New York City Transit
Department of Buses

REQUEST FOR INFORMATON (RFI) #: 494736

Vehicle Telematics and Data Analytics System (VTaDAS)

Reply Date: 2/5/2025

New York City Transit / MTA Bus (NYCT/MTAB), agencies of the Metropolitan Transportation Authority (MTA), are seeking to identify potential sources for developing, delivering, and maintaining a Vehicle Telematics and Data Analytics System for MTA's zero-emissions bus operations.

Purpose

This Request for Information is not a solicitation of actual bids, though bids may be solicited by means of a Request for Proposal (RFP) at a later date. The purpose of this RFI is to identify the most advanced technology to provide MTA's zero-emissions bus fleet with a high degree of success in monitoring and reporting. The solution must be capable of acquiring multiple data sources through existing electric-bus-components, APIs, interfaces (may include third-party). NYCT/MTAB is open to both newly developed and commercial off-the-shelf (COTS) systems. Proposers with systems successfully implemented in other transit/transportation properties are encouraged to respond.

Project Overview

For this RFI, the Vehicle Telematics and Data Analytics System (VTaDAS) is defined as a system that captures essential system data from an electric bus, analyzes, interprets, and generates notification reports. The primary business objectives for implementing the VTaDAS are provided in this RFI.

System Considerations

The proposer shall demonstrate a system that meets the following functional and operational criteria:

1. **Data Collection:**
    - **Real-time data acquisition:** Collecting and transmitting real-time data from multiple sources, including however not limited to CAN bus networks, GPS/GNSS, gyroscopes, multi-axis accelerometers, onboard diagnostics (OBD-II), and mechanical fault sensors.
    - **Data storage:** Storing data locally on the vehicle in case of network disruptions, with sufficient storage capacity to accommodate long-term retention.
    - **Data synchronization:** Ensuring seamless synchronization of data between on-vehicle and cloud-based systems.
    - Leveraging the existing mobile computing platform and cellular modem device from the Bus Customer Information System Bus Hardware Subsystem (Bus CIS BHS).
    - Use of container-based application(s) or services.
    - Reduction of on-board design complexity by allocating on-bus configuration functionality to the server.

2. **Data Analytics and Reporting:**
    - **Advanced analytics:** Utilizing advanced analytics techniques, such as machine learning and artificial intelligence, to extract insights from the collected data.
    - **Predictive maintenance:** Predicting potential failures and maintenance needs based on historical data and real-time sensor readings.
    - **Customized reporting:** Generating customizable reports based on various parameters, including time, location, vehicle performance, and driver behavior.
    - **Integration with existing systems:** Seamlessly integrating with existing NYCT/MTAB systems, such as maintenance databases and fleet management software.
3. **Vehicle Data:**
    - **Comprehensive data capture:** Capturing comprehensive vehicle data, including trip information, energy consumption, charging history, operating parameters, driver behavior, diagnostic messages, and mechanical fault data.
    - **Accurate time stamps and location data:** Providing accurate time stamps and location data using GNSS and other positioning technologies.
    - **Geofencing capabilities:** Defining virtual boundaries to monitor vehicle location and track compliance with route deviations or unauthorized areas.
4. **Charging Data:**
    - **Detailed charging information:** Tracking charging transactions, including energy transfer, charging method, charging station information, and charging duration.
    - **Charge cycle Analytics:** Analyzing charge cycles to optimize charging strategies and battery health.
    - **Integration with charging infrastructure:** Seamlessly integrating with the charging infrastructure to monitor charging status, manage charging schedules, and optimize energy usage.
5. **Energy Storage System (ESS) Data:**
    - **Real-time monitoring:** Monitoring the health and performance of the ESS in real-time, including individual pack/string status, state of charge, temperatures, current and voltage.
    - **Predictive diagnostics:** Utilizing predictive diagnostics to identify potential issues with the ESS and prevent failures.
    - **Battery management:** Implementing advanced battery management algorithms to optimize battery life and performance.
6. **Operating Data:**
    - **Real-time monitoring:** Monitoring real-time operating data, such as state of charge, power consumption, vehicle speed, and driver behavior.
    - **Driver behavior Analytics:** Analyzing driver behavior to identify areas for improvement and enhance safety.

