



# PROCEEDINGS OF 5<sup>th</sup> MILTC 2023

MITRANS INTERNATIONAL  
LOGISTICS AND TRANSPORT  
CONFERENCE

20<sup>th</sup> DECEMBER 2023  
DEWAN SIVIK, PETALING JAYA CITY COUNCIL

**“TRANSPORT AND LOGISTICS IN  
EDUCATION FOR COMMUNITY”**

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# **PROCEEDINGS OF 2023 MITRANS INTERNATIONAL LOGISTICS AND TRANSPORT CONFERENCE (MILTC2023)**

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## PREFACE

The MITRANS International Logistics & Transport Conference (MILTC) has been an annual event since its inception in 2016. The fifth edition, MILTC2023, took place on 20<sup>th</sup> December 2023, at the Dewan Sivik, Petaling Jaya City Council, Selangor. The conference was organized in collaboration with several partners, including Majlis Bandaraya Petaling Jaya (MBPJ), Research Nexus in Transport and Logistics, ReNeu UiTM; Trisakti Institute of Transport and Logistics (ITL) from Indonesia; and the Chartered Institute of Transport Malaysia (CILTM) Selangor Section.

MILTC2023 featured two distinguished keynote speakers from academia and industry who shared their knowledge and experiences on the first day of the event. These speakers delivered insightful presentations that enriched the conference.

The conference received a total of 43 papers, which were selected for oral presentations during the two- day event. Authors from both industries and academia from Malaysia and Indonesia contributed to the conference by presenting their research findings, innovations, and technological advancements in the field of Transportation, Logistics, and Supply Chain.

The abstracts of all papers, along with a selection of full papers, are included in the conference proceedings. This publication aims to disseminate knowledge and contribute to the advancement of the field of Transport, Logistics, and Supply Chain within education while serving the community.

The organizing committee would like to express their sincere gratitude to the keynote speakers, secretariats from both MITRANS and MBPJ Learning City team (including academics, support staff, and students), the reviewers, and especially the authors and participants who made MILTC2023 a memorable event. The committee also acknowledges the support of the top management of MITRANS and UiTM in making the conference possible.

It is the committee's sincere hope that the Proceedings book will serve as a valuable resource for the advancement of knowledge in the field of Transport, Logistics, and Supply Chain.

### **Chief Editor**

**Associate Professor Ts. Dr. S Sarifah Radiah Shariff**

Deputy Director

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## MESSAGE FROM THE ADVISOR OF MILTC 2023




Assalamu'alaikum warahmatullahi wabarakatuh, Peace Be Upon You.

Dear Distinguished Guests and Conference Participants,

We sincerely congratulate the success of the 5th MITRANS' International Logistics and Transport Conference 2023 (MILTC2023) to the Malaysia Institute of Transport (MITRANS), Universiti Teknologi MARA (UiTM), and conference committee members. Emerging technological advances are having a huge influence on supply chain management, logistics, and even transportation sustainability. The logistics industry benefits the most from its broad usage of manual methods and vast amount of data to retain. As a result, adding new technologies such as artificial and augmented intelligence, advanced analytics, and automation appears to be fashionable, original, and intriguing.

In keeping with our conference subject, "Transport and Logistics in Education for Community", we are aware that technology is advancing at a rapid pace, resulting in new solutions and innovations. Industries that specialize in these sectors would have to adapt to the new expectations and standards or risk falling behind. bear in mind, however, that new business models and industry participants have also had a key role in contributing to the challenges, so bear in mind that it is not only new technology that will influence these sectors in the future.



I would like to express my heartfelt appreciation to all participation and partnerships in making this event a success. Not to mention our four distinguished keynote speakers: Yang Berbahagia Prof Ir. Dr. Ahmad Kamil Arshad, Director of Institut Kejuruteraan Infrastruktur dan Pengurusan Mampan (IIESM), UiTM Shah Alam and Tuan Tpr. Lee Lih Shyan (Pengarah Perancangan Pembangunan of Petaling Jaya Council (MBPJ)).

