ITS MALAYSIA

INTELLIGENT TRANSPORT SYSTEM
ASSOCIATION OF MALAYSIA

ITS SEMINAR AND EXHIBITION 2017

DRIVING ITS
TO A NEW NORMAL

Connexion@Nexus
Bangsar South, Kuala Lumpur, Malaysia
21 - 23 February 2017

Organised by

ITS MALAYSIA
INTELLIGENT TRANSPORT SYSTEM
ASSOCIATION OF MALAYSIA

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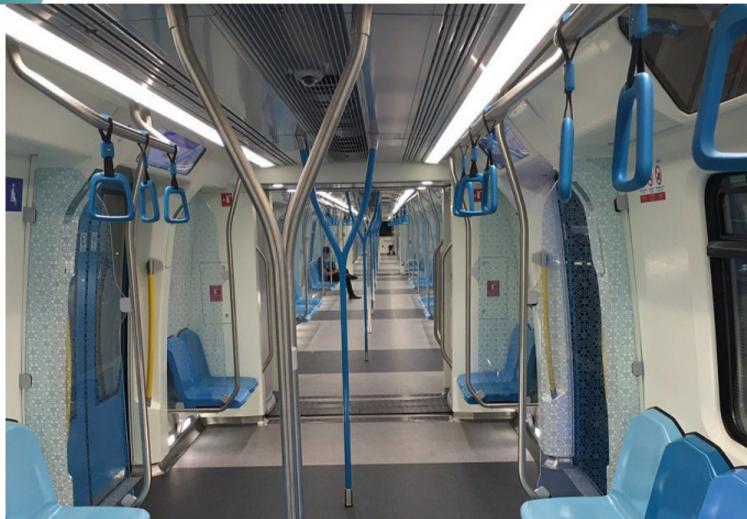CONCESSIONAIRES MALAYSIA

MRT
SBK Line
overview

The Guiding Light
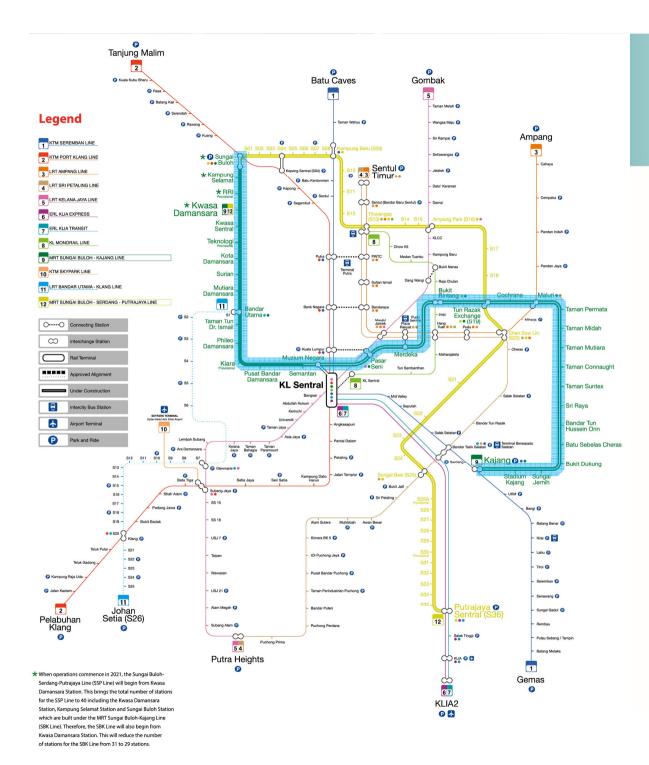
SBK Line overview

- Construction launched in July 2011
- Completion :
  - Phase 1 (Sungai Buloh – Semantan) : 16 Dec 2017
  - Phase 2 (Muzium Negara – Kajang) : by July 2017
- Each 4-car train set max capacity = 1,200 passengers
- Daily ridership ≈ 400,000 passengers
- Frequency
  - Peak hours ≈ 3 minutes 18 seconds
  - Others : From 4.3 mins to 7.4 mins (weekday)
  - 11pm to 12 pm ≈ 15 mins

SBK Line overview

- 51km in total with 9.5km underground
- 31 stations
  - 24 elevated
  - 7 underground
- End-to-end (Sg Buloh to Kajang) journey time ≈ 90 minutes

