UN Department of Economic and Social Affairs
Division for Sustainable Development

United Nations Forum
on Climate Change Mitigation,
Fuel Efficiency and
Sustainable Urban Transport

URBAN PUBLIC TRANSPORT PLANNING IN TEHRAN AND THE OUTCOME OF THE IMPLEMENTED BRT LINES

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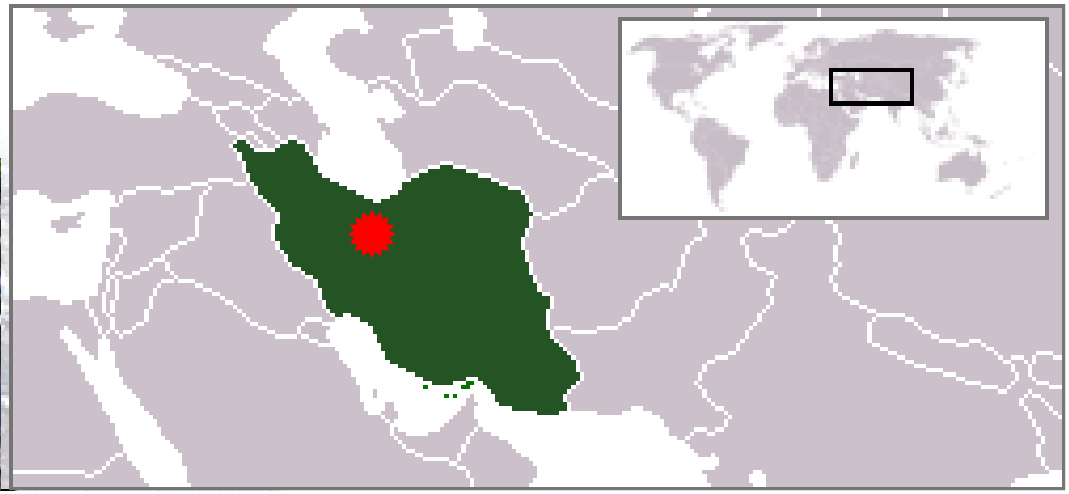
CITY VISION

Tehran Should Have integrated, Available, Safe, Easy, Comfortable and Clean transportation system with consideration of resources limitation and other conditions for improvement of life quality.

