



CHENNAI METRO
RAIL LIMITED

Creating Revolution in the Urban Transportation

The Metro Rail Diaries

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CMRL

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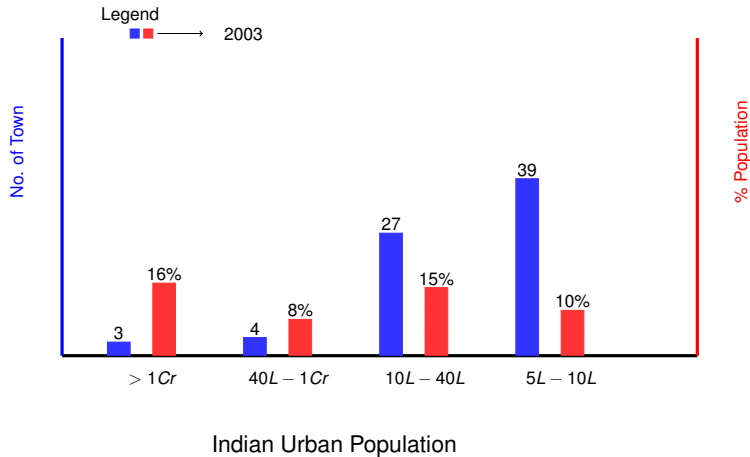


Outline

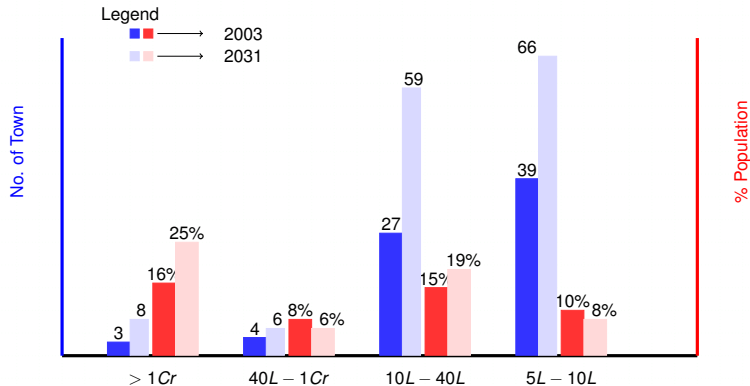
- 1 Metro Network in India
 - Need and Present Network
 - Locating Stations
- 2 Chennai Metro
 - Public Transport Strategy
 - Works in Progress
 - System Features



Rapid Urbanisation



Rapid Urbanisation



Indian Urban Population



Why Metro?

- Urbanisation
 - 33% of population live in Urban areas, in 2011.
 - Contribute 60% to GDP.
 - Demand for Urban Mass Public Transport.
- Environment
 - Motorised transport account for 25% of Carbon Emissions.
 - Per passenger-km, private vehicle emit 5 times more carbon as compared to public transport.
 - In urban areas, Rail based Transport gives minimum carbon footprint.
- Social benefits
 - Direct and Indirect employment, skill development, asset creation.



Issues and Challenges

- Capital Requirement
 - Metro projects are capital intensive with low financial returns.
 - They require multiple funding sources and have a complex financial arrangement
- Limited private investment
 - For Metro projects undertaken on PPP basis, securing funds is a challenge
 - Predominantly government funded.
- Time and cost overruns
 - Land acquisition can cause delays.
 - Cost escalation due to delays are a major concern.



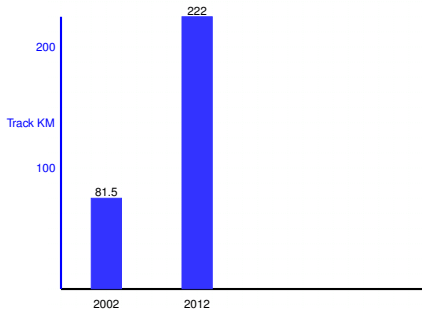
Operational Metros

- Total operational metro network in India has increased from 81.5 km in 2006 to 222 km in 2012.
- Average daily ridership is 2.2 million(172 stn) for Delhi Metro, 0.6 million(23 stn) for Kolkata Metro and 0.03 million(6 stn) for Bengaluru Metro