Klang Valley Rail Transit Map

ITS MALAYSIA
NTELLIGENT TRANSPORT SYSTEM
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Legend

1	KTM SEREMBAN LINE
2	KTM PORT KLANG LINE
3	LRT AMPANG LINE
4	LRT SRI PETALING LINE
5	LRT KELANA JAYA LINE
6	ERL KLIA EXPRESS
7	ERL KLIA TRANSIT
8	KL MONORAIL LINE
9	MRT SUNGAI BULOH - KAJANG LINE
10	KTM SKYPARK LINE
11	LRT BANDAR UTAMA - KLANG LINE
12	MRT SUNGAI BULOH - SERDANG - PUTRAJAYA LINE

⊶	Connecting Station
∞	Interchange Station
⬭	Rail Terminal
▪▪▪	Approved Alignment
▭	Under Construction
🚌	Intercity Bus Station
✈	Airport Terminal
P	Park and Ride

★ When operations commence in 2021, the Sungai Buloh-Serdang-Putrajaya Line (SSP Line) will begin from Kwasa Damansara Station. This brings the total number of stations for the SSP Line to 40 including the Kwasa Damansara Station, Kampung Selamat Station and Sungai Buloh Station which are built under the MRT Sungai Buloh-Kajang Line (SBK Line). Therefore, the SBK Line will also begin from Kwasa Damansara Station. This will reduce the number of stations for the SBK Line from 31 to 29 stations.

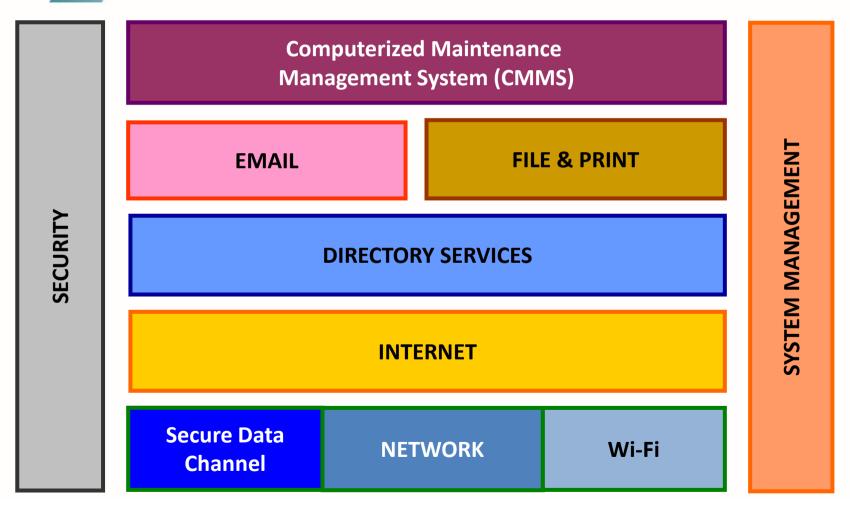**MRT CORP**

IT in MRT

Enterprise IT

Design considerations

- Proposed information technology (IT) systems can be integrated or work seamlessly with future IT systems
- Resilient design to meet a minimum of 99.7% availability, requiring full redundancy in network and server hardware
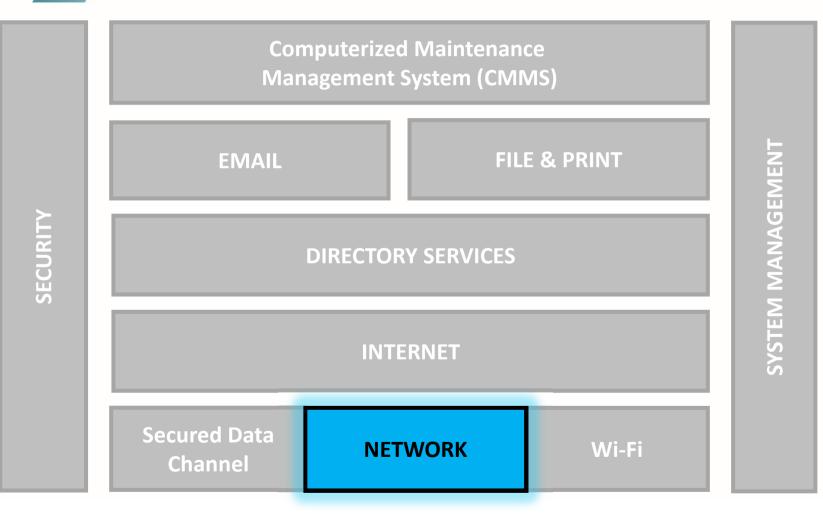
Enterprise IT