Furthermore, we hope that this platform helped to the development of a strong synergy between academics and business. Last but not least, the conference would not be possible without the papers submitted by authors, thus we appreciate their efforts and participation in the MILTC2023. Finally, on behalf of the organizing committee, I really hope that this one day conference will be fruitful and engaging for all of you, motivating you to continue doing high-quality research.

Thank you

**Professor Ts. Dr. Norazah Abd Rahman**  
Deputy Vice-Chancellor (Research & Innovation)  
Universiti Teknologi MARA (UiTM)

## MESSAGE FROM THE CHAIRPERSON OF MILTC 2023



Assalamualaikum Warahmatullahi Wabarakatuh  
and Good Day.

As the conference chairperson and on behalf of Malaysia Institute of Transport (MITRANS), Universiti Teknologi Mara (UiTM), I would like to extend a warm appreciation to all speakers, co-organizers, and participants of the 5th MITRANS International Logistics and Transport Conference.

We would like to offer our heartfelt appreciation to all of the attendees who have responded positively to this conference. For this conference, we got 43 papers (from both international and local participants, from academics as well as industry).

MILTC 2023 is an MITRANS project to encourage research findings sharing among players in the transportation, logistics, and halal supply chain through oral presentations and publications. The goals are to foster research in these disciplines and to allow the sharing of new ideas. It comprises plenary sessions, keynote speeches, and oral presentations on various themes.

We think that everyone attending this conference shares the goal of researching and comprehending current and cutting-edge topics in order to remain at the forefront of knowledge. As a result, we really hope that the knowledge gathered from this conference will serve as a springboard for further investigation into the possibility of new research agendas for the benefit of humanity. Thus, it delivers high-quality scientific information as well as essential networking opportunities for scholars from across the world.

Finally, we'd want to take this occasion to thank all MILTC 2023 committee members for their time and effort. MILTC 2023 would not be a reality without their endless effort and hard work. Many thanks also to the co-organizer, UiTM management, and everyone else who helped make this conference a success.

Finally, we wish you a successful career ahead. Thank you.

**Associate Professor Madya Ts. Dr. S Sarifah Radiah Shariff**  
Chairperson Of MILTC 2023,  
Malaysia Institute of Transport (MITRANS) Universiti Teknologi MARA (UiTM)



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## THE FEATURES OF THE UNIFIED INTERGRATED ASSET MONITORING SYSTEM FOR MONITORING MULTIPLE TYPE OF ROAD ELECTRICAL ASSET

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### Abstract

Road Assets monitoring systems allow personnel to monitor real-time performance of asset and fault management detection. This article determines the characteristics of a unified integrated monitoring system to allow multiple type of asset with different roles to be easily monitored. The approach will allow easy data collection, group monitoring, overall asset assessment and method for open integration for multiple road electrical assets. From the analysis of findings, we propose a key concept and criterion of a Unified System which are categorized from similar field and functions which allow easy monitoring. Three major factors include Types of Assets, various Sources of Supplier Brands and Easy Maintenance. The implication of this study holds a significant value which supports smart city initiatives, enhances road safety, and optimizes asset management. The adoption of a unified system can improve urban infrastructure efficiency in real time asset downtime and decision-making. Moreover, efficient maintenance practices can be implemented by having the right monitoring system and contribute to more effective road network and aligning with urban development ultimately providing safer with more efficient road networks. The exploration of study offers fresh insights into an integrated and unified monitoring system adding value to stake holders especially road maintenance organization about the potential benefits and implications of similar systems, ultimately contributing to more efficient, safer, and technologically advanced road infrastructure.

**Keywords:** unified system, integrated asset system, asset management system, smart city infrastructure, road monitoring system

### Introduction

With the presence of industrial revolution 4.0, technologies have moved to a web based or internet of things architecture system, providing opportunities for improved asset monitoring and management practices. The emergence of many monitoring software and programs have indeed benefited various organization including road infrastructure managers or any kind of asset manager and asset management organization. The real time status of asset viewing, or asset controlling have become more convenient and efficient with access



through mobiles and laptops have also made it easier for managers to monitor assets remotely and make informed decisions in a timely manner. For road infrastructure managers or organizations, the use of an electrical asset monitoring system becomes crucial in ensuring the proper functioning of street lighting and traffic signal as well as other related road assets.