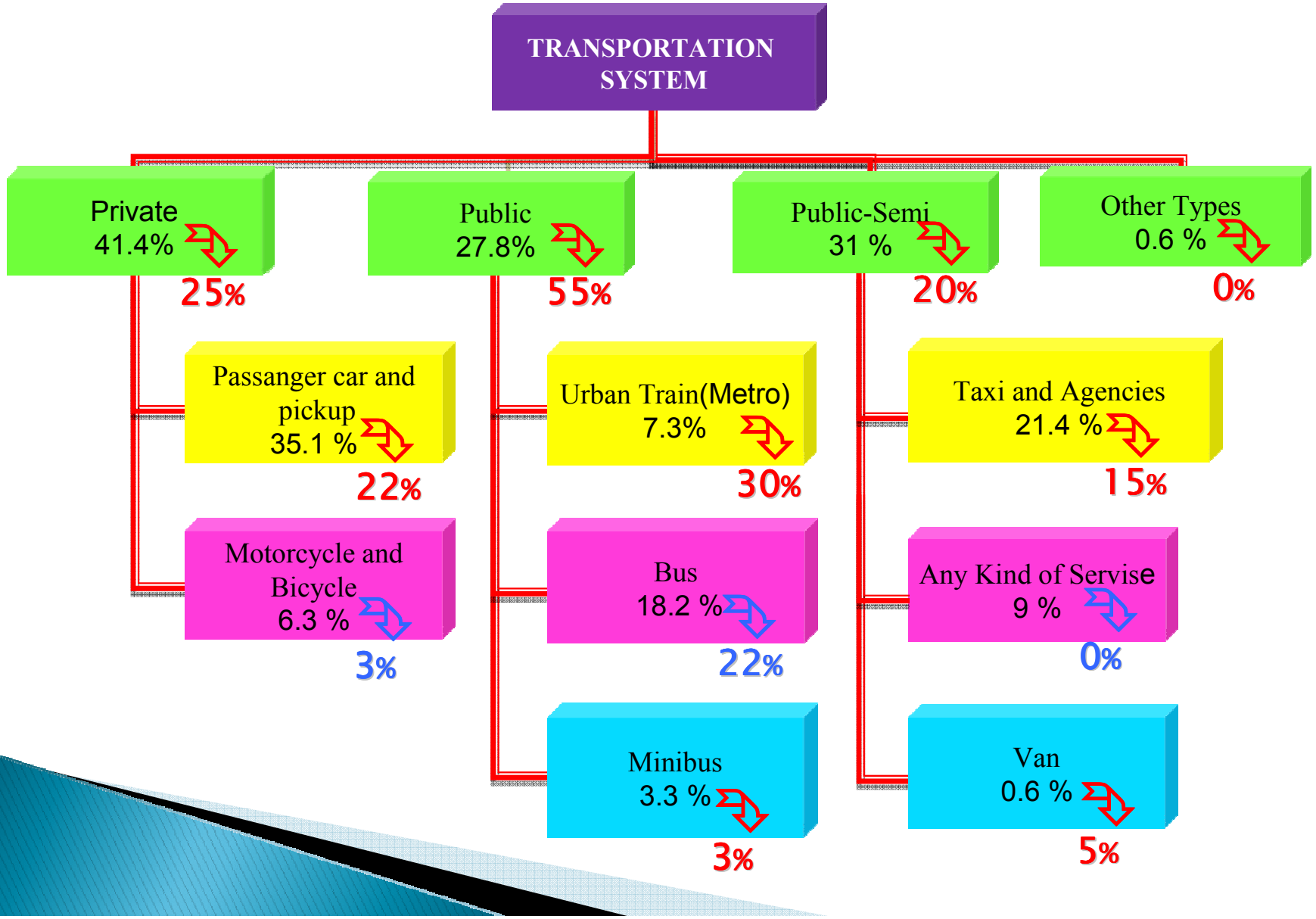
Tehran in ONE Glance

- **Tehran**: Capital of Islamic Republic of Iran,
- **Population**: 7,962,000
  - surrounded by towns: Karaj, Varamin, Eslamshahr, Shahriyar , … pop 15.0 M
- **Area**: 740 Km^2
- **Population Density**: 10750 /km2
- **Residents Trip**: 12.5 M



Modal Split of Trip in Tehran – 2006

Vehicle Classification in Tehran Trip Displacement (Modal Share) in 2015



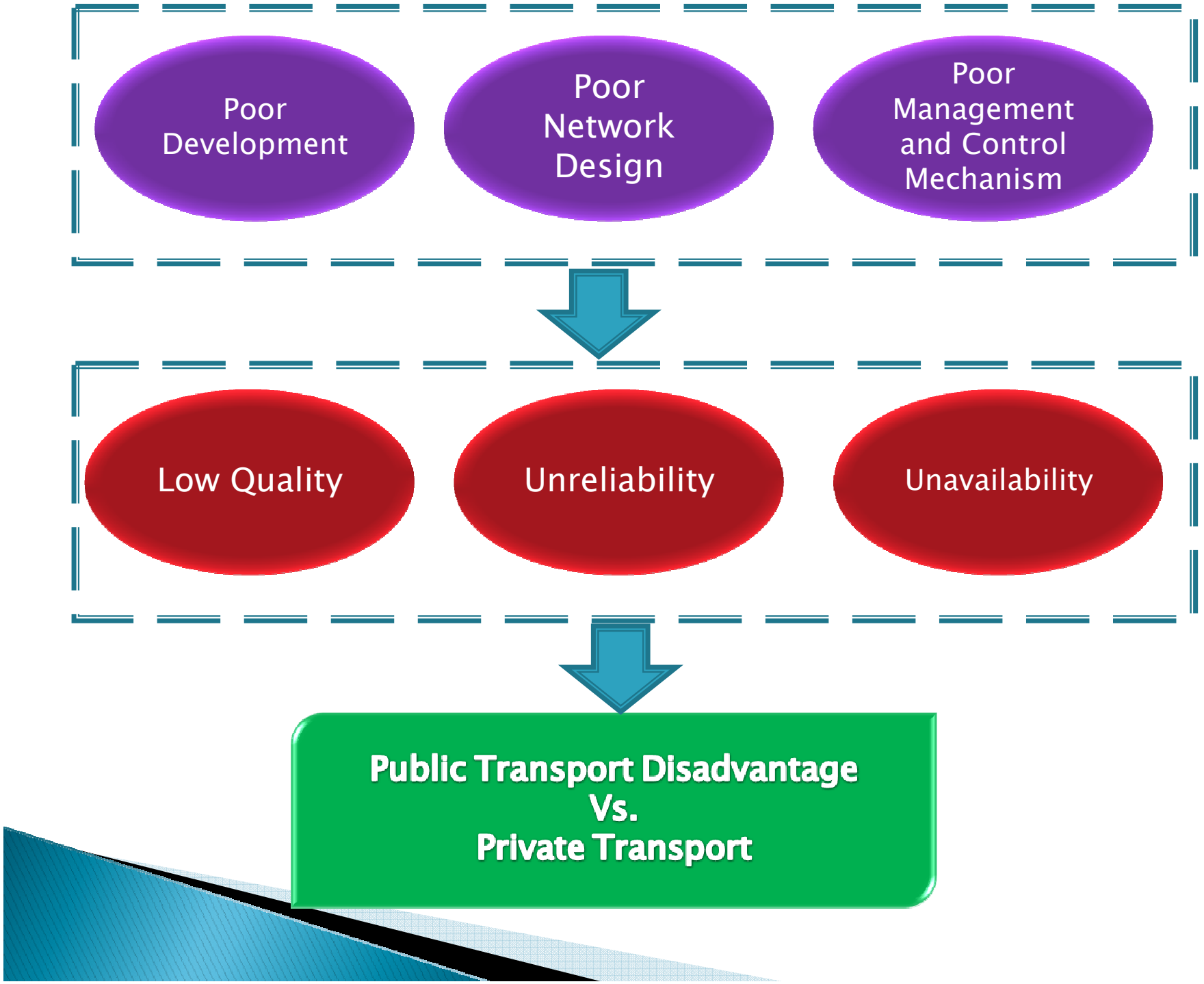
Transport System and Environmental Concerns

- More than 3.5 million vehicles account for 88 percent of air pollutant produced in Tehran
- More than 1192 tons of air pollutant are disseminated in Tehran especially SO_x, NO_x and Co and suspended particles
- Every private car consumes energy 9 times more than a public bus per passenger trip
- Motorcycles are responsible for 49 percent of noise pollution in Tehran
- Average Speed of Public buses was just about 14 km/hr