SECURITY

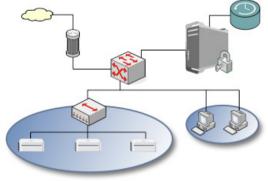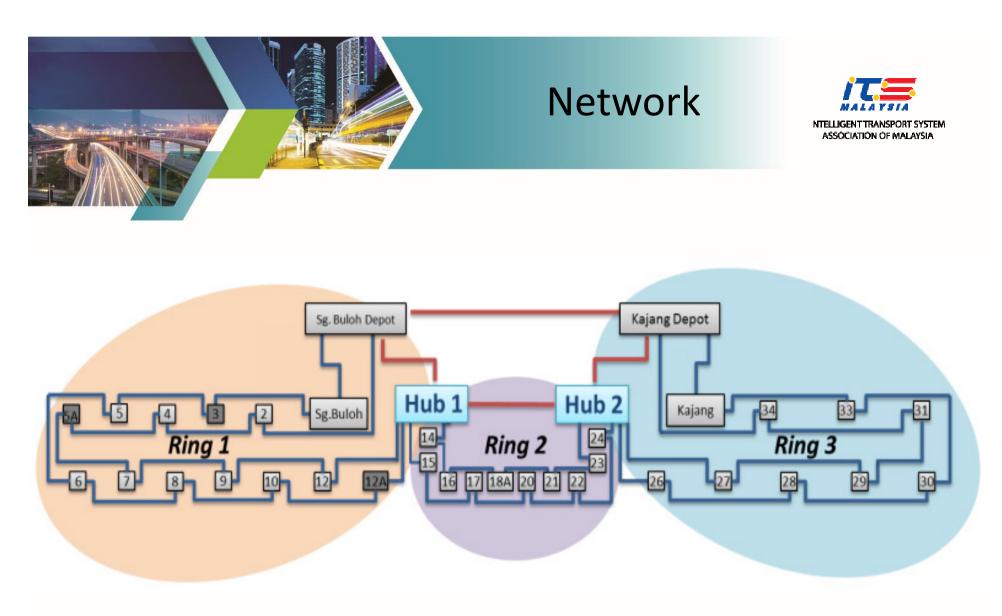**Computerized Maintenance Management System (CMMS)**

EMAIL

FILE & PRINT

DIRECTORY SERVICES

INTERNET

Secure Data Channel

NETWORK

Wi-Fi

SYSTEM MANAGEMENT

Enterprise IT

SECURITY

Computerized Maintenance Management System (CMMS)

EMAIL

FILE & PRINT

DIRECTORY SERVICES

INTERNET

Secured Data Channel

NETWORK

Wi-Fi

SYSTEM MANAGEMENT

Network

Design highlights

- Fibre connections between stations & depots are provided by the Backbone Trunk Network (BTN) in the Telecommunication System package

- Automatic recovery within one minute in the event of fibre or any hardware failure

- Modified Ring network topology to balance cost, network latency and failure recovery time

