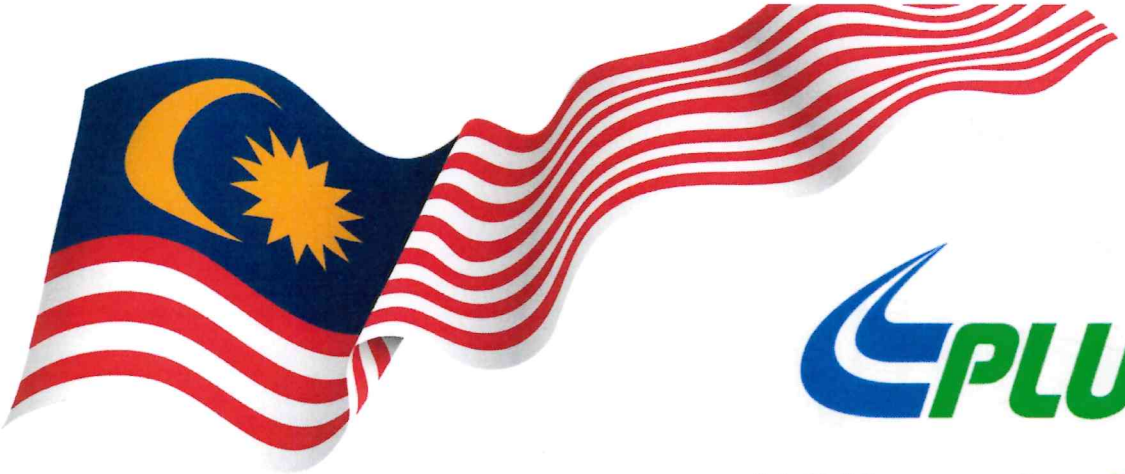


MALAYSIA MADANI
daya cipta

KITASELANGOR

visit Selangor 2025 Malaysia

ANS
ANUGERAH INOVASI
NEGERI SELANGOR

PLUS

Ahli Kumpulan UEM

Lane Remote Function

ANUGERAH INOVASI NEGERI SELANGOR

JABATAN TOL DAN MEKANIKAL,ELEKTRIK & ELEKTRONIK
PLUS BERHAD
TAHUN 2025

INTRODUCTION

BRIEF BACKGROUND OF SERVICE

PLUS A member of UEM XENDS

- **27 June 1986** – Known as Highway Concessionaires Berhad
- **13 May 1988** – Renamed to ***Projek Lebuhraya Utara-Selatan Berhad (PLUS)*** and was completed 15 months earlier than expected construction date
- **29 November 2010** – Incorporated as ***PLUS Malaysia Berhad (PMB)*** and involved in investment holdings

Khazanah Nasional Berhad

UEM Group Berhad

Employees Provident Fund

PLUS Kumpulan UEM

- Projek Lebuhraya Usahasama Berhad
- Terra Plus Sdn Bhd
- Zoom Interactive Sdn Bhd
- TERAS Teknologi Sdn Bhd
- TERAS Control Systems Sdn Bhd
- Projek Lebuhraya Utara-Selatan Berhad
- Linkedua (Malaysia) Berhad
- Expressway Lingkaran Tengah Sdn Bhd
- Penang Bridge Sdn Bhd

PMB is the holder of Projek Lebuhraya Usahasama Berhad (PLUS), TERAS Teknologi Sdn Bhd ("TERAS"), Terra PLUS Sdn Bhd, and Zoom Interactive Sdn Bhd.

Projek Lebuhraya Usahasama Berhad (PLUS), a wholly-owned subsidiary of PMB, was incorporated on 27 July 2011, with the aim of consolidating all highway concessions under PMB (except LPT2) into a single entity. This consolidation was finalized on 12 January 2012.

With this consolidation, PMB became the **largest toll highway operator in Malaysia** and one of the **largest in Southeast Asia**, as well as the **eighth largest in the world** and with **over 20 years of experience** in operation and maintenance, now preparing for the **future as a modern highway toward the era ahead**.

Projek Lebuhraya Usahasama Berhad

NSE	1.	North-South Expressway
NKVE	2.	New Klang Valley Expressway
SPHD	3.	Seremban-Port Dickson Highway **Length**: 805.8km
LINKEDUA	4.	Malaysia-Singapore Second Crossing **Length**: 47km
PB	5.	Penang Bridge **Length**: 13.5km
ELITE	6.	North-South Expressway Central Link **Length**: 63km
BKE	7.	Butterworth-Kulim Expressway **Length**: 17km

Total Length : 946.3 km

2

2

INTRODUCTION

BRIEF BACKGROUND OF SERVICE

PLUS A member of UEM XENDS

PLUS SENIOR LEADERSHIP

Datuk Nik Airina Nik Jaffar
Managing Director,
PLUS Malaysia Berhad

Operation

Oversees PLUS's daily operations, including operational functions, health and safety, maintenance of highway assets, and ensures execution of sustainability initiatives

Financial

Manages PLUS' financial strategies and operations to meet obligations as the largest rated sukuk issuer, ensuring long-term sustainability and investor returns

Human Resource

Leads PLUS' talent management and industrial relations, ensuring a capable workforce for sustainability initiatives, and overseeing all PLUS members

Technology & Innovation

Oversees and leads the development, implementation, and operation of technological ecosystems within PLUS

Governance, Risk & Compliance

Tasked with leading the Programme Management Office, overseeing PLUS' sustainability strategy, and coordinating sustainability practices

Commercial

Implements PLUS' commercial and customer strategies with a focus on customer-centric sustainability practices and partnerships with businesses and organisations

3

3

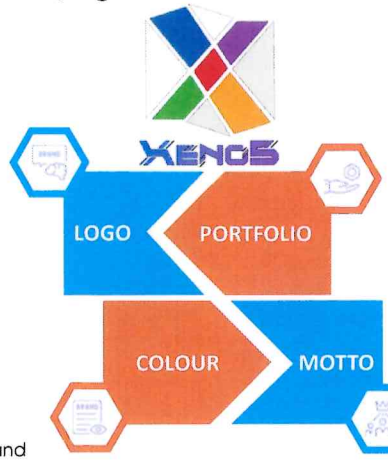
INTRODUCTION

BACKGROUND OF PROJECT TEAM

A member of UEM Xeno5

Team profile background – Team Portfolio, Logo & Motto

The circle symbolizes the association formed by individuals with diverse qualities and expertise, working together as a team to successfully achieve clear objectives



The Xeno5 Team is a dynamic collective of creative professionals, innovators, and technical experts dedicated to crafting forward-thinking project and design solutions. The Xeno5 logo is a testament to our team's collaborative effort and creative synergy, highlighting our values of innovation, diversity, and precision

Blue (Alliance) represent vitality for the company and its future
Grey represents balance of productivity with serenity
Dark Purple – represents power, strength and endurance
Indigo (Together we define) – represent wisdom and creativity

"Empowered By Innovation"

Collaboration and working towards a common goal promotes creativity and learning by optimizing shared knowledge and broadening skill sets.

4

4

INTRODUCTION

BACKGROUND OF PROJECT TEAM

A member of UEM Xeno5

Team Structure

RESPONSIBILITY
- Leads the project and ensures that the project runs smoothly as planned
- Ensure that the group achieves the target.

Muhammad Bin Ajmi
Team Leader

Fadhlina Sameon
Facilitator

RESPONSIBILITY
- Group Advisor
- Guides group members and monitors project progress
- Contribute ideas to the project

XENO5
"We Empower by Innovation"

RESPONSIBILITY
- Research and development processes (R&D)
- Ensure that the passage is suitable for the trial process
- Technical testing of the product.
- Getting the raw material to build the prototype

Ts. Muhammad Nazim Hakimi Ghani
Technical

RESPONSIBILITY
- Research and development processes (R&D)
- Ensure that the passage is suitable for the trial process
- Technical testing of the product.
- Getting the raw material to build the prototype.

Khairul Annuar Bin Abd Razak
Operation

RESPONSIBILITY
- Research and development processes (R&D)
- Ensure that the passage is suitable for the trial process
- Technical testing of the product.
- Getting the raw material to build the prototype.

Sahila Suadi
Operation

5

5

EXPLAINATION OF PROJECT OUTCOME/RESULT

SUMMARY OF PROJECT INNOVATION

A member of UEM XENOS

Explanation of Innovation Product Creation

Lane Remote Function

The Explanation..

Project Briefing	
The objective of the Project Innovation	To **minimize toll fare manipulation incidents** and reduce operational expenditure by automating enforcement and verification processes at toll plazas
Project Methodology	Leveraging **ALPR (Automatic License Plate Recognition) technology** to capture and compare vehicle entry images with those recorded at exit lanes, ensuring vehicle identity consistency and detecting potential toll manipulation
Technology adoption	Deployment of **ALPR (Automatic License Plate Recognition) systems** as a proactive enforcement tool to detect, verify, and act on toll fare manipulation attempts in real time
Project Location	**Initial pilot testing** was conducted at Bertam and Sungai Dua toll plazas. Following the success of the pilot testing, the system has been progressively implemented at all toll lanes throughout the northern and southern regions.
Project Implementation	The project was officially implemented in **March 2023**, with phased deployment **across all toll plazas** to ensure smooth integration and operational efficiency
Result	This innovation strengthens the toll management ecosystem by enabling faster verification, efficient monitoring, and safeguarding toll revenue against manipulation attempts.