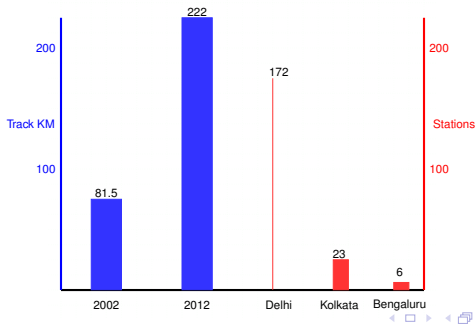
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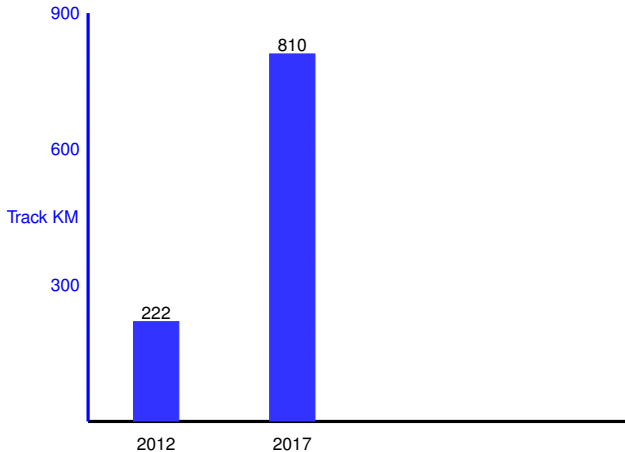


Operational Metros

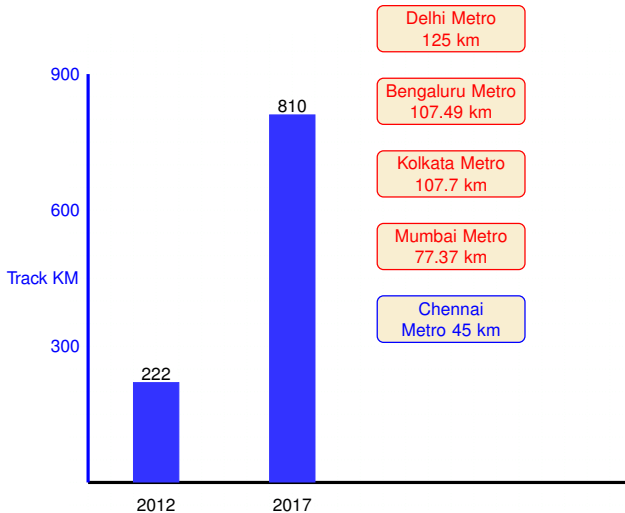
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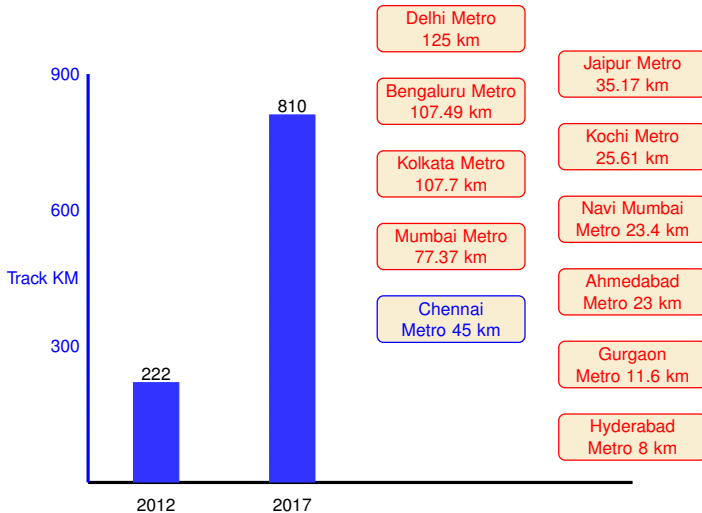
Expected Network by 2016-17



Expected Network by 2016-17



Expected Network by 2016-17



Location of Stations

Identification of
feasible locations
for stations

Estimation of rail
transit demand

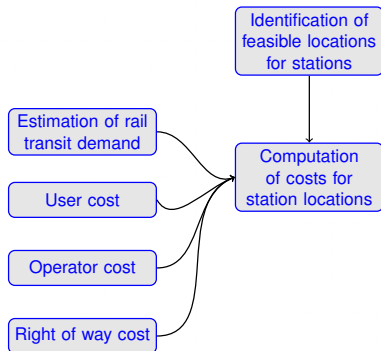
User cost

Operator cost

Right of way cost



Location of Stations



Location of Stations

Computation
of costs for
station locations

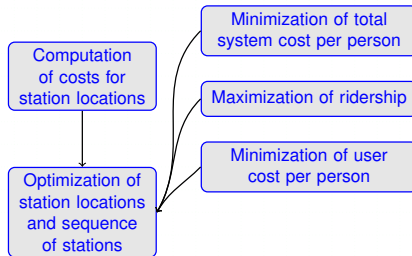
Minimization of total
system cost per person

