Presentation On Intelligent Transport Systems (ITS) in City Bus Transport in the Indian context

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GM – Transportation Technology Solutions
Company Overview

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:

- Government of National Capital Territory of Delhi (GNCTD)
- IDFC Foundation (a not-for-profit initiative of IDFC Ltd.)

IDFC is India’s leading infrastructure financing institution set up in 1997 by the Government of India to catalyze private investment into infrastructure development.
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.

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DIMTS ITS Platform- Where We are

• Single largest public service vehicle AVL system in the country Covering
  – DTC : 3782 buses
  – Cluster Buses : 1650 buses
  – Enforcement Vehicles : 33 nos
  – Bluelines : 1962 buses
  – Public Service Vehicles : 35000 Vehicles
  – AutoRickshaws : 75000

• One of Largest Device Vendor independent system over 40 different Device vendors empaneled in Various Categories.

• Mobile App – Pooch-O for Multi-Modal travel options. (Bus, Auto, Taxi, CarPool, Parking)

• Online Parking management for 100 Location in NDMC area.

• Implementing Intelligent Signaling in 2 Cities.
City Bus Services Management
Changing Face of Delhi Bus System: Bus Clusters

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

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 serviced by both, Delhi Transport Corporation and a private operator.
Bus Service – Key Parameters

• A Transit Service is

  - Integrated
  - Reliable
  - Safe
  - Economical
ITS for Bus System: Mapping Stake Holders

Commuter Perspective
- Which bus should I take to reach my destination???
- When is the bus coming???
- What is the bus schedule & route??

Operations Perspective
- Are all the buses operating as per schedule?
- Are there any breakdowns?
- Where are the buses??
- Is any of the bus over-speeding?
- Has there been any accident?

Management Perspective
- Revenue earned
  - Per Bus
  - Per Route
  - By Conductor
  - Passenger Profiling?
- Facilities for commuters
- Transport facilities during festival seasons
- Driver and conductor Appraisal
- MIS Reports on
  - Fleet Usage
  - Violations
  - Incidents
  - Provided with Graphical and Chart formats of the above

DIMTS
We help people move
Bus Cluster Scheme – Key Features

Key Facts
- Routes clustered (657 bus routes distributed into 17 Clusters) so as to leverage network synergies.
- Public Operator (DTC) and Private Operator to share fleet 50:50 Private ratio
- Currently Over 1650 Buses in 9 depots.
- Conductor deployed by DIMTS is around 5000.
- Schedules creation and Management – Schedules Over 18000

Unified Time Table (UTT)
- Public and Private operators will follow Unified Time Table to ensure timely and reliable bus service to public.

Contract Type – Gross Cost
- Resource contract
- No transfer of revenue risk to bus owner
- Revenue goes to a pool
• The Concessionaire ensures drivers are qualified and medically fit
• Special training sessions organized for drivers with bus manufacturer, Traffic Police and through Driver Training Schools

• Ticket collectors (conductors) are deployed by DIMTS
• All conductors are well trained through rigorous training process.
• Fare collection through Electronic Ticketing Machines to plug leakages
In the present operations in Delhi, the operator faces performance deduction or get incentive based on performance vis-à-vis benchmarks.
Intelligent Bus
Connected Bus
Stops
Connected
Bus
Enhanced 
Passenger
Service
Experience

Personal 
Travel
Assistant

Live tracking feeds
Personal Travel Planner
Connected Bus Stops
Connected Bus

Fare Collection Analysis
Smart Congestion management
Intelligent decision support
Live tracking feeds
Intelligent Bus

Route Optimization
Passenger Information System
Personal Travel Planner
Connected Bus Stops
Connected Bus

Efficient Transport Operations
Optimized transport Operation, offering reliable and safe Transportation services
Connected Bus
Enhanced Passenger Service Experience

Better management of resources and Efficient interface with Related City services
Complete Visibility for effective Travel Plan for passengers

Intelligent Transport System
ITS Components
ITS Components

• GPS based AVL system
  o Tracking on GIS maps own @ 1:2000 scale
  o Route wise tracking and vehicle running information
  o Monitor out shedding and route deviation of the fleet.

• Fare Collection System

• Passenger Information System
  o LED Boards at bus stops and other key locations
  o Integration with In-Bus Announcement System
  o Mobile based public transit application
  o Web interface for journey planning

• Centralised Control Centre with Operation Management System
What Stakeholders Get From ITS

Key Facilities

Passenger Information System (PIS)
- Commuter
  - ETA on display board
  - ETA on mobile/web
  - Various alerts i.e. route cancellation etc.
  - Journey planning

Automatic Vehicle Location System
- Commuter
  - Information about bus routes, schedule
  - Real time location information
  - Transit vehicle arrival/Departure

Fare Collection System
- Commuter
  - Receipt of ticket through ETM
  - Optimize travel planning to minimize travel
  - Seamsless / faster transfer

Management
- Commuter
- Management
  - Route information / status frequency
  - Schedule information
  - Better Community satisfaction

Management
  - Effective operation management
  - MIS Report for distance schedule adherence etc.