6

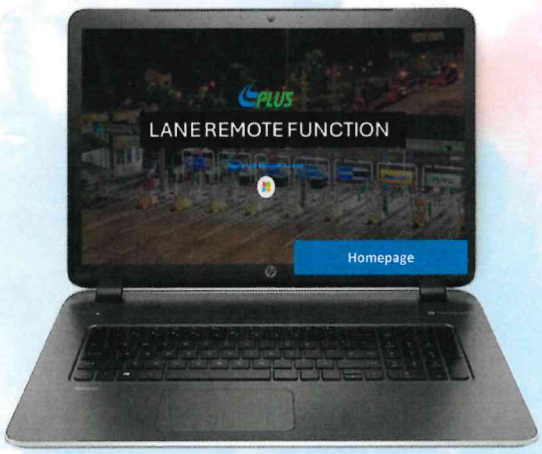
6

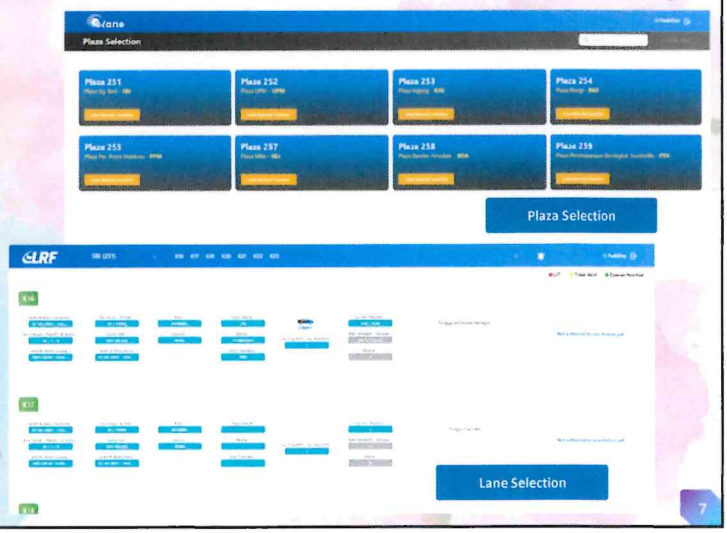
EXPLAINATION OF PROJECT OUTCOME/RESULT

SUMMARY OF PROJECT INNOVATION

A member of UEM XENOS

LANE REMOTE FUNCTION "LRF"





7

7

EXPLAINATION OF PROJECT OUTCOME/RESULT

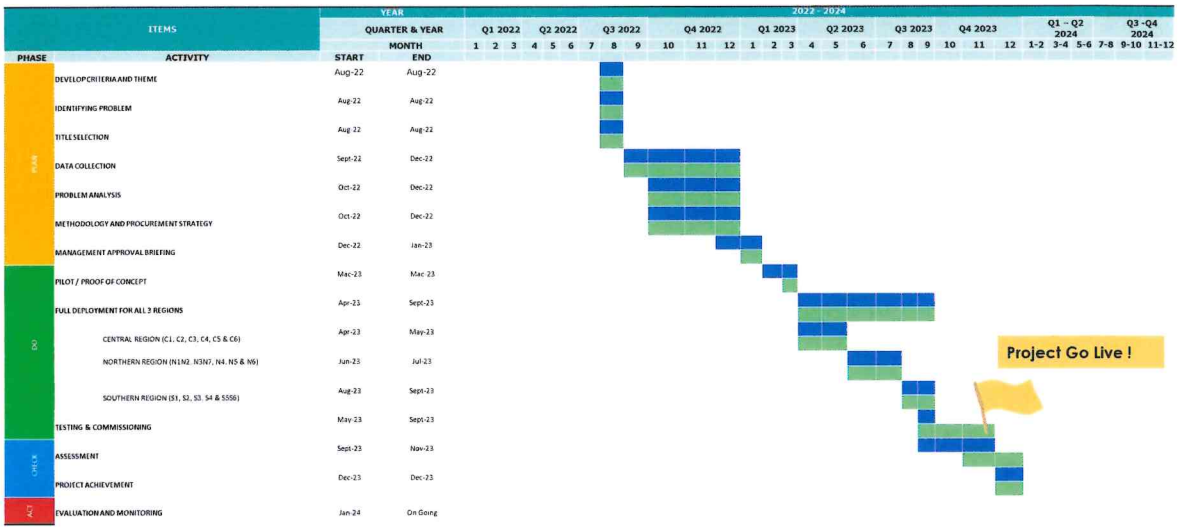
PROJECT IMPLEMENTATION SCHEDULE

PLUS — A member of UEM X XENDS

The project kick start on Y2022 & fully implemented Y2023

PLAN | ACTUAL

PHASE	ACTIVITY	START	END
PLAN	DEVELOP CRITERIA AND THEME	Aug-22	Aug-22
	IDENTIFYING PROBLEM	Aug-22	Aug-22
	TITLE SELECTION	Aug-22	Aug-22
	DATA COLLECTION	Sept-22	Dec-22
	PROBLEM ANALYSIS	Oct-22	Dec-22
	METHODOLOGY AND PROCUREMENT STRATEGY	Oct-22	Dec-22
	MANAGEMENT APPROVAL BRIEFING	Dec-22	Jan-23
DO	PILOT / PROOF OF CONCEPT	Mac-23	Mac-23
	FULL DEPLOYMENT FOR ALL 3 REGIONS	Apr-23	Sept-23
	CENTRAL REGION (C1, C2, C3, C4, C5 & C6)	Apr-23	May-23
	NORTHERN REGION (N1N2, N3N7, N4, N5 & N6)	Jun-23	Jul-23
	SOUTHERN REGION (S1, S2, S3, S4 & SSS6)	Aug-23	Sept-23
	TESTING & COMMISSIONING	May-23	Sept-23
CHECK	ASSESSMENT	Sept-23	Nov-23
	PROJECT ACHIEVEMENT	Dec-23	Dec-23
ACT	EVALUATION AND MONITORING	Jan-24	On Going



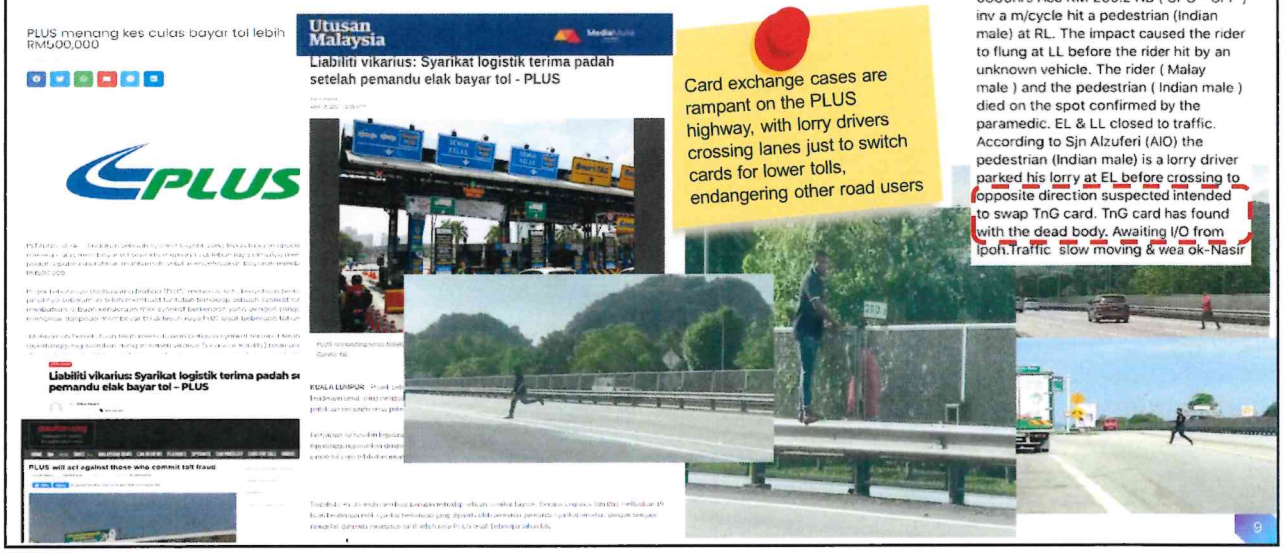
8

EXPLAINATION OF PROJECT OUTCOME/RESULT

INNOVATION PROJECT OBJECTIVE

PLUS — A member of UEM X XENDS

ISSUE - CROSSING LANES TO EXCHANGE CARD



9

EXPLAINATION OF PROJECT OUTCOME/RESULT

INNOVATION PROJECT OBJECTIVE

A member of UEM XENOS

CURRENT SITUATION : MANUAL CCTV VERIFICATION PROCESS

TRX NO	NCSH_MFGNO	NCSH_ENTRYPLAZA	NCSH_ENTRYDATETIME	NCSH_ENTRYLANENO	NCSH_ENTRYCLASS	NCSH_PLAZANO	NCSH_TRXDATETIME	NCSH_LANENO	NCSH_EXITTCCLASS	NCSH_JOBNO	NCSH_OPERDATE
1	1686538959	322	11/21/2021 21:35	1	2	321	11/22/2021 5:43	K10	2	9	11/21/2021
2	4162950191	321	11/20/2021 21:52	1	2	322	11/21/2021 5:36	K11	2	8	11/20/2021
3	1690990351	322	11/21/2021 3:44	1	3	323	11/21/2021 22:44	K07	3	7	11/21/2021

Transaksi no.	Mfg No.	Gambar Lorong Masuk	Plaza & Kelas Lorong Masuk	No. Plat Lorong Masuk	Gambar Lorong Keluar	Plaza & Kelas Lorong Keluar	No. Plat Lorong Keluar	Remarks (SAHEIKAR KADIMEJ TIDAK JELASTIADA DARAMAN)
1	[redacted]		ARH - KLS 2	[redacted]		SAT - KLS 2	[redacted]	TUKAR KAD
2	[redacted]		SAT - KLS 2	[redacted]		ARH - KLS 2	[redacted]	TUKAR KAD
3	[redacted]		ARH - KLS 3	[redacted]		TGK - KLS 3	[redacted]	TUKAR KAD

* Hide the plate number detail due to Privacy Concern.

