

# Leadership in Urban Transport Project on *Integrated Ticketing System* for Mumbai Metropolitan Region

## Urban Mobility India Conference



### ***Presented by:***

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# Mumbai Metropolitan Region (MMR)



| Particulars                          | India                   | Maharashtra            | MMR                   | MCGM                  |
|--------------------------------------|-------------------------|------------------------|-----------------------|-----------------------|
| Population 2011 Census (in millions) | 1,210<br>(1.21 billion) | 112<br>0.112 (billion) | 23<br>(0.023 billion) | 12<br>(0.012 billion) |
| Area Sq. km                          | 3,287,240               | 307,713                | 4,253                 | 438                   |
| Density - Persons per sq. km         | 382                     | 370                    | 5,361                 | 28,310                |
| Urban Pop in %                       | 32%                     | 45.23%                 | 94%                   | 100%                  |
| GDP Per Capita (USD/annum)           | \$1,626.62              | \$1,963.33             | \$2,120.18            | \$2,570.73            |

# Public transport system in Mumbai Metropolitan Region (MMR)...

**Rail**



**Metro**



**Bus**



**5 modes of  
public transport  
system + IPTs**

**Monorail**



**Ferry**

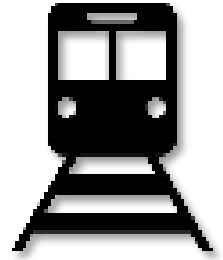


# Operated by 14+ Public Transport Operators (PTOs)

*Mix of Central, State & Local Governments as well as Private operators*

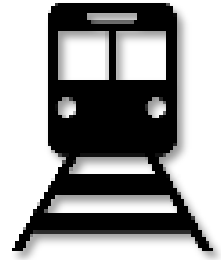
| <b><i>Bus</i></b>                                 | <b><i>Railways</i></b>               | <b><i>Metro</i></b>                      | <b><i>Monorail</i></b>  | <b><i>Others</i></b>  |
|---------------------------------------------------|--------------------------------------|------------------------------------------|-------------------------|-----------------------|
| Brihanmumbai Electric Supply and Transport (BEST) | Western Railways                     | Mumbai Metro One Private Limited (MMPOL) | Mumbai Monorail (MMRDA) | Mumbai Maritime Board |
| Navi Mumbai Municipal Transport (NMMT)            | Central Railways                     | Mumbai Metro Rail Corporation (MMRC)     |                         |                       |
| Thane Municipal Transport (TMT)                   | Mumbai Rail Vikas Corporation (MRVC) | Navi Mumbai Metro                        |                         |                       |
| Vasai Virar Municipal Transport (VVMT)            |                                      | MMRDA Metro                              |                         |                       |
| Kalyan Dombivali Municipal Transport (KDMT)       |                                      |                                          |                         |                       |
| Mira Bhayandar Municipal Transport (MBMT)         |                                      |                                          |                         |                       |
| Ulhasnagar Municipal Transport (UMT)              |                                      |                                          |                         |                       |

# Railways- Key Statistics



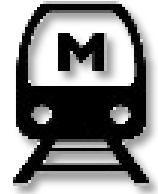
- ☐ 7.5 million daily trips
- ☐ 70% of the journeys completed through season tickets
- ☐ Around 30-40% of the suburban rail commuters uses other motorized transport modes (primarily bus and autos) to connect and from the railway stations
- ☐ Ridership saturated likely to be same till 2020 - 21
- ☐ Average ticket size of each journey is in slab of 05-20 Kms i.e.- INR 6

# Railways- Existing Ticketing System



|                             |                                                      |
|-----------------------------|------------------------------------------------------|
| <b>Fare Medium</b>          | Paper and Mobile Tickets                             |
| <b>Ticketing Channels</b>   | Ticket Counters, ATVMs, Online and Mobile App        |
| <b>Payment Type</b>         | Cash, Smartcard, Credit/ Debit cards, Mobile Wallets |
| <b>Inspection mechanism</b> | Spot checking at the station and inside the trains   |