Maximization of ridership

Minimization of user
cost per person



Location of Stations



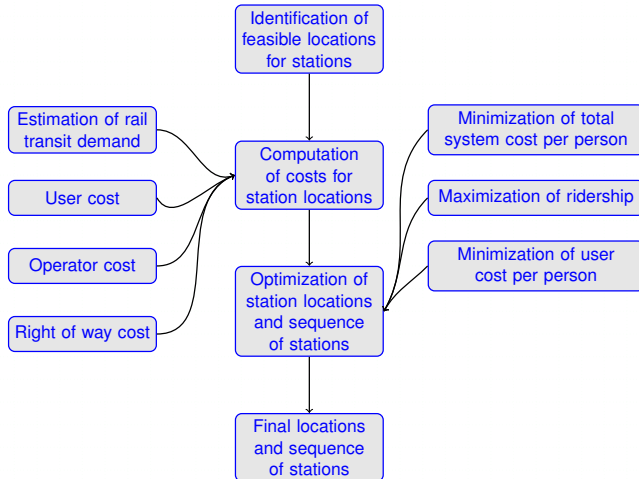
Location of Stations

Optimization of
station locations
and sequence
of stations



Final locations
and sequence
of stations

Location of Stations



Chennai Transport Scenario

- 143 lakh trips are made daily by passengers.
- 64 lakh trips by public transport.
 - Bus - 54 lakhs trip.
 - Suburban - 9 lakhs trip.
 - MRTS - 1 lakhs trip.
- CMRL will contribute an addl. 5% by 2016 (7.74 lakhs trip in 2016).
- Cities like Hong Kong have PT share 90%, Singapore 65%



Modal Shares

Mode	2008	Goal for 2023
Public Transport	27%	46%
Interim Public Transport	7%	5%
Private Transport	32%	15%
Non-Motorised Transport	34%	34%

- Planned modes of Public Transport.
 - Bus Rapid Transit.
 - Suburban Rail.
 - Metro Rail.
 - Monorail.



Passengers Per Hour in Peak Direction

Mode	Capacity Range (pphpd)
Dense Bus	3,000
Bus Rapid Transit	3,000 - 8,000
LRT/Monorail	8,000 - 20,000
Metro Rail	20,000 - 40,000
Suburban Rail	30,000 - 60,000



Public Transport Shift Strategy

- Monorail along highly congested feeder routes.
- Chennai Metro along high density corridors.
- BRTS along certain corridors.
- Modernisation of suburban rail system.
- Standard Bicycling and Pedestrian facilities.
- Physical Integration of Metro, Mono, Bus, BRT and Suburban Rail under CUMTA Fare Integration and Common Ticketing.



Project Cost

	GOI	GOTN	Total
Equity	2,190	2,190	4,380
Debt	730	844	1,574
JICA Loan	8,646	0	8,646
Total	11,566	3,034	14,600



Current Status

- Chennai Metro is being implemented in about 45 km.
 - Elevated - 21 km.
 - Underground - 24 km.
- Can eventually carry 45,000 passengers/hour/direction.
- Loan from JICA being disbursed in stages.
- MOU with GOI signed on 15.2.2011.
- 23 out of 23 packages awarded and works are under various stages of progress.
- Recruitment process for Operation and Maintenance initiated.



Multimodal Integration

Washermanpet

Central

High Court

Egmore

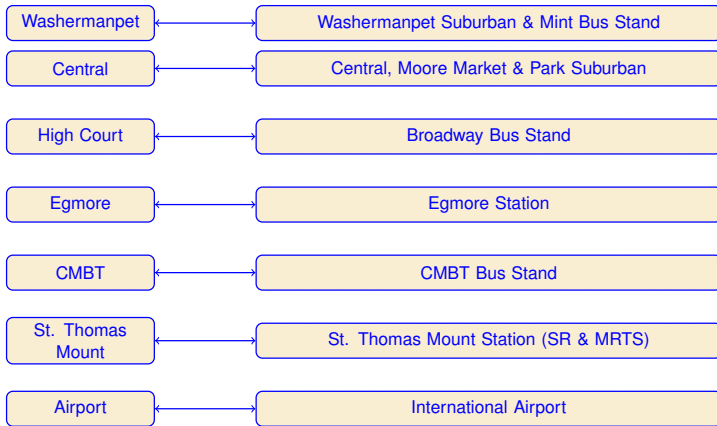
CMBT

St. Thomas
Mount

Airport



Multimodal Integration



Stations

- Approximately spaced a kilometer apart.
- Equipped with Elevators and Lifts.
- Underground stations air-conditioned.
- Underground stations have Platform Screen Doors.
- BMS in each stations. item Differently abled friendly.



Trains

- Maximum Speed 80kmph.
- Average Speed 34kmph.
- Coaches fully air-conditioned with Passenger Information System.
- First Class available.
- Wheel chair ingress/egress facility available.
- Passenger capacity per coach - 300 approx.
- Power input by 25KV overhead lines.
- Regenerative 'Green' braking.



Operation

- Initially 4 car trains.
- Designed for $2\frac{1}{2}$ minutes headway.
- Cab Signaling.
- Automatic Train Operation with Automatic Train Protection.
- Centralised operations through OCC.
- Smart Card, Ticket vending machines.



Thank You

