



**5<sup>th</sup> National Summit on  
100 Smart Cities India  
2019**

# BEL Overview

## Navratna PSU

- Established in 1954 under Ministry of Defence
- R&D / Technology driven Company operating in competitive Defence Electronics area
- 59<sup>th</sup> among top 100 Companies Worldwide in Defence Revenue (Defence News, USA)

## Subsidiary & JVs

- BEL Optronics Devices Ltd - Night Vision Image Intensifier tubes
- GE BE Pvt Ltd - Medical Electronics Parts, X-Ray Tubes
- BEL Thales Systems Ltd - Civil ATM and select Defence Radars

## Manufacturing Plants

### 9 Factories

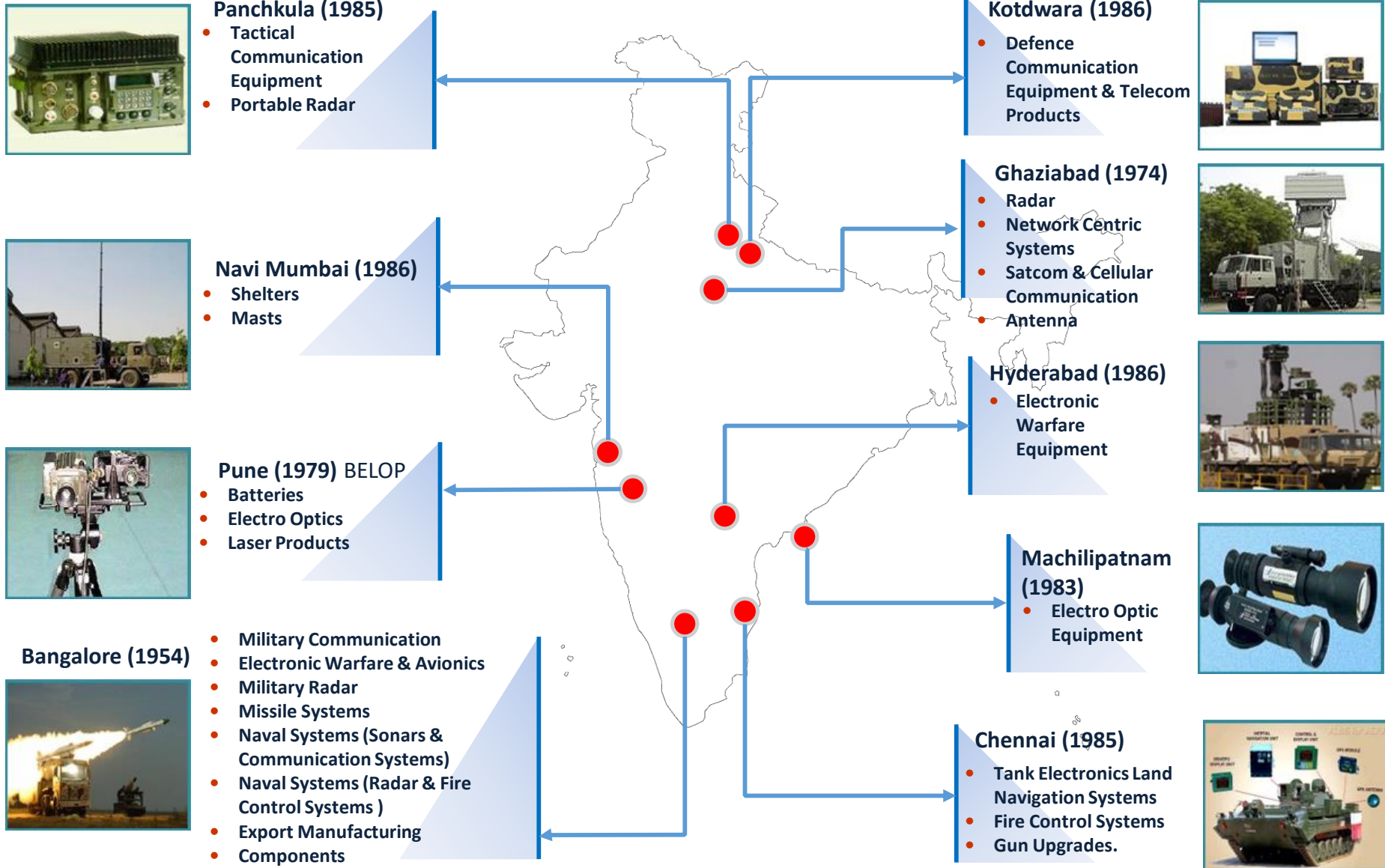
- Bangalore
- Ghaziabad
- Pune
- Machilipatnam
- Chennai
- Panchkula
- Kotdwara
- Hyderabad
- Navi Mumbai