The manual process of reviewing CCTV footage involves careful **eyeballing**, and **tedious checking**, which can take a lot of time

Step 1: Identify LJT hot stretches by each region

Step 2: Extract transactions LJT on the identified hot stretches

Step 3: Manual CCTV verification to search entry and exit image

Step 4: Compile the data as an evidence during operation exercise at ground

10

10

EXPLAINATION OF PROJECT OUTCOME/RESULT

INNOVATION PROJECT OBJECTIVE

A member of UEM XENOS

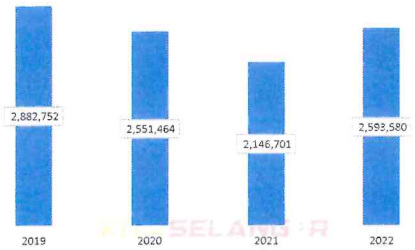
Current Data Analysis

DATA OVERVIEW

TOTAL TOLL MANIPULATION CASES

YEAR	DATA TOLL MANIPULATION
2019	2,882,752
2020	2,551,464
2021	2,146,701
2022	2,593,580
Total	**10,174,497**

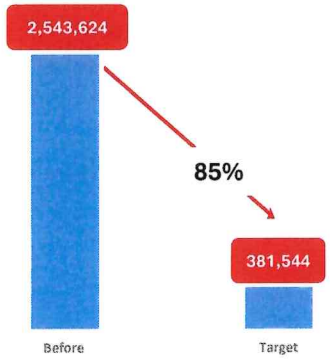
DATA MANIPULATION



DATA ANALYSIS

To achieve 85% reduction of Toll Manipulation Cases

TARGET FOR REDUCING THE NO. OF TOLL MANIPULATION CASES



Total Manipulation Annual Avg Cases
2,543,624

Total Manipulation Cases (2019-2022)
10,174.497

Total Revenue Leakage (2019 to 2022)
RM 633,008,164.92

ENDORSEMENT

Nor Haidi Yahaya
Head of Toll
Projek Lebuhraya Usahasama Berhad
norhaidi@plus.com.my

DATA SOURCE:
Toll Department

11

11

EXPLAINATION OF PROJECT OUTCOME/RESULT

INNOVATION PROJECT OBJECTIVE

A member of UEM XENDS

Current Data Analysis

DATA OVERVIEW

TOTAL OPERATION EXERCISE CONDUCTED AND COST UTILIZATION

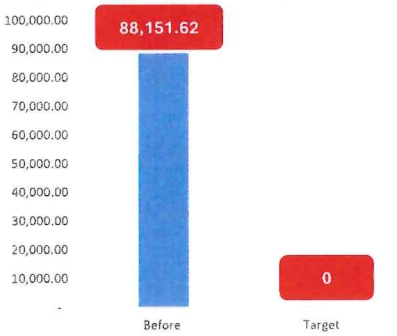
Year	Number of Operation exercise	Total Ops Cost utilization (RM)
2019	7	50,032.00
2020	Covid	
2021	10	71,474.29
2022	20	142,948.57
Total	**37**	**264,454.86**

COST UTILIZATION DURING OPERATION EXERCISE

DATA ANALYSIS

To reduce operational exercise cost to ZERO

Target for Reducing the cost of Ops Utilization



Total Ops Cost Utilization Annual Avg
88,151.62

Total Operation Exercise
37

Total Ops Cost Utilization
RM 264,454.86

ENDORSEMENT

Nor Haidi Yahaya
Head of Toll
Projek Lebuhraya Usahasama Berhad
norhaidi@plus.com.my

DATA SOURCE:
Toll Department

12

12

EXPLAINATION OF PROJECT OUTCOME/RESULT

INNOVATION PROJECT OBJECTIVE

A member of UEM XENDS

PROJECT TARGET SELECTION : TARGET SETTING & IMPACTS

TARGET SETTINGS

1. To achieve 85% reduction of LJT Type 2 cases
2. To reduce operational exercise cost to ZERO

13

13

EXPLAINATION OF PROJECT OUTCOME/RESULT

INNOVATION PROJECT OBJECTIVE

A member of UEM XENDS

FINAL CREATIVE SOLUTION SELECTION BASED ON PROBLEM STATEMENT

INPUT

Problem Statement & Main Causes

- The process involves **tedious checking**, which can take a lot of time and be challenging because need to verify every detail
- Contactless Smart card is **easy to purchase,** available at numerous convenience stores and online, making it simple to obtain.
- The manual process of reviewing CCTV footage involves careful **eyeballing,** requiring meticulous attention to detail and a significant investment of time
- The **unavailability of the LJT parameter** makes it difficult to identify and define fraud cases

Most Practical Solutions

1. To automate the LJT parameter by **separating LJT Type 1 and LJT Type 2**
2. To use Automated **Video Analytics Software,** which uses machine learning to analyze video footage

TOOLS & TECHNIQUES

Decision Making Process

- Brainstorming
- Market Research
- Desktop Studies

OUTPUT

Final Creative Solution

Develop **a system** that **detects vehicles** from the **entry point** until the **exit point**

14

14

EXPLAINATION OF PROJECT OUTCOME/RESULT

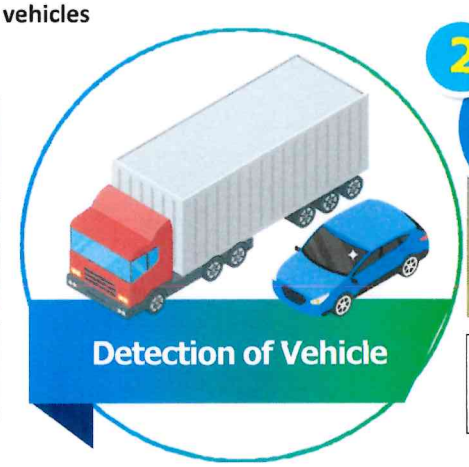
INNOVATION IMPLEMENTATION PROCESS

A member of UEM XENDS

Existing technologies used to detect vehicles

1 VIDEO ANALYTIC

Using video to identify vehicles information based on vehicle plate number.



2 LiDAR SYSTEM

This technology uses laser scanning to create detailed 3D representations of vehicles

15

15

EXPLAINATION OF PROJECT OUTCOME/RESULT

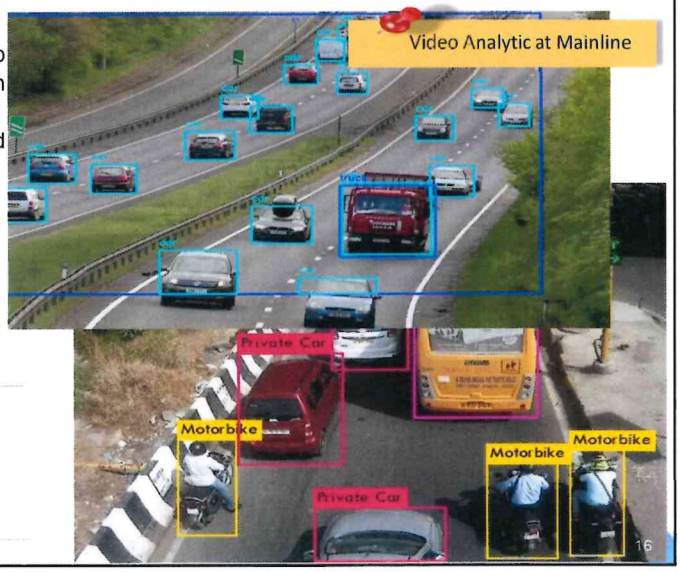
INNOVATION IMPLEMENTATION PROCESS

A member of UEM XENDS

1 **VIDEO ANALYTIC (Mainline / Toll Plaza) : Using video to identify actual vehicles based on license plates**

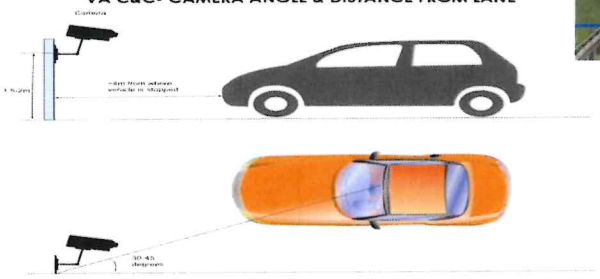
- Digital video technology that integrates video analytics software to generate data and information from each video frame
- The capabilities of video analysis include advanced image recognition processing using machine learning