Possible Solutions

Challenges in Public Transport Development

- Partial private Operation: government sets fares, private sector takes all risks
- Poor **availability** of Services throughout the City
- Poor **Integration** with other Public and Semi-Public services
- Poor **service quality**: decreasing patronage
- Low fares: unable to renovate old and polluting fleet
- On board cash payment: revenue losses
- Weak **supervision**, **monitoring** and **control**


Poor Development
Poor Network Design
Poor Management and Control Mechanism
Low Quality
Unreliability
Unavailability
Public Transport Disadvantage
Vs.
Private Transport

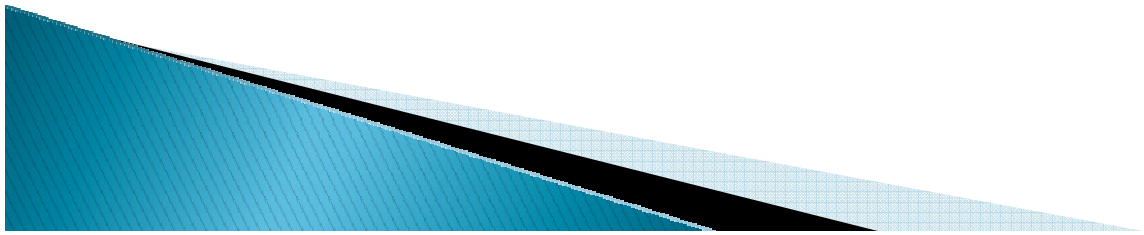
A Systematic Approach to:

Public Transport System Design

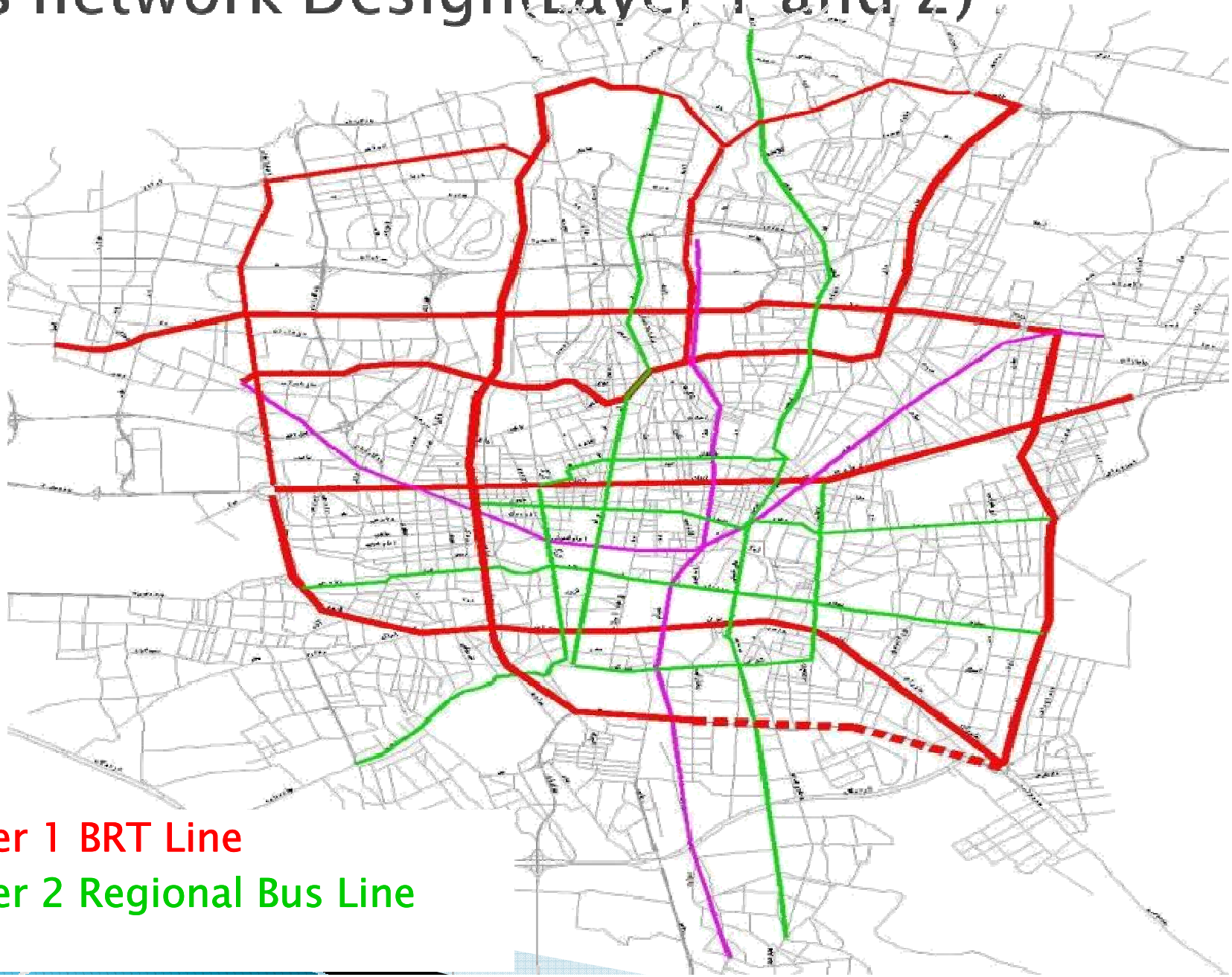
- **Bus** and **Railway** as the primary PUBLIC Transport Network
- **Van** and **Taxi** as the Secondary Complementary Services
- Priority to public services in Road Network Design