However, with the wide range of road assets suppliers and their diverse monitoring and management requirements, the technology has become more complex and fragmented. Different systems are built to cater for each function, which results in inefficiencies and difficulties in management, data integration and analysis. For instance, potholes or road damage should not be in a different category than pavements and drainage, electrical system should include cable management, traffic lights and street lightings together, while signage and markings should be concurrently to provide optimum road efficiencies. Asset monitoring and asset management on the other hand should be under in one arch of a system, having different systems and different applications or software will result in lower productivity, increased costs, and a lack of cohesive decision-making.

A unified integrated asset monitoring and management system is a solution to address the challenges posed by the complex and fragmented nature of road infrastructure assets, especially electrical assets. Unified integrated asset monitoring systems play a vital role in the effective management of multiple types of road assets which will immensely be beneficial in terms of various suppliers, efficiency, cost savings and decision-making. Organization of road infrastructure managers will deeply benefit from having a unified system that consolidates all asset monitoring and management functions into one cohesive framework. Therefore, the research aims to define the features of a unified integrated asset monitoring and management system for road electrical assets.

## **Methodology**

### ***Differentiating the Term Unified System and Centralized Systems***

To define the unified characteristics of a road asset management system, it is essential to consider the integration and cohesion of various functions within the system. A unified system in road asset management consolidates diverse aspects such as monitoring, data analysis, and decision-making into a cohesive framework. This type of unified integration allows for seamless interaction between different components, leading to improved efficiency, cost-effectiveness, and decision-making processes (Ekpiwhre & Tee, 2018).

A unified system is also a framework which allows multiple different complex systems to be in one architectural framework. For instance, three different systems developed by different vendors, using different technology sensors to monitor only the identical type of asset, then to be put together into a system is called a unified system.

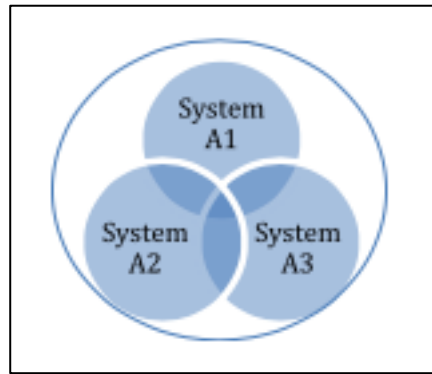


Figure 1: Illustration to express a unified system.

In contrast, a centralized system typically involves the concentration of control or decision-making processes in a single location or entity. While a centralized system may have a single point of control, it may not necessarily integrate various functions or components into a unified framework. Centralized systems can be effective in streamlining decision-making processes but may lack the comprehensive integration and cohesion found in unified systems (Qu et al., 2019).

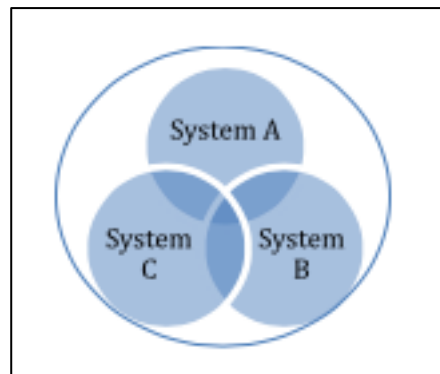


Figure 2: Illustration to express a Centralized system.

The differences between a system with unified features and a centralized system lie in the level of integration, standardization, and coherence achieved within the system architecture. A unified road asset management system harmonizes diverse functions and data sources into a cohesive framework, facilitating standardized classification, decision-making, and understanding across various domains. On the other hand, a centralized system may centralize control but may not necessarily integrate functions into a unified framework, potentially leading to siloed operations and inefficiencies in managing road assets (Ekpiwhre & Tee, 2018).