Network
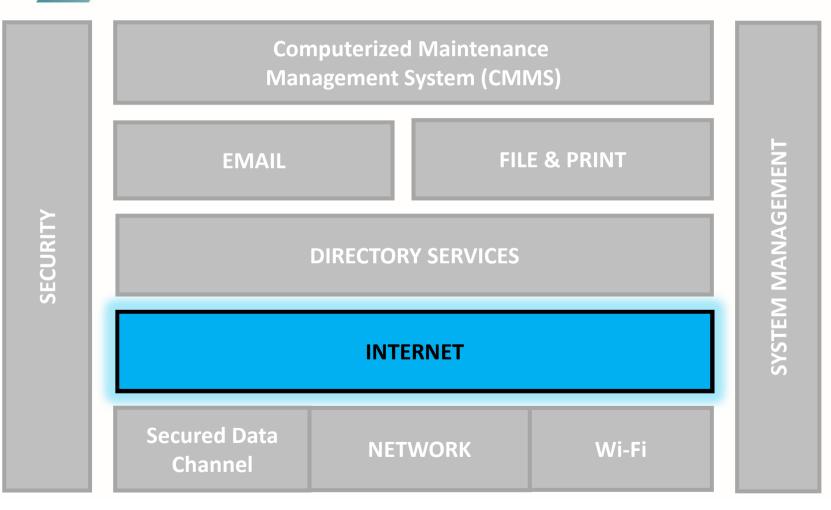
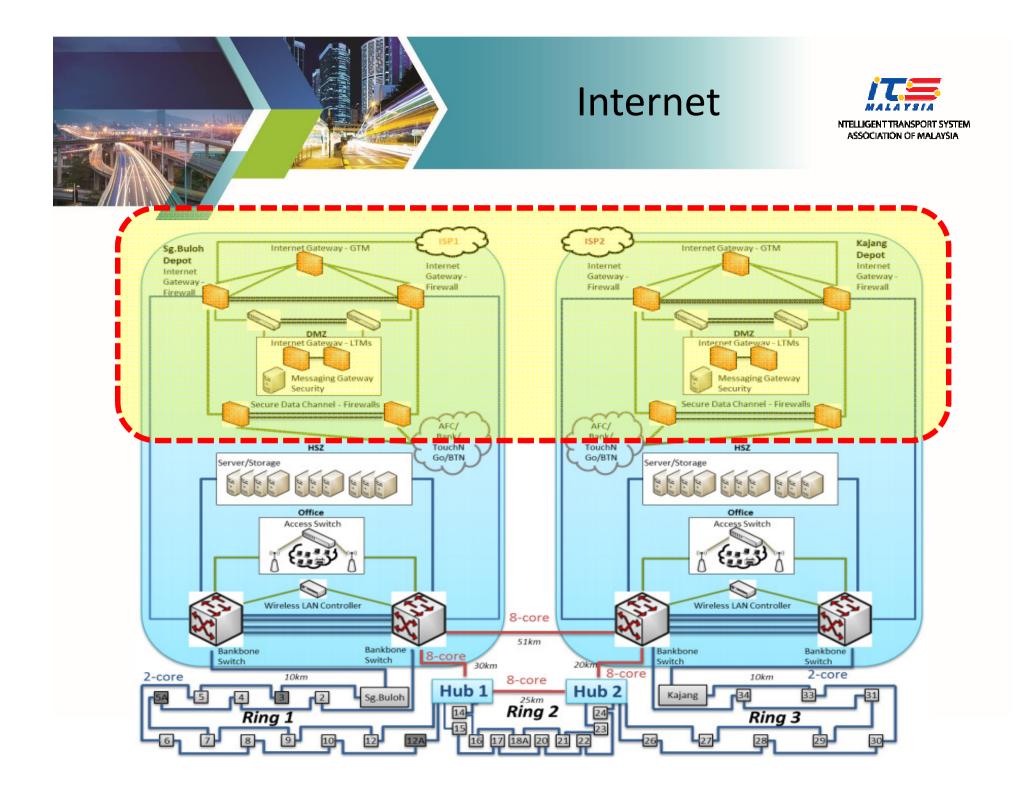Modified Ring network topology

Enterprise IT

SECURITY	Computerized Maintenance Management System (CMMS)		SYSTEM MANAGEMENT
	EMAIL	FILE & PRINT	
	DIRECTORY SERVICES		
	INTERNET		
	Secured Data Channel	NETWORK	Wi-Fi
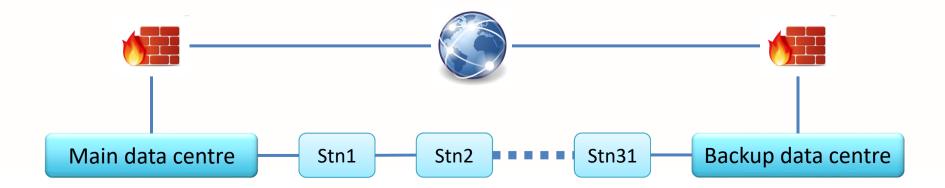
Internet

- Each data centre has a link to internet
- Each from a different Internet Service Provider (ISP)
- Each internet gateway is protected from external cyber threats with a firewall
- Designed to eliminate downtime due to failure of internet service or internet gateway

Internet

Enterprise IT

SECURITY

Computerized Maintenance Management System (CMMS)