Video Analytic at Mainline



Video Analytic at Toll Plaza

VA C&C- CAMERA ANGLE & DISTANCE FROM LANE



16

EXPLAINATION OF PROJECT OUTCOME/RESULT

INNOVATION IMPLEMENTATION PROCESS

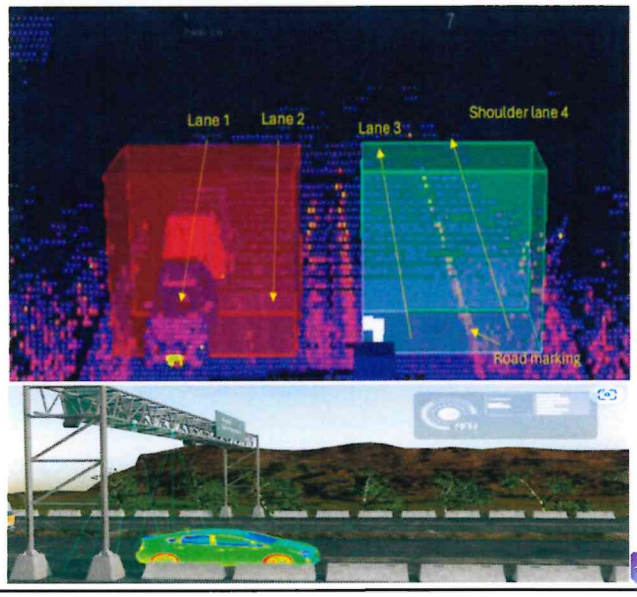
A member of UEM XENDS

2 **LiDAR SYSTEM : Light Detection and Ranging**

- LiDAR provides accurate and reliable vehicle detection and classification, ensuring precise tracking from the moment a vehicle enters the toll zone until it exits.
- LiDAR (Light Detection and Ranging) technology plays a significant role in enhancing operations within the toll industry

Functionality: LiDAR systems can accurately detect and classify vehicles based on their size and shape as they approach toll booths.

Benefits: This enables precise tolling based on vehicle type, ensuring that charges reflect the actual vehicle category (e.g., cars, trucks, buses).



17

EXPLAINATION OF PROJECT OUTCOME/RESULT

INNOVATION IMPLEMENTATION PROCESS

A member of UEM XENOS

Comparison on technology to detect vehicle

COMPARISON	VIDEO ANALYTIC	LiDAR SYATEM
Vehicle Profile	Able	Able
Detect Registration Number	Able	Not Able
Hardware Readiness	Utilize Existing	New Installation
Cost-Effectiveness	Yes	No
Time Consume	Low	High
Wide Availability	Yes	No
Detailed Contextual Information	Yes	No
Real-Time Processing	Yes	Yes
RESULT	✔	✘

KITA SELANG-R

18

18

EXPLAINATION OF PROJECT OUTCOME/RESULT

INNOVATION IMPLEMENTATION PROCESS

A member of UEM XENOS

FINAL CREATIVE SOLUTION : BENCHMARK FROM OTHER INDUSTRIES

- Brazil implements the RFID system that is paired with an ALB system.
- However, ALPR is optional and not mandated by the government for implementation across all highways.
- Currently the system processes **0.88mil daily RFID traffic.**

- Taiwan deployed an ALPR system as part of its National ETC toll system. The ALPR (Automated License Plate Recognition) camera is paired with an RFID Tag known as E-Tag
- Currently the system processes about **14mil transactions** daily from Taiwan's traffic.

19

19

EXPLAINATION OF PROJECT OUTCOME/RESULT

INNOVATION IMPLEMENTATION PROCESS

A member of UEM XENDS

Project Development
Overview of Development Phases for Lane Remote Function

1. Concept	2. Design	3. Software Development	4. Testing	5. Improvement
Define Scopes and Specification of the System	Define system structure, component, interfaces, and interactions to meet specified requirements	Setting up and configuring software components to properly integrated and operational within the system environment.	Evaluating and verifying that the system's components and functions work correctly and meet specified requirements	Enhancing the system's performance, efficiency, functionality, or user experience by making modifications, optimizations, or updates based on feedback, testing results, or evolving
Project Start Aug 22	Sept - Dec 22	Mar 23 – Sept 23	Project Completed Sept 23	In Planning

20

20

EXPLAINATION OF PROJECT OUTCOME/RESULT

INNOVATION IMPLEMENTATION PROCESS

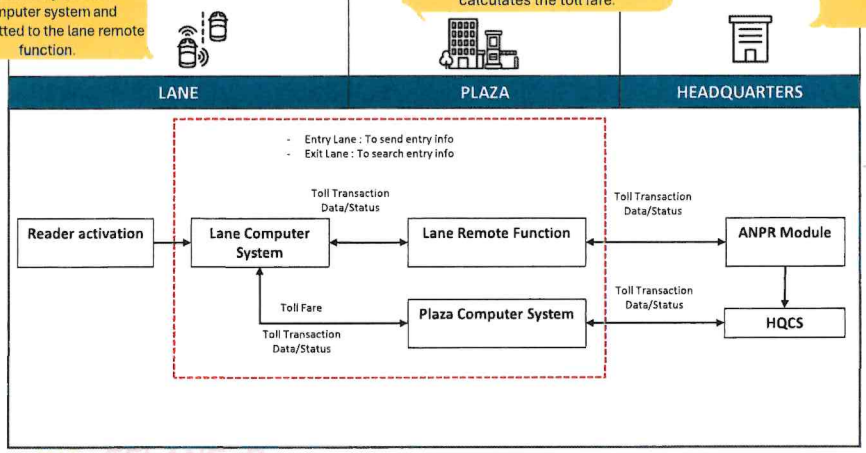
A member of UEM XENDS

1. Concept **Lane Remote Function**

Vehicle information will be captured by the lane computer system and transmitted to the lane remote function.

The plaza computer system receives toll transaction data from the lane remote function and calculates the toll fare.

Toll transaction data is further forwarded to the headquarters computer system (HQCS) for centralized processing and storage in the TIS staging area



Process Flow

The diagram illustrates the process of toll collection and data management at toll plaza. Upon entering, vehicles trigger reader activation, initiating the toll transaction process.

21

21

EXPLAINATION OF PROJECT OUTCOME/RESULT

INNOVATION IMPLEMENTATION PROCESS

A member of UEM XENDS

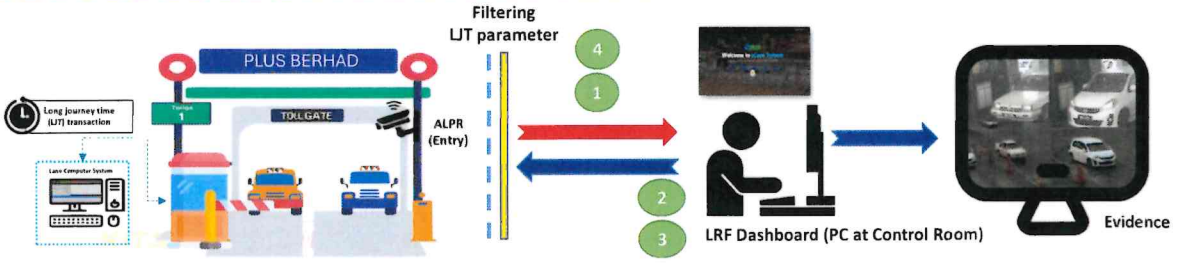
1. Concept

Definition Long Journey Time (LJT) : The time travelled between entry and exit plazas that exceeds the maximum allowable time (but <20 hours)

1. ***LJT Type 1 :*** *Exceeding the LJT parameter with a valid reason – no penalty*
   ** Date, Time, Plaza Entry, Lane Entry, Journey Time*
2. ***LJT Type 2 :*** *Exceeding the LJT parameter without valid reason – penalty charge is imposed*

Conceptual Diagram

1. *LJT Event Pop-up at LRF Dashboard Exit Plaza*
   * Date, Time, Plaza Entry, Lane Entry, Journey Time
2. Supervisor will manually **search entry image** from LRF dashboard (Image retrieve from ALPR captured at Entry)
3. Supervisor will validate and **decide on the action**
4. The LRF system uses travel **time parameters** to detect and filter out suspected toll manipulation



22

22

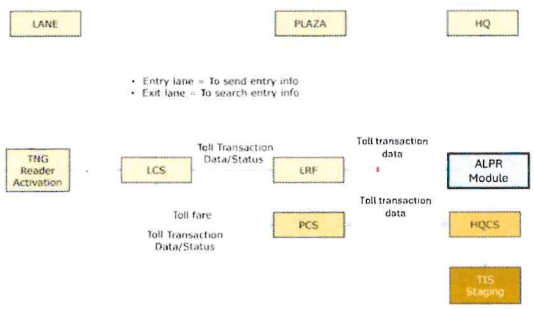
EXPLAINATION OF PROJECT OUTCOME/RESULT

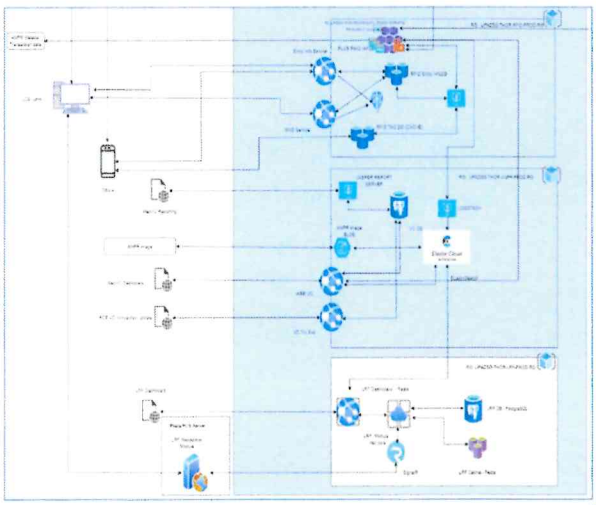
INNOVATION IMPLEMENTATION PROCESS

A member of UEM XENDS

2. Design — Lane Remote Function

Lane Remote Function Architecture





Automatic license plate recognition (ALPR) module is integrated into the system to **capture vehicle information** and **assist in toll enforcement**. This system ensures efficient toll collection, data integrity, and centralized oversight for toll plaza operations.

