

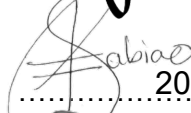


TRANSNET

freight rail

TECHNOLOGY MANAGEMENT SYSTEM REQUIREMENT SPECIFICATION

Real-Time Locomotive GPS Tracker

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DOCUMENT REVISION SHEET

Rev	Section(s)	Description	Release Date	Authorised
1.	All	Initial release	January 2025	Justice Ngwenyama
2.	5.8 Communication and Connectivity Requirements	Addition of cross border communication requirements	May 2026	Justice Ngwenyama

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1 System Purpose

This system is being developed to support Transnet Freight Rail (TFR) in its train scheduling and planning by providing accurate and real-time tracking of locomotives within the TFR operating corridors. This is to ensure optimal asset utilisation and efficiency, which has been hindered due to the unreliable availability of existing tracking systems caused by maintenance issues, excessive equipment swap-outs in locomotives, and component failures.

2 Scope

The system being developed shall be referred to as the "Real-Time Locomotive GPS Tracker." The system addresses the need for reliable real-time tracking of locomotives to enhance the performance of the TFR scheduling tool. The aim of the dedicated GPS tracking system is to provide continuous and accurate location data, essential for the TFR planning and rescheduling process by meeting the following requirements:

- Provide near real-time updates on locomotive locations.
- Maintain historical logs of locomotive movements.
- Integrate with other TFR systems through SOAP APIs.
- Enhance security by encrypting data transmissions and controlling access based on user roles.
- Be scalable to accommodate a growing number of locomotives and users.
- Operate reliably even in areas with communication dead spots by utilising multiple communication mediums and redundant components.

The system will cover TFR Corridors in South Africa, providing real-time tracking of locomotives nationwide. However, it will specifically track locomotives within the designated fleet and ensure that new locomotives introduced to the system are fitted with the GPS tracking system.

3 System overview

3.1 System context

The system for locomotive GPS tracking in the North Corridor consists of human and technological elements that interact to provide real-time tracking and monitoring capabilities. The system's primary function is to accurately determine the location of locomotives across the TFR network, enabling efficient operations, maintenance, and safety measures.