## Human Resources

**9726 Employees**

**4953 Engineers (47% in R&D)**

# Manufacturing Network



# Business Segments



Radar

Missile Systems

Communication

Electronic Warfare & Avionics

Network Centric Systems

Anti submarine Warfare

Electro-Optics

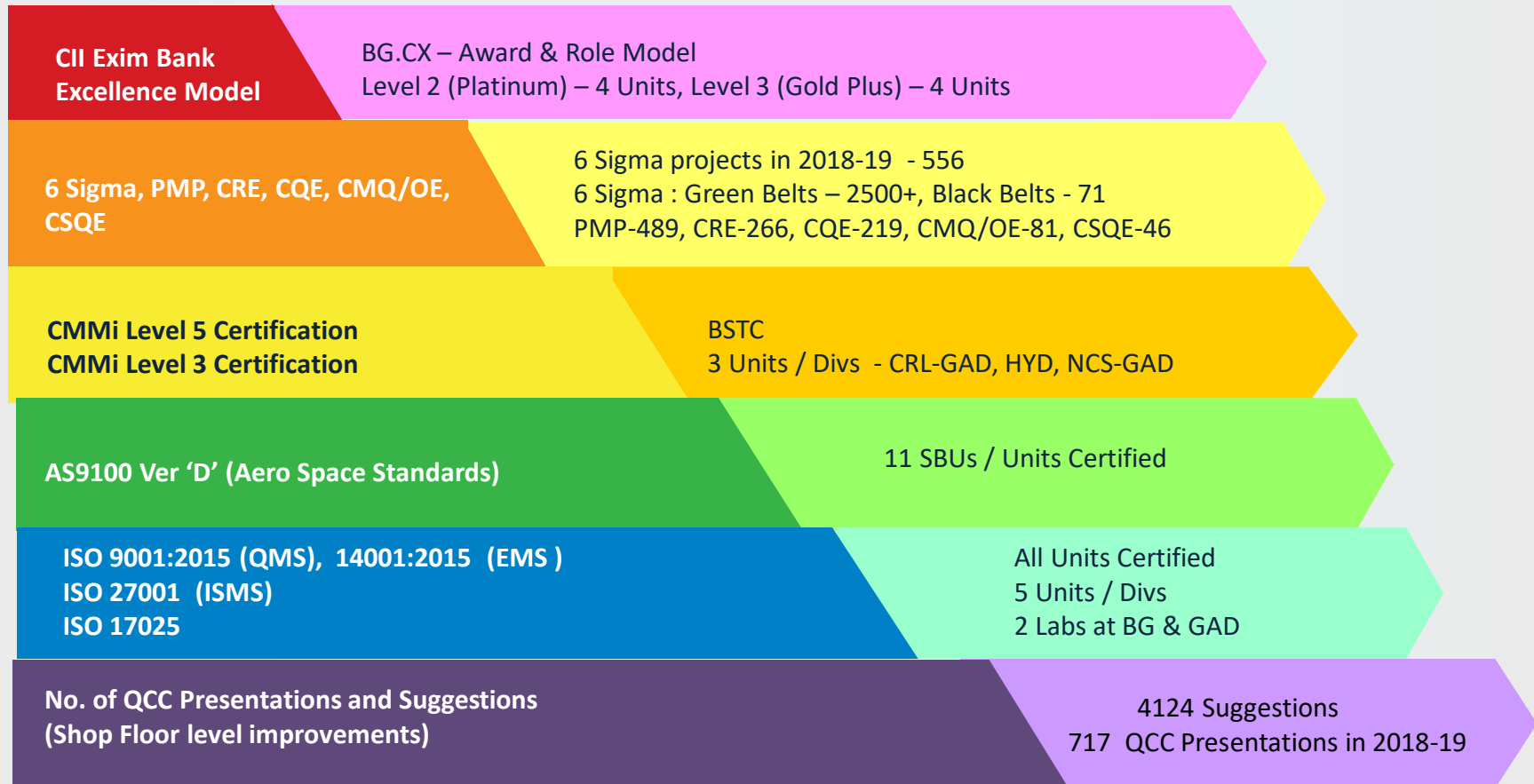
Tank Electronics

Home Land Security

Civilian Products

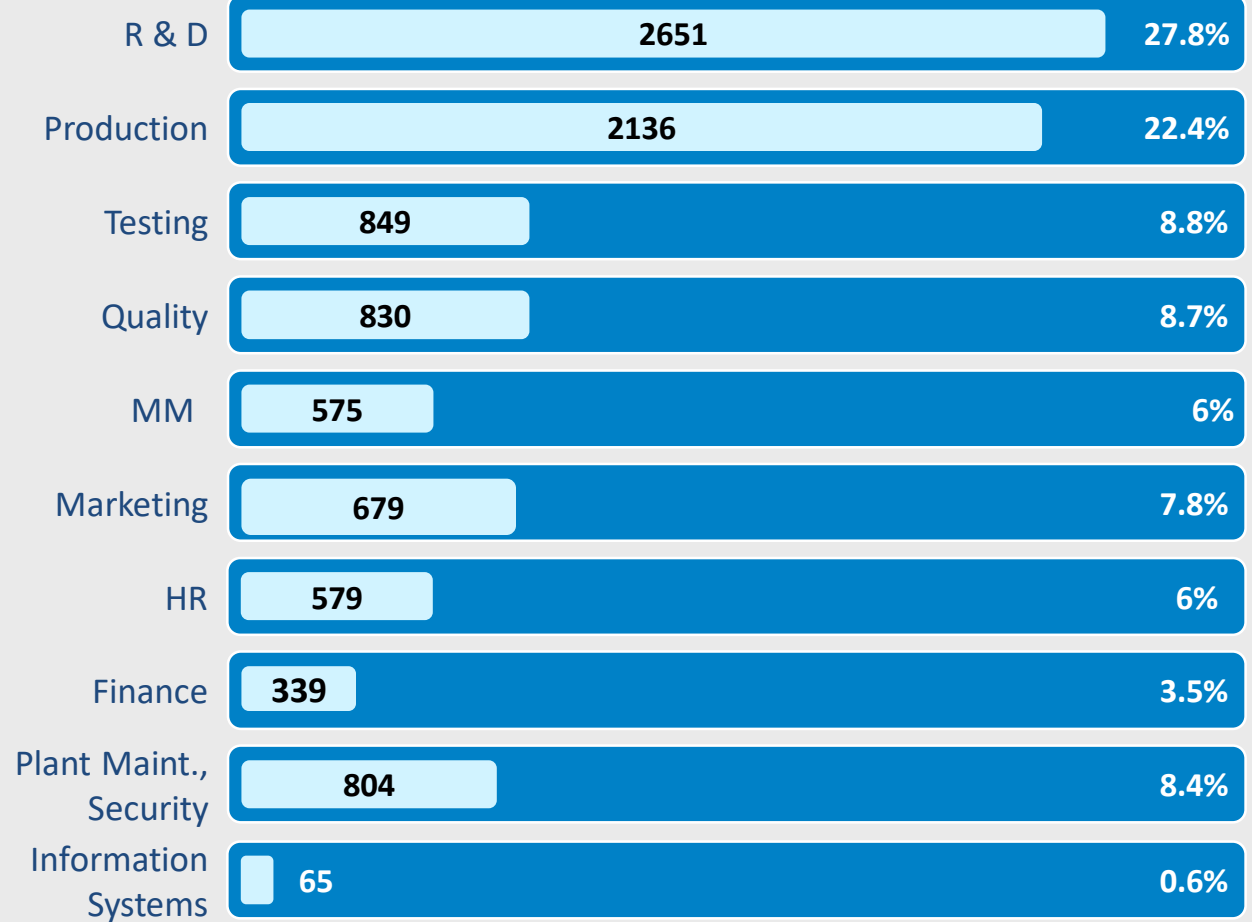
Multi product, Multi technology company – Diverse product range

