RAILTEL CORPORATION OF INDIA LIMITED

(A Govt. of India Undertaking)

Regd. & Corp. Off:-

Plate-A, 6th Floor, Office Tower-2,
NBCC Building, East Kidwai Nagar, New Delhi-110023

Selection of Partner For
Supply and Implementation of IT application for Collection and Assimilation of Field Sensor Data viz. Rail Temperature & Bridge Water Level, Drone Recording and CCTV.

EOI No: RCIL/EOI/CO/DNM/2021-22/IT services to RCIL customer/01 dated 05.04.2021

NOTICE

RailTel Corporation of India Limited Plate-A, 6th Floor, Office Tower-2,
NBCC Building, East KidwaiNagar, New Delhi-110023

EOI No: **RCIL/EOI/CO/DNM/2021-22/IT services to RCIL customer/01 dated 05.04.2021**

RailTel Corporation of India Ltd., (here after referred to as RailTel) invites EOIs from RailTel's Empaneled Partners for the selection of suitable agency for supply and implementation of of IT application for Collection and Assimilation of Field Sensor Data viz. Rail Temperature & Bridge Water Level, Drone Recording and CCTV.

The details are as under:

1	Last date for submission of EOIs by bidders	12.04.2021 before15:00Hrs.
2	Opening of bidder EOIs	12.04.2021 at 15:30Hrs.
3	Number of copies to be submitted for scope of work	01

Prospective bidders are required to direct all communications related to this Invitation for EoI document, through the following Nominated Point of Contact persons:

Contact: Naresh Kumar
Position: DGM/IT
Email: naresh.kumar@railtelindia.com
Telephone: +91124 2714000 Ext 2222

NOTE:

I. **All firms are required to submit hard copy of their EOI submissions, duly signed by Authorized Signatories having Power of Attorney with Company seal and stamp.**

II. **The EOI response is invited from empanelled partners of RailTel only – Category IOT/Automation etc. Only RailTel empaneled partners are eligible for participation in EOI process.**

TABLE OF CONTENTS

1. RailTel Corporation of India Limited–Introduction

RailTel Corporation of India Limited (RailTel), an ISO-9001:2000 organization is a Government of India undertaking under the Ministry of Railways. The Corporation was formed in Sept 2000 with the objectives to create nationwide Broadband Telecom and Multimedia Network in all parts of the country, to modernize Train Control Operation and Safety System of Indian Railways and to contribute to realization of goals and objective of national telecom policy 1999. RailTel is a wholly owned subsidiary of Indian Railways.

For ensuring efficient administration across India, country has been divided into four regions namely, Eastern, Northern, Southern & Western each headed by Regional General Managers and Headquartered at Kolkata, New Delhi, Secunderabad & Mumbai respectively. These regions are further divided into territories for efficient working. RailTel has territorial offices at Guwahati, & Bhubaneswar in East, Chandigarh, Jaipur, Lucknow in North, Chennai & Bangalore in South, Bhopal, and Pune & Ahmedabad in West. Various other territorial offices across the country are proposed to be created shortly.

RailTel's business service lines can be categorized into three heads namely B2G/B2B (Business to Government and Business to Business) and B2C (Business to customers):

Licenses & Services

Presently, RailTel holds IP-1, NLD and ISP (Class-A) licenses under which the following services are being offered to various customers:

CARRIER SERVICES

1. National Long Distance: Carriage of Inter & Intra -circle Voice Traffic across India using state of the art NGN based network through its Interconnection with all leading Telecom Operators
2. Lease Line Services: Available for granularities from E1, DS-3, STM-1 & above
3. Dark Fiber/Lambda: Leasing to MSOs/Telco's along secured Right of Way of Railway tracks
4. Co-location Services: Leasing of Space and 1000+ Towers for collocation of MSC/BSC/BTS of Telco's

ENTERPRISE SERVICES

1. Managed Lease Line Services: Available for granularities from E1, DS-3, STM-1 & above
2. MPLS VPN: Layer-2 & Layer-3 VPN available for granularities from 64 Kbps to nx64 Kbps, 2 Mbps& above
3. Dedicated Internet Bandwidth: Experience the "Always ON" internet connectivity at your fingertips in granularities 2mbps to 155mbps

RETAIL SERVICES

Rail wire: Triple Play Broadband Services for the Masses. It is a pilot project undertaken by RailTel and currently services are offered out of Bangalore and nearby places.