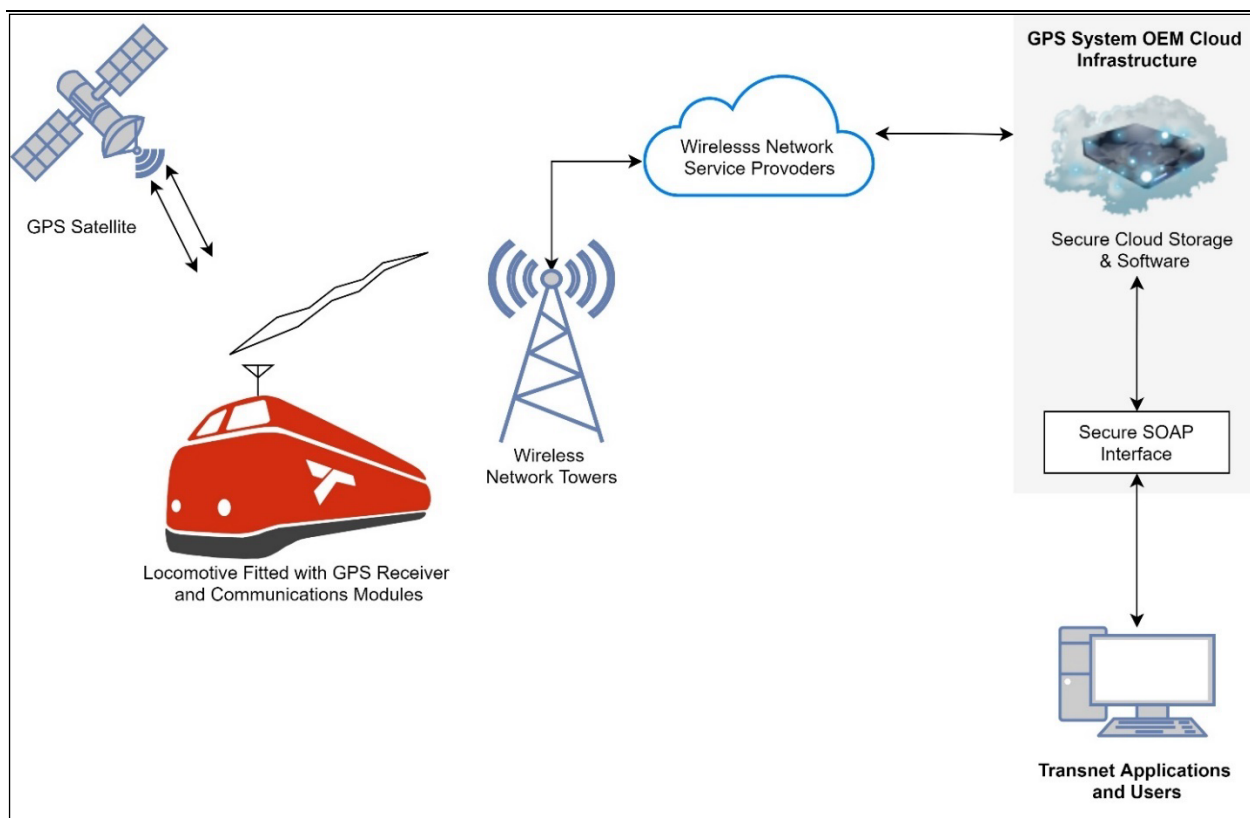


Figure 1: Real-time GPS system context diagram

The context diagram shows that the locomotive GPS tracking system consists of several interconnected components. Each locomotive is fitted with Global Navigation Satellite System (GNSS) GPS trackers and wireless communication modules that collect and transmit GPS location data. The GPS location data is transmitted via a wireless communication network such as cellular, satellite, IOT network, etc.

This GPS location data is received by the successful bidder cloud infrastructure, which consists of cloud servers and software applications used to process, store, and display the GPS location information. Additionally, the system interacts with external applications such as the TFR software applications/ users through a secure SOAP API.

4 Applicable documents

4.1 Transnet documents

Document Number	Title
BBH 7102 Version 1	Real-Time Locomotive GPS Tracker for the North Corridor
BBD 8188 Version 3	TRANSNET freight rail locomotive 19-inch rack
	Internal Track and Trace Technology Assessment for Plato Rail Rescheduling Requirements

4.1 External documents

Document Number	Title
Cenelec EN50155	Railway Applications: Electronic equipment used on Rolling Stock
Cenelec EN 50121-3-2	Railway Applications: Electromagnetic compatibility, Rolling stock apparatus.
CSE-1154-001-CAT E48 Version 2	Physical characteristic of the railway environment in south africa.

4.2 Abbreviations

API	Application Programming Interface
GPS	Global Positioning System
HTTPS	Hypertext Transfer Protocol Secure
JSON	JavaScript Object Notation
SaaS	Software as a Service
SAST	Standard South African Time
SLA	Service Level Agreement
SOAP	Simple Object Access Protocol
SUCCESSFUL BIDDER	Original Equipment Manufacturer
TFR	Transnet Freight Rail
UTC	Universal Time Coordinated
XML	Extensible Markup Language

