AN INTERNATIONAL PLATFORM MOVE DREAMT,
DESIGNED AND MADE IN INDIA
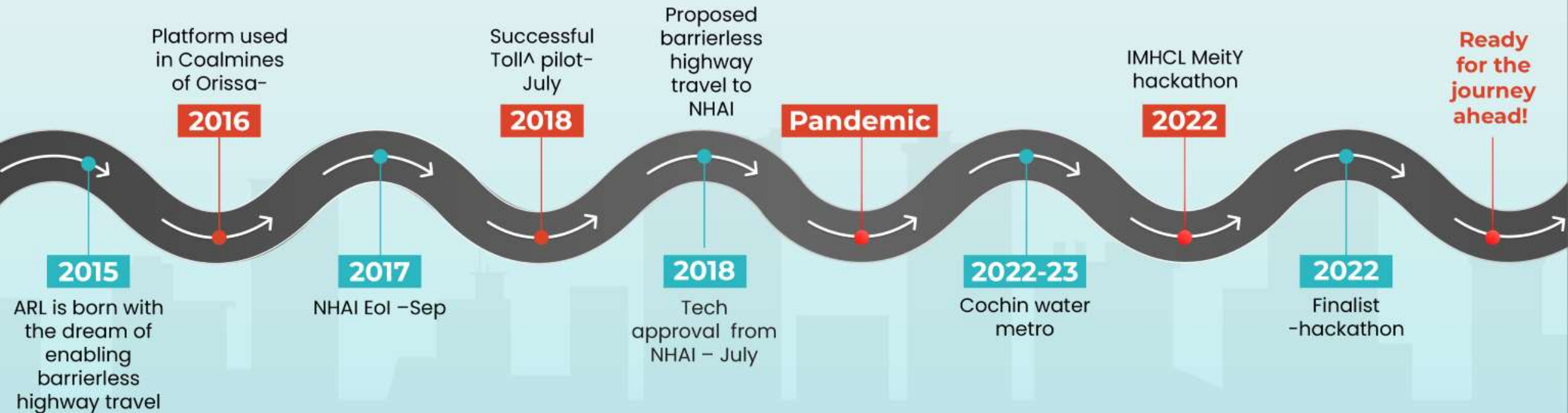
आत्मनिर्भर भारत

MAKE IN INDIA

The product

It's a IOT based proximity yechnology platform that digitizes a person, a vehicle or an asset within a pre-defined geography. Without dependency on internet connectivity in the most un-obtrusive way.