# Quality Management



# Human Resources

UNIT	Emp. No.
Bangalore	4184
Ghaziabad	1553
Pune	244
Machilipatnam	290
Navi Mumbai	408
Panchkula	512
Kotdwara	518
Hyderabad	501
Chennai	301
Corporate	575
Central Research Lab	421
<b>TOTAL</b>	<b>9507</b>



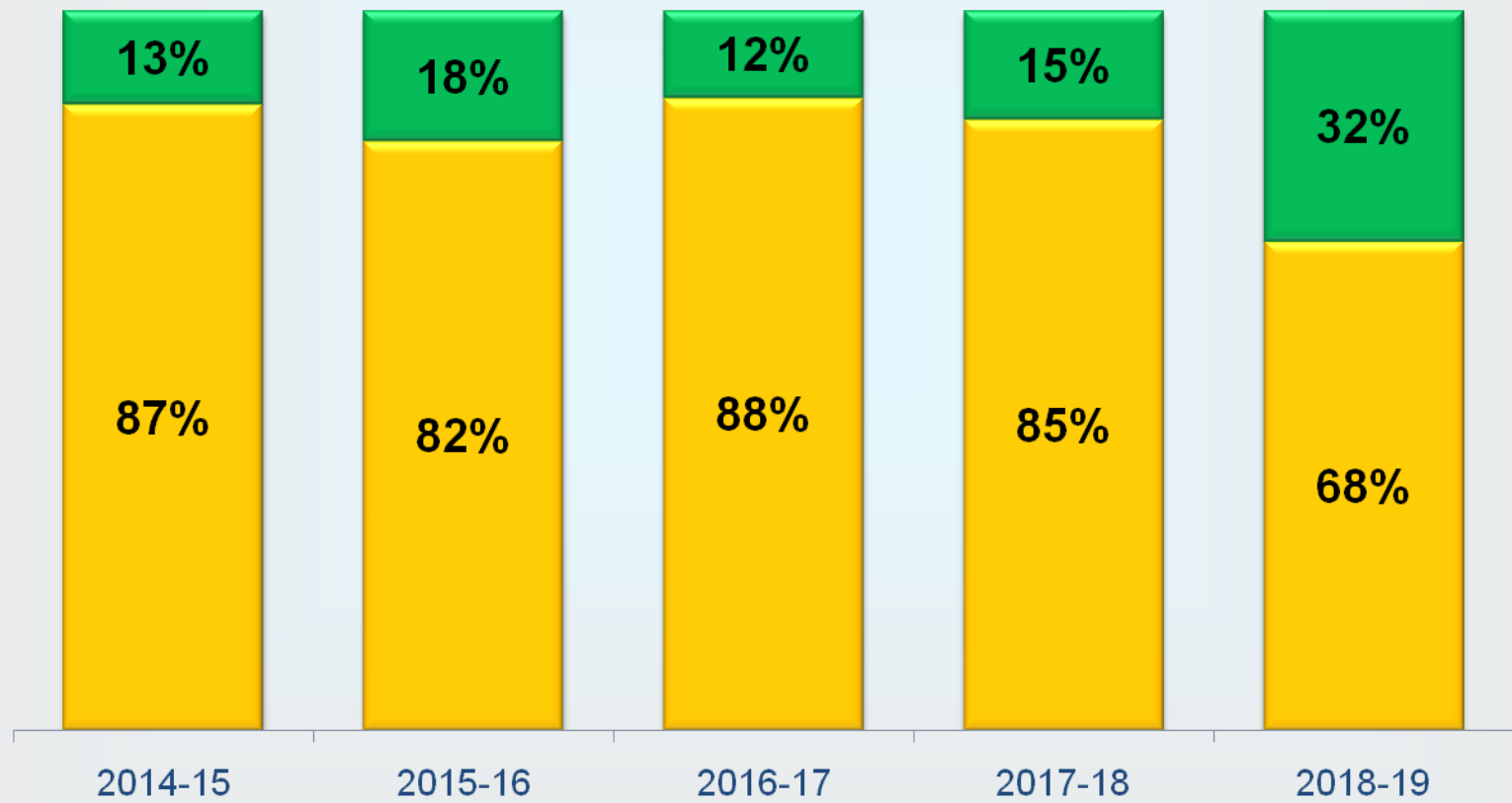
## Research & Development

- 50% Engg. Manpower deployed in R&D
- 87% Sales Revenue from Indigenous R&D
- R&D investment: Approx 10% of our turnover
- CMMi Level-5 Certification for Software development
- Largest Production Partner of DRDO
- Patents - 6 Registered, 55 filed