2. Objective of EOI

RCIL is implementing IT-ICT projects like providing Infra & Cloud Services, Application Development, ERP/E-Office Implementation and Consultancy Services for Indian Railways (IR) and its customers. In its strive for continuous improvement, Indian Railway has been taking various initiatives by the way of introduction of new technology, extensive use of IT systems, optimum utilization of manpower etc. IR believes that first step to achieve efficiency is to measure and then control. In this regards, IR wishes to implement following three IT applications for various remote monitoring initiatives across it assets and manpower:

2.1. IRCETAP – Indian Railways Civil Engineering Telemetry Application Platform

2.2. IRGDVAP – Indian Railways Geo/Drone Video Application Platform

2.3. IRCCCAP – Indian Railways Closed Circuit Camera Application Platform

2.1. IRCETAP – Indian Railways Civil Engineering Telemetry Application Platform

IR has and shall introduce telemetry enabled intelligent field devices along with variety of intelligent Sensors such as radar based water level measurement system (WLMS) and continuous rail temperature (CRT) measurement. In this regard, Indian Railways has successfully implemented pilots for Bridge Water Level and Continuous Rail Thermometer applications through third party cloud systems. In order to have standardization, optimal utilization of data collected, security as well privacy of data, it is imperative that data from theses devices is transported securely and directly to IR own IT application i.e. IRCETAP (Indian Railways Civil Engineering Telemetry Application Platform) for purpose of MIS, data analysis, preventive maintenance, resultant action through field actuators, providing SMS/E-Mail reporting to various stake holders as well as act as a single bridge for integration with other IR IT Applications viz. TMS (Track Management system) / BMS (Bridge Management System) based on existing IR technical guidelines. The IRCETAP will be a software application platform which shall connect the WLMS / CRTs / and future devices of IR. IRCETAP shall be a complete application platform which shall have a capability to add new assets, sensors types that can be integrated with diverse types of instruments which shall be installed from time to time in various tracks, bridges, Structural health monitoring (SHM), Track Machines monitoring and other civil engineering assets of Indian Railways.

2.2. IRGDVAP – Indian Railways Geo/Drone Video Application Platform

Indian railway has adopted drone based survey for leveraging the latest Drone technology and the detailed guidelines were issued from railway board. After that the lot of drone based Aerial surveys are being done by open line and construction organizations including railway PSU's and also with the help of Survey of India. The very high resolution (HD) aerial Geo/Drone videos are captured using survey grade drones for bringing operational efficiency in various areas such as progress monitoring of the project, encroachment monitoring, condition monitoring, aerial recce etc. These videos are visualized by railway officers in desktop environment for getting the insight of every part of railway corridor and helping in making decision at their level, but currently these Geo/Drone video datasets are not available for sharing on common platform. Centralized web based Rail-Geo/Drone Video Application will help for systematic storing on defined protocols, Searching, Visualizing and sharing the Aerial Geo/Drone Video data captured through Drones for Indian Railway Network. The Objective of the Rail Geo/Drone Video Web Application is to provide Web based Integrated Micro & Macro view of the Indian Rail Corridor where the high resolution (HD) Videos captured from drones flying on low altitude will be made available for the area around railway corridor using Integrated satellite/Map view.

2.3. IRCCCAP – Indian Railways Closed Circuit Camera Application Platform

Indian Railway has presently installed and in future shall continue to install various CCTV cameras with live feed from various project sites, important bridges for project monitoring etc. The recordings for the same are currently stores at site servers, and there is separate access / logins for the same without Zone / Divisions / PSUs / Projects wise common access mechanisms. A software application is required wherein a user who is provided with the access password, can access the real time live feed of these cameras which may be sorted out through Railway Zone-Division-Sub Division-Section-Project/Sites etc.

3. Broad Scope of Work

RCIL will be providing IT infrastructure in its own data centre for deployment IRCETAP, IRGDVAP and IRCCCAP application platforms. All three applications will have following broad scope of work:

3.1. IRCETAP – Indian Railways Civil Engineering Telemetry Application Platform

RCIL is setting up a central Telemetry Application Platform for use in various IR Civil Engineering applications. IR will be expanding the above mentioned applications as well as introducing new applications on its assets and structures for better monitoring and control. Currently, the water level monitoring solution and continuous rail temperature monitoring solution implementations were piloted by using vendor specific cloud platforms integrated with Railways IT Application(s).

In order to maintain standardization, prevent any eaves dropping and snooping of data being transacted over the network, as well as seamless integration with various Indian Railway Civil Engineering Portal (IRCEP) applications, RailTel plans to deploy and manage a Central Server Application – IRCETAP. IRCETAP will be ready to use IOT/Automation application platform based on MQTT technology for every bi-directional communication application needs and Cloud API (REST) gateway for simple data gathering application needs. Various Railways Zonal, Divisional users will have role-based access to the application with their secured User ID and Password, over a simple Internet browser without any requirement of any additional licenses / third party applications / licenses on remote machines, computers, laptops etc.