A unified road asset management system combines various functions and data sources into a cohesive framework, enhancing efficiency, cost-effectiveness, and decision-making processes. Understanding the differences between a system both with unified features and a centralized system is crucial for road infrastructure managers to optimize asset management practices and ensure the effective maintenance and operation of road assets.

## Available Monitoring System

Monitoring systems can be an advantage to road management organizations such as city councils or governments as it allows real time viewing of assets and historical records of asset performance in a bird's eye view. Within road electrical assets itself traffic lighting and street lighting is an important type of asset criterion for monitoring.

The effective monitoring and management of street lighting assets is essential for maintaining the functionality and safety of road networks (Beccali et al., 2017). While in heavy traffic conditions, where green times become scarce and longer queues are formed, the monitoring of traffic light signals becomes even more crucial (Wang et al., 2023).

With saturated suppliers and many systems available in the market, it is hard to maintain optimum performance of a monitoring system for road maintenance organization for easy maintenance and management. Below is a table to understand a few various Malaysian suppliers for street lighting and traffic signals and their system can be used for organizations such as the Public Work Department or Local Council.

Table 1: Street Lighting Brands and its Monitoring System

	<b>Street Lighting Brand Name</b>	<b>Owned by</b>	<b>System Name</b>
Brand 1	Nikkon	Success Electronics & Transformer Manufacturer Sdn. Bhd. (SETM)	Intelligent Lamp Control System (ILCS)
Brand 2	Schredder	Straits Design Sdn. Bhd.	EXEDRA
Brand 3	Iwasaki	ELM Lighting Sdn. Bhd.	REACT

Table 2: Traffic Signal Brands and its Monitoring System

	<b>Traffic Signal Brand Name</b>	<b>Owned by</b>	<b>System Name</b>
Brand 1	Dyna	Dynamic Traffic Signal Sdn. Bhd.	REACT
Brand 2	PPK	PPK Technologies Sdn. Bhd.	PINTAS
Brand 3	Kaf	Kaf Idea Tech Sdn. Bhd.	EXAITS

Understanding the tables above, each supplier may have a different approach to handling or monitoring its assets and using different technologies or techniques. Additionally, hardware devices used on site may differ, some may use PLC or Power Line Control, NEMA socket technology or NBIOT as their IOT network communication system.

In the perspective of road organization, handling multiple systems is ineffective and adopting only one type of system is breaking the competitive advantages of technology. A method of integration can be developed to ensure optimal monitoring and management of

assets which allow different technologies to be in a unified framework. The unified system characteristics need to be organized in a structural way to ensure the objective and main features of monitoring and management system can be idealized.