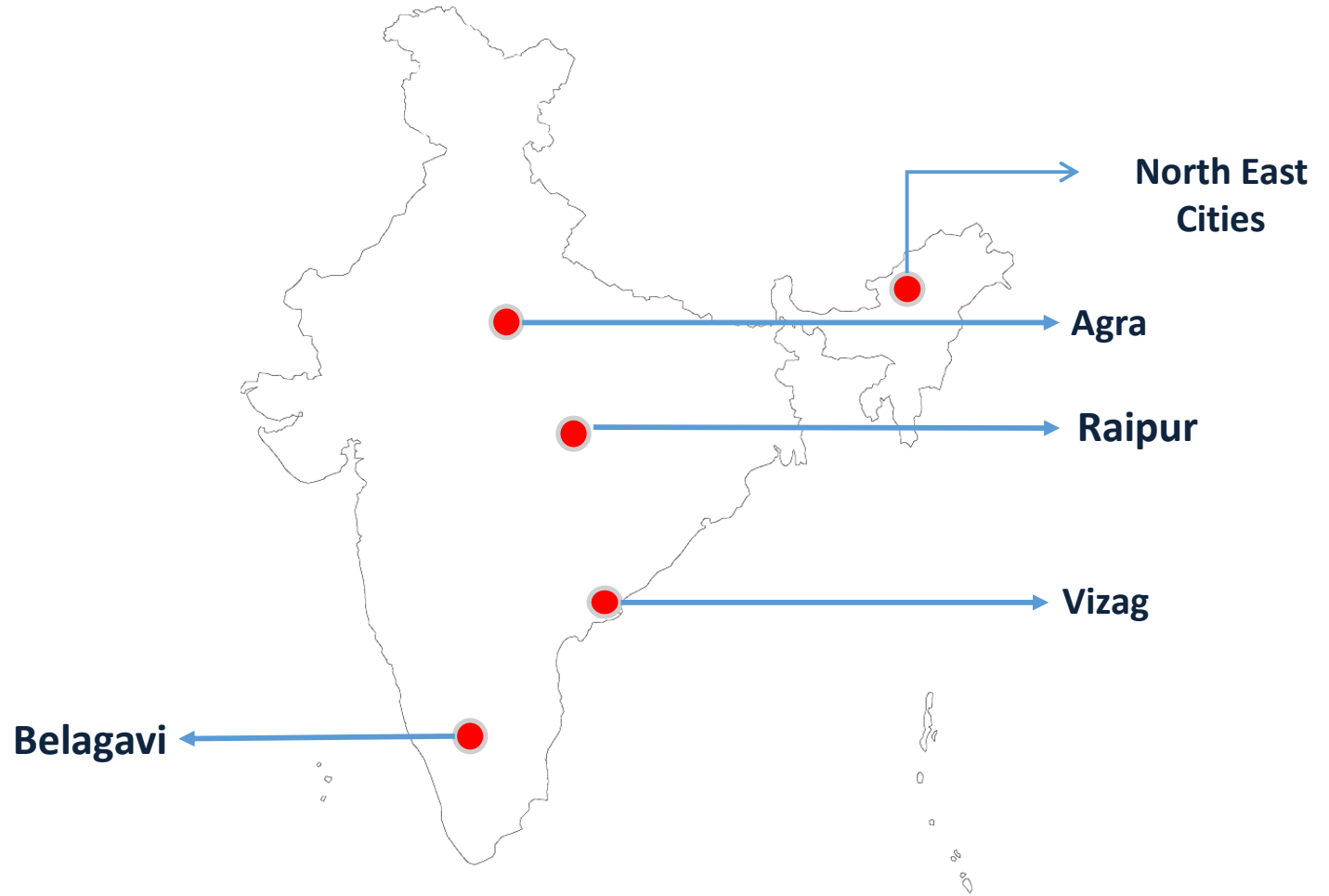
## Defence - Non Defence Turnover



# BEL Strength & Capabilities

- Wide experience in implementing Integrated Security Systems.
- Surveillance solutions for defense and Govt. Agencies.
- Customized Solutions/products for the customers.
- Software development & customization:
  - Command & Control Application
  - Network Management Application
- Major Security projects implemented:
  - Coastal Surveillance Solution
  - Supreme Court Security Solution
  - Ghaziabad & Gautam Buddha Nagar City Surveillance
  - Solar Power Plant (100 MW) at all Ordnance Factories
  - National Population Register
  - Multi-Purpose National Identity Card (MNIC)
  - Socio-Economic Caste Census (SECC)
  - Hyderabad Integrated Traffic Management System
  - EVM & VVPAT

# Our Presence in Smart Cities



# Experience of Bharat Electronics in Smart City Business

## Belgavi Smart City

- Command Control and Communication Centre,
- ITMS comprising ATCS, Surveillance, Variable Message Signs, ECB And Public Address Systems,
- Pan City Network, City Wi-Fi, Environment Monitoring Sensors, Enterprise GIS, City Web Portal and Mobile App
- Data Centre and Cloud DR, Solid Waste Management, Smart Street Lighting

## Raipur Smart City

- Supply, Installation and Commissioning of 39 ATCS controllers with central software in Raipur.
- Video-Based Advanced Algorithm Vehicle detectors & Advanced Timers

## Vizag Smart City

- Supply, Installation and Commissioning of 50 ATCS controllers with central software in Vizag is similar HTRIMS-Hyderabad.

# Experience of Bharat Electronics in Smart City Business

- Hyderabad Traffic Integrated Management (HTRIMS) Project
- Bangalore Traffic Integrated Traffic Management Project