3 Layers in Bus system

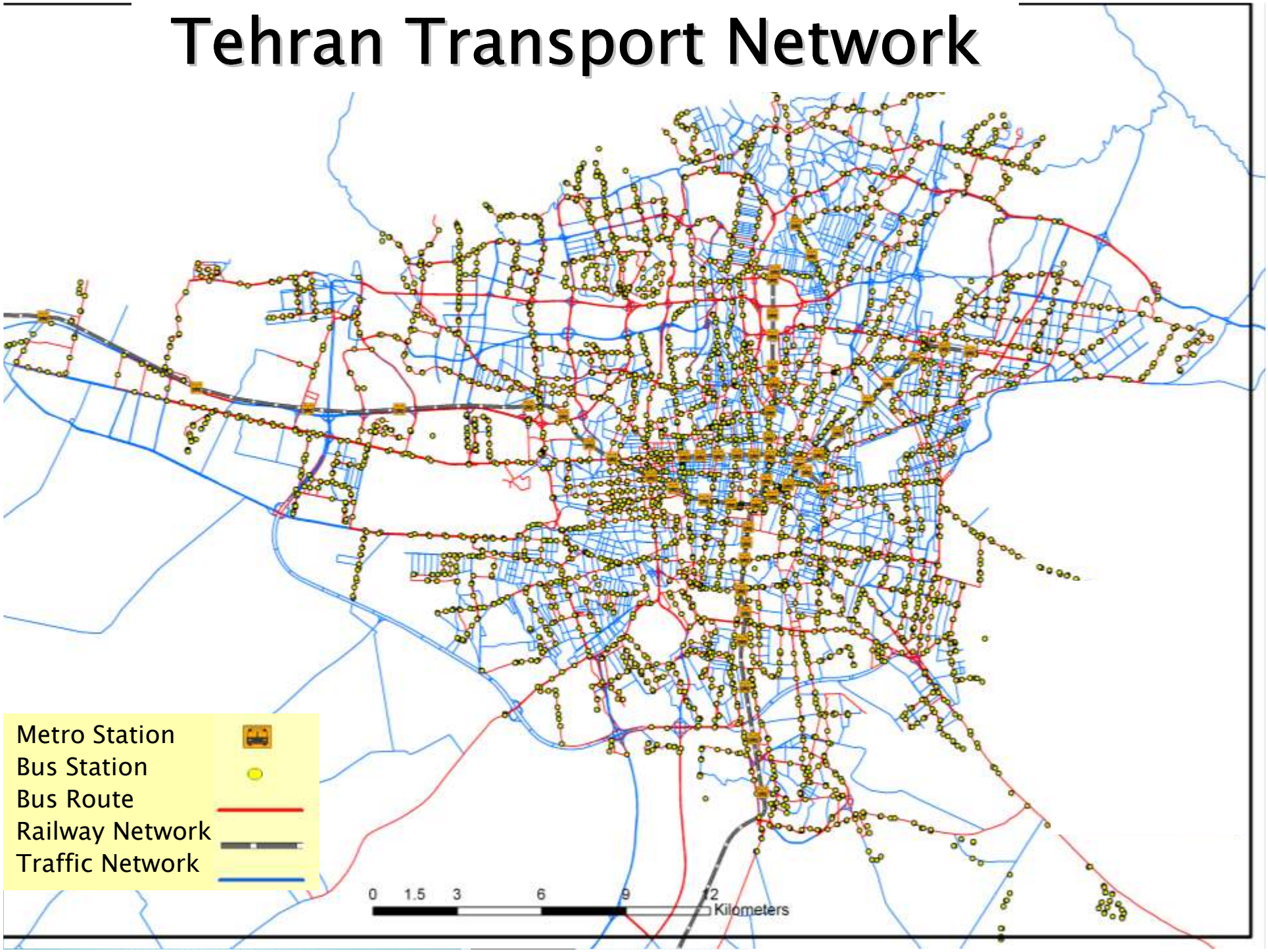
Layer	Speed	Capacity	Fare collection	Operators
L1: BRT Line	High	High	Off Vehicle	Public
L2: Regional Bus Line	Medium	High	Off Vehicle	Private
L3: Local Bus Line	Low	Medium	In vehicle	Private & Public



Bus network Design(Layer 1 and 2)



Tehran Transport Network



Bus Rapid Transit

System Design & Implementation

An urban transit system equipped with ITS systems including **Speed** and **Accuracy** from Railway System and **Flexibility** from bus transit system