- **Operational efficiency optimization:** Providing insights to optimize operational efficiency, reduce energy consumption, and improve overall performance.

7. **Mechanical Fault Analytics:**
   - **Fault detection:** Acquiring data from onboard controllers and sensors through the CAN network to detect faults.
   - **Root cause Analytics:** Analyzing detected faults to identify common root causes and potential failures.
   - **Preventive maintenance:** Recommending preventive maintenance actions based on vehicle operation and identified fault patterns.
8. **Remote Dashboard:**
   - **User-friendly interface:** Providing a user-friendly interface for remote monitoring and management of vehicle operations.
   - **Real-time updates:** Displaying real-time updates on vehicle status, location, and performance.
   - **Alert notifications:** Sending alerts for critical events, such as low battery levels, maintenance issues, or safety concerns.
9. **Technical Specifications**

Data Collection:

- **Data collection frequency:** Minimum 1 Hz for critical parameters, higher frequencies for specific use cases (e.g., 10 Hz for propulsion system data).
- **Data accuracy:** Ensure data accuracy within specified tolerances.
- **Data synchronization:** Implement mechanisms for real-time data synchronization between on-vehicle and cloud-based systems.
- **Data security:** Employ robust security measures to protect data confidentiality and integrity.

Data Storage:

- **Storage capacity:** Provide sufficient storage capacity to accommodate at least 1 year of historical data.
- **Redundancy:** Implement data redundancy mechanisms to prevent data loss in case of hardware failures.
- **Data backup:** Regularly backup data to off-site storage.

Reporting:

- **Customizable reports:** Generate customizable reports based on user-defined parameters and templates, including generation of tables and graphs.
- **Data export:** Allow for data export in various formats (e.g., CSV, Excel, PDF).
- **Integration with existing systems:** Integrate with existing NYCT/MTAB reporting systems to streamline data Analytics and reporting processes.

Integration with Existing Systems:

- **API integration:** Provide well-documented APIs for integration with existing NYCT/MTAB systems, such as maintenance databases, fleet management software, and charging infrastructure.
- **Data exchange formats:** Support standard data exchange formats (e.g., RESTful APIs, SOAP) to ensure seamless interoperability.
- **Security protocols:** Implement robust security protocols to protect data during transmission and exchange.

10. **Evaluation Criteria**

The VTaDAS will be evaluated based on the following criteria:

- **Functionality and Features:** The system's ability to meet the specified requirements and provide additional value.
- **Scalability:** The system's ability to handle the growing size of the electric bus fleet and accommodate future expansions.
- **Reliability and Performance:** The system's reliability, accuracy, and speed of data collection, Analytics, and reporting.
- **Integration Capabilities:** The system's ability to integrate with existing NYCT/MTAB systems and infrastructure.
- **Security and Privacy:** The system's ability to protect sensitive data and ensure compliance with relevant regulations.
- **Cost and Maintenance:** The overall cost of the system, including hardware, software, and ongoing maintenance.

Background Information

NYCT/MTAB operates a vast transit bus network spanning all five boroughs of New York City, comprising around 6,000 buses across 28 bus depots. The service runs 234 local, 71 express, and 20 Select Bus routes continuously, 24/7, covering approximately 120 million miles annually.

The MTA is resolute in its commitment to combat climate change by transitioning to a 100% zero-emissions bus fleet by 2040, replacing diesel and CNG buses. This shift aims to significantly reduce greenhouse gas emissions, fostering cleaner air and a more sustainable and resilient transit system.

Passengers will benefit from a quieter, more peaceful ride, with zero-emissions buses reducing noise pollution and improving air quality. Additionally, these buses will be equipped with cutting-edge technologies, enhancing connectivity and accessibility for riders.

The MTA will accurately monitor the new zero-emissions fleet's operations, including maintenance and upkeep, to ensure optimal performance and longevity.