# Metro- Key Statistics



- ☐ 0.3 million trips on a week day
- ☐ Per annum ridership growth is 5%
- ☐ Average ticket size of each journey is INR21
- ☐ New metro lines expected to be operational by 2021-2022
- ☐ The overall daily ridership expected to increase to 3-4 million by 2022
- ☐ No season tickets available, only Pay As You Go (PAYG)

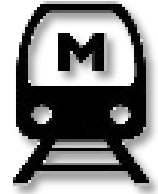


# Major Projects Currently Under Implementation

- Metro Line 2A : DN Nagar – Dahisar
- Metro Line 7 : Dahisar – Andheri
- Metro Line 2B : DN Nagar – Mandale
- Metro Line 4 : Wadala-Kasarwadvli
- Metro Line 3 : Colaba to SEEPZ
- Metro Line 5 : Thane Bhiwandi - Kalyan
- Metro Line 6 : Jogeshwari – Kanjurmarg
- Monorail Line Extension



# Metro- Existing Ticketing System



|                             |                                              |
|-----------------------------|----------------------------------------------|
| <b>Fare Medium</b>          | Smartcards and tokens                        |
| <b>Ticketing Channels</b>   | Ticket Counters, TVMs, Online and Mobile App |
| <b>Payment Type</b>         | Cash, Credit/ Debit cards, Mobile Wallets    |
| <b>Inspection mechanism</b> | Gated system, No inspection required         |

# Monorail- Key Statistics



- ❑ 17000-18000 regular commutes
- ❑ 2<sup>nd</sup> line to be operational by 2018
- ❑ The ridership by 2021 expected to reach 0.18 million
- ❑ No season tickets available, only Pay As You Go (PAYG)
- ❑ Average ticket size of each journey is 3.5km i.e. -INR 9

# Monorail- Existing Ticketing System



|                             |                                              |
|-----------------------------|----------------------------------------------|
| <b>Fare Medium</b>          | Smartcards and tokens                        |
| <b>Ticketing Channels</b>   | Ticket Counters, TVMs, Online and Mobile App |
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| <b>Inspection mechanism</b> | Gated system, No inspection required         |

# Buses- Key Statistics



- ❑ 7 Bus Operators in Mumbai Metropolitan Region
- ❑ 3.5 million daily trips
- ❑ BEST Undertaking is the largest Bus Operator in the city with ~2.8 million daily trips
- ❑ Around 20% of the trips completed through season tickets
- ❑ Around 10 % of the suburban rail commuters use bus to connect and from the railway stations
- ❑ Estimated growth of 15% per annum
- ❑ Average ticket size of journey is INR 12.84 for normal Buses
- ❑ Average ticket size of INR 82.40 for AC buses

# Buses- Existing Ticketing System



|                             |                                                      |
|-----------------------------|------------------------------------------------------|
| <b>Fare Medium</b>          | Paper Tickets, Smartcards and Mobile Tickets         |
| <b>Ticketing Channels</b>   | Ticket Counters, ETMs with conductors and Mobile App |
| <b>Payment Type</b>         | Cash, Credit/ Debit cards and Mobile Wallets         |
| <b>Inspection mechanism</b> | Spot checking inside and outside the buses           |

# The objective of Integrated Ticketing System (ITS) is to provide a seamless travel experience to commuters

*The Integrated Ticketing System aims to promote the use of public transport in Mumbai Metropolitan Region (MMR) by making ticketing system easy and attractive*

*PricewaterhouseCoopers Pvt Ltd & Consult Hyperion were appointed as the consultant for ITS*

ITS shall assist to:



*Combination of modes and transfer*



*Reduce time to purchase tickets*



*Reduce fraud and revenue leakage*



*Reduce administrative and fare collection cost*

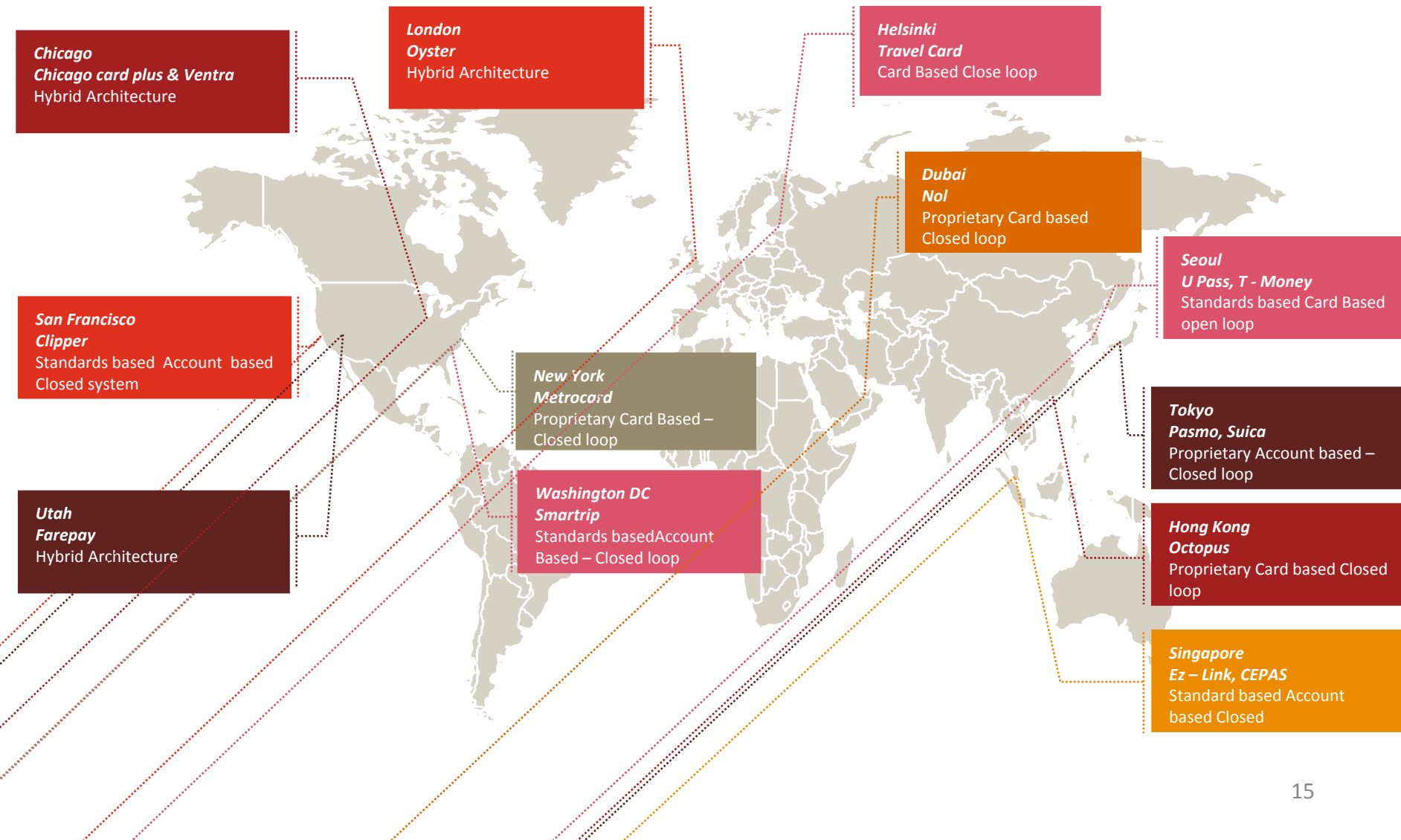


*Accurate and reliable information to people*

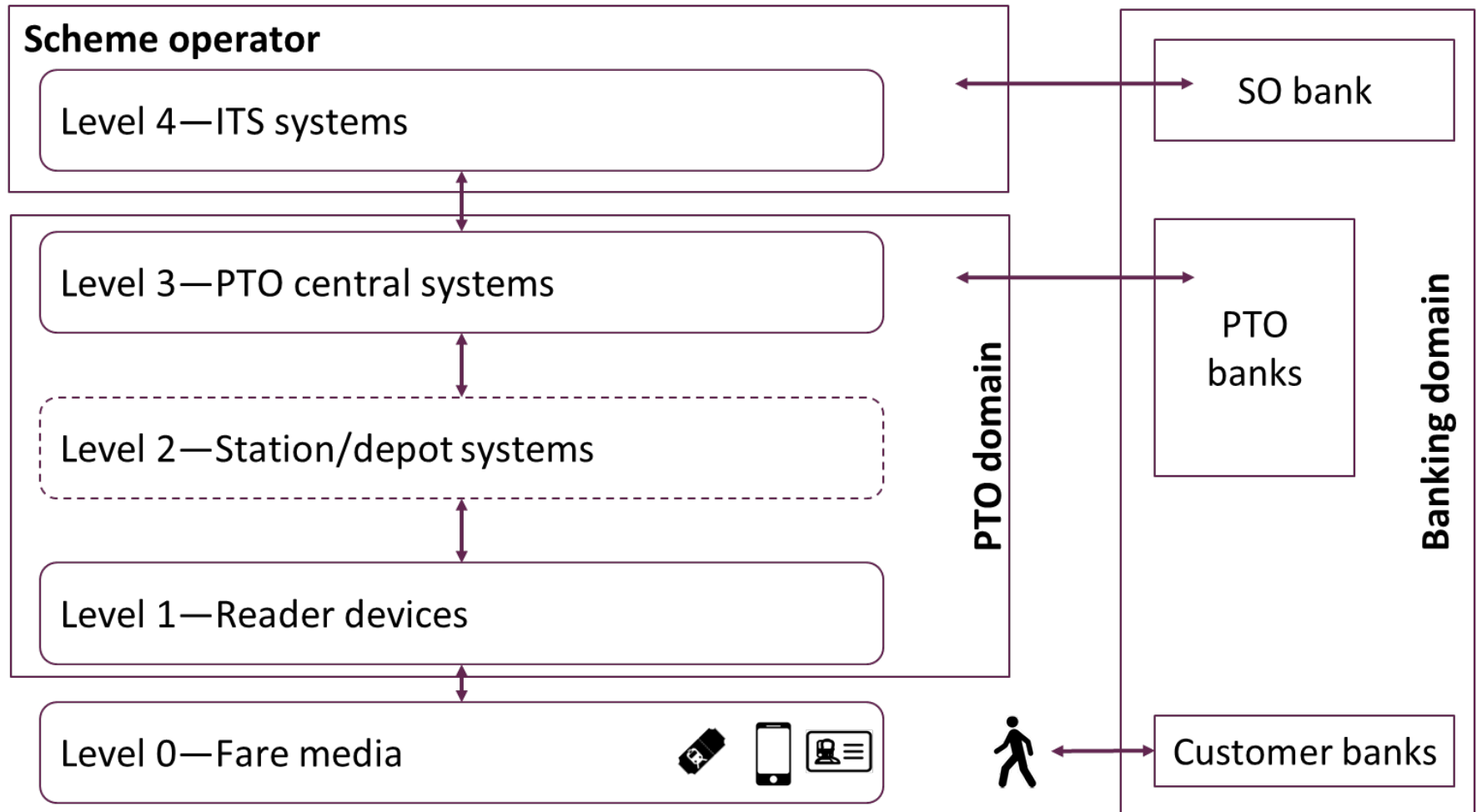


*Data to develop fare policies and products*

# ITS Systems around the world



# Layered AFC Architecture for ITS (1/2)



# Layered AFC Architecture for ITS (2/2)

**Level-0:** The fare medium available with the passengers. These may include smartcard, mobile phones, wearables etc.

**Level-1:** Front-end devices with which passengers interact. These include Ticket Vending Machines (TVMs), Ticket Office Machines (TOMs), Fare Gates, Fare Readers etc.

