ITS in Public Transport Systems

Presented By:

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DIMTS
We help people move
Joint Venture of Govt. of NCT of Delhi and IDFC Foundation
Delhi Integrated Multi-Modal Transit System Ltd. (DIMTS) is an urban transport and infrastructure development company committed to build and deliver quality infrastructure.

Equal equity partnership of GNCTD and IDFC Foundation (a not-for-profit initiative of IDFC Ltd.)
DIMTS has a team of experts and professionals in the fields of urban transport planning, engineering, public transport operations, PPP advisory, Planning, Scheduling, Monitoring and related fields. They bring with them a wealth of experience, having worked in various Government departments as well as leading private companies such as IDFC, IL&FS, TCS, IBM, L&T, DMRC etc.

### Range of Services

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<th>Advisory Services</th>
<th>Transport Technologies</th>
<th>Engineering</th>
<th>Transport Operations</th>
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<td>• Comprehensive Mobility Planning</td>
<td>• Transaction Advisory Services</td>
<td>• Asset Tracking and Public Fleet Management</td>
<td>• Engineering Design</td>
<td>• Bus Rapid Transit Corridor Management</td>
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<td>• Feasibility Studies for Mass Transit Systems</td>
<td>• Bus Corporatization Scheme</td>
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<td>- High Speed Rail Corridors</td>
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<td>- Bus Rapid Transit Systems</td>
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<td>- Bus Rapid Transit Systems</td>
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<td>- Mumbai Mono Rail</td>
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<td>• Route Rationalization</td>
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<td>• Intelligent Signalling System</td>
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<td>• Traffic Simulation</td>
<td>• UMTA, UTF Structuring</td>
<td>• Identity Management</td>
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<td>• Financial Viability Analysis</td>
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- Electronic Ticketing
- Intelligent Signalling System
- Identity Management
- Engineering Design
- Construction Supervision
- Project Management
- Bus Rapid Transit Systems
- Multi-level parking
- Railways
Presentation Coverage

• ITS – Key Drivers and Opportunities
• DIMTS’ ITS Experience
• ITS – Challenges
• Conclusions
• **ITS – Key Drivers and Opportunities**

• **DIMTS ITS Experience**

• **ITS – Challenges**

• **Conclusions**
India launched its first transportation policy in 2006, which focuses on moving people and not vehicles.

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<td>Ensure coordinated planning for urban transport</td>
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<tr>
<td>Ensure integrated land use &amp; transport planning</td>
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<tr>
<td>People focused &amp; equitable allocation of road space</td>
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<td>Investments in public transport &amp; Non Motorized modes</td>
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<td>Strategies for parking space and freight traffic movements</td>
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<td>Establish Regulatory mechanisms for a level playing field</td>
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<td>Innovative financing methods to raise resources</td>
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<td>Promote ITS, cleaner fuel &amp; vehicle technologies for cities</td>
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<td>Build capacity to plan for sustainable urban transport</td>
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<td>Projects to demonstrate best practices in sustainable transport</td>
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Source: “NUTP and JnNURM- Government of India Initiatives to Strengthen Public Transport”, S.K. Lohia, OSD (MRTS), MoUD, GOI
Where Should Investments Go

- Transport System
- Transport Infrastructure
- IT Infrastructure

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Key Drivers

**Regulatory requirement**
- As per MoUD guidelines, all buses procured under JnNURM scheme should incorporate ITS features
- As per its reform agenda, MoUD also directed city need to implement ITS through city specific SPV

**Funding**
- Availability of funding under JnNURM has also pushed many cities to start city bus services
- ITS has now become essential component of efficient city bus service
- For better future planning, the data can be gathered through ITS components
Enhancing Service Delivery in the Indian Context

• Public Transit Systems
  • Automatic Vehicle Location (AVL)
    • Improved Operational Efficiency
    • Reliability of service
  • Passenger Information System
    • Increased confidence in the public transit system
  • Automatic Fare Collection Systems (AFCS)
    • Smoother inter-modal interchanges
    • Flexibility in fare products

• Para-transit Systems
  • GPS based tracking and complaint management
    • Instill confidence in the system
    • Value added services like auto-on-call

• Traffic Management Systems
  • Intelligent Signaling System (ISS)
    • Optimized use of road space
    • Priority to public transport modes
Efficiency Enabler in Urban Transport