Tried and tested in the coal mines of Orissa and Madhyapradesh for 3 years

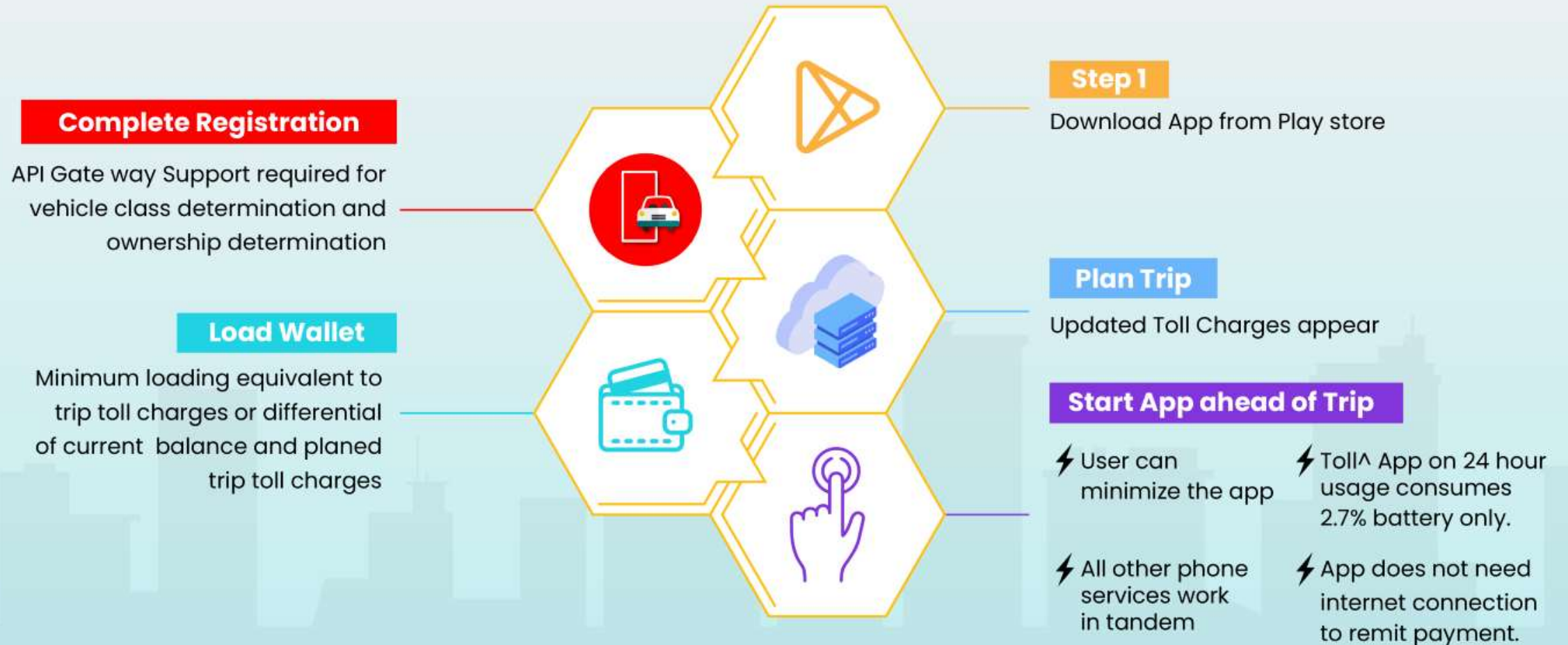NHAI approved alternative technology to RFID based Toll management

A 7 YEAR OLD JOURNEY WITH IHMCL & NHAI

Frequent Long queues and waiting times in toll plazas despite the existing RFID based solution intrigued the founder He dedicated the whole year to this cause AppRaam labs was born with the dream of enabling barrierless highway travel A dream to challenge the unchallended RFID based solution It was considered ahead of time

Toll — Access Redefined

Platform used in Coalmines of Orissa-
2016

Successful Toll^ pilot- July
2018

Proposed barrierless highway travel to NHAI

Pandemic

IMHCL MeitY hackathon
2022

Ready for the journey ahead!

2015
ARL is born with the dream of enabling barrierless highway travel

2017
NHAI EoI –Sep

2018
Tech approval from NHAI – July

2022-23
Cochin water metro

2022
Finalist -hackathon

WORKFLOW AT USER SIDE

Complete Registration

API Gate way Support required for vehicle class determination and ownership determination

Load Wallet

Minimum loading equivalent to trip toll charges or differential of current balance and planed trip toll charges

Step 1

Download App from Play store

Plan Trip

Updated Toll Charges appear

Start App ahead of Trip

⚡ User can minimize the app

⚡ Toll^ App on 24 hour usage consumes 2.7% battery only.

⚡ All other phone services work in tandem

⚡ App does not need internet connection to remit payment.