5 Functional requirements

5.1 Real-time tracking

- 5.1.1 **SyS-REQ001:** The system shall record and display geographic coordinates latitude and longitude in decimal degrees format, refer to table 1 below.
- 5.1.2 **SyS-REQ002:** The GPS system must measure the GPS speed of the locomotive in real-time as per table 1 below.
- 5.1.3 **SyS-REQ003:** The system shall record timestamp of the location data as per table 1 below.
- 5.1.3.1 GPS date time: The time at which the location was sent (UTC+2).
 - 5.1.3.2 Received time: The time at which the sent location was received in the server. This is important to determine latency of transmission.
 - 5.1.3.3 Format: the timestamp shall be recorded in a standard format such as ISO 8601 (e.g., YYYY-MM-DD HH:MM:SS) (year-month-day hour:minutes:seconds).
- 5.1.4 **SyS-REQ004:** The GPS system shall have the capability to monitor the quality of positional data in real-time.
- 5.1.5 **SyS-REQ005:** The GPS system shall record and store positional data quality metrics along with positional data to support post-analysis.
- 5.1.6 **SyS-REQ006:** The GPS module's transmit interval shall be remotely configurable, with a default setting of 5 minutes.
- 5.1.6.1 The successful bidder must establish a formal process for reviewing and requesting API changes.
 - 5.1.6.2 All change requests must be submitted by TFR via a ticketing system to ensure proper documentation, evaluation, and approval.
- 5.1.7 **SyS-REQ007:** The transmission interval shall be configurable within a range of 1 minute to 15 minutes.
- 5.1.7.1 The transmission interval shall apply to stationary and moving including when the locomotives.

- 5.1.8 **SyS-REQ008:** The GPS tracking system shall provide real-time location information indicating the group of locomotives coupled together, referred to as a consist, at any given time during operation.
- 5.1.8.1 A consist is defined as a configuration of one or more locomotives coupled together to operate as a single unit.
- 5.1.8.2 A consist includes all locomotives in the arrangement regardless of their physical position (front, middle, or rear of the train).
- 5.1.9 **SyS-REQ009:** The cloud storage shall maintain a historical log of all location data for each locomotive, including all positional data points, for a minimum of 12 months.
- 5.1.9.1 The OEM shall remove any sensitive information that violate POPIA rules, including but not limited to:
- Personal data of locomotive operators or system users (e.g., names, employee IDs).
 - Login credentials and other user authentication data.
- 5.1.10 **SyS-REQ010:** The locomotive equipment shall be able to store 7 days of the latest measurements in device memory, in the case of a catastrophic failure of the device and/ or the locomotive to which it is installed (derailment).

5.2 Locomotive identification

- 5.2.1 **SyS-REQ011:** The system shall maintain a unique identifier (i.e., locomotive number) for each locomotive to enable accurate tracking of its location and operational status within the railway network.
- 5.2.1.1 The format of this unique identifier shall be defined and assigned by TFR.
- 5.2.2 **SyS-REQ012:** The locomotive number shall be a six-digit identifier based on the unique number assigned to each locomotive, refer to table 1 below.
- 5.2.3 **SyS-REQ013:** The first three digits represent the class (e.g., 21E), and the last three digits (e.g., 034) represent the specific locomotive number. For example:
- 5.2.3.1 If a locomotive is assigned the number 21E034, it shall be expressed as 021034.
- 5.2.3.2 If a locomotive is assigned the number 43D055, it shall be expressed as 043055.
- 5.2.4 **SyS-REQ014:** The system shall validate locomotive numbers against a central registry to prevent duplication leading to two locomotives reporting with the same number.

5.3 Minimum required reporting fields

The table the minimum reporting fields from the GPS tracking system.

Table 1: Minimum required reporting fields

Name	Unit of measure	Description	Example/ precision
Locomotive number	Text	Locomotive number	021034

Latitude	Decimal degrees (6 decimal places)	Latitude of GPS data	-26.194995
Longitude	Decimal degrees (6 decimal places)	Longitude of GPS data	28.043772
Speed	Km/h	2D ground speed	45 km/h
Position accuracy	Metres	Position accuracy estimate	5 meters
GPS date time	Date-time	GPS time location was sent	YYYY-MM-DD HH:MM:SS (24H)
Reporting time zone	Date-time	Indicates time zone	UTC +2
Received time	Date-time	Indicates the time the GPS data was received on the server	YYYY-MM-DD HH:MM:SS (24H) (SAST)
Data send interval	Text	Indicates the configured time interval to send GPS data	5 minutes
Locomotive Consist information	Text	Indicates locomotive numbers in a consist	021066,021067,021068,021069,021070

5.4 Software As a Service (SaaS)

- 5.4.1 **SyS-REQ015:** The system shall be implemented as a Software as a Service (SaaS) subscription model.
- 5.4.2 **SyS-REQ016:** The successful bidder shall supply, install and manage the GPS tracking equipment in locomotives.
- 5.4.3 **SyS-REQ017:** The successful bidder shall provide, maintain, host and manage cloud infrastructure responsible for collection and storage of location data.
- 5.4.4 **SyS-REQ018:** The sharing of the GPS data with other customers other than TFR shall require prior approval from TFR.