EMAIL

FILE & PRINT

DIRECTORY SERVICES

INTERNET

Secured Data Channel

NETWORK

Wi-Fi

SYSTEM MANAGEMENT

Information Technology Systems
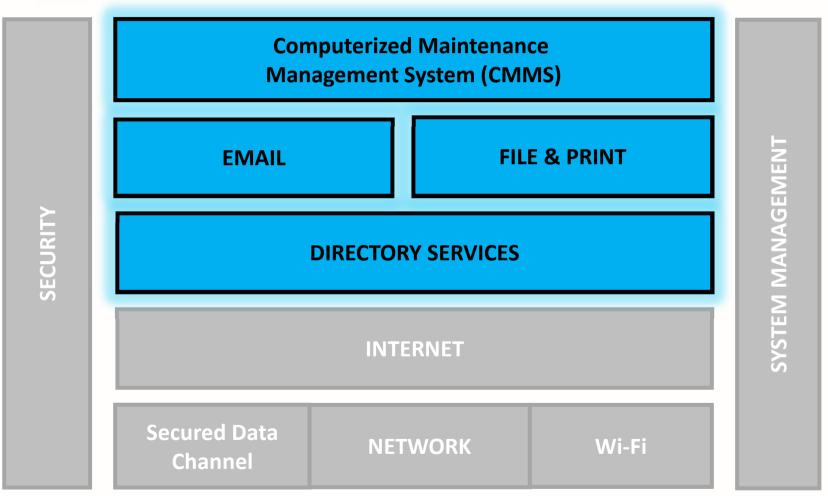
- Directory services
  - Management of user authentication and access control to the IT network
- Email
  - To support secured access from external network using web browser and mobile devices
- File server
- Print server
- CMMS (computerised maintenance management system)

Information Technology Systems
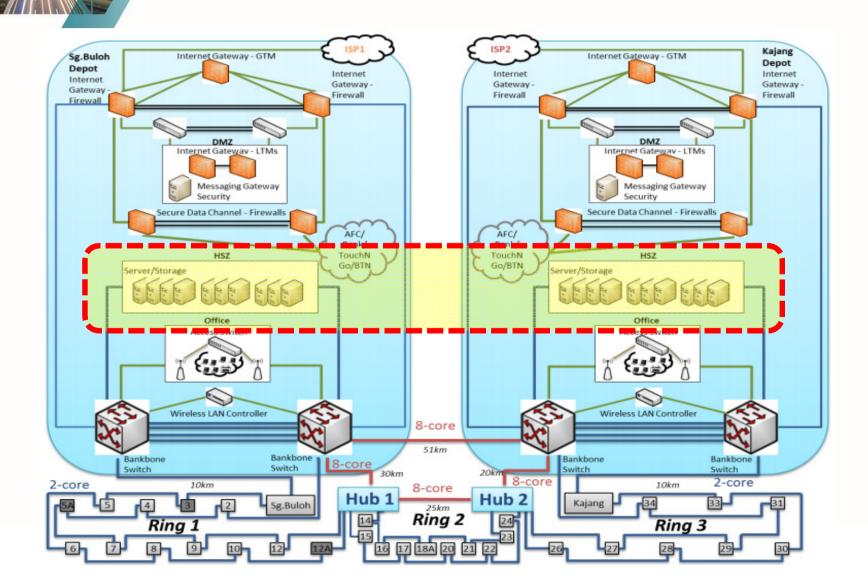
- All servers have redundant hardware for automatic recovery on-site (main data centre)

- All servers have the same redundant set of hardware in backup data centre for off-site redundancy

- Continuous or real-time replication of servers for minimal data loss and recovery time