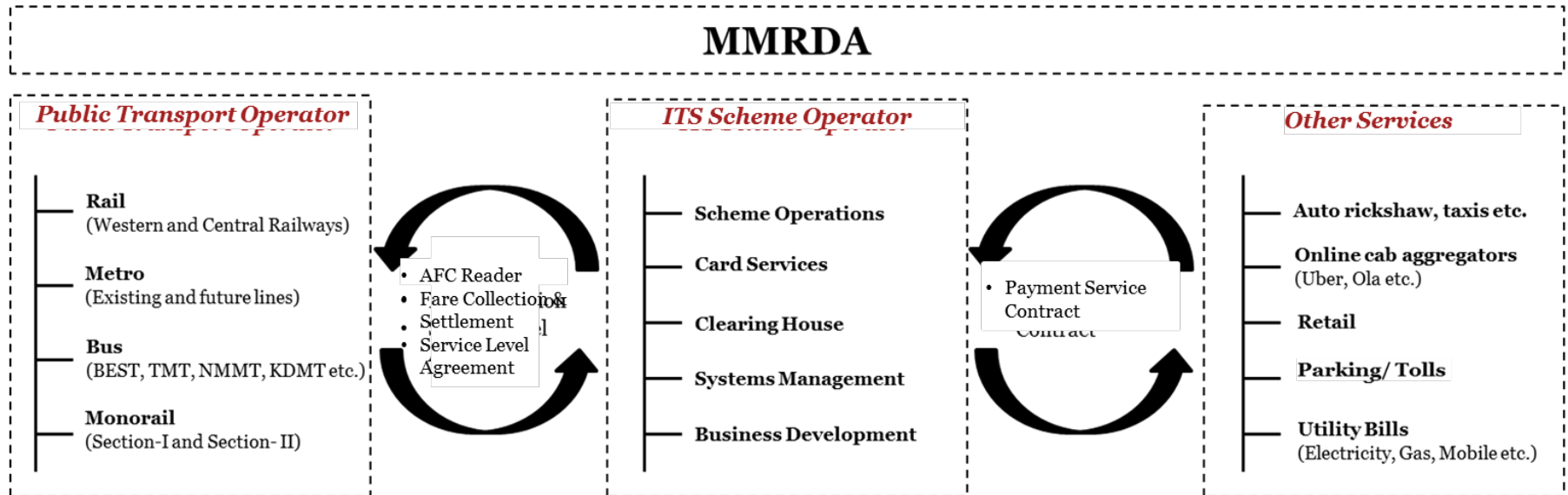
**Level-2:** Station/ depot level servers for data aggregation. The data from all Level-1 devices installed at a station are aggregated at its respective Level-2 server.

**Level-3:** These are PTO level servers which collect the data from all Level-2 servers. The aggregated data is passed on to the common city level server and also used for reconciliation.

The Level-1 to Level-3 devices come under PTO domain.

**Level-4:** This is a common ITS server, which comes under a central scheme operator. This Level-4 will performs the function of tap aggregation, fare calculation, risk management and interact with the acquiring bank for the settlement of the transactions with the issuing banks.