## Highlights:

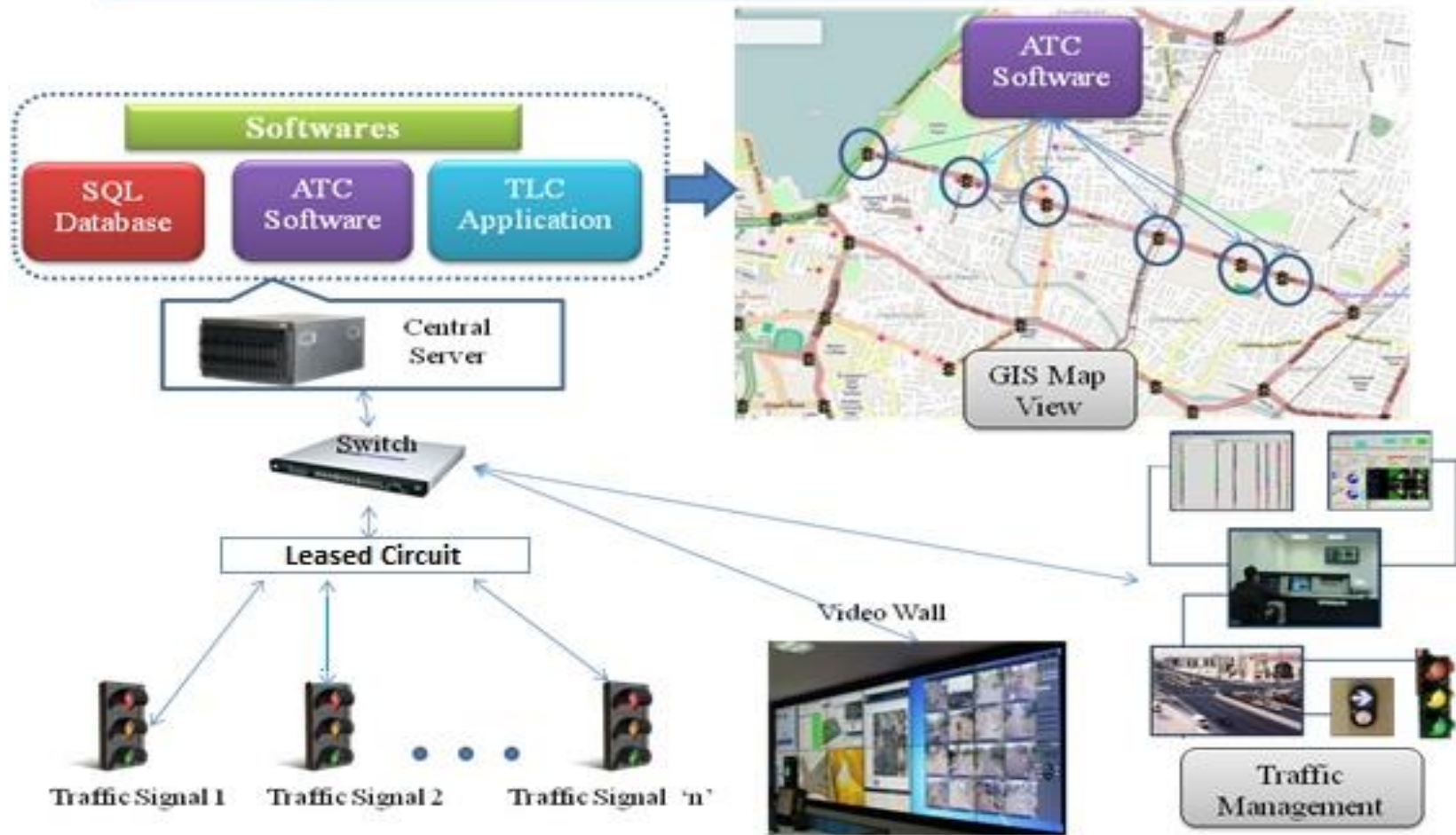
- BEL is the only company which has got design, development and implementation of ITMS projects in India.
- BEL also received Best Intelligent transport System award from Govt. of India, Ministry of Housing and Urban Affairs for Hyderabad Traffic Integrated Management project.



# Adaptive Traffic Control System

# Automatic Traffic Management

## Adaptive Traffic Control Architecture



# AI based Re-enforcement Learning in technical collaboration with IISc

- Re-enforcement learning based ATCS algorithms for Indian road traffic conditions
- An attempt to address mixed traffic conditions in India more efficiently



# Traffic Management Software

Configuration
Monitor
Control
Reports
Administration

Junction Name
▼

BEL CIRCLE

Monitor Junction

Refresh Data

Welcome Administrator | Sign Out

Junction is: ● On


Enter Junction Name

Zoom

View Traffic

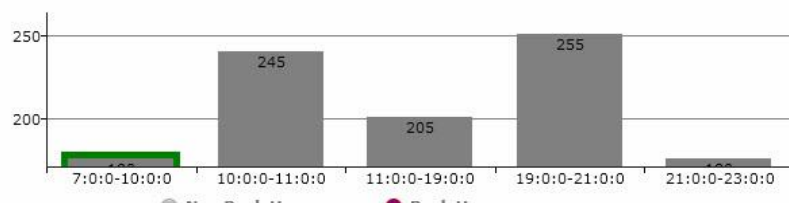
Get Longitude/Latitude

For Future Use



3D Mapped Roads

Day Plan



Time Slot	Volume	Category
7:0:0-10:0:0	~150	Non Peak Hours
10:0:0-11:0:0	245	Peak Hour
11:0:0-19:0:0	205	Non Peak Hours
19:0:0-21:0:0	255	Peak Hour
21:0:0-23:0:0	~150	Non Peak Hours

Monitor Junction

Allocated Green Time: 43
Utilized Time: 5
Saved Time: 0

☀️ Solar: 0

🔋 Battery: 0

💡 Power: 0

Mode Of Operation: Full VA Split  
 Stage Packet Time: 08:06:21

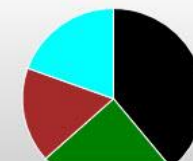
Roads Data

Road Name	Green Time	Signal	ABG	AAG	RBG
Kuvempu Circle	0	RED	0	3	0
Mathikere	43	G	0	3	0
MES Road	0	RED	0	3	0
BEL	0	RED	0	3	0