23

23

EXPLAINATION OF PROJECT OUTCOME/RESULT

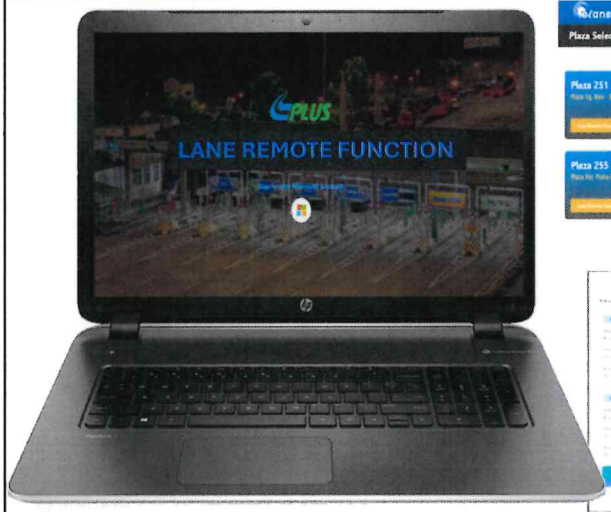
INNOVATION IMPLEMENTATION PROCESS

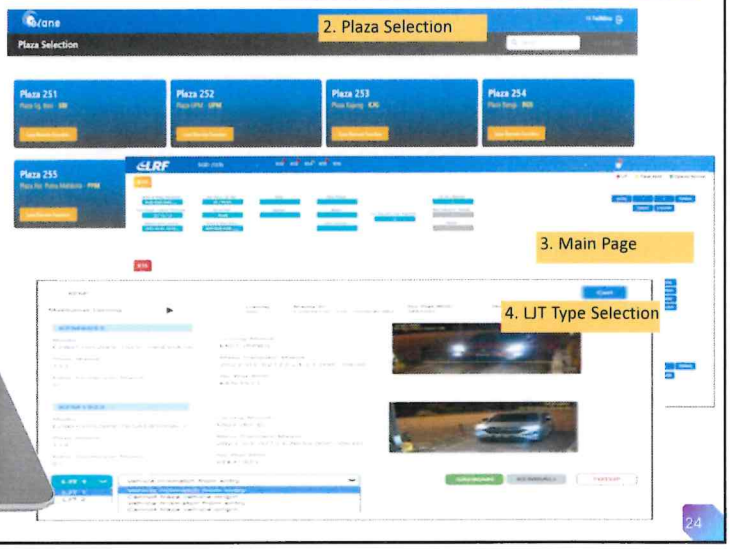
A member of UEM XENDS

3. Software Development

Client Software Installation

Lane Remote Function Dashboard





24

24

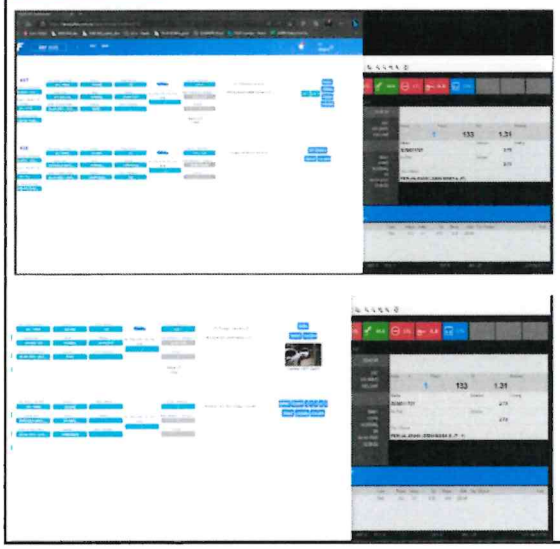
EXPLAINATION OF PROJECT OUTCOME/RESULT

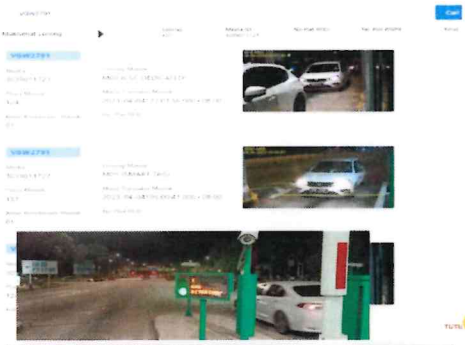
INNOVATION IMPLEMENTATION PROCESS

A member of UEM XENDS

4. Testing

Testing Client Software : Pilot Test at Bertam & Sungai Dua Toll Plaza





Pilot test conducted at Toll Plaza Bertam (BRT). The deployment was done via:

i. Online Microsoft Teams
ii. Onsite at BRT TP

25

25

EXPLAINATION OF PROJECT OUTCOME/RESULT

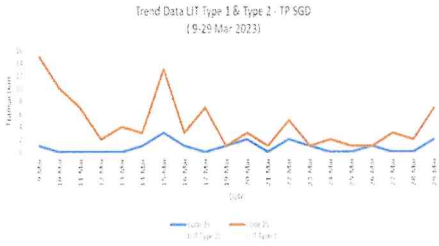
INNOVATION IMPLEMENTATION PROCESS

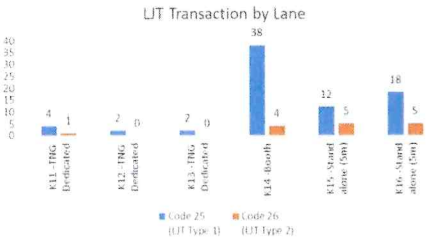
PLUS X — A member of UEM XENDS

4. Testing — Testing and Data Collection : Pilot Test at Bertam & Sungai Dua Toll Plaza

Data LJT TP SGD (9 - 29 Mar 2023)

Week	Date	Code 25 (LJT Type 1)	Code 26 (LJT Type 2)	Total
Week 1	9-Mar	14	1	15
	10-Mar	10		10
	11-Mar	7		7
	12-Mar	2		2
	13-Mar	4		4
	14-Mar	2	1	3
	15-Mar	10	3	13
week 2	16-Mar	2	1	3
	17-Mar	7		7
	19-Mar		1	1
	20-Mar	1	2	3
	21-Mar	1		1
	22-Mar	3	2	5
Week 3	23-Mar		1	1
	24-Mar	2		2
	25-Mar	1		1
	26-Mar		1	1
	27-Mar	3		3
	28-Mar	2		2
	29-Mar	5	2	7
Total		76	15	91
%		84%	16%	100%





Team has monitored the pilot test closely. After 3 weeks observation, there are **91 LJT transaction** recorded at SGD with **16%** of it decided as LJT Type 2 (Penalty);

It was also observed that the 90% LJT transaction occurs at multiclass lane, as expected

26

26

EXPLAINATION OF PROJECT OUTCOME/RESULT

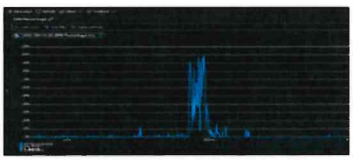
INNOVATION IMPLEMENTATION PROCESS

PLUS X — A member of UEM XENDS

4. Testing — LRF Pilot Test Issue: Issues Arising During Pilot Test

4.0FINDINGS

1. After checking the module at Azure, TERAS have narrow down the issues to the Azure App service and some application logic that required some enhancement.
2. Steps that have been done
   a. Upscale the Azure App Service due to CPU spike usage



   b. Enable auto-scale option
      i. Increase app service instance by 1 if CPU > 70%
      ii. Decrease app service instance by 1 if CPU < 20%
      iii. Min instance count = 2

Deployment at BRT was unsuccessful, potential suspect due to network connectivity

Issue 01 — **Network Connectivity**
Unstable network connectivity

Issue 02 — **Button Command / Function**
Button commands/functions are malfunctioning and responding slowly.