When preparing your submission, please review and address in writing your approach to the above requirements. Include a description of your company, a brief overview of your system, and a list of transit properties (if any) with contact information that are presently utilizing the system being offered, and answer the following questions:

General Questions

1. How does your VTaDAS system address the specific challenges and requirements of electric and zero-emissions bus operations?
2. What is your experience in deploying similar systems for large-scale transit fleets?
3. How does your system ensure data accuracy, reliability, and security?
4. What are the key differentiators of your VTaDAS compared to other solutions in the market?

Data Collection and Storage

5. How does your system collect data from various sources (CAN bus, GNSS, sensors, etc.) and ensure data integrity?
6. What is the data storage capacity and retention policy for your system?
7. How does your system handle data synchronization between on-vehicle and cloud-based systems?
8. How would your VTaDAS leverage the existing IOT (Internet of Things) platforms and cellular modem devices such as those associated with mobile computing systems?

Data Analytics and Reporting

9. What advanced analytics capabilities does your system offer, such as machine learning and artificial intelligence?
10. How does your system enable predictive maintenance and identify potential failures?
11. What types of reports can your system generate, and how customizable are they?
12. How does your system integrate with existing NYCT/MTAB reporting systems?

Vehicle Data

13. How does your system capture and analyze comprehensive vehicle data, including trip information, energy consumption, charging history, and driver behavior?
14. How does your system ensure accurate time stamps and location data?
15. How does your system handle geofencing and track vehicle compliance with route deviations?

Charging Data

16. How does your system track charging transactions and analyze charging cycles?
17. How does your system integrate with the charging infrastructure to manage and optimize charging operations?

Energy Storage System (ESS) Data

18. How does your system monitor the health and performance of the ESS in real-time?
19. What predictive diagnostics capabilities does your system offer for the ESS?
20. How does your system implement battery management algorithms to optimize battery life?

Mechanical Fault Analytics

21. How does your system detect and analyze faults using data from onboard systems?
22. How does your system identify common root causes of mechanical failures?
23. How does your system recommend preventive maintenance actions based on fault patterns?

Remote Dashboard

24. Please describe the customizable analytical and reporting features of your remote dashboard interface.
25. What real-time update and alert functionality does your dashboard provide?
26. How does your dashboard enable remote management and monitoring of vehicle (and charging) operations?

Technical Specifications

27. Please provide detailed technical specifications for your VTaDAS system, including hardware requirements, software architecture, and integration capabilities.
28. How does your system comply with relevant industry standards and regulations?
29. What is the estimated cost of implementation and ongoing maintenance for your system?

Container-Based Applications or Services

30. How does your VTaDAS leverage container-based technologies (e.g., Docker, Kubernetes) to improve scalability, portability, and manageability?
31. What are the benefits of using container-based applications or services for the VTaDAS?
32. How does your system ensure security and compatibility with NYCT/MTAB's existing infrastructure?

Product Demonstration

Potential vendors are invited to showcase their system through a demonstration for evaluation by NYCT personnel. This demonstration can take several forms, including:

- **Data Access:** Providing limited access to data and analytics collected from another EV operator's fleet to a designated subset of NYCT personnel for a specific timeframe (e.g., 2-4 weeks). NYCT acknowledges that this may require an agreement with the third-party fleet operator to ensure data privacy and security.
- **Simulated Data Demonstration:** Using simulated vehicle data to demonstrate the system's capabilities.

The demonstration should be structured to allow NYCT personnel ample time to independently explore the reporting and analytical functions. Vendors must provide a training session on the basic operation of the data browser and have personnel available during the demonstration period to offer support and answer questions.

Although demonstrations can be provided at zero-cost, please provide preliminary estimates for the cost of providing these services. Please specify the basis for the estimate and any exclusions.

Submissions should be sent to the address below no later than 2/5/2025.

New York City Transit

2 Broadway, Floor 19, Office B19.132

New York, NY 10004

Attn: Christian Zapata

Tel (646) 252-6013

If you would like to make your submission electronically, please send it to Christian.Zapata@nyct.com.