- Leverage on server virtualisation technology to optimise hardware usage, easier maintenance & future upgrading, reduce energy and physical consumption.
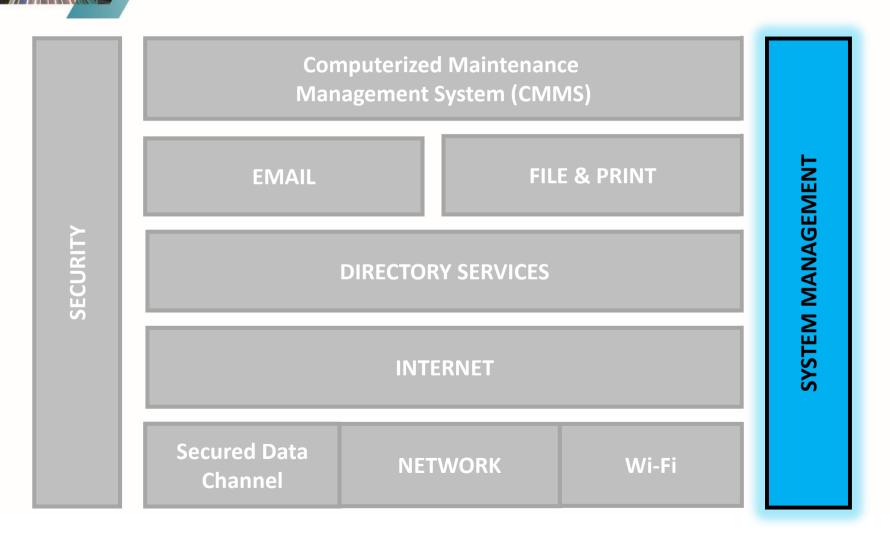
Information Technology Systems

Information Technology Systems

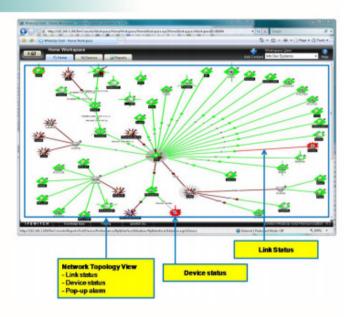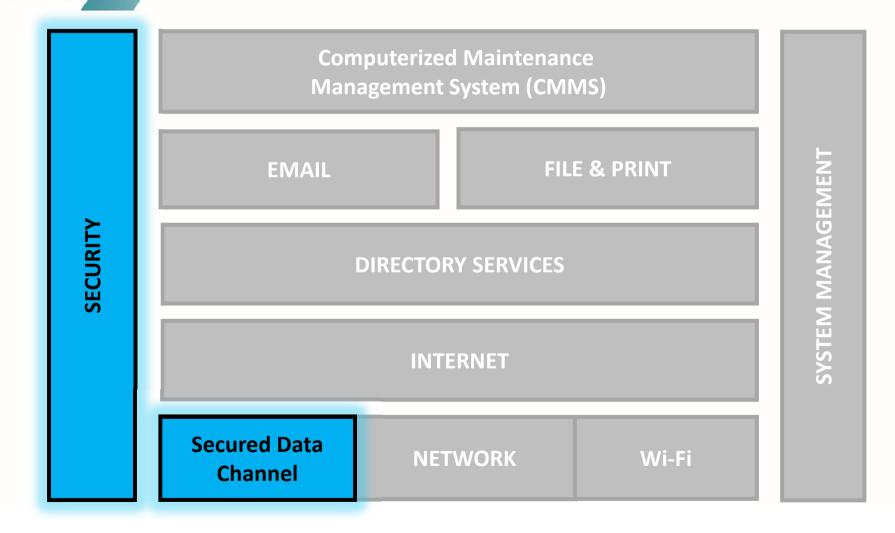| SECURITY	Computerized Maintenance Management System (CMMS)		SYSTEM MANAGEMENT
	EMAIL	FILE & PRINT	
	DIRECTORY SERVICES		
	INTERNET		
	Secured Data Channel / NETWORK / Wi-Fi		

System Management

- Network Management System
  - Monitor network health
- Server Monitoring System
  - Monitor server health
- Central Patch Management System
  - Deployment of PC operating system security patches
- Endpoint Security Management Console
  - Manage and monitor endpoint protection agents in PCs

Information Technology Systems

SECURITY

Computerized Maintenance Management System (CMMS)