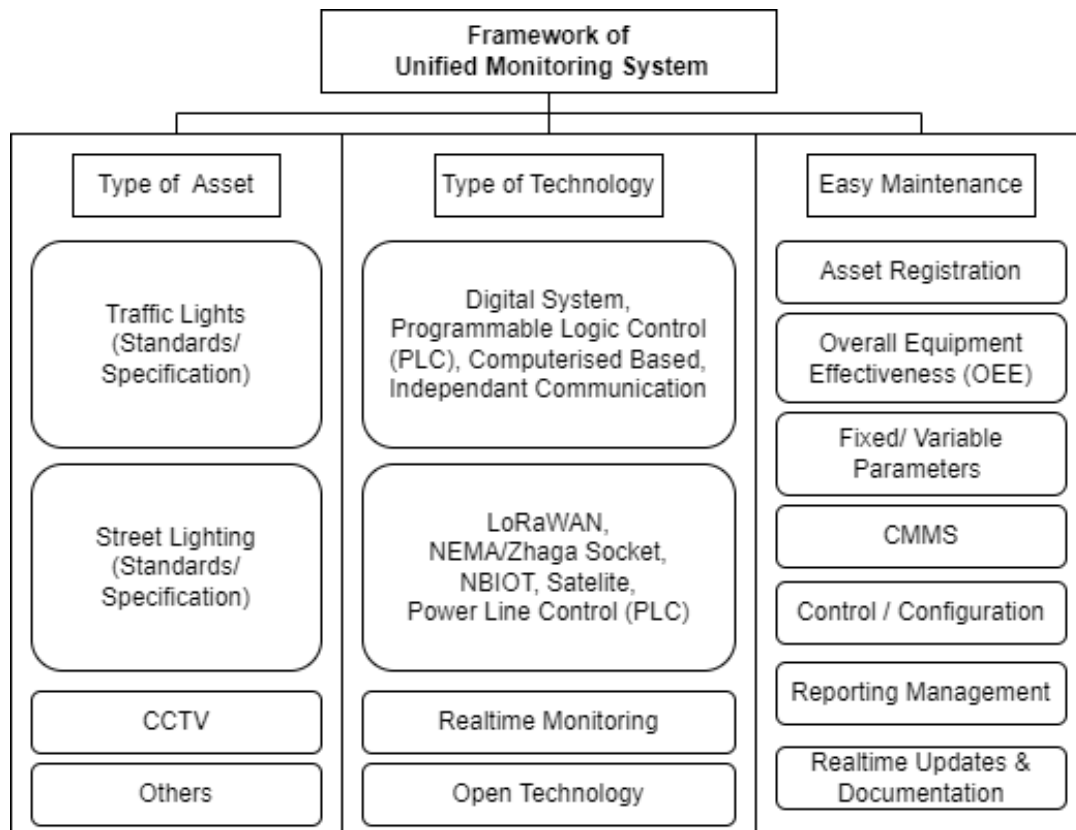
## **Results and Discussion**

### ***Proposed Architecture Framework from Public Work Department of Selangor, Malaysia Unified System and Integration***

The proposed framework was captured by a system implemented in Public Work Department of Selangor, a federal organization which are responsible for managing road assets in State of Selangor, Malaysia. The system was called Road Electrical Asset Control & Telemetry (REACT) which monitors electrical assets especially traffic lights and street lighting in Realtime.

Based on its system framework implemented, they generalized into three major characteristics which will outline major features of a unified system which are Type of Asset, Type of Technology and Easy Maintenance. These assets categorization is important as it classify multiple type of assets into major categories and minor categories, while the different technologies used for monitoring cannot not be a barrier to the unified system as it operates openly and concurrently through the unified platform. The diverse technology used in REACT system helps to monitor various system including the old traditional system and latest technologies.

Easy maintenance on the other hand is an ongoing result of complex data management from asset profile registration and projection of Overall Equipment Effectiveness. The REACT system was not fully equipped with maintenance function as a major criterion that can ensure the longevity of a platform, but having an open integration approach is a major unified characteristic.