IRCETAP shall broadly be a sub part of overall IRCEP (Indian Railway Civil Engineering Portal) having TMS and BMS applications using middleware application and database technology. IRCETAP shall be deployed on same compatible middleware technology platform and integrate with various IRCEP applications for seamless integration (as per requirements), and will be hosted in RailTel data center.

3.2. IRGDVAP – Indian Railways Geo/Drone Video Application Platform

RCIL is setting up a central Geo Video Application Platform for use in various Civil Engineering applications. IRGDVAP shall be a sub part of overall IRCEP (Indian Railway Civil Engineering Portal) and the Application shall be available on IR Portal through web browser. The Geo Video Web application shall access the available GeoVideo files in different resolution (Upto HD) and geometadata data centrally stored on the server. The GeoVideo shall be played in GeoVideo player and enable synchronization with Map/satellite imagery by using Geo metadata such as Latitude, Longitude, Elevation, Camera information, Flying Height, Rotation angle formation (roll, pitch, Yaw). A user friendly GeoVideo player shall have the Video controls such as, zoom, pan, play, pause, backward, forward, speed control & video enhancement, shall be made available. Also chainage & asset based search shall be made available using uploaded kml files for users for faster accessing and asset visualization.

The application shall be made compatible to use map services available from Google Map API and should also be compatible to have integration with open source map API services (*as required*). The facility of downloading data from centralized GeoVideo server in the local system shall be made available.

IRGDVAP should allow the user to annotate the video and develop the annotated report. The annotated report can be shared via map annotation and list with description on the portal itself and it should have an option to convert the user annotation in a PDF format which can be downloaded.

3.3. IRCCCAP – Indian Railways Closed Circuit Camera Application Platform

RCIL is setting up a central software application wherein there will be an option to create Indian Railway organization (Zone / Divisions / Sections), departments and designations, create users and groups, create projects. There will be a module to configure secured web accessible CCTV cameras, and accordingly associate CCTVs to Projects to Users to Railways Zones-Divisions-Section etc. Once the CCTVs are associated to projects, users and organization, IR users can login into a common platform and view live feeds of various compatible CCTVs from this common platform.

4. Language of Proposals

The proposal and all correspondence and documents shall be written in English. The hardcopy version will be considered as the official proposal

5. Proposal Preparation and Submission

The Applicant is responsible for all costs incurred in connection with participationin this EOI process, including, but not limited to, cost incurred in conduct of informative and other diligence activities, participation in meetings/discussions/presentations, preparationof proposal, in providing any additional information required by RCIL to facilitate the evaluation process or all such activities related to the EoI response process. RCIL will in nocase be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

6. Bidding Document

The bidder is expected to examine all instructions, forms, terms and conditions and technical specifications in the bidding documents. Submission of bids, not substantially responsive to the bidding document in every aspect will be at the bidder's risk and may result in rejection of its bid without any further reference to the bidder.

All pages of the documents shall be signed in ink by the bidder including the closing page in token of his having studies the EOI document and should be submitted along with the bid.

7. Qualification for Participation

7.1. The Applicant should be an empanelled RailTel partner having a valid Permanent Account Number (PAN), Goods and Service Tax Identification Number (GSTIN). Copy of documents in this regard are to be submitted.

7.2. The Applicant should not be black listed during last three years by any State / Central Government / PSU / Autonomous Body as on the last date of EOI submission. A Self- Declaration on letter head is to be submitted in this regard.

7.3. There should not be any ongoing or past, arbitration case(s) between RCIL and Applicant on the last date of submission of EOI. Self-Declaration on letter head is to be submitted in this regard.

7.4. RailTel empaneled partners having experience in Railways/Government IT applications management in the field of IOT/Automation and Geo location based project and progress monitoring. Copies of Work Order to be provided. Joint ventures and consortiums are not allowed.

8. Evaluation criteria

The Applicant should have relevant experience and proven application platform as per the requirement of EOI. The applicant may have to demonstrate the proposed solution within 1 week of submission of EOI or on a pre-appointed date by RCIL if asked by RCIL. The demonstration shall be conducted by RCIL experts to adjudge readiness, correctness of the solution to be deployed based on the detailed technical specifications mentioned in Clause "21", Clause "22" and Clause "23" as well as technical compliance sheet mentioned in Clause 24 - Annexure "A".

Only technical qualified bidder will be eligible for opening the financial bid . Based on the lowest price offered under financial bid as mention under clause no 27 by the technical eligible bidder, L1 will be selected. If required, the L1 bidder may be called for negotiation. A Tender Committee would be carrying out the evaluations. RCIL shall evaluate the responses to this EOI and scrutinize the supporting documents / documentary evidence / technical compliance. Inability to submit the requisite supporting documents / documentary evidence/ technical compliance, may lead to rejection. The decision of RCIL in the evaluation of EOI responses shall be final. During the EOI response evaluation, RCIL reserves the right to reject any or all the EOI responses.