Issue 03 — **Notification Bell**
The notification bell is not functioning as intended

27

27

EXPLAINATION OF PROJECT OUTCOME/RESULT

INNOVATION IMPLEMENTATION PROCESS

A member of UEM XENOS

4. Testing — Analysis of Design Effectiveness – Process Decision Program Chart (PDPC)

No.	ISSUES	IMPROVEMENT	RISK	CORRECTIVE ACTION
1.	Network Connectivity	1. Establish an alternative to fiber optics and IP VPNs for network redundancy 2. Optimized bandwidth consumption.	Operational Disruptions: Slow connections can disrupt critical systems' operation, resulting in downtime.	1. Enhance network and hardware redundancy at all toll plazas with TIME Managed Mesh Optical Connectivity (MMOC) 2. Avoid consuming unnecessary bandwidth with background applications / activities.
2.	Button command/ function in LRF Dashboard – slow performance	To ensure that a system maintains optimal performance and does not become slow,	Lag or delays to validate the LJT transaction, leading to increase traffic congestion	Optimize the Code: Review and streamline the code to make it more efficient and reduce processing time.
3.	Notification Bell	To ensure the notification bell is loud and clearly audible when an LJT transaction is detected at the lane	Missed Alerts- TC may not hear the notification, leading to missed LJT transaction	Increase the volume setting And change to distinct sound: Use a more attention-grabbing sound for the notification bell

28

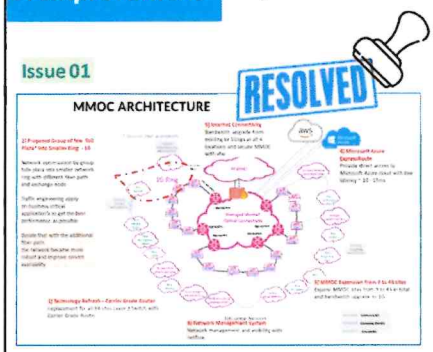
EXPLAINATION OF PROJECT OUTCOME/RESULT

INNOVATION IMPLEMENTATION PROCESS

A member of UEM XENOS

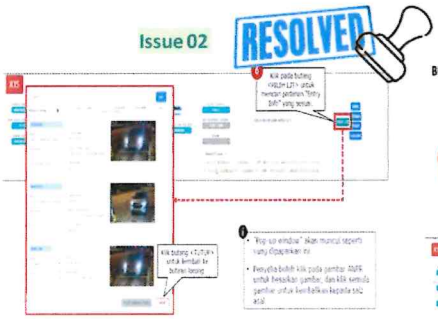
5. Improvement — Improvements Based on Issues Identified During Pilot Testing

Issue 01



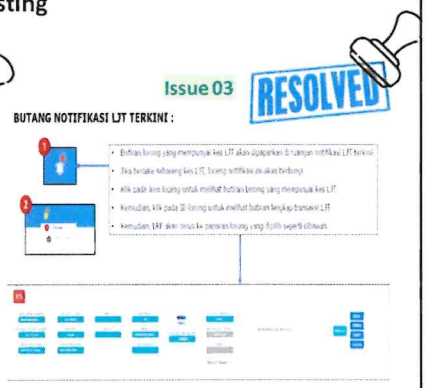
- MMOC expansion from 9 to 43 Sites
- Increase bandwidth from 300Mbps to 1Gbps

Issue 02



- Optimize the Code.
- Review and streamline the code to make it more efficient and reduce processing time.

Issue 03



- Increase the volume setting
- change to distinct sound: Use a more attention-grabbing sound for the notification bell

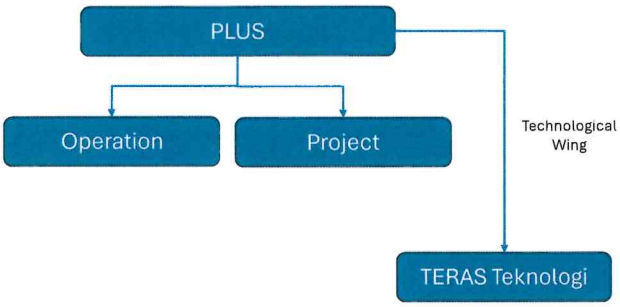
29

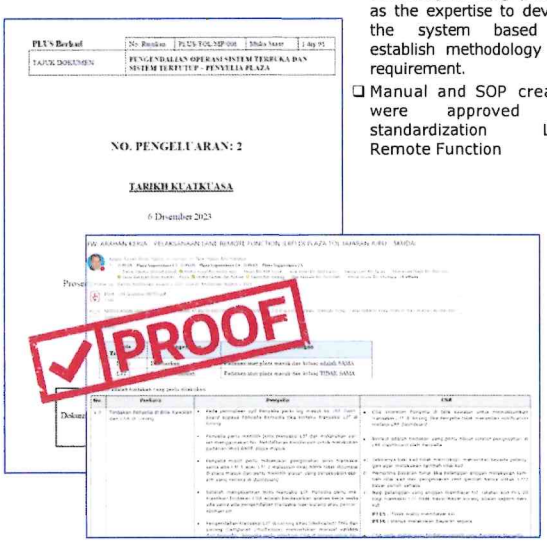
EXPLAINATION OF PROJECT OUTCOME/RESULT

INNOVATION IMPLEMENTATION PROCESS

A member of UEM Xenos

Documentation of the Innovation Project That Has Been Implemented





- Developed with the PLUS Technological Wing (TERAS) as the expertise to develop the system based on establish methodology and requirement.
- Manual and SOP created were approved for standardization Lane Remote Function

30

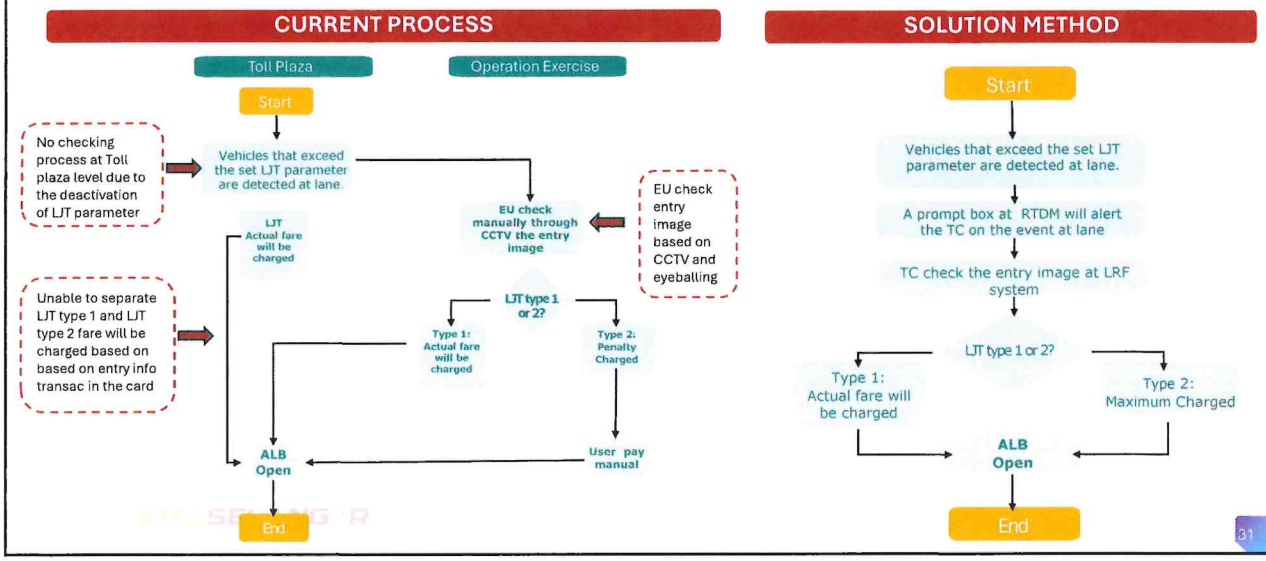
30

EXPLAINATION OF PROJECT OUTCOME/RESULT

BEFORE AND AFTER PROCESS

A member of UEM Xenos

FINAL CREATIVE METHOD : COMPARISON EXISTING PROCESS VS SOLUTION METHOD



31

31

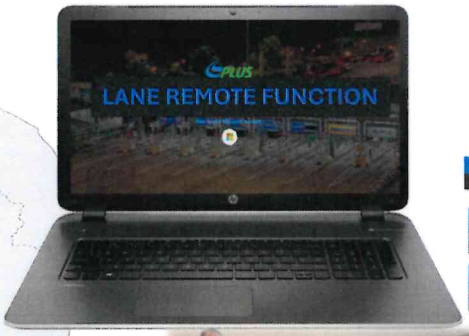
EXPLAINATION OF PROJECT OUTCOME/RESULT

TARGET GROUP AND SCOPE COVERAGE

A member of UEM XENOS

Lane Remote Function Implementation to the Entire PLUS Expressways

- ❑ Implemented at all 82 toll plazas (Close system)
- ❑ LJT parameter activation 24 hours
- ❑ Ability to identify fraudulent activity (EOC) on real time basis