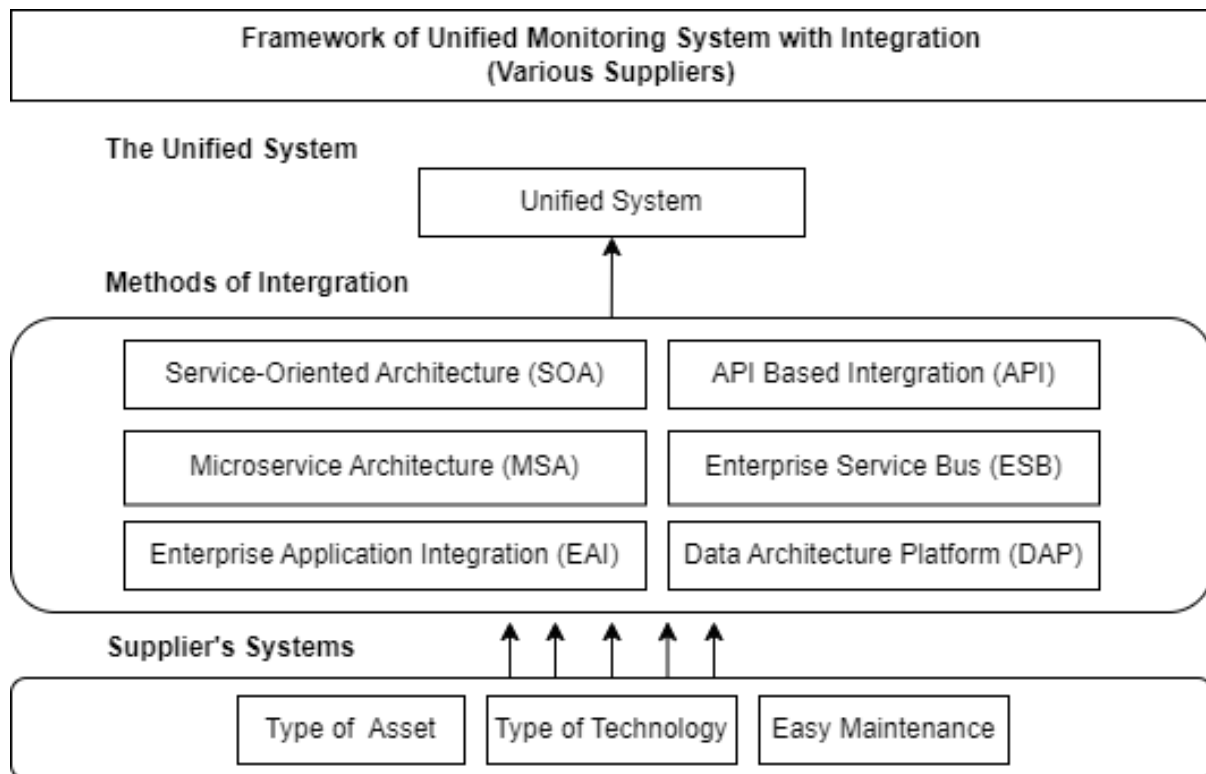


**Figure 3:** The Proposed Framework by Public Work Department of Selangor, Malaysia

Figure 3 shows the proposed framework implemented in REACT which are suitable for monitoring road electrical assets for traffic light and street lighting. Its major characteristics was classified into similar fields but opted for variables for technology. From a higher perspective, the final data appeared on the unified platform was more important to gather information from various assets rather than adopting only one technology system.

Assets such as traffic lights, street lighting or CCTV have diverse functionalities which integral to ensuring public safety, efficient traffic management, and effective surveillance. Leveraging this advanced technology implemented, including Neme, Zhaga, LoRa, NB-IoT, Zigbee, M2M cloud services, and other network protocols can facilitate seamless data communication and integration. Both street lighting and traffic light technology-approach emphasize the importance of these data utilization, enabling centralized monitoring and control for optimized performance.

Having multiple systems to monitor can be a challenge to the road maintenance organization such as Public Work Department. The approach made by Public Work Department of Selangor which create an integration method or path allowing other system to transfer data or standard message protocol into the unified system was a good plan.



**Figure 4:** The Proposed Integration Framework by Public Work Department of Selangor, Malaysia

Integration method used by PWD explain in Figure 4 was using a Message Que Telemetry Transport (MQTT) platform or API Based integration. MQTT is a messaging protocol used for machine-to-machine (M2M) communication. It's a publish/subscribe protocol that's designed to be lightweight and reliable and is often used for Internet of Things (IoT) devices. This approach allow data to be sent from various places or system into only to a single platform and responds vice versa.

## Conclusion

Data from various system is suitable with the various technologies used for street lighting and technology for traffic light. Only few systems allow control features and communication between other suppliers, but most have a restricted protocol to share. Some traffic light junctions can communicate within their respective controllers and some brands can communicate with other brands which give a leap advantage in integration. Other street lighting systems can communicate within few kilometers of range from main point, and some can only communicate through mesh network or few hundred meters point to point. This difference was unified with a standard set of information needed by the system and was identified early before integration.

In unified frameworks all is one, unity open integrated concepts and more sky view top view to the systems.

## Acknowledgements

This research owes a debt of gratitude to the Public Work Department (PWD) of Selangor, Malaysia for their extensive information sharing and meticulous system review, which have significantly enriched the depth and quality of this study. Their willingness to offer insights derived from onsite experiences has enriched this research article with a nuanced understanding of the subject matter. This research stands as a testament to the collaborative efforts of the PWD whose invaluable contributions have undoubtedly elevated the knowledge of area.

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