9. Bidding Process

The bidder needs to submit the bid in sealed, signed and stamped envelope clearly mentioning of EOI number, EOI name, addressed to the EOI inviting officer as well as Bidding Agency Name and Contact person.

Packet I - Technical BID should consist the following:

1. Covering Letter
2. Notarized Power of Attorney in the name of Company Representative
3. Self Declaration of Non Blacklisting as per Clause 7.2
4. Self Declaration of No past / ongoing arbitration with RCIL as per Clause 7.3
5. Format for Providing Bidder's Information – Clause 20.
6. Documents / Certificates related to Experience as per Clause 7.4
7. Technical Compliance Sheet as per Annexure "A" – Clause 24
8. Signed and Stamped EOI Document
9. Any other relevant documents

Packet II - Financial BID given in Annexure "B" – Clause 27

1. Submission of Financial BID as per given format. (Clause 27.1, Clause 27.2 and Clause 27.3)

Both the Packets i.e. Packet – I and Packet – II should be separately put in a common Envelope. The envelope also needs to be sealed, signed and stamped clearly mentioning of EOI number, EOI name, addressed to the EOI inviting officer as well as Bidding Agency Name and Contact person.

10. Period of Validity of bids and Bid Currency

Bids shall remain valid for a period of 180 days from the date of issue of LOI by RCIL Customer. The prices in the bid document to be expressed in INR only.

11. RCIL's Right to Accept/Reject Bids

RCIL reserves the right to accept or reject any bid and annul the bidding process or even reject all bids at any time prior to award of contract, without thereby incurring any liability to the affected bidder or bidders or without any obligation to inform the affected bidder or bidders about the grounds for RailTel's action.

12. Bid Earnest Money (EMD)

NA

13. Security Deposit / Performance Bank Guarantee (PBG)

13.1. Successful bidder has to furnish security deposit in the form of Performance Bank guarantee @ 3 % of issued PO/ LOA value, the same should be submitted within 30 days of issue of LOA/PO, failing which a penal interest of 15% per annum shall be charged for the delay period i.e. beyond 30 (thirty) days from the date of issue of LOA/PO. This PBG should be from a Scheduled Bank and should cover warranty period plus three months for lodging the claim. The performance Bank Guarantee will be discharged by the Purchaser after completion of the supplier's performance obligations including any warranty obligations under the contract.

13.2. The Performa for PBG is given in Form No. 1. If the delivery period gets extended, the PBG should also be extended appropriately.

13.3. The security deposit/PBG shall be submitted to Corporate Office & will bear no interest.

13.4. A separate advice of the BG will invariably be sent by the BG issuing bank to the RailTel's Bank through SFMS and only after this the BG will become acceptable to RailTel. It is therefore in interest of bidder to obtain RailTel's Bank IFSC code, its branch and address and advise these particulars to the BG Issuing bank and request them to send advice of BG through SFMS to the RailTel's Bank.

13.5. The security deposit/Performance Bank Guarantee shall be released after successful completion of Contract, duly adjusting any dues recoverable from the successful tenderer. Security Deposit in the form of DD/Pay Order should be submitted in the favour of "Railtel Corporation of India Limited" payable at New Delhi Only.

13.6. Any performance security upto a value of Rs. 5 Lakhs is to be submitted through DD/Pay order / online transfer only.

14. Deadline for Submission of Bids

Bids must be submitted to RCIL at the address specified in the preamble not later than the specified date and time mentioned in the preamble. If the specified date of submission of bids being declared a holiday for RCIL, the bids will be received up to the specified time in the next working day.

15. Late Bids

Any bid received by RCIL after the deadline for submission of bids will be rejected and/or returned unopened to the bidder.

16. Modification and/or Withdrawal of Bids

Bids once submitted will treated, as final and no modification will be permitted. No correspondence in this regard will be entertained. No bidder shall be allowed to withdraw the bid after the deadline for submission of bids. In case of the successful bidder, he will not be allowed to withdraw or back out from the bid commitments. The bid earnest money in such eventuality shall be forfeited and all interests/claims of such bidder shall be deemed as foreclosed.

17. Details of Financial bid

17.1. The financial bid should clearly bring out the cost of the work with detailed break-up of taxes.

17.2. The financial bid must be submitted as per Proforma under clause No. 27 "Annexure B – Cover Letter and Schedule of Rates"

18. Clarification of Bids

To assist in the examination, evaluation and comparison of bids the purchaser may, at its discretion, ask the bidder for clarification. The response should be in writing and no change in the price or substance of the bid shall be sought, offered or permitted.

19. Variation in Contract

+/-25% variation may be operated on SOR during the period of Project Schedule with the approval of competent authority with similar terms and procedure as specified in the agreement.