5.5 Application Programming Interface (API) and System Integration Requirements

- 5.5.1 **SyS-REQ019:** The system shall provide a secure, standards-based Application Programming Interface (API) to enable Transnet Freight Rail (TFR) to access location and related operational data.
- 5.5.2 **SyS-REQ020:** The API shall support encrypted communication using industry-accepted transport security protocols.
- 5.5.3 **SyS-REQ021:** The API shall provide capabilities to retrieve both real-time (current) and historical location data.
- 5.5.4 **SyS-REQ022:** The solution shall support efficient query mechanisms to enable filtering, timebased searches, and structured data retrieval as required by TFR systems.
- 5.5.5 **SyS-REQ023:** The API shall support structured, machine-readable data formats commonly adopted in enterprise environments (e.g., JSON, XML, or equivalent). Bidders may propose the most appropriate data format, provided interoperability with TFR enterprise systems is

ensured.

- 5.5.6 **SyS-REQ024:** Comprehensive API documentation shall be provided, including:
- 5.5.6.1 Endpoint definitions or interface specifications
 - 5.5.6.2 Authentication and authorization requirements
 - 5.5.6.3 Sample requests and responses
 - 5.5.6.4 Error handling descriptions and response codes
 - 5.5.6.5 Usage guidelines and integration examples
 - 5.5.6.6 Documentation shall be sufficient to enable independent integration by TFR technical teams.
- 5.5.7 **SyS-REQ025:** The bidder shall provide high-level and detailed architecture documentation illustrating the end-to-end data flow from onboard GPS devices through communication networks to backend infrastructure and API interfaces. The architecture documentation shall clearly identify:
- 5.5.7.1 Data acquisition components
 - 5.5.7.2 Communication mechanisms
 - 5.5.7.3 Storage infrastructure
 - 5.5.7.4 API exposure layer
 - 5.5.7.5 Security controls
- 5.5.8 **SyS-REQ026:** The system shall implement logging and audit mechanisms to record all API access attempts, transactions, configuration changes, and administrative actions.
- 5.5.9 **SyS-REQ027:** Audit logs shall support traceability, security monitoring, and compliance with TFR governance requirements.

5.6 User access and permissions

- 5.6.1 **SyS-REQ028:** The system shall implement robust access control mechanisms to manage and enforce permissions for accessing data and performing API operations.
- 5.6.2 **SyS-REQ029:** The solution shall support role-based access control (RBAC) or equivalent authorization models, enabling the definition of user roles and associated permissions (e.g., read, write, modify, delete). Permissions shall govern access to data sets and API functionality in accordance with TFR security policies.
- 5.6.3 **SyS-REQ030:** The system shall provide secure authentication and authorization mechanisms for API consumers using industry-recognised standards (e.g., token-based authentication, certificate-based authentication, or equivalent).
- 5.6.4 **SyS-REQ031:** The bidder shall describe the proposed authentication model and demonstrate alignment with enterprise security best practices.

5.7 Power Supply(Supplier-Defined Architecture)

- 5.7.1 **SyS-REQ032:**
- 5.7.1.1 The GPS tracking module may be powered either through connection to the locomotive electrical supply or through an internal battery solution, or a hybrid combination thereof, at the discretion of the bidder.
 - 5.7.1.2 The proposed power architecture shall ensure continuous and reliable operation of the module for the full duration of the contract period.
 - 5.7.1.3 The bidder shall clearly describe the proposed power strategy and demonstrate its

suitability for the locomotive operating environment.