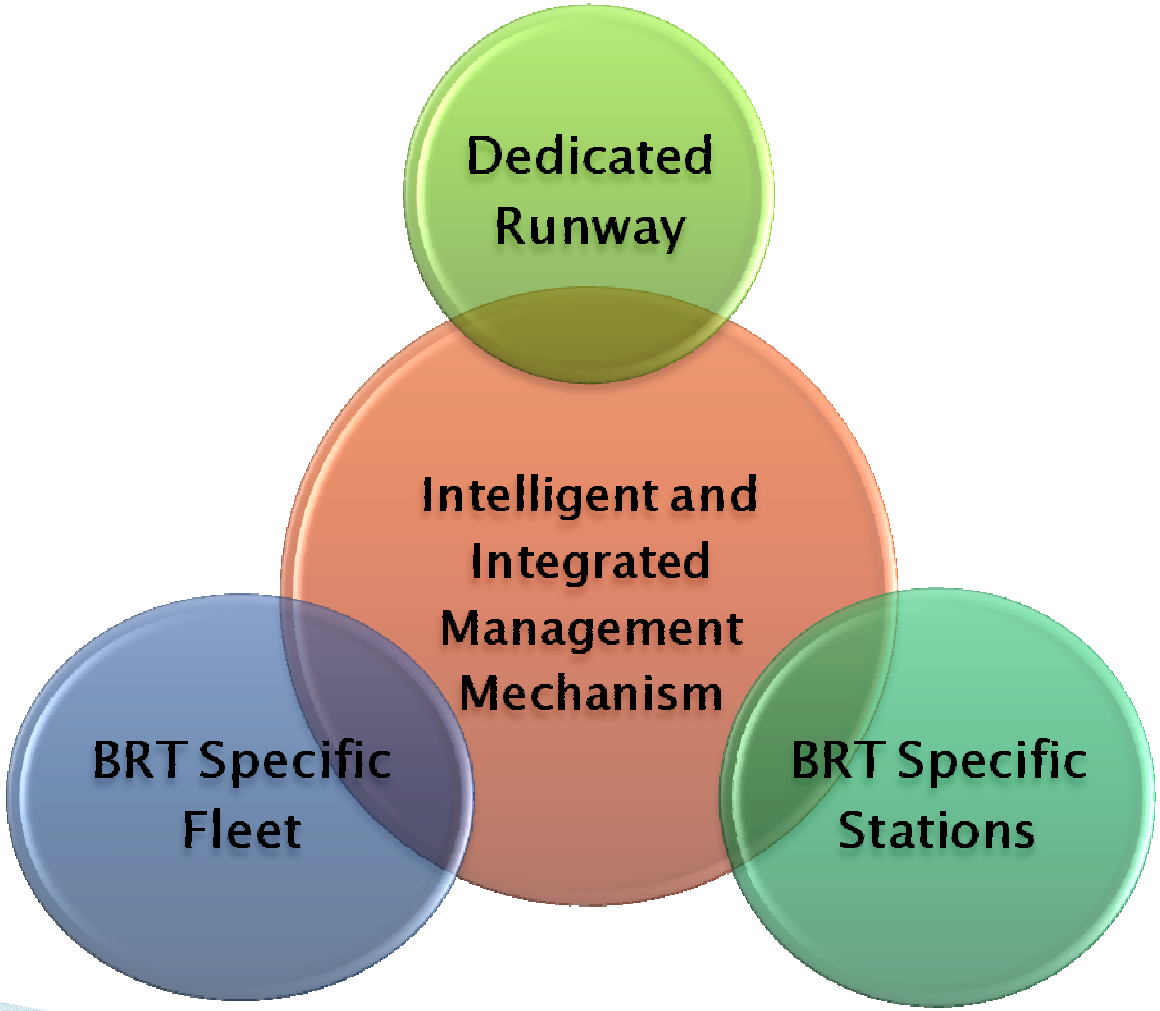
BRT System Implementation Objectives

- Increasing public intention to Urban Bus Services
- Promoting Informed Route Choice Decision Making Culture and using multi modal public transport services
- Real time Fleet management
- Optimum Distribution of the Fleet based on the current demand patterns

Major Advantages of BRT System

- Smart Allocation of the buses to the routes and increased system productivity
- Limited implementation and arrangement costs comparing to railway systems
- Establishment of a single control center for BRT system management and coordination
- Maximum use of existing facilities and infrastructures

BRT System Architecure



BRT Implementation

Experience in Tehran

- More than 18 months of study and system design based on successful experiences in other countries
- BRT Network Design for Tehran including 10 Rapid Transit Lines
- Detail Design and implementation of the FIRST BRT line in Tehran in 2007

BRT Implementation

Experience in Tehran

- Implementing and operating line 2 and 3 in 2008 and reaching to a network of BRT with 50 km length
- Designing and implementing the 4th BRT line in one of the most important North-South corridors of Tehran with 21.5 km length in 2009

Running way

- Arterial Median (Physically Separated Lanes within Street Rights-of-Way)
- Exclusive Two-Way Facilities for BRT

BRT Vehicles

- 18-meter (60-foot) BRT vehicle configured with Six passenger service streams (three double doors) for a dense urban corridor with significant passenger turnover.

Station

- Dimensions:
  - Height: 5.00 m
  - Wide: 3.20 m
  - Length: 36, 40, 44 m
  - High of floor: 40 cm
- Normal Station:
  - 12 (18) gate for boarding for 2 (3) Bus in each direction
  - 4 (8) entrance gate with 3 (6) e-card reader
  - 5 (7) officer in each Station

ITS Application in Station
(Camera system)

- Features:
  - Visual monitoring of Stations through two video cameras installed in each station (4 cameras are installed in larger stations)
  - 2 LCD Monitors to show Passenger Information and in-station video cameras' picture in each station
  - Online video transmission to BRT Control Center
- Goal:
  - Diagnosis of Passenger congestion in station
  - Improve Passenger Security
  - Ensure equipments security

ITS Application in Station
(E-Payment)