20. Bidder's Information

Company Name:	
Type of RCIL Business Partner	
Status of Applicant (Partnership, Company etc.)	
Number of Years of Experience	
Number of office locations in India (Provide details)	
Number of office locations globally (Provide details)	
Number of employees in India and global	
Total revenue from sales in India (for last 3 financial years)	FY (2018-19):
	FY (2019-20):
	FY (2020-21):

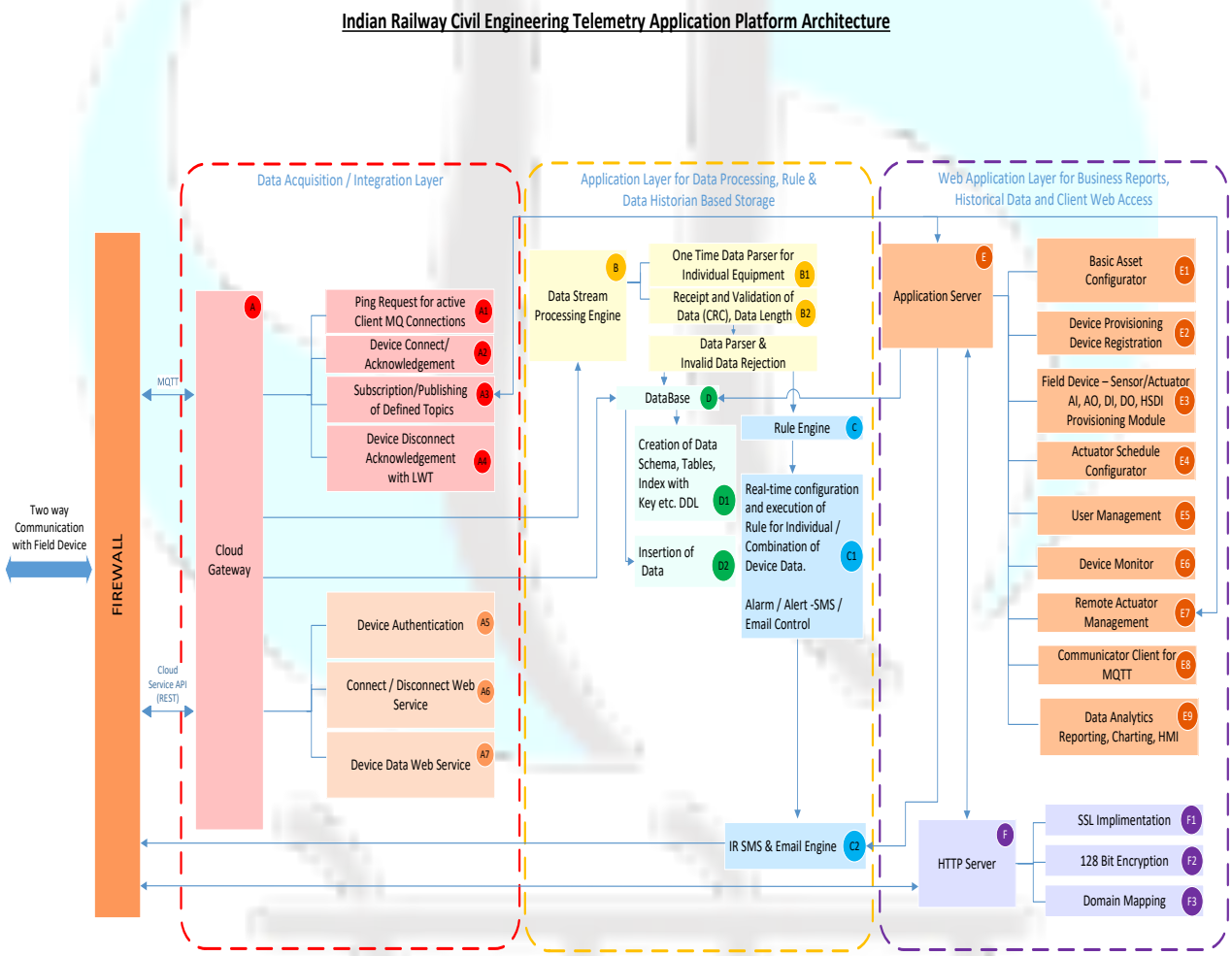
CONTACT DETAILS:			
First Name		Last Name	
Designation			
Address for correspondence			
Contact Number (Office Landline)			
Mobile Number			
Official Email ID			
GSTN No			
PAN No			
Bank Account No			
IFSC Code			
Registered Address of Company			

21. Detailed Technical Specifications - IRCETAP

In line with IR existing technical guidelines for water level monitoring system and continuous rail temperature monitoring system, various pilots conducted across various IR Zones / Divisions over the years, and adoption of technology in Indian Railways system, RCIL will deploy below mentioned Application platform for Indian Railways Civil Engineering applications. IRCETAP has to be a ready to use and deploy application having n-tier component based architecture with separate physical hardware and software layers working on Linux, java based, middleware Application Server and middleware database server for seamless integration as used in existing Indian Railways civil engineering IT applications viz. TMS (Track Management System) / BMS (Bridge Management System) as detailed below.