Phase Data

	DT1	DT2	DT3	DT4	DT5
1	50	25	80	25	60
2	40	60	50	60	40
3	40	60	35	60	40
4	50	50	40	60	40

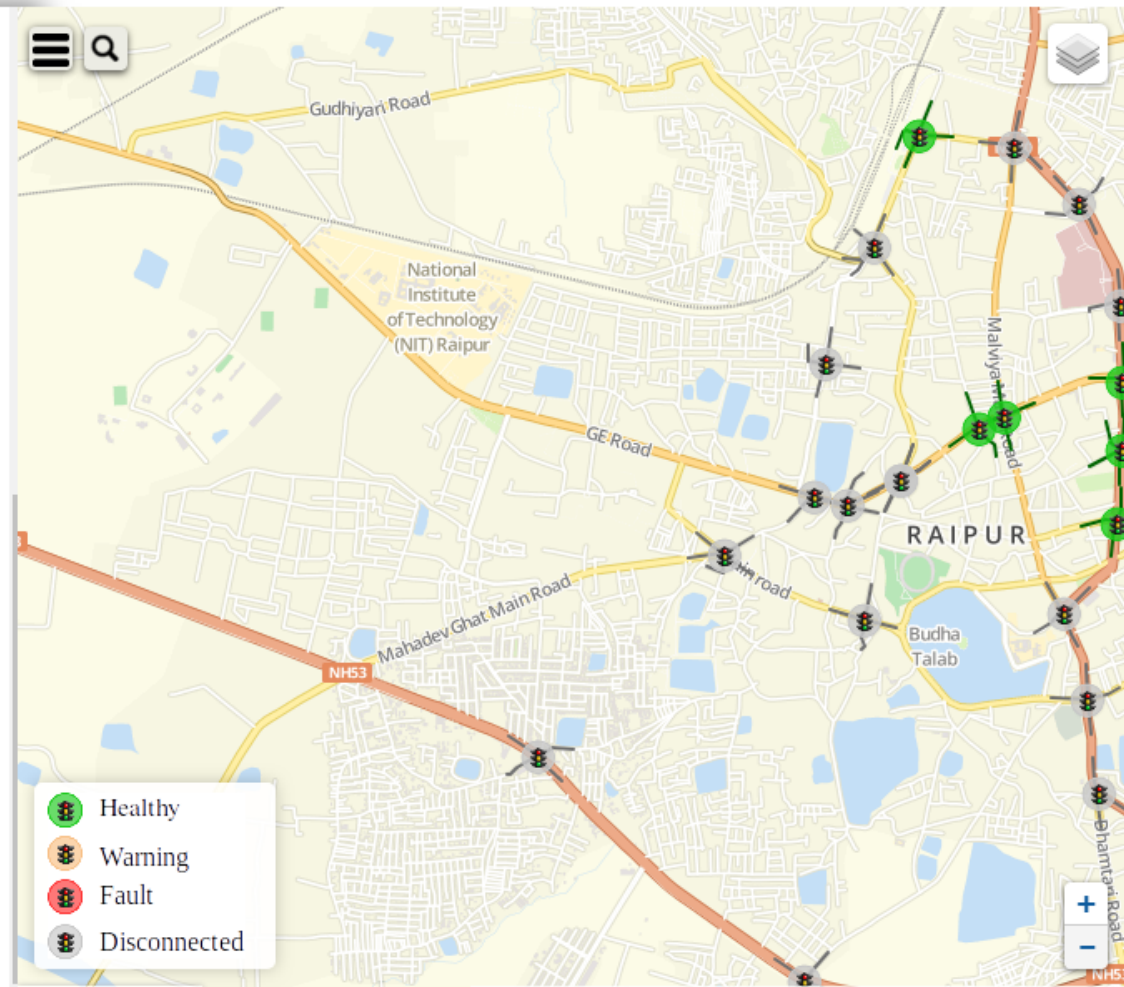
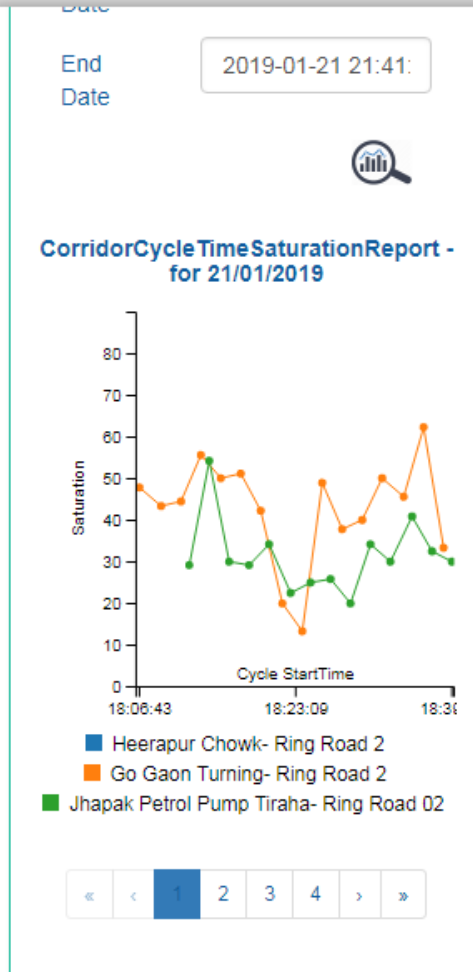
Phase Diagram



# Traffic Monitoring Application

## Integrated Traffic Management System

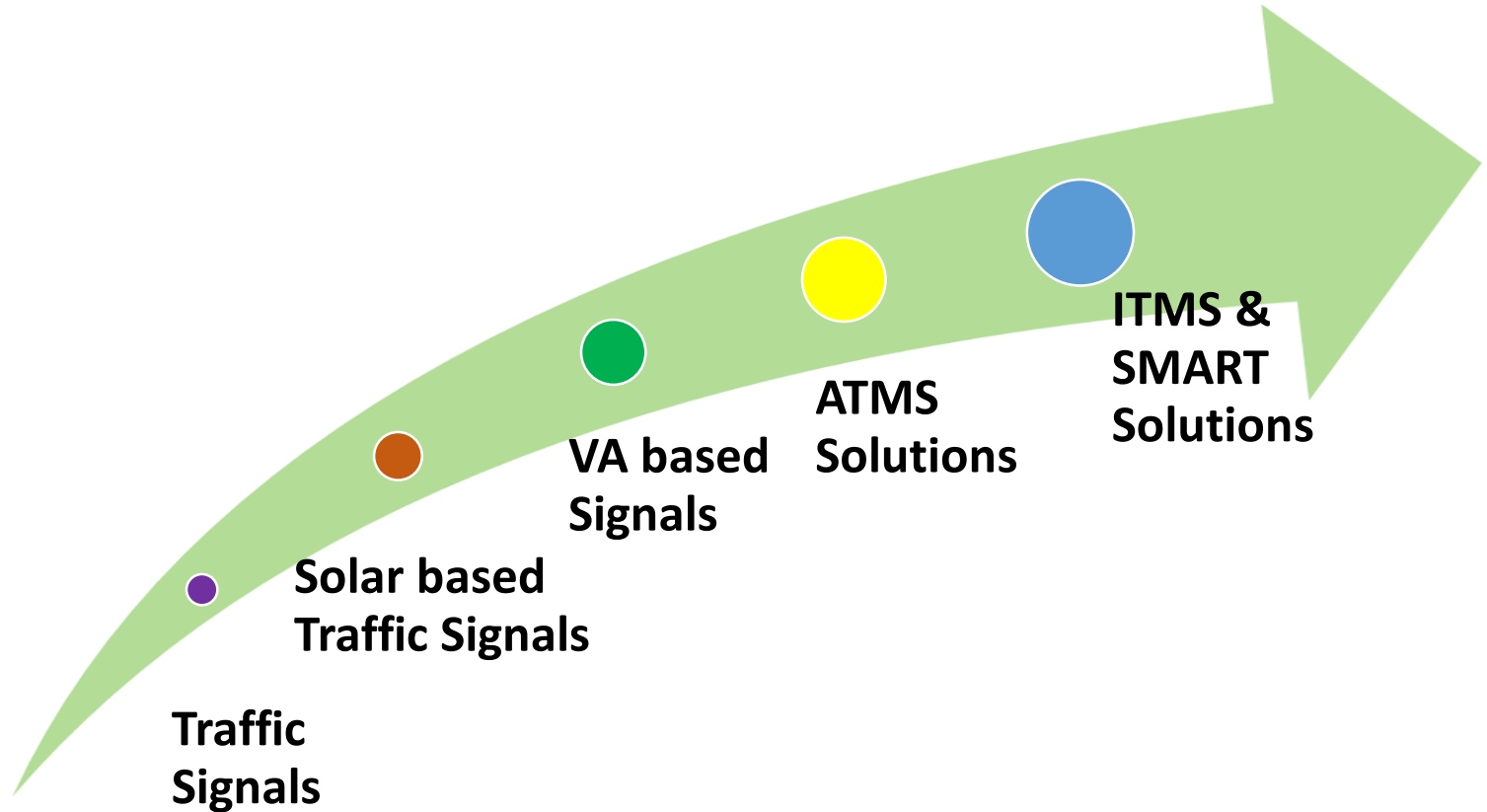
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# Intelligent Traffic Management system

