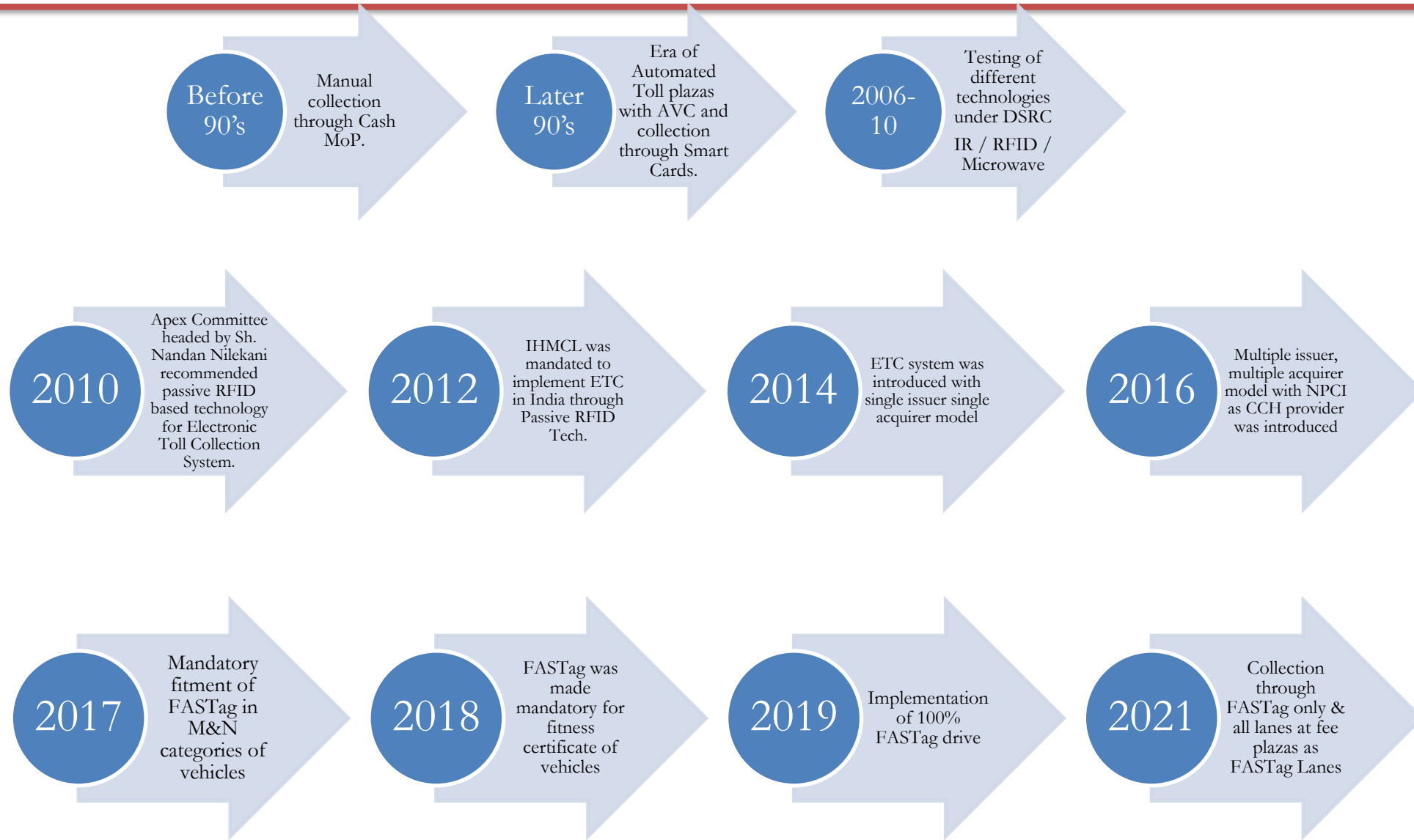


## Highway Operators' Association (I)



# Challenges in Implementing GNSS

# Evolution of Tolling



- **Hon'ble Union Minister of Road Transport & Highways Shri. Nitin Gadkari**, has been at the forefront of implementing innovative solutions for transportation.
- One such initiative is the adoption of **GPS-based (Global Positioning System) technology for toll collection**:
- **GPS-Based Toll Collection**:
  1. The government has finalized the use of GPS technology to ensure seamless movement of vehicles across the country. This move aims to make all highways “toll booth free” with free flow mechanism.
  2. Under this system, toll amounts are being proposed to be deducted directly from the user bank accounts or through their pre-paid accounts just like the current Fastag echo-system, which will be based on their movement.
  3. Commercial vehicles which are already equipped with vehicle tracking systems will benefit from this approach.
  4. Other vehicles will be considered, with plans to install GPS OBUs to facilitate toll collection.

## Known challenges in the existing Fastag/HETC System

- **Traffic jams on toll plazas** due to barriers, repeated readings of tags, blacklisted tags and cash payments.