SToll
Access Redefined

CONCERNS EXPRESSED BY MINISTER

1. Penetration of smart phones- Especially amongst Commercial good vehicle driver

2. Accuracy of detection- loss of data

Concerns addressed

Penetration of smart phones- Especially amongst Commercial good vehicle driver

appraam labs
Complexity simplified

2023 VERSION 1.0

HOW INDIA PAYS

		By Volume	By Value
	NEFT	4.6%	51.2%
	UPI	72.1%	20.9%
	Paper Based	0.6%	10.7%
	IMPS	5.1%	8.7%
	NACH	3.3%	4.5%
	Credit Cards	2.7%	2.2%
	Debit Cards	3.3%	1.2%
	Wallets	5.3%	0.4%
	Others	2.9%	0.32%

InvestyWise
@investywise

(%) Retail Payments Share for Aug 2022
Source: rbi.org.in

Payment thru Smart phones contribute 72% by volume

20% by value of transactions – 2nd highest

Interestingly

Accuracy of detection- loss of data

There are two parts to our design/ solution
- **Initiator**
- **Readers**

Initiator communicates in point-to-point and broadcasts modes. using advertising channels and data channels.

The advertisement frequency is measured in nano seconds.

Reader is a custom developed electronic board with power circuits BLE Signal finder circuits and necessary safety components to mitigate the following risks.

- Sparse or Zero Internet
- Power Surge
- Protection from Rain & Extreme temperatures.

- Customizable detection range of up to 200 meters spherical amoeba like range.

- Can detect up to 5 signals in 2 seconds.

The famous formula for Speed is used here again I.e. Distance/ Time – Speed

Considering that our reader has a range of 100meters radius of detection Ie 200 meters Dia.
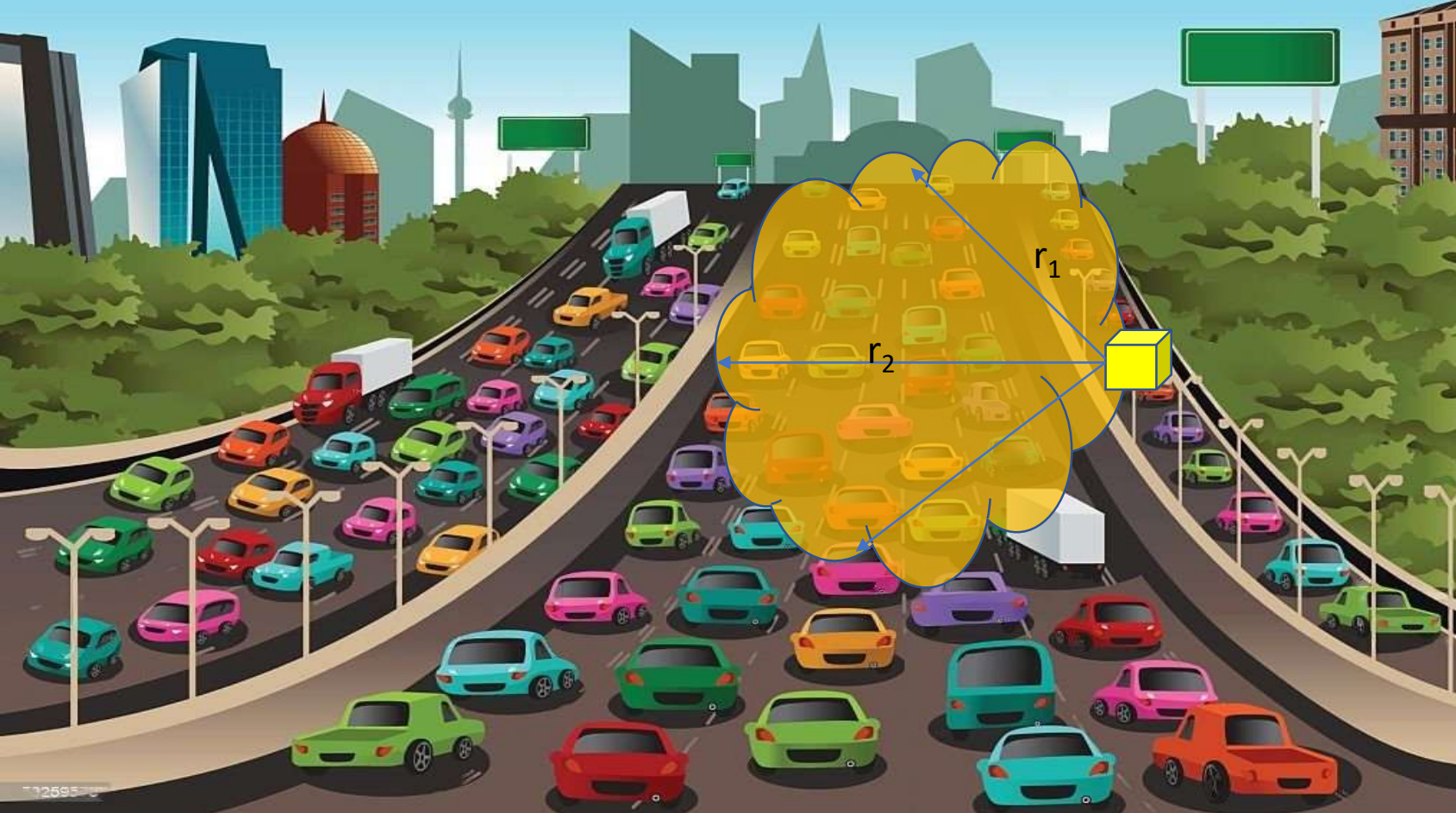
200 Meters = 0.2 Km