# Commercial structure for the ITS setting out clear roles and responsibilities of each group of stakeholders needs to be developed



- ❖ *SLAs to be agreed with PTOs and payment service agreements with third party users*
- ❖ *Scheme Operator can issue hardware specifications and testing criteria for PTOs to deploy own hardware*
- ❖ *Transaction charges to be paid by PTOs to the Scheme Operator depending on levels of service taken*

# Components of ITS



## **1** Technical features

- **Fare Architecture**
  - Card based or Account based system
- **Payment Architecture**
  - Open loop or Closed loop
- **Fare Medium**
  - Smartcard
  - Mobile phones
  - Wearable etc.
- **Banking system**
  - Single or multiple acquiring bank
  - Single or multiple issuing bank

## **2** Institutional arrangement

- **Organisational structure for Scheme Operator (SO)?**
  - MMRDA's department
  - SPV under State Govt.
- **Roles and responsibilities**
  - What will be the roles and responsibilities of SO and PTOs
- **Outsourcing**
  - What functions to do in-house and what functions to outsource

## **3** Commercial plan features

- **Financing options**
  - PTOs to pay for their own AFC hardware
  - SO to arrange for PTO's hardware
- **Sharing of revenue**
  - How to share the SO revenue between PTOs
- **Transaction charges**
  - Transaction charges to be paid to the SO and banks

# Challenges with Rail, Metro/Monorail & Buses

## Rail

- Very high footfall
- Lack of space
- Architectural design limits horizontal expansion of stations
- Fraud and revenue leakage



## Metro

- Long queues at the ticket counter and fare gates
- Slow online top-ups
- Tokens increase the cost of fare collection



## Bus

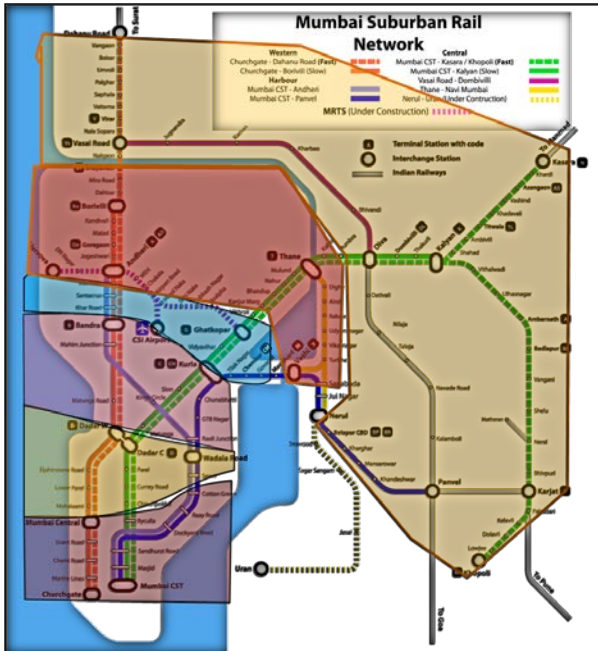
- Very high footfall
- Old Electronic Ticketing Machines (ETMs)
- Fraud due to cash transactions
- Revenue leakage



# Strategy for Railways

## Phase-1

Installation of tap-in fare readers



## Operation



Taps Card and Selects  
Zone



- Suburban Stations are segregated into Zones
- Fares are Calculated based on transit between zones for Single journey
- Ticket stored in Customer account at Backend
- Traditional Paper Single Journey Tickets can be purchased in counter like existing ticketing system