EMAIL

FILE & PRINT

DIRECTORY SERVICES

INTERNET

Secured Data Channel

NETWORK

Wi-Fi

SYSTEM MANAGEMENT

NTELLIGENT TRANSPORT SYSTEM
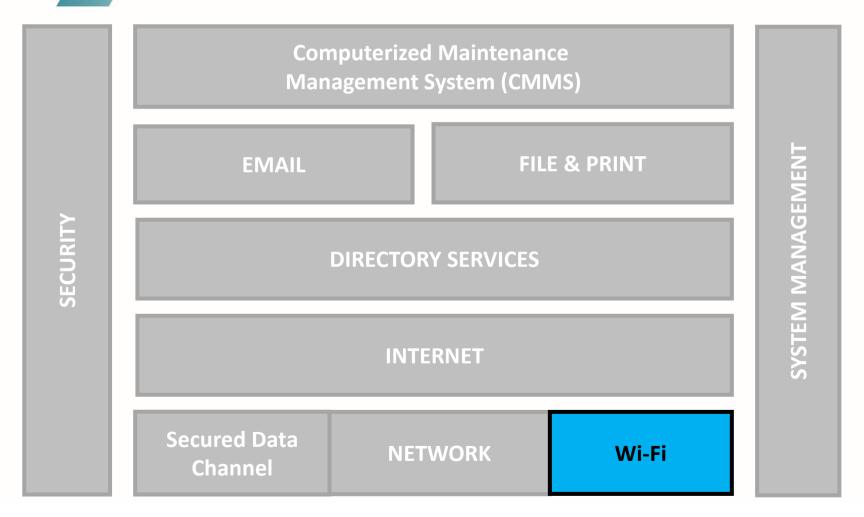ASSOCIATION OF MALAYSIA

Security & Secure Data Channel

- Internet and email gateway are protected using firewall to protect from external cyber threats

- Endpoint security for protection of PCs from internal threats

- Redundancy in data and hardware for protection of data (retention and integrity)

- Internal connection between ITS network and BTN is controlled with firewall :
  - To form secured data channels
  - Allow only permitted traffic to travel between ITS and BTN

Information Technology Systems

SECURITY

Computerized Maintenance Management System (CMMS)

EMAIL

FILE & PRINT

DIRECTORY SERVICES

INTERNET

Secured Data Channel

NETWORK

Wi-Fi

SYSTEM MANAGEMENT

Wi-fi

- Operator wi-fi for operational use only
- Coverage
  - Depot : Workshops, maintenance offices, guard house
  - Station : maintenance office, staff room, meeting room, concourse and platform areas
- Allow access to CMMS and other authorised enterprise applications using mobile devices
- Redundant access points (APs), cabling and wireless network controllers are used to ensure no single point of failure at any physical site
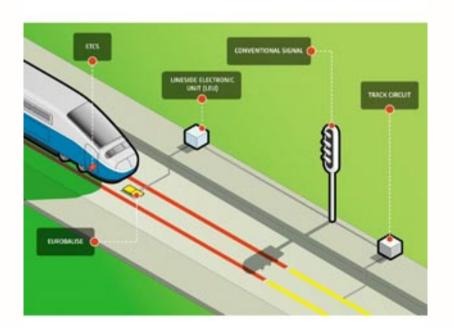
Other E&M Systems

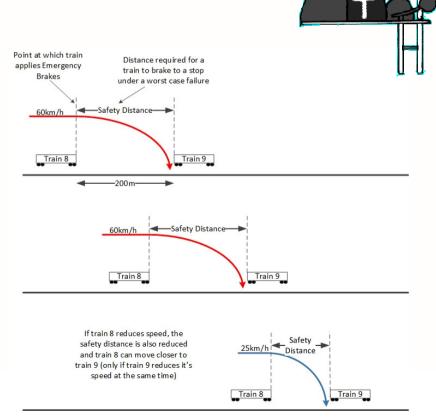E&M Systems with Information Technology (IT) components for controls and operations

Other E&M Systems

STCS (Signalling & Train Controls System)

Point at which train applies Emergency Brakes

Distance required for a train to brake to a stop under a worst case failure

60km/h — Safety Distance —

Train 8   Train 9

— 200m —

60km/h — Safety Distance —

Train 8   Train 9

If train 8 reduces speed, the safety distance is also reduced and train 8 can move closer to train 9 (only if train 9 reduces it's speed at the same time)