- Better management of resources and efficient interface with related city services
- Live tracking feeds
- Smart Congestion management
- Intelligent decision support
- Connected Bus Stops
- Live tracking feeds
- Intelligent Bus
- Personal Travel Planner
- Passenger Information System
- Route Optimization
- Fare Collection Analysis
- Complete Visibility for effective Travel Plan for passengers
- Efficient Transport Operations
- Optimized transport operation, offering reliable and safe transportation services
- Enhanced Passenger Service Experience

Intelligent Bus
Connected
Stops
Enhanced
Passenger
Service
Experience

Smart Transportation Roadmap

Personal Travel Assistant

Efficient Transport Operations

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Current Market Scenario

• Automatic Vehicle Location (AVL) and Passenger Information Systems
  • Projects implemented in Delhi, Ahmedabad (BRT), Bhopal, Indore and Mysore
  • Project bids by Bangalore, Chennai, Surat, Rajkot

• Automatic Fare Collection Systems (AFCS)
  • Implemented in Metro systems and Ahmedabad BRT
  • Bids underway in various BRT systems

• Para-transit Management
  • Implemented in Delhi
  • Chennai, Hyderabad – planning stage

• Intelligent Signaling System (ISS)
  • Bids planned in Delhi and Mumbai
• ITS – Key Drivers and Opportunities
• DIMTS’ ITS Experience
• ITS – Challenges
• Conclusions
Key Projects

• **Cluster Bus System**
  • GPS based fleet management
  • Electronic Ticketing
  • Passenger Information Systems

• **Para-transit Management**

• **Intelligent Signaling System**

• **Traffic Management and Information Control Centre & National Public Transport Helpline**
Changing face of Delhi Bus System: Bus Clusters

DIMTS conceptualized the scheme of corporatization of private stage carriage buses. Under this scheme 657 bus routes of Delhi were grouped into 17 clusters. Each cluster will be serviced by DTC and a private operator.

Delhi Transport Corporation
- State owned
- Fares set by Government
- Gets gap-funding from the Govt.
- No ITS for performance monitoring

Private Stage Carriage - Bluelines
- A few buses per owner
- Fares set by Government
- Fare box only source of revenue
- Entire market risk borne by operator
- Every reason to cut corners & recover costs ASAP
Automatic Vehicle Location (AVL) System has been deployed on all the buses. System is being used to monitor operations of the fleet.

Alerts Dashboard manages alerts and responds to deviation/violations:
- Over-speeding reports
- Depot, vehicle and route wise reports
- Missed stops reports
- Route deviation reports
- Trip status reports (Cut/Short/Missed)
- Distance travelled
Electronic Ticketing Machines

DIMTS has deployed New Generation Electronic Ticketing Machines (ETMs)

- Real Time data transfer through GPRS
- Smart Card Enabled
- Over the air configuration & update of master data, configuration data and application

Backend System enables:

- E-mail Operational & Revenue to key stakeholders
- Performance analysis on Route, Conductor
- Display Heath status of the field devices to take proactive action
- Day-end Revenue reconciliation
Passenger Information System

- On-board passenger information system integrated with GPS unit
  - Voice announcement
  - Display of names of approaching bus stops
- Passenger Information Displays at Bus Stations
  - Dynamic update of the approaching buses with their Route No., Destination and ETA
Passenger Information System

**Mobile Application**

- Route No: 500
  - Name: S0050MN
  - Frequency: 15 mins
  - Source: Saket Terminal
  - Destination: New Delhi Railway Station Gate No-2
  - Type Of Bus: 

**Web Portal**

- Delhi Transit Bus Information
  - Route Details
  - Bus Schedule
  - Track Location of a Bus

**Route Details**
- Enter Bus Route No: 

**Bus Schedule**
- Enter Bus Route No: 

**Trip Planner**
- Route Details
- Bus Schedule
- Track Location of a Bus
Enterprise Resource Planning (ERP)

An ERP system for efficient management of Private Stage Carriage Buses developed.