5.7.2 SyS-REQ033:

5.7.2.1 Where the solution interfaces with locomotive electrical systems, it shall be compatible with both diesel and electric locomotive supply conditions and shall be designed to tolerate typical railway voltage variations and transients in accordance with recognised railway environmental and power standards (e.g., EN 50155 or equivalent).

5.7.3 For reference:

5.7.3.1 Diesel locomotive nominal supply: $U_n = 74V$ DC

5.7.3.2 Electric locomotive nominal supply: $U_n = 110V$ DC

5.7.4 SyS-REQ034: The bidder shall specify the supported voltage ranges and protective mechanisms implemented.

5.7.5 SyS-REQ035: Where a battery-powered solution is proposed, the module shall:

5.7.5.1 Sustain data transmission at the specified reporting intervals

5.7.5.2 Operate reliably under the environmental conditions applicable to TFR operations

5.7.5.3 Minimise battery replacement frequency

5.7.5.4 Provide clear battery health monitoring and reporting capability

5.7.5.5 The bidder shall specify:

- Expected battery life at the proposed transmission interval
- Replacement cycle
- Access methodology for battery replacement
- Any operational impact during battery servicing

5.7.6 SyS-REQ036: The bidder shall demonstrate that the selected power solution (wired, battery, or hybrid):

5.7.6.1 Supports uninterrupted data collection and transmission

5.7.6.2 Does not introduce operational safety risks

5.7.6.3 Does not adversely affect locomotive systems

5.7.6.4 Is maintainable within TFR operational constraints

5.8 Communication and Connectivity Requirements

5.8.1 SyS-REQ037: The solution shall provide a reliable and resilient communication capability to transmit locomotive data to the designated backend systems at the specified reporting intervals.

5.8.2 SyS-REQ038: The bidder may propose any suitable communication technology or combination thereof, provided that measurable service performance (e.g., latency, packet loss, connection stability, and coverage) is demonstrated and made available to TFR for monitoring.

5.8.3 SyS-REQ039: For Class 44D locomotives operating in the Mineral, Mining and Chrome (MMC) Business Unit and intended for cross-border operations, the communication solution shall support continuous tracking data availability both within the Republic of South Africa and across cross-border railway corridors outside the borders of South Africa.

5.8.4 SyS-REQ040: The successful bidder shall be responsible for ensuring that tracking data for applicable Class 44D locomotives operating in the MMC BU remains available irrespective of

the communication environment, network operator, or country in which the locomotive is operating.

- 5.8.5 **SyS-REQ041:** The bidder shall be responsible for providing and maintaining all communication arrangements, technologies, services, and associated infrastructure necessary to support reliable cross-border tracking capability for the duration of the contract.
- 5.8.6 **SyS-REQ042:** Where communication is temporarily unavailable, the onboard tracking solution shall continue recording tracking data and automatically transmit stored data once communication is restored.
- 5.8.7 **SyS-REQ043:** The successful bidder shall be fully responsible for ensuring that all communication equipment, spectrum usage, and transmission technologies used in the solution are legally approved for operation within the Republic of South Africa and, where applicable, in cross-border operating territories.
- 5.8.8 **SyS-REQ044:** The bidder shall obtain and maintain all required regulatory certifications, approvals, licences, and authorisations (including, where applicable, ICASA type approval, spectrum licensing, and approvals from applicable telecommunications and regulatory authorities within the SADC region) for the full duration of the contract. Non-compliance shall remain the sole responsibility of the supplier.

6 Performance requirements

6.1 Speed recording accuracy

- 6.1.1 **SyS-REQ045:** The system must ensure the accuracy of the speed data with an error margin of no more than 5 km/h.

6.2 API response time

- 6.2.1 **SyS-REQ046:** It is desirable that time shall not exceed 1000ms for real-time data requests.

6.3 High-Accuracy GNSS Positioning

- 6.3.1 **SyS-REQ047:** It is desirable that the tracking system shall provide a positioning accuracy of 5 meters or better under standard operating conditions.