82

Closed System Toll Plazas with LRF system

32

EXPLAINATION OF PROJECT OUTCOME/RESULT

TARGET GROUP AND SCOPE COVERAGE

A member of UEM XENOS

Replication: Deployment To Selected Toll Plazas

Date	Time	Section	Plaza	No. of Lanes	Lane No.
NORTHERN REGION					
10 July 2023	10.30 pm	N3	JRU	6	K11
					K12
					K13
					K14
					K15
					K16
11 July 2023	10.30 pm	N8	BTU	2	K05
					K06
			BTS	3	K01
					K02
					K03
12 July 2023	10.30 pm	N4	IWI	3	K07
					K08
					K09
			BBR	2	K01
					K02
13 July 2023	10.30 pm	N4	ALP	2	K07
					K08
			BKM	2	K03
					K04

Date	Time	Section	Plaza	No. of Lanes	Lane No.
SOUTHERN REGION					
24 July 2023	10.30 pm	S3	MAC	1	K04
		S4	SPR	2	K06
					K07
			SDK	1	K04
25 July 2023	10.30 pm	S4	KLI	2	K06
					K07
			SKD	4	K10
					K11
					K13
					K14
26 July 2023	10.30 pm	S4	SKD	6	K15
					K16
					K31
					K32
					K33
					K34

Date	Time	Section	Plaza	No. of Lanes	Lane No.
CENTRAL REGION (TEAM A)					
24 July 2023	10.30 pm	C1	IPS	6	K12
					K13
					K14
					K15
					K16
					K17
25 July 2023	10.30 pm	C1	SPP	4	K04
					K05
					K07
					K08
			GPG	3	K04
					K05
					K06
26 July 2023	10.30 pm	C1	TFH	3	K04
					K05
					K06
		C2	BDR	3	K07
					K08
					K09

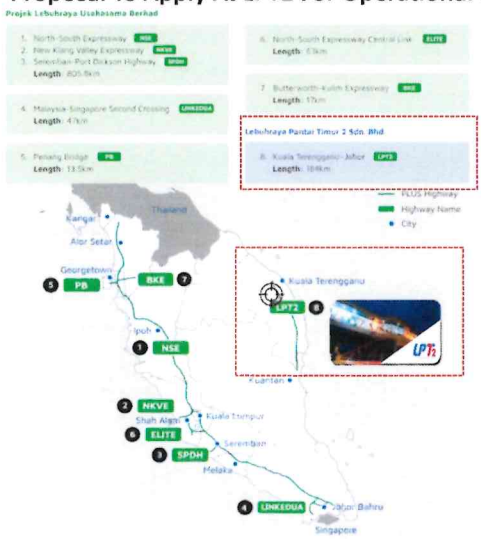
33

EXPLAINATION OF PROJECT OUTCOME/RESULT

TARGET GROUP AND SCOPE COVERAGE

A member of UEM XENDS

Proposal To Apply At LPT2 For Operational Consistencies



PROJECT REPLICATION

The implementation of the LRF system has been carried out in stages at selected toll plazas and LPT2 Sdn Bhd.

Discussion with LPT2 Team on the LRF Project Overview and benefit

Briefing to LPT2 Plaza staff on the introduction of LRF.

PLUS received a good feedback from the ground on the introduction of Lane Remote Function to reduce the toll manipulation.

34

34

EXPLAINATION OF PROJECT OUTCOME/RESULT

TARGET GROUP AND SCOPE COVERAGE

A member of UEM XENDS

Provides consultation to other highway concessionaires on the implementation of Lane Remote Function (LRF)

35

35

EXPLAINATION OF PROJECT OUTCOME/RESULT

SUMMARY OF ELEMENTS

A member of UEM Xenos

Explanation.. *Lane Remote Function*

Innovative & creative element	The first innovation project in Malaysia that uses the ALPR (Automatic License Plate Recognition) system to detect Exchange of Card activities
Effectiveness element	Reduction of LJT Type 2 cases at **99.83%** Reduction of cost utilization to **ZERO** during operation exercise
Significant element	Secured Revenue - **RM 67.2M** Customer Survey Index 2024 - **87%** Printing cost for toll violation form - **RM 1,360.80 /year** Operation Cost during Operation Exercise - **RM168,000/year**
Relevant Element	The impact of Lane Remote Function to Environment -reflects a significant positive effect on resource conservation, air pollution reduction, and energy savings

36

36

EXPLAINATION OF PROJECT OUTCOME/RESULT

CREATIVE AND INNOVATION ELEMENT

A member of UEM Xenos

Uniqueness Of Solution–The first innovation project on Malaysian highways

- The first innovation project in Malaysia that uses the ALPR (Automatic License Plate Recognition) system to detect Exchange of Card activities

MINIMAL RESOURCES REQUIRED

i. *No additional manpower and logistics required*
ii. *Only Supervisor require to validate the transaction*

SEAMLESS OPERATION

i. *Remote validation by Supervisor in the control room*
ii. *Real-time.*

AUTOMATION

i. *Utilized the existing ALPR Lane Camera (low capex)*
ii. *Leveraging the latest technology*
- Such as Cloud and IOT technologies

MINIMAL TRAFFIC DISRUPTION

i. *Filtration is done using journey time to minimize the manual validati on process*
ii. *Back-end process*

EVIDENCE

i. *Able to generate photos as evidence at the Entry TP in case of challenge by users.*

To be further commercialize to other highway operator in Malaysia

37

37

EXPLAINATION OF PROJECT OUTCOME/RESULT

EFFECTIVENESS ELEMENT

A member of UEM XENDS

Achievement Of Lane Remote Function

TARGET ACHIEVEMENT

1. Reduction of LJT Type 2 cases at 99.83%
2. Reduction of cost utilization to ZERO during operation exercise

38

EXPLAINATION OF PROJECT OUTCOME/RESULT

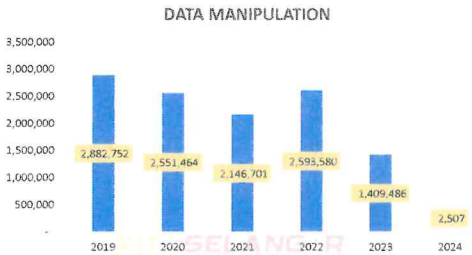
EFFECTIVENESS ELEMENT

A member of UEM XENDS

Assessing Solution Performance

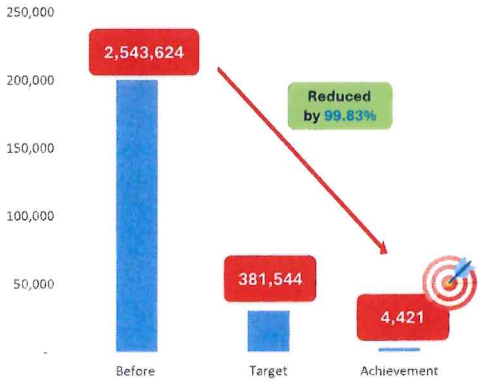
TOTAL TOLL MANIPULATION CASES

Year	Data Manipulation
2019	2,882,752
2020	2,551,464
2021	2,146,701
2022	2,593,580
2023	1,409,486
2024	4,421
Total	**11,588,404**



PROJECT ACHIEVEMENT

2,543,624-4,421 = 2,539,203
(2,539,203/2,543,624) x 100 = 99.83%



Total toll manipulation reduced by 99.83% Operation

ENDORSEMENT

Nor Haidi Yahaya
Head of IoS
Projek Lebuhraya Usahasama Berhad
norhaidi@kplus.com.my

DATA SOURCE:
Toll Department

39

EXPLAINATION OF PROJECT OUTCOME/RESULT

EFFECTIVENESS ELEMENT

A member of UEM XENDS

Assessing Solution Performance

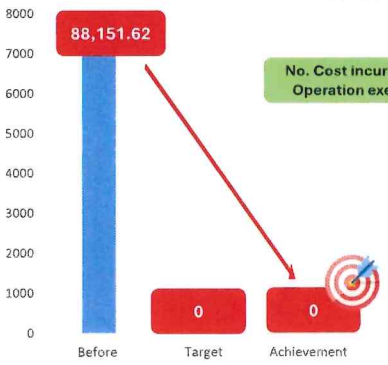
TOTAL OPERATION EXERCISE CONDUCTED AND COST UTILIZATION

Year	No.of Ops	Total Ops Cost utilization (RM)
2019	7	50,032.00
2020	Covid	
2021	10	71,474.29
2022	20	142,948.57
2023	12	85,769.14
2024	0	-
Total	**49**	**350,224.00**

PROJECT ACHIEVEMENT

Project Achievement:
ZERO cost utilization on Operation exercise

Total Ops Cost Utilization reduced by RM 0



DATA SOURCE:
Toll Department

40

40

EXPLAINATION OF PROJECT OUTCOME/RESULT

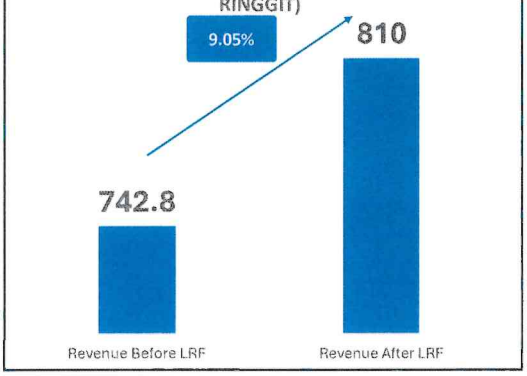
SIGNIFICANT ELEMENT - COST REDUCTION AND OPERATIONAL EXERCISE

A member of UEM XENDS

Reconciliation of target and actual achievement were made (cost incurred explained).