The payment module uses various parameters of performance such as

- No. of buses
- Service kms
- Service hours
- Missed trips
- Infractions (over-speeding etc.)
Outcomes

• Fleet of 850* buses operated from 9 depots on 50 routes spread across Delhi
  • Procurement of 2439 buses underway
  • Fleet size by year end is expected to be 1000 buses

• Passenger perspective
  • Punctual service
  • Well informed passenger (In-bus voice announcement, Passenger Information Systems at the BQS, Bus Transport Mobile Application)

• Government perspective
  • Reliable, safe and presentable service to citizens
  • Revenue leakages plugged through use of electronic ticketing systems
  • Methodical planning of routes

• 1000 passengers per bus per day
GPS based tracking of Auto Rickshaws
Delhi Case Study

- About 75,000 auto and 9,500 taxis plying in the city
- 30,000 new permits to be issued
- Modes of hiring for commuter
  - hire an auto/taxi from a stand or
  - flag down an auto/taxi moving on the road
- Driver has the discretion of taking the commuter on board & charging metered fare
- Commuter issues
  - Meter tampering
  - Refusal
  - Over Charging
  - Safety
Delhi Case Study

- New generation Integrated GPS enabled Fare Meter spec drawn up

- 10 vendors empanelled for supply of devices

- Existing autos/taxis to be fitted with GPS integrated EFMs
  - 21,000 new autos fitted with GPS integrated electronic fare meter (EFM)

- Backend system for tracking of autos with GPS integrated EFM being done from DIMTS data centre
Signaling & Traffic Management
Intelligent Signalling System - Features

• First of its kind in India
• Commissioned at 17 junctions
• Three levels of intelligence
  – Vehicle Actuated Radar optimizes signal cycle locally
  – SCOOT algorithm optimized throughput over the network
  – High resolution cameras record and display video
• System designed for 750 junctions – enough to cover entire City of Delhi
**Wi-TraC (CDAC Technology Transfer)**

**DIMTS is an authorized Technology Partner of CDAC to manufacture, market & support WiTraC in India & abroad**

- Concept of controlling the Road Traffic Signal without a physical connection between the Traffic Controller equipment and the signal lamps

- Feature for Solar Power thereby completely getting rid of road cutting and issues related to road cutting

- Distributed Architecture having 1 Master Controller and up to 16 Slave Controllers

- Plans to implement at one junction in Delhi on Pilot Mode.
Vehicle Actuated Traffic responsive Smart Signals

ITS Project in Ahmadabad, Gujarat

- 186 junctions

- Built-in Camera Interface is provided for Vehicle detection

- Very efficient as compared to Fixed Time Controllers as it caters to a particular phase, only when Vehicle is detected and extends the Green time to its maximum value, on the basis of detected vehicle.

- Connects to Central Control Room on wired (leased lines)

- Composite Signal Control Strategy (CoSiCoSt) based ATCS compatible Central Control Room provides Optimized Cycle/Phase/Offset timings along with Real Time Junction Monitoring, instantaneous PHASE status, Remote Police Panel functionality & Remote Upload facility
Traffic Management & Information Control Centres and National Public Transport Helpline
Consultant to MoUD for preparation of Operations Document for Traffic Management and Information Control Centre (TMICC) and National Public Transport Helpline (NPTH)

Objective

- Develop operations documents for Intelligent Transport Systems (ITS) on:
  - Traffic Management and Information Control Centre (TMICC) and
  - National Public Transport Helpline (NPTH) through Travelers Information Systems.
- Tailor the manuals to specific city requirements
- Organize workshops to disseminate the learning’s of the project to all the 28 States and 7 UTs through interactive presentation.
- Select two cities for project concept implementation
- Prepare detailed NTPH and TMICC Operational Document
- Provide assistance to MoUD to empanel consultants to provide assistance and handholding to cities for implementation of the TMICC and NHPT projects.
- Conduct Workshops in Delhi on Capacity building
## TMICC Activities

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<tr>
<th>TRAFFIC MANAGEMENT</th>
<th>TRANSIT RELATED</th>
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<tr>
<td><strong>Traffic Monitoring</strong></td>
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<tr>
<td>Traffic Equipment Status</td>
<td>To be the Back Office of the NPTH for receiving and processing transit data feeds</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Transit Related Information Dissemination Through NPTH</td>
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<tr>
<td>Controlling Field Equipment</td>
<td></td>
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<tr>
<td><strong>Signal Control</strong></td>
<td></td>
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<tr>
<td>Supporting Traffic/Transport</td>
<td>Support Intermodal Coordination such as feeders, service planning, schedule</td>
</tr>
<tr>
<td>Planning Activities</td>
<td>enforcement</td>
</tr>
<tr>
<td>Simulation of Various Traffic</td>
<td>Giving traffic updates to Transit Agencies, feedbacks received through NPTH</td>
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<tr>
<td>Interventions</td>
<td></td>
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<tr>
<td><strong>Supporting Incident</strong></td>
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<tr>
<td>Management</td>
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<tr>
<td>Supporting Event</td>
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<tr>
<td>Related Traffic Management</td>
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<td>Supporting Traffic Rules</td>
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<tr>
<td>Enforcement</td>
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<tr>
<td><strong>Traffic Info Feed</strong></td>
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<td>to NPTH</td>
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<tr>
<td>Coordination with Traffic</td>
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<tr>
<td>Agencies / Agreements</td>
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<td>Communication with Field</td>
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<tr>
<td>Staff/Other Agencies</td>
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## NPTH Activities