Operation
- Commuter
  - Location basis services
  - Communication with vehicle crew
  - Emergency response

Management
- Financial & Revenue collection statistics
- Route wise revenue analysis for better service planning

Operation
- Track the financial performance and for better revenue generation
### Core ITS Technologies - AVL and ETA Applications

#### Communication Server
- Device Agnostic.
- Telecom grade middleware to handle multiple device types, with all industry standard protocols like 3GPP supported.
- Robust telecom grade communication server working on dedicated bandwidth from telecom service provider and through a secured dedicated APN.

#### Map Server/Database
- Map Agnostic
- Spatial Map data set with multiple layers and robust map server for visual rendering of maps on screens
- Creation tool for POI, Polygon etc. GIS data with required layer of routes, bus stop, depot, terminals etc.
- Route Creation Tool GUI based for adding updating routes

#### ETA and PIS Application
- Self Learning Algorithm to take care of Mixed traffic conditions in city
- Integration API for other systems, Mobile, Journey planner etc.
- Control LED/LCD Boards in BQS to display route number and expected time
- Multiple PIS board Suppliers
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 of Operation & Revenue parameters to key stakeholders
- Performance analysis Route-wise, Conductor-wise
- Display health status of the field devices to take proactive action
- Day-end revenue reconciliation
NextBus Delhi – Mobile App

Disseminates information regarding city buses to commuters through

– Mobile Application (Android)
– Web Based Tool
Mobile Applications

- One Transit App for Delhi
- Auto rickshaw locator
- Fare finder
- Live Congestion updates

On Android and iOS

- Citizen Security
- Send your location details to loved ones

On Android
Application Description (Screen shots)

- Poocho Home screen
- Poocho app menu list
- Change language- Hindi/English
- Exit from app
- Share app link

Track by Vehicle number

- Vehicle’s current location
AVL & PIS - Tracking and ETA App – Key Identified Challenges

Master Data
- Creation / Modification of Driver, Vehicle
- GPS device, Vehicle Mapping

Routes and Schedules
- Route surveys, Creation/ modification of Routes – Over 657 Official Routes, 5000 Plus Bus stops
- Schedules creation and Management – Schedules Over 18000
- Buses run on multiple Routes/ daily allocation of resources. Easy allocation.

Map data and Geo Analysis Engine
- Map upload, configuration and Updates
- Creation of Custom location, Depot Geo-fences
- Customizable, Configurable Geo Analysis Engine

Reporting
- Flexible, customizable Reporting tools

Integration
- Ease of integration with other systems like Depot, Fare collection system
- Third party PIS application
Key Implementation Challenges\ Lessons learnt

Environment Management
- Training and dialog with ground staff (Driver/Conductors/ Operators)
- Highlighting key Selling points (GPS overspeed, ETA at stops)
- Making ITS support Business Strategy

Embedding ITS into Business Operations
- Making ITS part of business operations
  - ETM for fare collection saves at least 30 mins during shift end.
  - GPS reports provide comprehensive reports for day to day operations
- Adding value to the Operations
- Schedule management and daily reporting

Planning with BIG Picture
- Step by Step progress
- Identification of Implementation issues, O& M issues
  - ETM Spares and Battery
  - GPS Installation schema

Buy IN of Stakeholders
- Vendors as Partner
- Users as Key Designers
- Senior Management Support
Benefit of ITS in actual Bus operations

- Complete Operational visibility of the entire fleet in real-time.
  - Real-time Trip Status
  - Real-time revenue Status

- Complete Contract Management for all 9 clusters is done through the system.

- Bus Behavioral Analysis:- Route Deviation, Bunching of Buses

- Minimizing revenue leakage

- Detail Analysis of low ridership sector

- Better Route Planning : Graphical presentation of data for route planning & Rationalization

- Mobile Applications for commuters for better experience

- Generation of various MIS reports on real time
<table>
<thead>
<tr>
<th>Unit of Measurement</th>
<th>Cluster Buses</th>
<th>PSC</th>
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</thead>
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<tr>
<td>Km Efficiency %</td>
<td>91.0</td>
<td>81.6</td>
</tr>
<tr>
<td>Fleet Utilization %</td>
<td>94.7</td>
<td>91.0</td>
</tr>
<tr>
<td>Vehicle Utilization Kms/Bus/Day</td>
<td>217.81</td>
<td>185.0</td>
</tr>
<tr>
<td>Gross Earning Rs./Bus/Day</td>
<td>7,249</td>
<td>6,245</td>
</tr>
<tr>
<td>Gross Cost Rs./km</td>
<td>40.8</td>
<td>58.3</td>
</tr>
<tr>
<td>Operations Gap Rs./km</td>
<td>7.0</td>
<td>24.6</td>
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Thank you