7 System Operations

7.1 Maintenance

- 7.1.1 **SyS-REQ048:** The successful bidder shall be fully responsible for the maintenance and upkeep and monitoring of the tracking device for the period of the contract.
- 7.1.2 **SyS-REQ049:** The successful bidder must conduct regular maintenance checks and technical support shall be available to quickly address any issues that arise.
- 7.1.3 **SyS-REQ050:** The successful bidder must provide details about the maintenance plan and strategy that shall be followed.
- 7.1.4 **SyS-REQ051:** The system shall support over-the-air (OTA) updates for firmware and software enhancements.

7.2 Reliability

- 7.2.1 **SyS-REQ052:** Bidders are required to provide Mean Time Before Failure (MTBF) values for the GPS tracking equipment. Bidders with higher MTBF values shall be preferred.
- 7.2.2 **SyS-REQ053:** Mean Time to Repair (MTTR) a faulty module shall be done within 24 – 48 hours.
- 7.2.3 **SyS-REQ054:** Contractors shall provide data, which proves these figures.
- 7.2.4 **SyS-REQ055:** There shall be penalties imposed when there is low reliability as to be defined in the SLA.

7.3 Availability

- 7.3.1 **SyS-REQ056:** TFR and the successful bidder shall jointly establish the required availability percentage for operational and accurate GPS data over a defined period.
- 7.3.2 **SyS-REQ057:** The successful bidder shall be responsible for continuous monitoring of the GPS system's availability.
- 7.3.3 **SyS-REQ058:** The successful bidder shall also be responsible for requesting locomotives from TFR operations if maintenance or repair work is needed on the GPS system devices installed in locomotives.
- 7.3.1 **SyS-REQ059:** There shall be penalties imposed when there is low availability as to be defined in the SLA.

7.4 Scalability

- 7.4.1 **SyS-REQ060:** The cloud infrastructure shall incorporate auto-scaling groups to dynamically adjust resources in response to increased load.
- 7.4.2 **SyS-REQ061:** The system shall undergo load testing to verify its capability to support multiple concurrent locomotive device connections and manage data from more than 2,000 locomotives.
 - 7.4.2.1 The successful bidder shall specify the testing tools and methods to be employed, indicating whether testing will be automated, manual, or a combination of both.
 - 7.4.2.2 The successful bidder shall provide a detailed test procedure.
 - 7.4.2.3 Device management processes shall be implemented to clearly indicate the status of devices as active or non-active.

8 Physical characteristics

8.1 Installation Requirements (Optional – Supplier-Defined Configuration)

- 8.1.1 **SyS-REQ062:** Installation Configuration (Optional Architecture): The installation configuration of the GPS tracking system shall be at the discretion of the bidder, provided that the proposed mounting location and method:
 - 8.1.1.1 Is technically suitable for reliable system operation
 - 8.1.1.2 Does not compromise locomotive safety, performance, or maintainability
 - 8.1.1.3 Complies with applicable railway installation standards and Transnet safety requirements
 - 8.1.1.4 The bidder shall be fully responsible for determining and justifying the appropriate

installation location within the locomotive.

- 8.1.1.5 Where a 19" rack is available, it may be utilised if deemed appropriate by the bidder. Alternative mounting locations may be proposed where operationally or technically justified.

8.1.2 **SyS-REQ063: Antenna Installation & Responsibility:** The bidder shall be responsible for determining the appropriate antenna configuration and installation location to ensure optimal signal reception and transmission. The bidder may:

- 8.1.2.1 Utilise an existing TFR GPS antenna, subject to confirmed spare slot availability on the bulkhead/roof, or
- 8.1.2.2 Install a dedicated antenna solution, which shall be high-voltage (HV) approved and suitable for railway environments
- 8.1.2.3 All antenna installations shall:
- Be mechanically robust
 - Be designed to withstand environmental and operational conditions, including exposure to overhead track equipment (OHE)
 - Not interfere with existing locomotive systems
 - Comply with applicable safety and electrical clearance requirements
 - The bidder assumes full responsibility for antenna integration, certification, and long-term integrity of the installation

