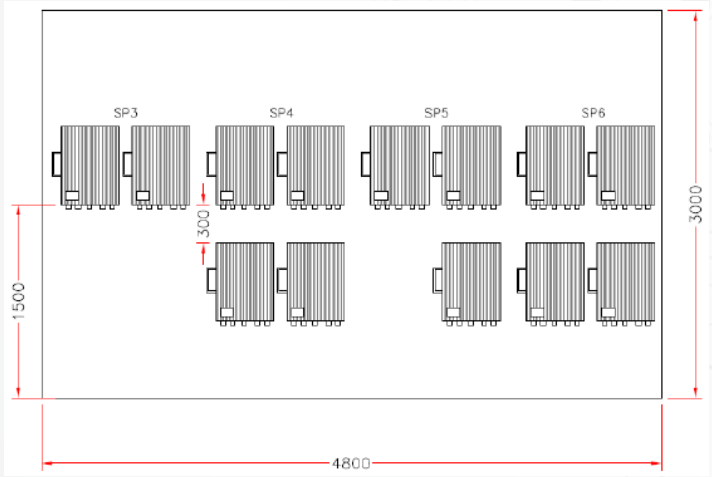


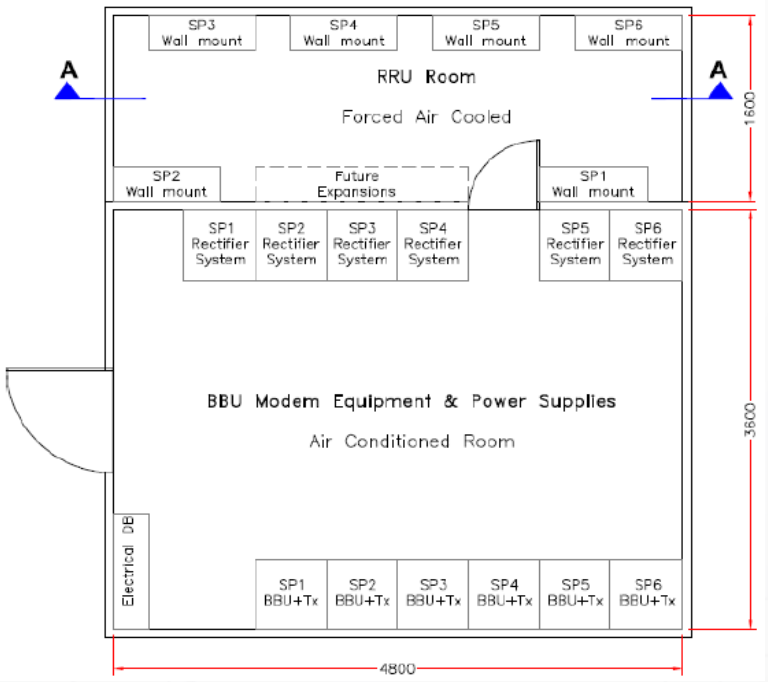
Architect,
Building Developer,
Quantity Surveyor

- To consider during planning stage and plan drawing stage for the allocation of:
  - Equipment space or Room for Mobile Network Operator – Pg 4
  - Sufficient Radio Remote Unit location nearest to Telecom Riser
  - Sufficient space in Telecom Riser – Pg 5

    MCMC MTSFB TC G024:2020 (Fixed Network)
  - Dedicated cable tray for Mobile operator cable routing – Pg 6

- Allocation of Mobile Equipment space during planning stage
- Sufficient space for Radio Remote Unit – nearest to telco riser





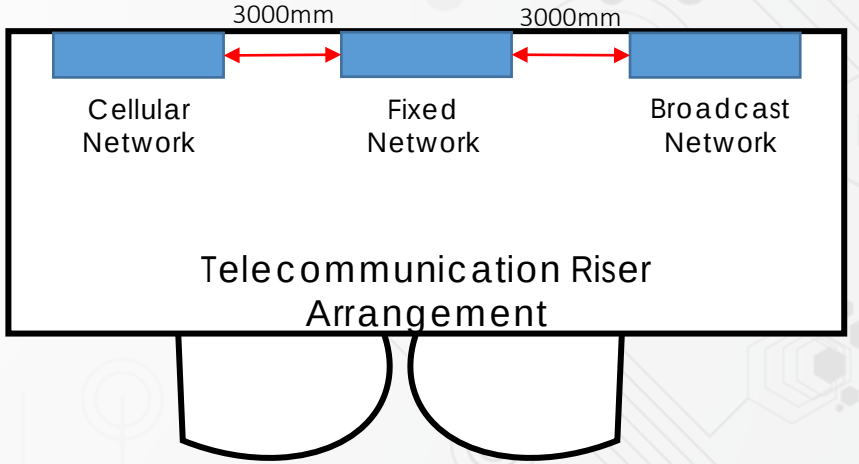


Fig: **Fully enclosed telecom room measuring 4.8 m x 5.2 m**

7 Conclusion

Radiocommunications Network Facilities In-Building

- The Technical Codes address the **minimum requirements** necessary for the internal radiocommunications network facilities – in building

- Promotes the use of **standardize designs** and **establish industry practice** that **meet international standards and comply with guidelines issued by relevant authorities**

- Useful reference and guidance to :
  - ❑**ibc builders** on RF KPIs,
  - ❑**CME consultant** on electrical dimensioning and CME related.
  - ❑And during the building design for **architect, building builders, and quantity surveyor** in allocating sufficient space for equipment room and Radio Remote unit (RRU) location nearest to telco risers

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Thank You

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