The Reader detects each moving mobile app on average of 2.5 times Per Second.

Assuming the Vehicle is moving at 90Kmph the time taken to cross 0.2 Km is

Distance/ Speed Ie 0.2/90 = 8 Seconds,

In 8 Seconds, the Reader will detect the Vehicle almost 20 times.

$r_1 = r_2 = r_3 = 100M$

D= 200M or 0.2 KM

Area(SqKM)= 0.12

Assuming all cars up to 25 cars in zone at any time

Theoretically

Distance	Speed KMPH	Time in Seconds	No of Detection while in range
0.2	90	8	20
0.2	720	1	2.5

Max Speed for detection is 720 KMPH

Distance	Speed	Time in Seconds	No of times Detected while in range
0.2	90	8	20
0.2	100	7	18
0.2	110	7	16
0.2	120	6	15
0.2	130	6	14
0.2	140	5	13
0.2	150	5	12
0.2	160	5	11
0.2	170	4	11
0.2	180	4	10
0.2	190	4	9

Basic facts to observe

For a given distance as transit speed increases, time decreases

In other words, the time spent by vehicle to be tracked inside the reader detection zone also reduces.

CHALLENGES FACED DURING PILOT

Challenge	Description	Solution
Cross talk	Serfs in both directions detect the user	Software filter was used to identify the deducting serf. I.e. The Serf in direction of travel of the user only should deduct from the wallet. The Same was corrected in software with taking note of previous toll plaza crossed.
Traffic Congestion	Whenever the traffic congestion was happening the serf detected and deducted the toll fee multiple times.	Software was tuned to deduct the user only once irrespective how many ever detections happen within 15 minutes. This can be set as a configurable factor in serf whenever there is a traffic jam.
User Mobilization	In the short span of time at Delhi NCR toll plaza we could not gather enough users to download the app	Request NHAI/ IHMCL / MeITY to issue official notification.
Location of Serf Installation	Many questions for which clarification was sought was not answered especially the support to mount the device in gantry	For Pilot the Device was mounted on the Light Pillar.