Traditional System

- Ticket Box for conventional Ticketing

Electronic Ticketing

3 Card Reader in Station

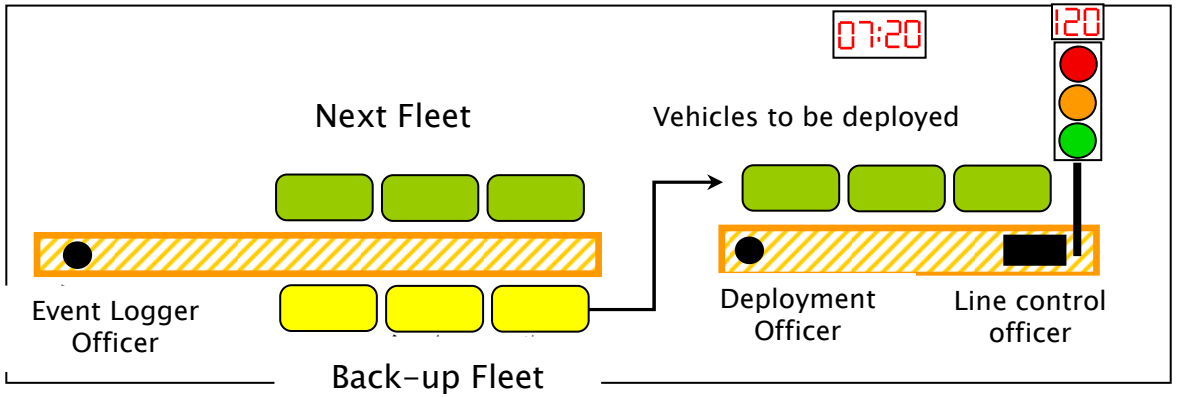
Integrated system with Metro Card

Objectives

- Improving public culture and directing people toward multi modal transportation
- reducing heavy costs of traditional non electronic solutions
- improving transport planning possibilities
- better demand forecast for public fleet management

ITS Application in Station
(Headway Control System)

- Warning passengers before bus doors closing and bus preparation for leaving
- Fleet headway control by setting for bus stoppage and leaving time in the station
- Down-Counter for Bus Stopping Time
- Detecting Bus Availability
- Sending warning message to BRT Control Center incase of bus unavailability for several intervals through GPRS network



ITS Application in Running way
(running way Camera)

- Visual Monitoring system & Communication Infrastructure
- Full coverage visual monitoring system
- 17 Km Fiber Optic network as the essential communication infrastructure
- Applying Wireless and GPRS networks as the secondary solutions

ITS Application in Running way (Bus Priority)

- Intersection Management
  - Bus priority in intersection (Late start)
    - Intentional delay for those vehicles intersecting bus route in a same traffic signal phase
  - Centralized intelligent Intersection management through SCATS
  - Installation of solar flashing lights for zebra line areas throughout the route to improve pedestrians crossing

ITS Application – On board
(Passenger information System)

- On-board Audio Information System
  - Passenger information about the next station in order to facilitate passengers departure
  - Providing extra information about those stations nearby or on the way of other public transport facilities
  - Storing time, speed geographical positions data for offline data gathering in order to support traffic engineering needs
  - Online fleet management and control through GPRS communication

Management and Operation Control

- BRT Control Room

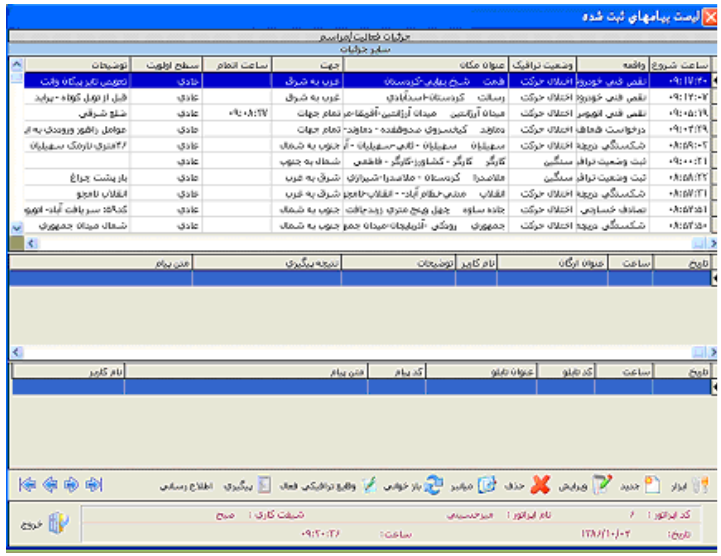
Bus Operations and Service Plan

- Scheduling
- Bus ordering (2 Bus)
- Service Time: 24 hour in day

	A	B	C	D	E	F	G	H	I	J
1	ناوگان۱	راه اول	راه دوم	راه سوم	راه چهارم	راه پنجم	راه ششم	راه هفتم	راه هشتم	راه نهم
2	دپوی شرق		6:33	8:21	10:09	11:57	13:45	15:30	17:24	19:18
3	جمشید		6:36	8:24	10:12	12:00	13:48	15:33	17:27	19:21
4	داریوش		6:37	8:25	10:13	12:01	13:49	15:34	17:28	19:23
5	خاقانی		6:38	8:26	10:14	12:02	13:50	15:37	17:32	19:26
6	جاجرود		6:41	8:29	10:17	12:05	13:53	15:40	17:34	19:28
7	مهرنژاد		6:42	8:30	10:18	12:06	13:54	15:41	17:35	19:29
8	شهید آیت		6:43	8:31	10:19	12:07	13:55	15:43	17:38	19:32

BRT Event Logger System

- Detecting traffic events
- Control and management with camera and radio communication
- Detecting and recording traffic equipments defects and making necessary coordination to resolve problems a. s. a. p.