INDIAN RAILWAYS CIVIL ENGINEERING TELEMETRY APPLICATION PLATFORM

IRCETAP – System Architecture



IRCETAP system architecture will comprise of following key layered modules:

21.1. Cloud Gateway - MQTT Gateway Server & Cloud Service API (REST) Layer

21.2. Data Processing Engine Layer

21.3. Rule Engine Layer

21.4. Database Layer

21.5. Application Server Layer

21.6. HTTP Sever Layer

21.7. IRCETAP above application layer wise source code will needed to be deployed in RCIL Data centre wherein RCIL will provide necessary infrastructure with required hardware, bandwidth, networking, OS and other related services.

21.1. Cloud Gateway - MQTT Gateway Server & Cloud Service API (REST) Layer

MQTT Gateway and Cloud Service API (REST) server is a head-end server allowing field devices to connect to the MQTT broker and third party cloud over REST APIs. Wherever IOT / Telemetry based field devices are installed by Indian Railways, MQTT would be a standard and preferable mode of bi-directional communication between field devices and IRCETAP application. In addition to above, IRCETAP application will also have a gateway for cloud service API (REST) for any need based data requirement from third party servers.

21.1.1. MQTT Gateway

MQTT (Message Queuing Telemetry Transport) is a Client Server secured and encrypted publish/subscribe assured delivery messaging transport protocol. The publish/subscribe message pattern should use TCP/IP protocol for network connectivity providing one-to-many message distribution. MQTT is a publish/subscribe protocol that allows field devices to connect to a MQTT broker wherein the field device can publish its data to a registered topic as well as simultaneously subscribe to a topic for receiving messages.

IRCETAP MQTT gateway should provide a functionality wherein the field devices will automatically connect itself, set up a unique communication channel for individual device and maintain persistent connection for sending and receiving the data over this unique communication channel. IRCETAP Central server shall never poll any information from field devices and all field devices shall remain connected through GPRS network (as per availability) to the IRCETAP central server for sending and receiving data at the same time.

The field devices shall automatically publish the information on pre defined topics to the central server, and subscribe to pre defined topics for control commands, provisioning commands etc from the IRCETAP Central server such that field devices use regular open GPRS data plan of any Cellular Service Provider which generally employ either Dynamic-IP policy or Private-IP-With-Proxy policy. This bi-directional communication shall not be dependent on any static IP for field devices or VPN connections etc. If field devices lose connectivity, all the subscribed clients will be notified with the "Last Will and Testament" from IRCETAP MQTT broker. Application should have a feature in which Connection / Disconnection between the device/client and servers shall be recorded with timestamps. Key Functionalities of MQTT Gateway:

1. The device will connect to MQTT server using inbuilt MQTT client.
2. Once MQTT connection is established, it will subscribe and publish data packets on pre-defined topics.
3. Device Connect Acknowledgement with time synchronization
4. Ping Request for active client MQ Connections
5. Device Disconnect Acknowledgement with Last Will Testament feature (LWT)
6. Handling and Acknowledgement management of following Data/Command packets

21.1.2. Cloud Service API (REST)

While MQTT would be a standard and preferable mode of bi-directional communication between field devices and IRCETAP application, IRCETAP application will also have a gateway for cloud service API (REST) for any need based data requirement from third party servers. IRCETAP cloud service API (REST) would be receiving data in a predefined format wherein various vendors would have to comply to IRCETAP standards. Further, IRCETAP cloud service API (REST) will have different URLs with Basic Authentication for different categories of data and will have a pre-defined data exchange JSON format. Access to the RESTful API (Representational State Transfer Application Programing Interface) will be by sending HTTPS requests to specific URLs (endpoints) on the Headend Server, and authentication information must be included in every API request as an HTTPS header. An API endpoint will contain the URL of the resource that will be accessed and the action that needs to be completed on that resource. The action is indicated by the HTTPS method of the request: GET, POST, PUT, or DELETE. Key Functionalities of Cloud Service API (REST):

1. Device Registration with basic user authentication
2. Different websites URLs for different categories of data
3. Web Service - Connect / Disconnect / Data Web Service / Diagnostic Data Web Service
4. Processing and Parsing of different categories of data and store in to the database in different data structure depending upon the type of the data object and it should write the unparsed raw data object to the database for backup and forward the structural data to rule engine for processing of pre defined rules.