- **Insufficient transparency of toll collection** - several levels of the system with a wide variety of participants
- **High cost of operation** – Increase in the backoffice manpower without major reduction in the lane manpower count.
- **Unfair charging to the road user:** Charging for full section for the fact of driving through the plaza, not for the actual distance traveled
- **Loss of part of the revenue** by Toll Plazas' operators, when using the section of road without crossing the Toll Plaza

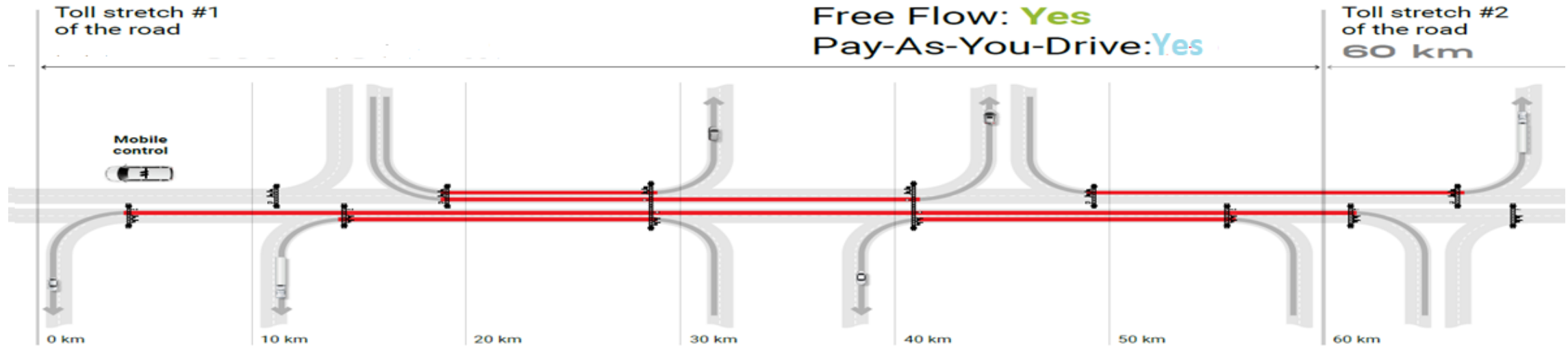
## With GNSS we expect the above issues to be addressed and serve as an enabler :

- In getting rid of stop-and-go toll plazas and thereby reduces congestions which in-turn reduces the CO2 emissions.
- Enables Pay-as-you-Drive principle which benefits the user and enables the operator to capture the revenue from 100% traffic plying on their highway.
- Highly scalable infrastructure as the tollable traffic / length grows and becomes interoperable.
- Provides adaptivity for toll rates and fares to further reduce congestions
- Ideal platform for developing value added services for users e.g. C-V2X