ADVANTAGES OF THIS SYSTEM

- **MADE IN INDIA- Zero dependency on CODE and TECH**

- **Easily adaptable and scalable**

- **Low / NIL Cost for users**

- **CAPEX investment at each Toll Point is approx. between Rs 35,000-40,000**

- **Plug and Play solution**

- **OTA updates and control possible**

- **Traffic congestion can also be monitored in the zone.**

- **USER reward program**

Distance	Speed	Time in Seconds	No of times Detected while in range
0.2	90	8	20
0.2	100	7	18
0.2	110	7	16
0.2	120	6	15
0.2	130	6	14
0.2	140	5	13
0.2	150	5	12
0.2	160	5	11
0.2	170	4	11
0.2	180	4	10
0.2	190	4	9

Basic facts to observe

For a given distance as transit speed increases, time decreases

In other words, the time spent by vehicle to be tracked inside the reader detection zone also reduces.

Sample Data for review

Vehicle Type	Type of Vehicle Number	Unique Code	Crossing Date	Crossing Time	Type of Travel	Toll Amount
Car	TN 58 B 6505	11315842-6505-0000-0000-000000000000	31/01/23	14:23:45	Single	90
Car	TN 58 J 5414	11315810-5414-0000-0000-000000000000	31/01/23	15:03:13	Single	90
Car	TN 58 AC 6734	11315823-6734-0000-0000-000000000000	31/01/23	19:47:11	Single	90
Car	TN 69 Z 2052	11316900-2052-0000-0000-000000000000	31/01/23	21:32:45	Single	90
Car	TN 58 AA 3658	11315833-3658-0000-0000-000000000000	01/02/23	7:01:24	Single	90
Car	TN 58 K 1246	11315802-1246-0000-0000-000000000000	01/02/23	7:34:34	Single	90
Car	TN 58 B 8991	11315842-8991-0000-0000-000000000000	01/02/23	15:54:49	Single	90
Car	TN 69 Z 2052	11316900-2052-0000-0000-000000000000	01/02/23	22:12:45	Double	90
Car	TN 58 AC 6734	11315823-6734-0000-0000-000000000000	01/01/23	21:17:11	Double	90
Car	TN 58 AB 6644	11315835-6644-0000-0000-000000000000	02/02/23	8:44:43	Single	90
Car	TN 58 AC 7745	11315834-7745-0000-0000-000000000000	02/02/23	9:12:26	Double	90
Car	TN 58 J 5414	11315810-5414-0000-0000-000000000000	02/01/23	11:07:13	Double	90

Car	TN 58 A 0989	11315801-0989-0000-0000-000000000000	03/02/23	2:11:32	Single	90
Car	TN 58 K 1721	11315812-1721-0000-0000-000000000000	03/02/23	6:42:56	Single	90
Car	TN 58 AA 3658	11315833-3658-0000-0000-000000000000	01/02/23	8:01:24	Double	90
Car	TN 58 Z 4546	11315800-4546-0000-0000-000000000000	04/02/23	13:37:22	Single	90
Car	TN 58 J 2798	11315809-2798-0000-0000-000000000000	04/02/23	13:54:20	Single	90
Car	TN 58 QA 7263	11315827-7623-0000-0000-000000000000	04/02/23	17:02:34	Single	90
Car	TN 58 QA 7263	11315827-7623-0000-0000-000000000000	04/02/23	21:44:32	Single	90
Car	TN 58 AD 4578	11315814-4578-0000-0000-000000000000	05/02/23	9:12:56	Single	90
Car	TN 58 Jk 9198	11315817-9198-0000-0000-000000000000	05/02/23	11:48:23	Single	90
Car	TN 58 AB 2129	11315812-2129-0000-0000-000000000000	05/02/23	12:32:29	Single	90
Car	TN 58 AB 2129	11315812-2129-0000-0000-000000000000	05/02/23	12:32:29	Single	90
Car	TN 58 KK 3425	11315866-3425-0000-0000-000000000000	06/02/23	8:07:52	Single	90
Car	TN 58 QA 4567	11315824-4567-0000-0000-000000000000	06/02/23	13:24:20	Single	90