21.1.3. Cloud Gateway - MQTT Gateway Server & Cloud Service API (REST) Layer – Packet Formats

IRCETAP MQTT Gateway as well as Cloud Service API (REST) Server would have below mentioned connection, authentication for different categories of data packet formats.

	MQTT Communication	Rest API Communication
Basic Requirement	• MQTT Broker Live IP and Open communication Port • Device Unique Identifier (pre provisioned in IRCETAP platform)	• Push API with Web Service URL & Basic Authentication • Device Unique Identifier (pre provisioned in IRCETAP platform)
	Pre-defined topic for both publish and subscription of different categories of Data	Pre-defined Rest API for different categories of Data
Data Exchange Format	XML	JSON
Layered topic Structure MQTT communication and Different URL for different categories of data with basic authentication.	<BROKER>/DATATOPIC/<DEVICE UNIQUE IDENTIFIER> Different Topic for Different type Of data as mentioned below: • DEVICEDATA • DIAG • CONNECT • CONTROL • SCHEDULE • RULE • ALARM • LOCAL_RULE • IMEI	Different URL for Different categories of data as mentioned below: • Get() • Post()
Basic Packet Structure	Header • Transaction ID • Timestamp • CCID/IMEI Number • Communication Protocol (COM) • Category of Data (CMD) • Sub Category of Data (XCMD) • ACK/NACK (RSP) • Pointer Value (PTR) - Value Optional) Payload • Device ID • Actual Sensor ID • Date • Time • Actual Data	Header • Transaction ID • Timestamp • CCID/IMEI Number • Communication Protocol (COM) Data • Device ID • Actual Sensor ID • Date • Time • Actual Data
Packet Delivery	Each packet must have ACK/NACK association for delivery assurance.	Synchronous Rest API for assured delivery.

21.2. Data Processing Engine

Data Processing Engine should be a high end multi-threaded application that intelligently does the identification of data type to populate the database and simultaneously provides caching of data to the customized Rule Engine for various field devices. This should provide secure conversion of incoming data packets received from MQTT broker via CRC check, data length verification and should have a user programmable noise/bad data identification system. Data processing engine should read the entire device configuration from the database at the time of initialization for data parsing and writing. The Data processing engine should consist of following key components:

1. Device Data Queue
2. Data Receiver
3. Data Parser
4. Data Forwarder
5. Data Writer

Following are the functionalities of each key component:

1. Device data receiving queue is a JMS (Java Message Service) queue with data persistence which gets data from MQTT Broker.
2. Data Receiver should read the Device Data Queue and forward individual data packets to Data Parser in a sequential manner (F-I-F-O).
3. The data parser should validate the data packet and parse each data value received from queue, checks for the message validity by checking the CRC bit, retrieves parameters from the received data message, checks for packet size and payload validation. The data parser also creates an unparsed raw data object from the received data packet for back up.
4. After successful parsing of data, the data forwarder should send individual data objects to the data writer as well as to the rule engine for processing of any pre defined rule(s).
5. Data writer should write the data in to the database in batch mode in different data structure depending upon the type of the data object and it should write the unparsed raw data object to the database for backup.

21.3. Rule Engine

IRCETAP application software should have menu driven web based interface to create real time rule configuration for both Individual / Combination of device(s) data with simple IF-THEN-ELSE logic and also provide real time execution of rule based on incoming device data received from Data processing engine. The inbuilt business rule engine should monitor and execute critical business rules/actions continuously in the software. Rule once triggered shall automatically generate SMS, Email or control output for digital or analog signal. Authorized User should be able to Create Rule / Edit Rule / Delete Rules / Activate / Deactivate rules through a web interface. Following event based condition & action rules shall be configurable and editable over Internet for all the equipments / sensors etc.:

Key Functionalities of Rule Engine:

1. Rule Engine would receive processed device data from data processing engine and must verify the existing rules for execution and take requisite action.
2. Rule engine should continuously monitor the incoming stream of packets coming from IFD & should report any violation of threshold values defined by the user. User should be able to configure the threshold on runtime.
3. If - Then Rules: Rule Engine module shall support rules based on the events which have occurred in the past.
4. Rules Parameters: Rule Engine module shall support rules based on various parameters Electrical Parameters / Sensor / Meter Parameters or any other (Diagnostic Data) specific conditions
5. Rule Conditions: Rule Engine module shall support rules with various conditions like “Less than” / “Greater than” / “Equal to”.
6. Multiple Conditions Support: Rule Engine module shall support multiple conditions for a rule like OR / AND based.
7. Rule Engine receives processed data from data parsing engine in a Message Service queue.