- 1) Adaptation in the ORT (Open Road Tolling) where we have uncontrolled entries and exists unlike the CLT (Closed Loop Tolling).
- 2) Insufficient technical know with the road operator and local system integrators and thereby dependency on foreign collaborators.
- 3) Vendor empanelment by IHMCL
- 4) Finalization of BoQ and price discovery for complete installation and monitoring.
- 5) Supplementary Agreement for amending CA (Concessionaire Agreement).
- 6) Clarity on enforcement mechanism / rights.
- 7) COS disbursement methodology in addition to continuation of existing toll plaza setup until maximum adoption / foolproof enforcement.
- 8) Road user data privacy concerns to be addressed
- 9) Since the technology is still in the testing phase, the following concerns still remain unanswered :
  - i) **Accuracy issue due to**
    - i) Parallel roads
    - ii) Satellite switching / shift
    - iii) Weather conditions
    - iv) OBU reliability / functionality in different use cases
    - v) Accuracy of Geofence which is considered as an alternate to installation of physical gantries
- 10) Detection of overload through HS-WIMs with charging through pre-paid / bank accounts and refund through SWBs at suitable locations has to be worked out in detail.

# The Way Forward in Implementing GNSS

## FREE-FLOW DSRC/RFID/ANPR



- To provide 'Pay-per-distance' it needs to build a lot of infrastructure
- Cost: **Up to 12.5 times higher than GNSS**

- *It is pertinent to mention that the technology adoption will be done in phased manner. The key enabler in successful implementation is establishing the enforcement mechanism.*
- *Until then the road operator shall have to continue with the existing toll plaza setup in parallel to the stationary gantries and mobile setups and work in a hybrid setup which will act as a deterrent to the adoption of GNSS.*



**Legal Framework (Amendment of Fee rules):** In order to implement the GNSS ETC System in the present tolling infrastructure, regulations relating to the current legal framework will require to be amended and new additions in definitions and clauses will be required to be made with the object and intent of the new technology with respect to the GNSS ETC System.

**For the implementation of the GNSS ETC System, it is suggested that the existing Supplementary Agreement which is being used for HTEC should be modified to accommodate the conditions suitable for toll collection through GNSS :**

Clearly defining the roles and responsibilities of both the NHAI and the concessionaires.

The agreement should contain the know-how of the GNSS system and other related parameters giving details about calculation of toll fee and must entail the obligations of vehicle owner on making toll fee defaults.

It should act as a watchdog and should help in catching hold of the user fee violators.

Must also throw light on the framework of settlement process including compensation and any deductions on the defaults made by the users / banks of any amount, which should be supported by the authority and payments to be made to the concessionaire from the pool accounts to replenish the losses on account of lack of enforcement.

1. The OBU to only collect the data of the vehicle's location and distance traveled on the toll road for the purpose of calculating and collecting the user fee only.
2. The data collected through the OBU shall be kept with the Government of India in addition to the concessionaire database and such data should not be shared / sold to any third party for any purposes.
3. All data collected and stored other than the required information essential to be retained for road user charging shall be discarded within a week.

Two types of toll control systems for enforcement infrastructure are proposed :

- a. Stationary Units
- b. Mobile Units

**Stationary Units** – Gantry-based fixed control points, which should consist of:

- 1) ANPR and Video Cameras
- 2) RFID Antennas and other sensors to cover the entire detection zone
- 3) Time and coordinates tools to track the entire journey
- 4) Computers / Processing Units
- 5) Telecommunication connection
- 6) Electricity with power backup connection
- 7) Junction Boxes

Recommendations on Gantries, localization of stationary enforcement infrastructure in all areas of traffic entry and exits including junctions / intersections for 100% coverage of traffic data acquisition.

## Mobile Enforcement Units – Vehicle-based mobile enforcement equipment

- 1) ANPR and Video Cameras
- 2) RFID Antennas and other sensors to cover the entire detection zone
- 3) Time and coordinates tools to track the entire journey
- 4) Computers / Processing Units
- 5) Telecommunication connection
- 6) Electricity with power backup connection

## Recommendations on positioning / placement of mobile enforcement units :

- 1) Constant change of location points as on need basis.
- 2) Places unknown to road users
- 3) Between stationary controls at any unauthorized entry / exit.
- 4) On new sections of toll roads / areas with minimal traffic e.g. village entry / exit.
- 5) In case of temporary unavailability of stationary control

THANK YOU