25km/h — Safety Distance —

Train 8   Train 9

Telecommunications

Other E&M Systems
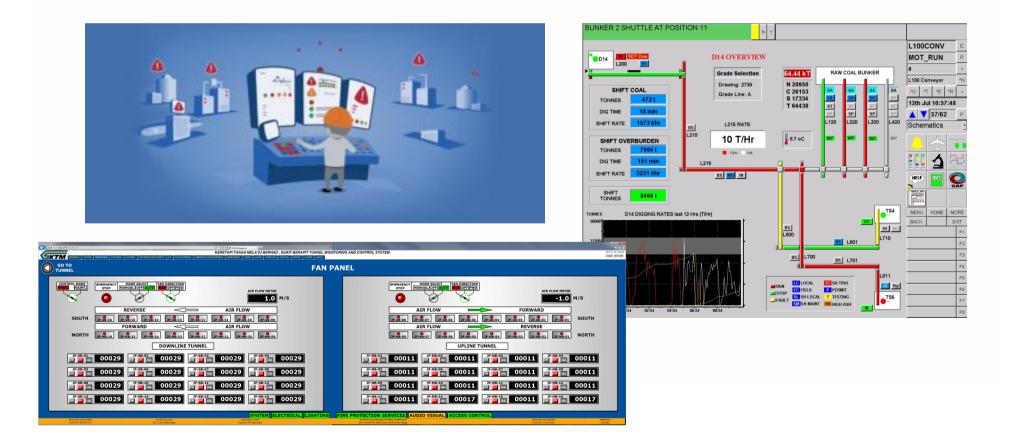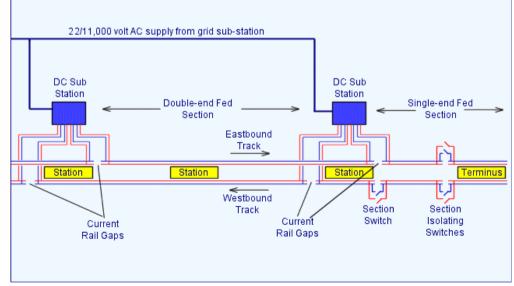
F-SCADA (Facility Supervisory Control & Data Acquisition)

PS&DS (Power Supply & Distribution System)

Other E&M Systems

Automatic Fare Collection (AFC)

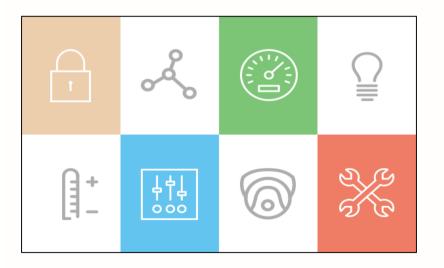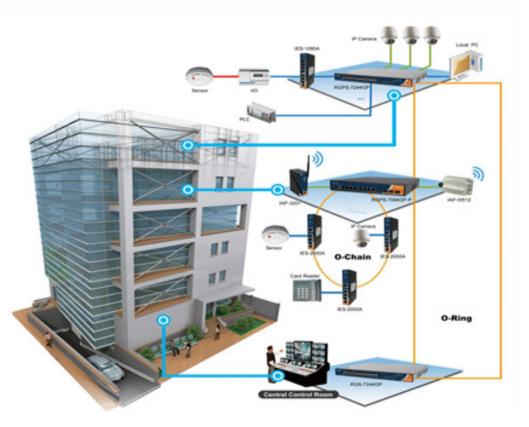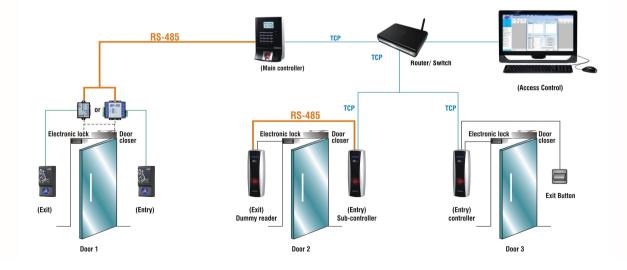## Building Management System (BMS)

Electronic Access Control (EAC)

Platform Screen Door (PSD)

Other E&M Systems

Design principles :

- All IT / network components must have redundant hardware for automatic recovery on-site (operations control centre and stations)

- All central hardware in the Sungai Buloh operations control centre (OCC) must have the same redundant set of hardware in Kajang backup control centre (BCC)

- Continuous or real-time replication of data from Sungai Buloh OCC to Kajang BCC for minimal data loss and recovery time

What now for MRT Corp?

What now?

- Completion of Phase 2 (Muzium Negara – Kajang) of SBK Line
  - By July 2016

- Sungai Buloh – Serdang – Putrajaya (SSP) Line
  - 52.2km in total with 13.5km underground
  - 37 stations (26 elevated, 11 underground)
  - Target completion date :
    - Phase 1 by Q2 2021
    - Phase 2 by Q2 2022

For more info

ITS MALAYSIA
NTELLIGENT TRANSPORT SYSTEM
ASSOCIATION OF MALAYSIA

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