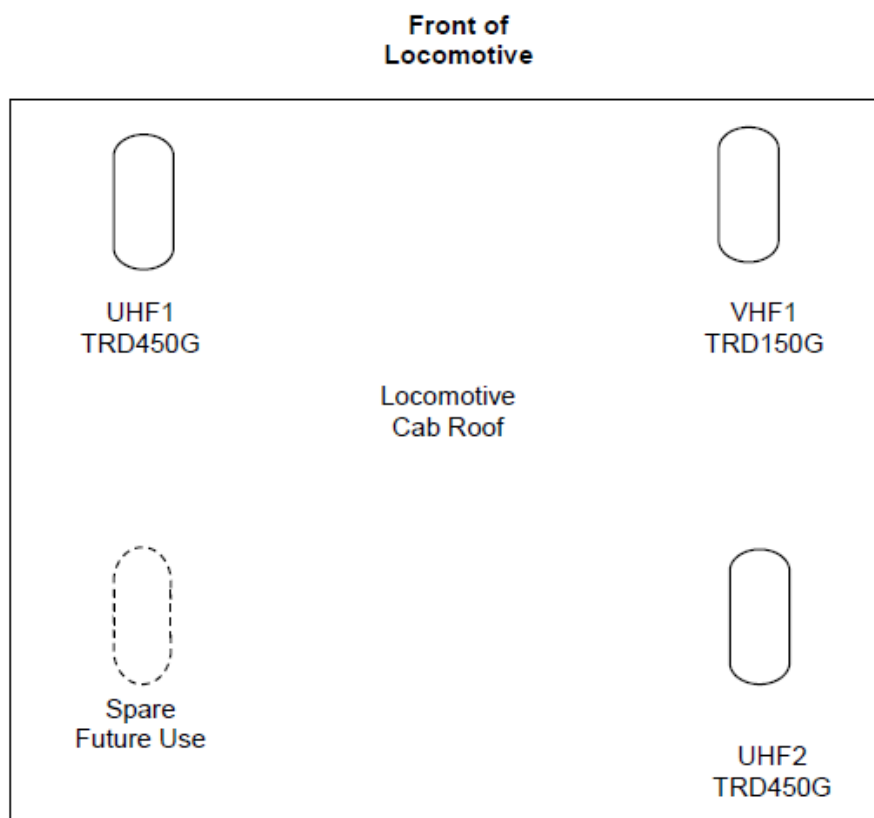


Figure 2 Recommended Roof Layout for antenna mounting

9 Locomotive environmental conditions

The guideline that must be adhered to for equipment to be used in the railway is described in the document CSE-1154-001-CAT E48 Version 2.

9.1 Cenelec EN50155: Railway applications- Electronic equipment used on rolling

stock

- 9.1.1 **SyS-REQ064:** The GPS Electronic equipment used on rolling stock system modules shall meet EN 50155 standard requirements to ensure it is suitable for railway applications.
- 9.1.2 **SyS-REQ065:** The system must be able to function without failure across a wide range of temperatures encountered in railway environments (-40°C to +85°C).
- 9.1.3 **SyS-REQ066:** The GPS system equipment shall be designed and tested to resist mechanical stress due to vibrations and shocks experienced during locomotive operation.
- 9.1.4 **SyS-REQ067:** The GPS system equipment shall be able to operate reliably in high humidity conditions and resist moisture ingress.
- 9.1.5 **SyS-REQ068:** All electronic components should be coated to protect against dust, moisture, and other environmental factors that could compromise reliability.
- 9.1.6 **SyS-REQ069:** Input surges are extremely higher on older type locomotives (e.g., 10E locomotives) and the GPS equipment must be immunised against higher surges than would normally be expected. In this respect, the requirements that are stipulated in EN50155 must be used as a minimum.
- 9.1.7 **SyS-REQ070:** The materials and design of the system should minimise the risk of fire and smoke, ensuring safety and reliability in railway applications.