<table>
<thead>
<tr>
<th>Traffic Information</th>
<th>Transit Information</th>
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<tbody>
<tr>
<td><strong>Static</strong></td>
<td><strong>Dynamic</strong></td>
</tr>
<tr>
<td>Road Network Details Including GIS Map</td>
<td>Road Closures, Diversions</td>
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<tr>
<td>Traffic Congestion Status such as jams, speeds etc.</td>
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<tr>
<td>Traffic Alerts for accidents, events, Water Logging</td>
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<tr>
<td>Scheduled construction / maintenance</td>
<td>Updates on construction / maintenance</td>
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<tr>
<td>Location of Cameras</td>
<td>Live Camera Feeds</td>
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<tr>
<td>Parking Locations, Capacity, Operation Timings</td>
<td>Parking Availability</td>
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## NPTH Activities .. 2

<table>
<thead>
<tr>
<th>Traffic Information</th>
<th>Transit Information</th>
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<tr>
<td><strong>Static</strong></td>
<td><strong>Dynamic</strong></td>
</tr>
<tr>
<td>Location of Signals on Map or as List</td>
<td>Signal Functional status</td>
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<tr>
<td>Location of Variable Messages Signs on Map or as List</td>
<td>Current Messages on VMS</td>
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<tr>
<td>Auto / Taxi Stands locations</td>
<td>Auto/taxi strikes</td>
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<tr>
<td>Weather Updates</td>
<td>Inter-modal Transfer Options: Feeder Services, Connecting Routes, Interchange Stations/Terminals</td>
</tr>
<tr>
<td>Advisories</td>
<td>Transit Trip Planner: Intra-modal as well as inter-modal based on Static Data</td>
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</tbody>
</table>
DIMTS has set up a state-of-the-art **Operations Control Centre** for efficient management of traffic flow. It will be the kernel for real-time operation of traffic through Intelligent Signaling System, operation of stage carriage buses and the Automatic Vehicle Location System.
• ITS – Key Drivers and Opportunities

• DIMTS’s ITS Experience

• ITS – Challenges

• Conclusions
Challenges – Project Development Stage

**Project Preparation and Selection**

- Existing body of knowledge on ITS is very limited
- Vendor driven approach to project preparation resulting in mix-n-match configuration and spec
- L1 syndrome haunts every Technically Superior solution provider

**Funding**

- Funding available under JNNURM not adequate to meet ITS requirements
- ITS is typically under-budgeted in the CDP stage
- ULBs have ITS on low-priority
- No ring-fenced funds available

**Project Structuring**

- Owing to lack of funds the projects end up being structured as BOT
- Since there is usually no direct consumer fee linkage the deferred payments are made by ULB/STC whose financials are typically weak, unreliable
- Unworkable contract conditions (eg “transfer of source code with worldwide rights to re-use, resell, distribute ....”)
Challenges – Project Implementation Stage

**Technical**
- Sign-off on Requirements remains elusive
- Change requests extremely cumbersome to deal with
  - client side usually does not have in-house capacity to judge and quantify the change
  - supplier side opaque on efforts and charges
- The industry remains wedded to proprietary methods – clients find it extremely difficult to take that first step knowing that migration will be near-impossible

**Stake-holder**
- Operational staff usually not receptive to introduction of ITS
- Client side infrastructure upgrades lagging
- Multiplicity of agencies to deal with especially in Signaling projects. We are still grappling with the issue of who should own and operate the Integrated Traffic Management Centre
• ITS – Key Drivers and Opportunities

• The Delhi Experience

• ITS – Challenges

• Conclusions
Conclusions

ITS can be a big market in India, **BUT**

- While need for ITS is well recognized at MoUD level this needs to percolate down to ULB and STCs
- A standard contract format required to deal with payment structuring and IP issues
- Technical agencies like BIS need to work out standard interchange protocols
- Contracts should bring in an IE concept to handle freezing of System Requirements and Change Requests
Thank You

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