Vehicle Type	Type of Vehicle Number	Unique Code	Crossing Time	Crossing Time	Type of Travel	Toll Amount
Car	TN 58 BD 4356	11315824-4356-0000-0000-000000000000	07/02/23	15:42:29	Single	90
Car	TN 58 AA 9487	11315811-9487-0000-0000-000000000000	07/02/23	4:23:21	Single	90
Car	TN 58 AB 4876	11315812-4876-0000-0000-000000000000	07/02/23	6:45:12	Single	90
Car	TN 58 BD 2765	11315824-2765-0000-0000-000000000000	08/02/23	11:54:23	Single	90
Car	TN 58 Z 4546	11315800-4546-0000-0000-000000000000	08/02/23	3:37:22	Double	160
Car	TN 58 QD 4598	11315827-4598-0000-0000-000000000000	08/02/23	10:34:22	Single	90
Car	TN 58 AA 4029	11315811-4019-0000-0000-000000000000	08/02/23	12:34:47	Single	90
Car	TN 58 K 1714	11315809-1714-0000-0000-000000000000	08/02/23	20:01:54	Single	90
Car	TN 58 K 1714	11315809-1714-0000-0000-000000000000	09/02/23	23:27:54	Single	90
Car	TN 58 Jk 9198	11315817-9198-0000-0000-000000000000	09/02/23	1:07:23	Double	160
Car	TN 58 Ga 3423	11315881-3423-0000-0000-000000000000	09/02/23	7:32:28	Single	90
Auto	TN 64 A 9515	11316401-9515-0000-0000-000000000000	09/02/23	8:02:12	Single	90
Car	TN 03 J 6505	11310387-6505-0000-0000-000000000000	09/02/23	8:05:43	Single	90

Car	TN 03 J 6505	11310387-6505-0000-0000-000000000000	10/02/23	17:05:43	Single	90
Car	TN 58 AP 4429	11315819-4429-0000-0000-000000000000	10/02/23	11:09:12	Single	90
Car	TN 59 BL 9131	11315937-9131-0000-0000-000000000000	10/02/23	11:42:12	Single	90
Car	TN 58 Ga 3423	11315881-3423-0000-0000-000000000000	10/02/23	13:03:28	Double	160
Car	TN 58 AA 4029	11315811-4019-0000-0000-000000000000	11/02/23	18:17:47	Double	160
Car	TN 58 X 8866	11315888-8866-0000-0000-000000000000	11/02/23	13:09:23	Single	90
Lorry	TN 58 D 9095	11315804-9095-0000-0000-000000000000	11/02/23	13:51:32	Single	90
Car	TN 69 Z 2052	11316900-2052-0000-0000-000000000000	11/02/23	13:59:42	Single	90
Car	TN 58 QD 4598	11315827-4598-0000-0000-000000000000	12/02/23	14:34:22	Double	160
Lorry	TN 58 D 9095	11315804-9095-0000-0000-000000000000	12/02/23	13:51:32	Single	90
Car	TN 59 AW 1651	11315918-1651-0000-0000-000000000000	12/02/23	4:23:12	Single	90
Car	TN 59 H 1747	11315966-1747-0000-0000-000000000000	13/02/23	9:36:12	Single	90
Car	TN 59 H 1747	11315966-1747-0000-0000-000000000000	13/02/23	16:02:57	Single	90
Car	TN 59 BL 1997	11315929-1997-0000-0000-000000000000	13/02/23	7:20:12	Single	90

Few Videos

External View

Bad Weather View

Further Research

- We are experimenting to load the app in the music system which are being used in cars and other vehicles.

- The good news is that more vehicles are coming with preloaded apps in their music system and in retrofit market is busy with Android based music systems which have google play store and the app can be easily loaded into the music system.

- If administrative order can be passed to incorporate Toll^ app as default this system can be scaled very easily and made fool proof.

- We largely found all truck drivers using a specific mobile app to get loads for their truck from their network especially while they return after a freight delivery.

Thank you!!

Further questions- Rajesh Gomathy
+91 9880107034