SECURED REVENUE

AVERAGE MONTHLY REVENUE BEFORE AND AFTER LRF IMPLEMENTATION (MILLION RINGGIT)



REVENUE BEFORE IMPLEMENTATION	RM 742.8M
AFTER AFTER IMPLEMENTATION	RM 810.0M

SECURED REVENUE

RM +67.2 M

RM 810 M – 742.8 M

41

41

EXPLAINATION OF PROJECT OUTCOME/RESULT

SIGNIFICANT ELEMENT

A member of UEM XENDS

Source :
Company Scorecard (Y2024 Vs Y2023)

Y2024	Thold	Base	Stretch	YTD Result	Achievement
Toll plaza management	79	83	87	87	Stretch
Y2023	Thold	Base	Stretch	YTD Result	Achievement
Toll plaza management	79	81	85	87	Stretch

CUSTOMER SURVEY INDEX

PLUS initiate the Customer Survey Index (CSI) to gauge the **level of satisfaction of customers in using the PLUS Berhad highways** in relation to customers experience, and most importantly in regard to issues relating to safety, convenience and comfort.

CUSTOMER SURVEY INDEX RESULT Y2024

87%

Y2024 Vs Y2023 CSI Result:
The KPI results for both last year and this year have remained consistent, demonstrating steady performance

42

42

EXPLAINATION OF PROJECT OUTCOME/RESULT

SIGNIFICANT ELEMENT - COST REDUCTION AND OPERATIONAL EXERCISE

A member of UEM XENDS

PRINTING COST FOR TOLL VIOLATION FORM

Average Cases/Month	**378** *Cases*
Toll Violation Form Usage/Exercise	**3** *Pages*
Form Usage/Year	**13,608** *378 x 12 Month x 3 Pages*
Printing Cost	**RM 0.10** *Per page*
Total Saving	**RM 1,360.80** *Per year*

OPERATION COST DURING OPERATION EXERCISE

Average Operation Exercise Cost	**RM 7,000** *Cost Logistic and Manpower*
Total Violation Exercise/Mont	**2** *Activity/Month*
Cost Operation/Month	**RM14,000** *RM 7,000 x 2 activity/ Month*
Cost Operation/Year	**RM168,000** *Cost per year*
Total Saving	**RM168,000** *Per year*

* Based on the achievement, the total saving as below :

TOTAL SAVING

RM 169,360.80
Per year

ENDORSEMENT

Nor Haidi Yahaya
Head of Toll
Projek Lebuhraya Usahasama Berhad
norhaidi@plus.com.my

43

43

EXPLAINATION OF PROJECT OUTCOME/RESULT

SIGNIFICANT ELEMENT - COST REDUCTION AND OPERATIONAL EXERCISE

A member of UEM XENOS

OVERALL SAVING

SECURED REVENUE

RM 67.2 M *Per Year*

SAVING FROM OPERATING AND PRINTING COST

RM 169,360.80 *Per Year*

OVERALL PROJECT SAVING

RM 67,369,360.80 *Per Year*

Notes:
Cost/secured revenue = 0.02 years
0.02 years x 365 days = 7.3 days
~ 7 days

44

44

EXPLAINATION OF PROJECT OUTCOME/RESULT

RELEVANT ELEMENT

A member of UEM XENOS

The impact of Lane Remote Function to Environment

Saving **13,608** Pieces of paper

Saving **223.5 Kg** usage of tree usage

Reduction of CO2 emissions by **554 Kg** CO^2 equivalent

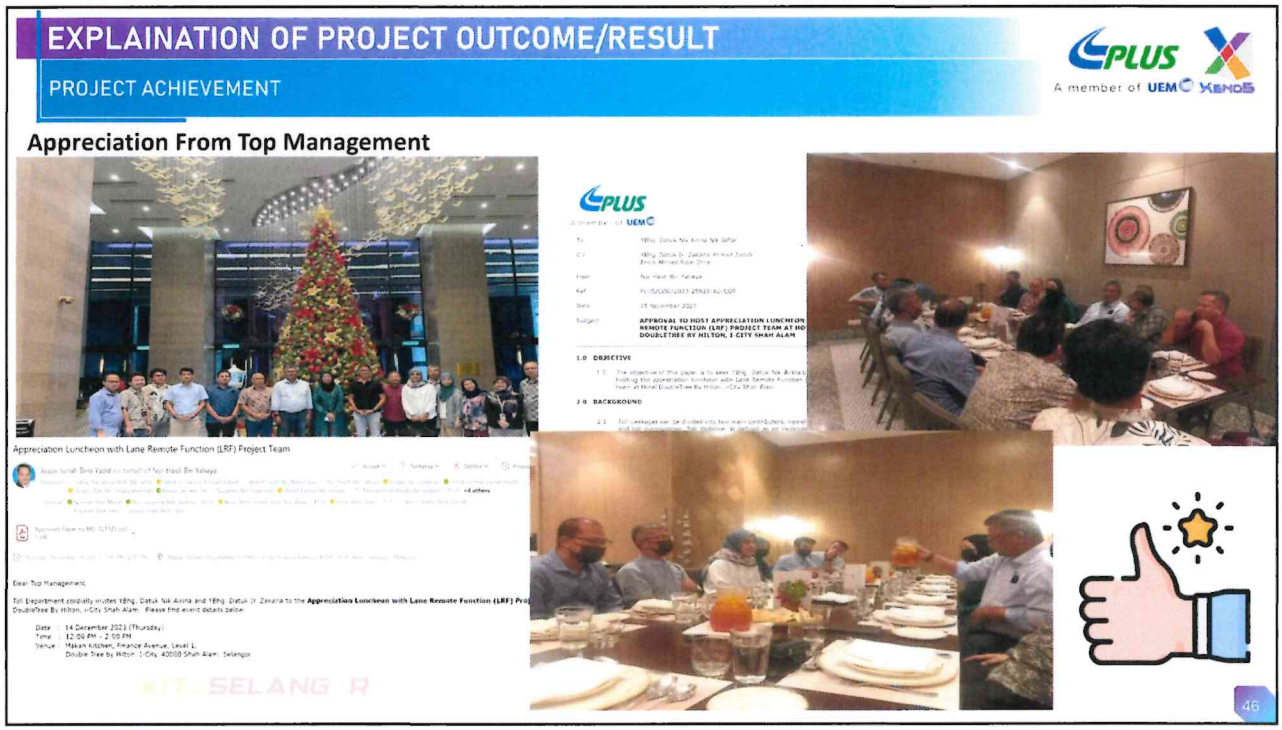
Reduction in Nox emissions by **14.90** equivalent per meter.

Energy savings of **1.2 million BTUs**

This reflects a significant positive effect on resource conservation, air pollution reduction, and energy savings.

45

45


EXPLAINATION OF PROJECT OUTCOME/RESULT
PROJECT ACHIEVEMENT
A member of UEM
Appreciation From Top Management
Appreciation Luncheon with Lane Remote Function (LRF) Project Team
46

46

EXPLAINATION OF PROJECT OUTCOME/RESULT
PROJECT ACHIEVEMENT
A member of UEM
Team profile background – Team Profile History
Registration of Team
17-26 January 2024
Jom Daftar
Anda ada idea projek penambahbaikan/inovasi?
Mari sertai program PLUS Team Excellence (PTE) 2024
Statistik Tahun 2023
Kategori Projek:
WINNER
Project Idea Presentation Session 2025
Project Pitching
15 February 2024
2024 PTE Pitching Session
"Pushing the Limits of Innovation with PLUS Team Excellence"
Bertam Training Room, PLUS Training Centre
15 February 2024 (Thursday)
Program Schedule
8.45 a.m - 9.15 a.m Registration
9.15 a.m - 9.25 a.m Opening Remarks by OQA
9.25 a.m - 9.35 a.m Opening Speech by Panel Judges
9.35 a.m - 10.40 a.m Teams Presentation
Tea Break
Teams Onboarding & Program Roll Out
18 Mac 2024
PTE 2024
Sesi Pembentangan Idea Projek
Kumpulan Inovatif & Kreatif (KIK)
Selamat Maju Jaya!
APPROVED

47

EXPLAINATION OF PROJECT OUTCOME/RESULT

PROJECT ACHIEVEMENT

A member of UEM XENOS

Primer Award Overall Champion & Winner In Service Sector ICC Malaysia 2024

48

EXPLAINATION OF PROJECT OUTCOME/RESULT

PROJECT ACHIEVEMENT

A member of UEM XENOS

Appreciation From Top Management

49

49

EXPLAINATION OF PROJECT OUTCOME/RESULT

FINANCIAL IMPACT

A member of UEM XENDS

COST BENEFIT ANALYSIS

DEVELOPMENT COST

RM 1.2M

PAYBACK PERIOD

$$\frac{\text{RM 1.2M}}{\text{RM 67.2M}} = 0.02 \text{ Year} \approx 7 \text{ Days}$$

ROI

$$\frac{\text{RM 67.2M} - \text{RM 1.2M}}{\text{RM 1.2M}} \times 100 = 5{,}500\%$$

Notes:
Cost/secured revenue = 0.02 years
0.02 years x 365 days = 7.3 days
~ 7 days

50

50

51