Fleet Operation Management

- Tracking System
- Software application for on-line fleet management
- Bus tracking through GPS satellite system and GPRS communication System

What We have Achieved

- Improved image and reputation for Public transport system
- Improved system productivity, quality and reliability
- Improved service availability and optimum land use

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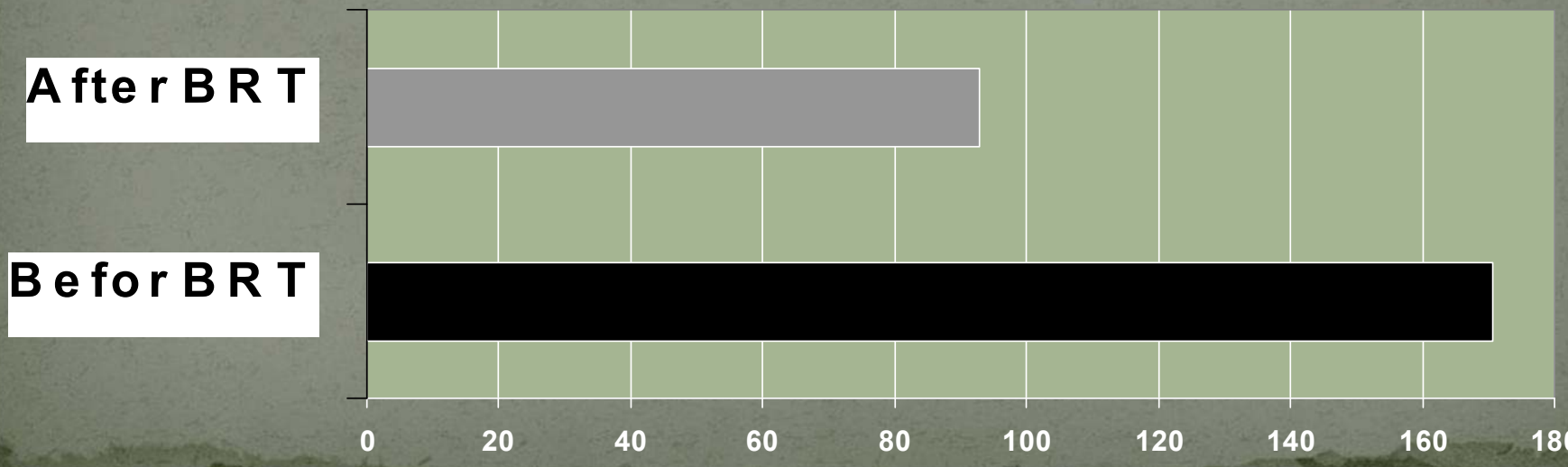
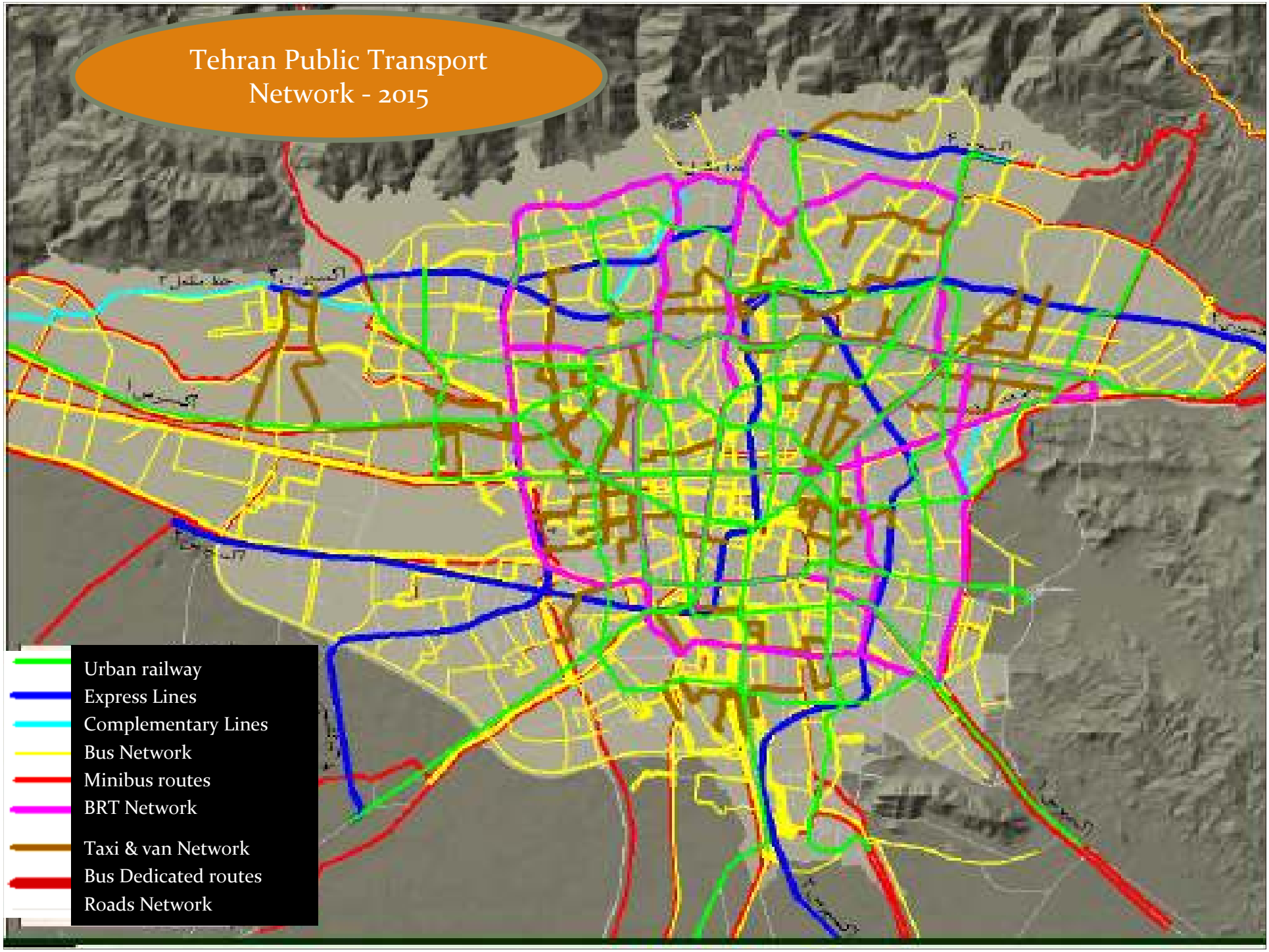
• Linking residential area
network design of BRT li
• improved access to pub
improved headway contr
• complementary design