9.2 Cenelec EN50121-3-2: Railway Applications: Electromagnetic compatibility, Rolling stock apparatus

- 9.2.1 **SyS-REQ071:** The GPS system equipment shall not produce noise levels that may interfere with other nearby devices as per EN50121-3-2.

9.3 IP Rating

- 9.3.1 **SyS-REQ072:** The GPS modules shall be rated IP67 or higher for environmental protection.

10 Security

10.1 Data security

- 10.1.1 **SyS-REQ073:** A security architecture document detailing the data encryption methodologies used (e.g., TLS 1.2 or higher) must be provided.
- 10.1.2 **SyS-REQ074:** Data in transit such as location data, user credentials, configuration files, logs, and any other confidential information must be encrypted.
- 10.1.3 **SyS-REQ075:** To comply with South African data protection regulations and ensure the security of sensitive location data, all GPS data from locomotives must be processed/ hosted locally before any potential transfer to international servers.
- 10.1.4 **SyS-REQ076:** The service provider shall provide a SOC II type 2 report or ISO-27001

compliance report or an attestation that a pen test has been conducted and findings remediated.

10.2 Theft and vandalism

- 10.2.1 **SyS-REQ077:** The GPS system equipment installed on the locomotives must be hardened to ensure they are robust and resistant to physical damage.
- 10.2.2 **SyS-REQ078:** The GPS system equipment must have security mechanisms to protect the device from theft, unauthorized access, and vandalism.

11 GPS System Redundancy

11.1 Redundancy requirements

- 11.1.1 **SyS-REQ079:** The GPS must be able to fall back to alternative wireless communication methods in case of primary network failure.
- 11.1.2 **SyS-REQ080:** The GPS must have backup power supplies in case of primary power source failure.
- 11.1.3 **SyS-REQ081:** The system must have backup servers in the case of primary server failure.

12 System Verification & Validation

12.1 Tests and examinations

- 12.1.1 **SyS-REQ082:** Operational Dashboard Capability - The solution shall provide configurable, web-based dashboards enabling authorised TFR users to visualise locomotive location, status, and historical movement data in near real-time. Dashboards shall support:
 - 12.1.1.1 Fleet-level overview (map-based and tabular views)
 - 12.1.1.2 Individual locomotive drill-down
 - 12.1.1.3 Time-based filtering (date, shift, corridor, depot)
 - 12.1.1.4 Export of data in structured formats for further analysis
 - 12.1.1.5 The system shall allow user-defined views and filters appropriate to railway operational control environments.
- 12.1.2 **SyS-REQ083:** Railway-Specific Analytics - The solution shall provide analytics suitable for railway operations, including but not limited to:
 - 12.1.2.1 Route and corridor utilisation analysis
 - 12.1.2.2 Dwell time and idle time analysis
 - 12.1.2.3 Movement history and replay functionality
 - 12.1.2.4 Communication performance reporting
 - 12.1.2.5 Device health and uptime monitoring
 - 12.1.2.6 The system shall enable TFR to generate reports that support operational performance monitoring, asset utilisation assessment, and service reliability analysis.
- 12.1.3 **SyS-REQ084:** Scalability & Performance - The dashboard and analytics platform shall be scalable to support the full fleet size and concurrent user access without degradation in performance. The bidder shall specify:

- 12.1.3.1 Data refresh intervals
- 12.1.3.2 System response times
- 12.1.3.3 Historical data retention limits

13 System Verification & Validation

13.1 Tests and examinations

- 13.1.1 **SyS-REQ085:** The successful contractor(s) shall be responsible for drafting an Acceptance Test Procedure (ATP) and submitting this to Transnet Freight Rail for Approval.
- 13.1.2 **SyS-REQ086:** The tests shall be executed according to the ATP to test the functionality of the complete system using a holistic approach.
- 13.1.3 **SyS-REQ087:** The test cases shall have traceability to both the System Requirement Specification (SRS) and the User Requirement Specification (URS).