## Phase-2

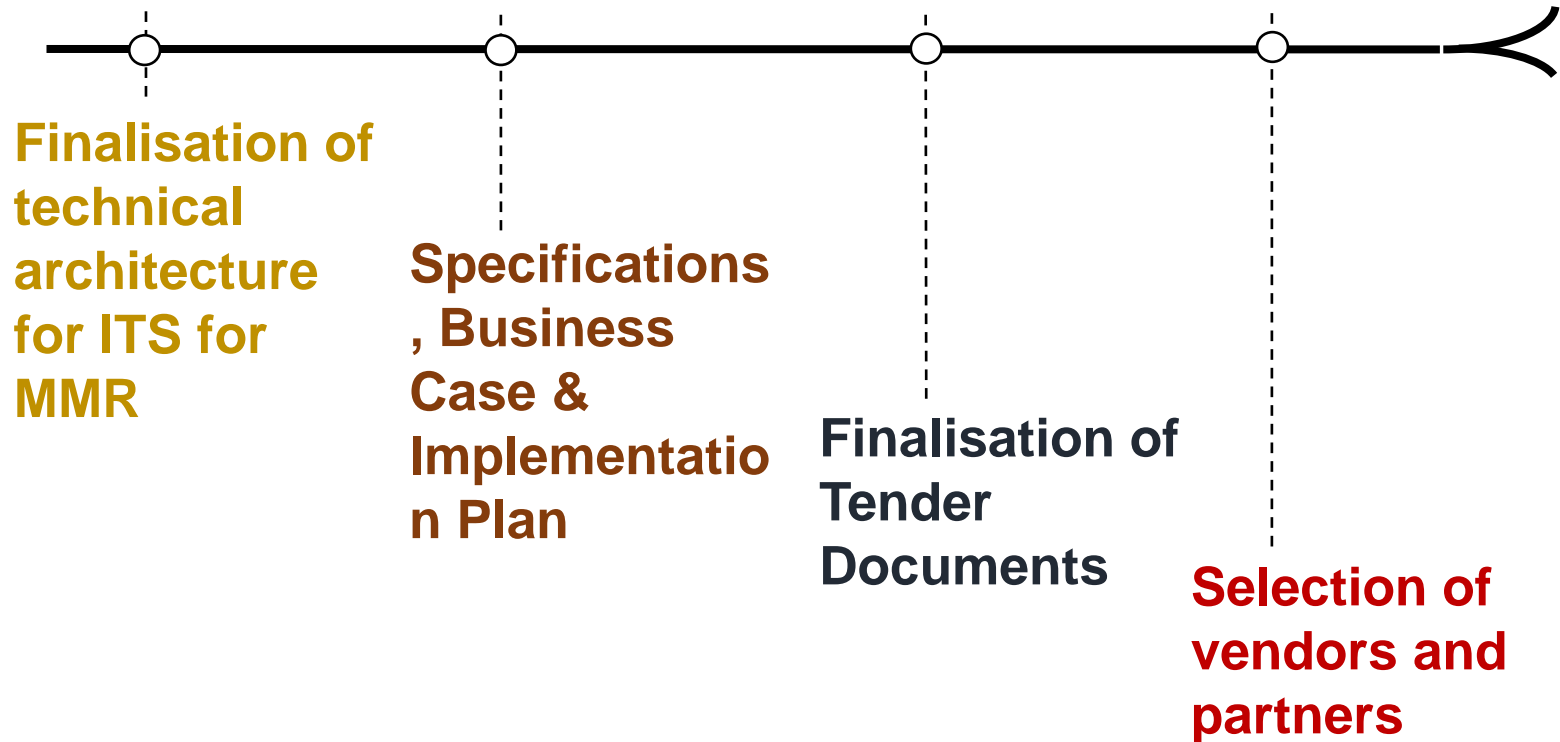
- Redevelopment/ modification of stations
- Installation of Fare Gates

## Conceptual layout plan to be developed for 12 stations under High, Medium and Low footfall category

| Station   | Category | Peak Hour Passengers | Fare Gates required |
|-----------|----------|----------------------|---------------------|
| CST       | High     | 77,387               | 29                  |
| Dadar     |          | 70,195               | 26                  |
| Andheri   |          | 73,446               | 27                  |
| Kurla     |          | 46,302               | 17                  |
| Mulund    | Medium   | 31,082               | 12                  |
| Dombivili |          | 34,443               | 13                  |
| Goregaon  |          | 34,667               | 13                  |
| Vashi     |          | 28,536               | 11                  |
| Airoli    | Low      | 10,472               | 4                   |
| Khar Road |          | 8,500                | 3                   |
| Wadala    |          | 10,000               | 4                   |
| Titwala   |          | 9,600                | 4                   |

Source: PwC Analysis

# Way forward



***Thank You***