What We have Achieved (Cont'd)

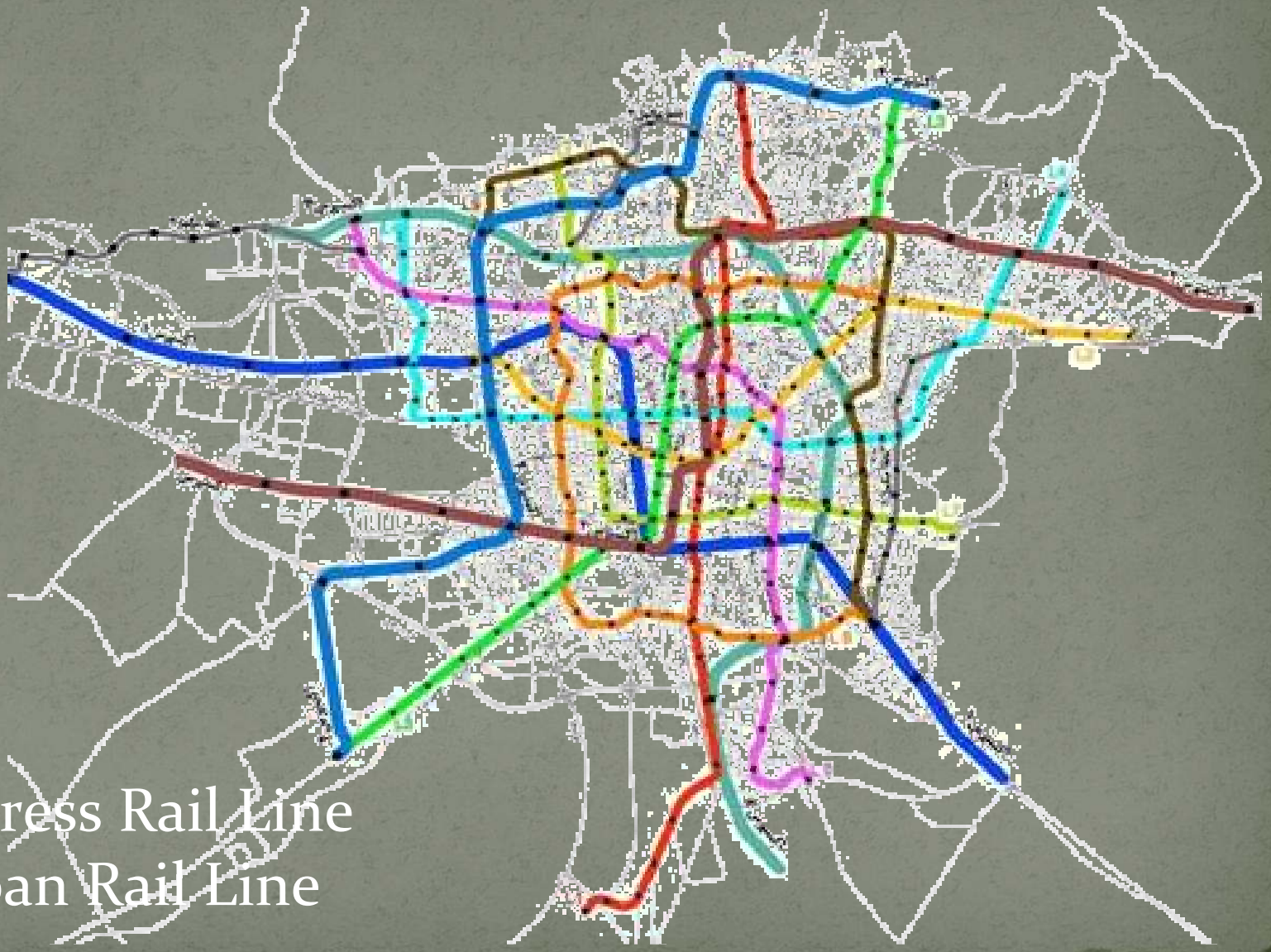
•Diverting 150.
semi private ve
• Decreased em
kg to 92.87 kg

Resolving traffic bottlenecks and improved air quality and energy consumption




Tehran Public Transport
Network - 2015
Urban railway
Express Lines
Complementary Lines
Bus Network
Minibus routes
BRT Network
Taxi & van Network
Bus Dedicated routes
Roads Network

Tehran Long Term Urban Rail Network (2020)



4 Express Rail Line
8 Urban Rail Line

Thanks
for Your
Attention

And
Happy New
Iranian Year