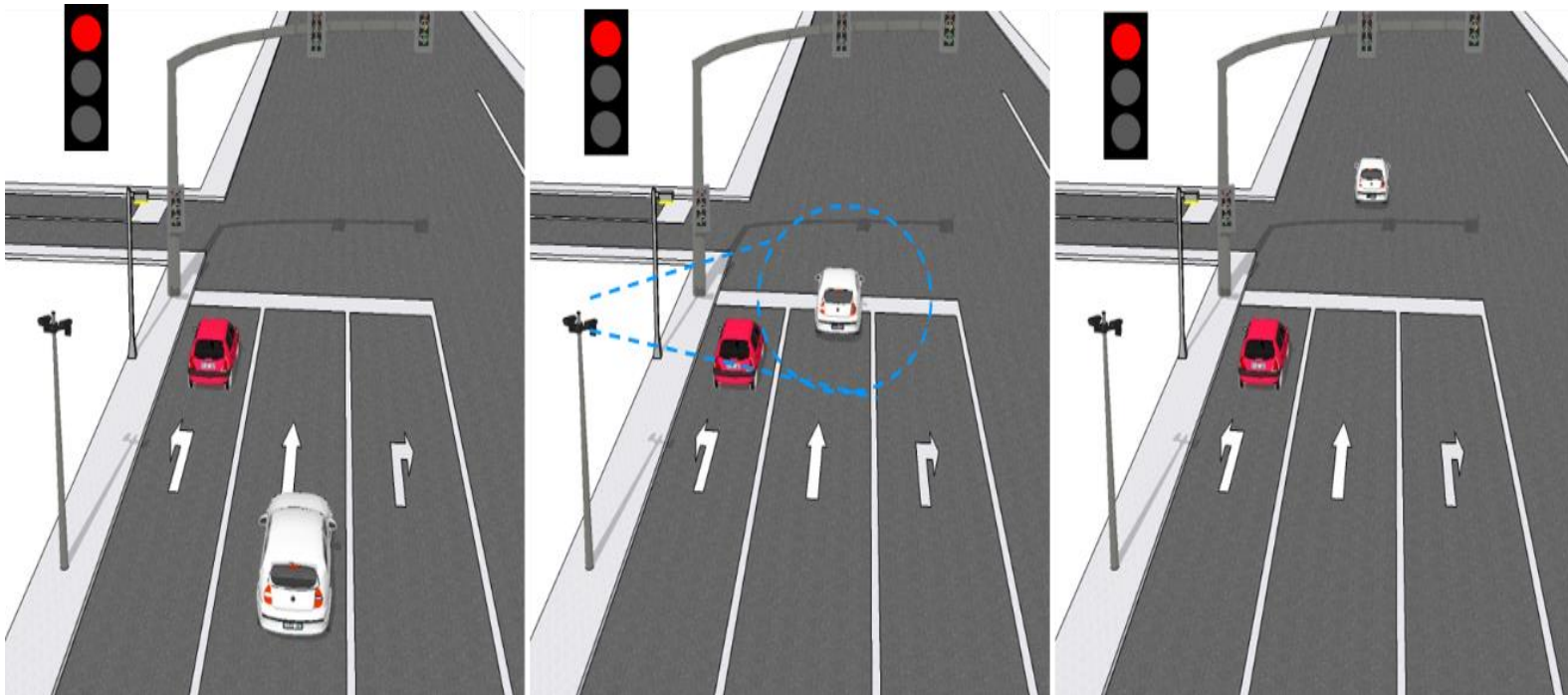
- BEL has been playing significant role in offering Traffic Solutions since 2000.
- BEL has migrated to a level of offering indigenously developed Integrated Traffic Management System Solutions comprising of the following:
  - Adaptive Traffic Control System (ATCS)
  - Vehicle Detection/Vehicle Actuating based Signaling Systems
  - Red Light Violation Detection Systems (RLVD)
  - Speed Violation Detection Systems (SVDS)
  - Automatic Number Plate Recognition System (ANPR)
  - City Surveillance
  - Public Address System
  - Environmental Sensors
- BEL has successfully executed ITMS Project at following cities:
  - Hyderabad & Cyberabad cities
  - Siddipet
  - Vishakapatnam
  - Raipur

# BEL's Growth in ITMS and SMART Solutions



## Red Light Violation Detection System

- Red Light violation detection system is working as a violation warning for those vehicles which try to violate the traffic signals at traffic junctions.
- This system captures the image for those vehicles which violate the traffic signal and finds the details from vahan.nic.in and penalizes the person to restrict them from repeating the same in future.

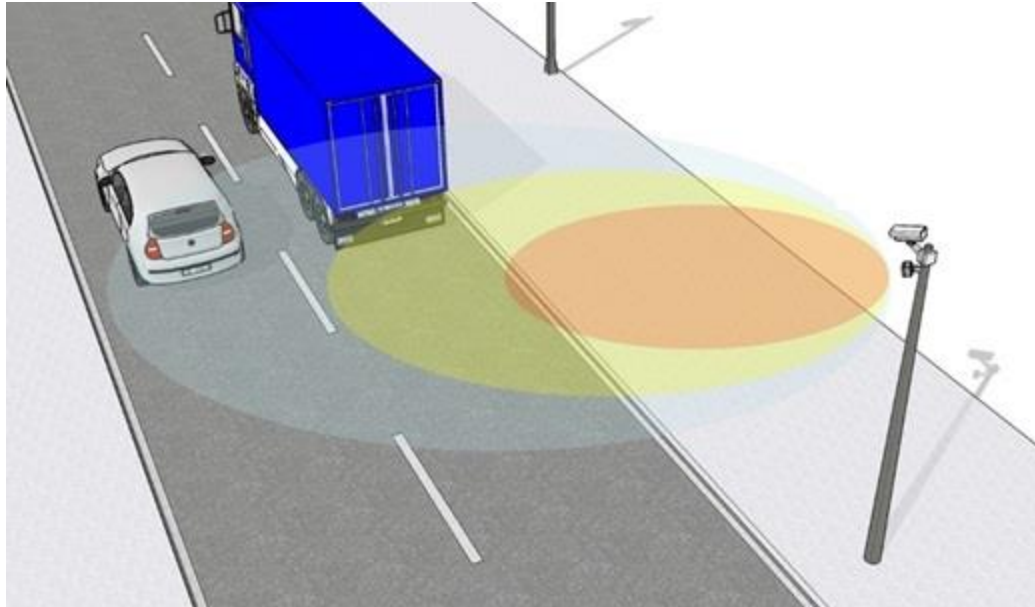


# Automatic Number Plate Recognition System

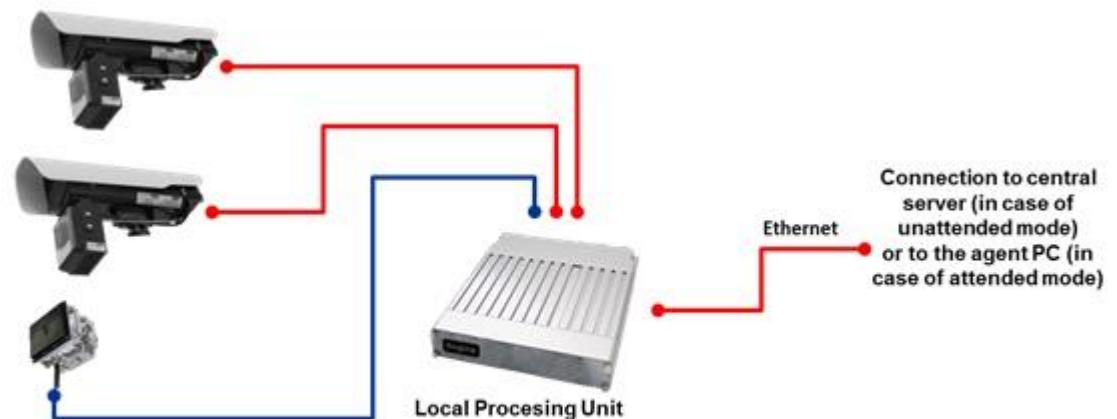


- **Automatic Number Plate Recognition (ANPR) is a highly accurate system capable of reading vehicle number plates without human intervention through the use of high speed image capture with supporting illumination.**

# Speed Violation Detection System

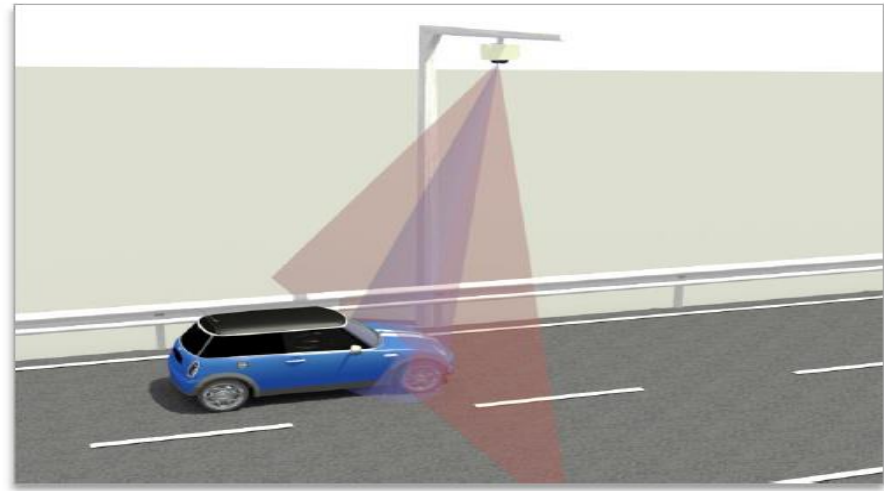
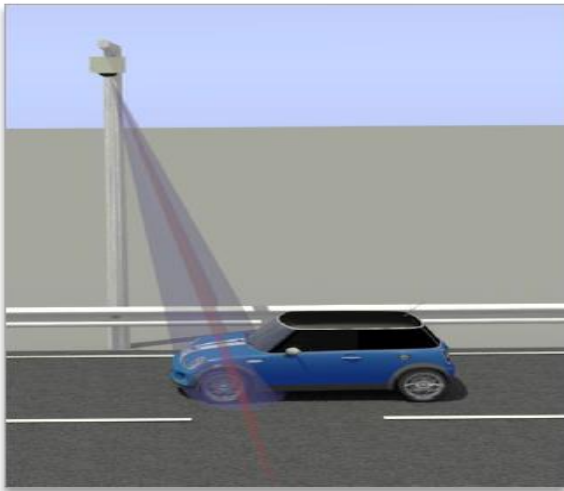


- Speed Limit violation detection system is working as a violation warning for those vehicles which crosses the maximum allowed speed on that route.





## Laser scanner + Radar Doppler for SVD



- This system will be capturing the Speed of each vehicle and also will capture the Image for those vehicles which crosses the speed

**THANK YOU**