8. A simple messaging listener listens to the queue and is invoked when a processed data is received.
9. Depending upon the type of the message device data, Diagnostic data or any other, rule engine initiates the execution of rules in relation with the data types.
10. The rule configuration has three aspects:
    a. Rule type, Rule parameter and rule validity.
    b. Rule Condition
    c. Rule Action
11. Rule engine caches all the existing rules in memory at the time of initialization for faster execution and update the rules automatically in memory if any changes made in the database during the execution.
12. Besides Enterprise level rules that are received and processed on Central server, there should also be an option of defining Local Device Rule for threshold based control via menu driven web interface. In this case, rules shall be made, transmitted and stored in IFD memory, and run locally on IFD.

21.4. Database

Database application should be in RDBMS platform, DB2 based historian server wherein the server can store collected real time data in tabular structure with following broad applications:

1. Easy to access, no configuration required-once collected, data can be accessed by any client.
2. Historian data can be accessed by many predefined reports in web with formats like hourly, daily, monthly and yearly.
3. Highly scalable and reliable data store with ability to scale seamlessly.
4. Time series based data storage providing great accuracy in data analysis.
5. Data base structure should have defined Schema, Tables, and Indexes with Keys etc.
6. The tables should have primary and foreign keys and indexes if required for faster retrieval of data.
7. The device data table must be scalable to incorporate multiple types of data storage.
8. Database must have defined schema for WLMS / CRT applications etc., and table structures to the schemas.

21.4.1. Database will contain tables, which should store information about at-least but not limited to following entities:

• User	• Administration Hierarchy
• User Menu Relationship	• Device and Administration Hierarchy relationship
• User Role Relationship	• Equipment and Administration Hierarchy relationship
• Device configuration	• Alarm and Event Configuration
• User to Device relationship	• Alarm and Event History
• Device parameters configuration	• Schedule Configuration
• Device Data	• Schedule Execution detail
• Equipment Data	• SMS and Email Configuration
• Raw Device Data	• Device Diagnostics
• Rule Configuration	• Device control status
• Rule Execution History	• Device control history
• Raw Device Data	
• Rule Configuration	

21.5. Application Server Layer

The IRCETAP application layer should be designed on standards such that the architecture is separating the user-interface from the substance of the application. The web application must provide separated and reusable Data Access Layer. The web application should work on commonly used browsers, use SSL encrypted, industry standards and guidelines to make itself secure and reliable. The web application should be responsive and should be able to scale vertically and horizontally. The web application should provide modularity, separating the

functionality of a program into independent, interchangeable modules, such that each contains everything necessary to execute only desired aspect of the desired functionality. The application layer is to create unique new devices, unique users, unique applications, bi-directional commands from server to devices, reporting etc. The Application Layer should have following broad sub components:

1. SKU Configuration
2. Basic Asset / Equipment Configurator and its association with Users within a Business Entity
3. Device Provisioning & Registration - Field Device – Sensor / Actuator: Analog Input (AI), Analog Output (AO), Digital Input (DI), Digital Output (DO), High Speed Digital Input Provisioning Module.
4. Instant Control (Remote Management) and Scheduled Control Configurator
5. Data Analytics - Reporting, Charting with Report Timer Module etc.
6. User Authentication, Role and Access Management
7. Device Health & Diagnostic Monitor
8. Communicator Module - Java based MQ Client for Enterprise to Device(s) Communication.

Overview of Device Provisioning and Associated Components:

In order to create a unique device ID and its associated functions, following steps are to be followed within the IRCEPTAP application:

1. **SKU (Stock Keeping Unit) Configurator** – Here a one-time model for individual device should be created as a template wherein all the possible functionalities of the respective device is mapped.
2. **Business Entity and User** to be created in the system from the User Management Module.
3. **Asset and Equipment Configurator** – Here the type of asset for monitoring, control or both along with name plate details should be created and mapped with user and business entity.
4. **Device Provisioning** – Here the required functionalities within a specific SKU should be configured and then mapped to the asset/equipment that has been configured.
5. This should give an output file to go into the device and once the device is connected the application already identifies its unique ID, user, its associated functionalities etc.

21.5.1. SKU (Stock Keeping Unit) Configuration

SKU creation is a one-time activity of creating a unique device model whenever introduced in the IRCETAP application. A SKU must model all possible functionalities within a specific device like meters (Multiple Parameters within a single packet), Analog Inputs (AI), Digital Inputs (DI), Digital Outputs (DO), any other new type as introduced etc. Broad details but not limited to within SKU creation should be

1. SKU Name / SKU Number
2. Communication Mode (MQTT/Rest-API)
3. Communication Medium - GPRS etc.
4. Meter - Meter Name, Meter Manufacturer, Meter Model, Device Code, Scan Interval, Meter Parameter
5. Analog – Name, Analog Type (4-20mA, 0-10Volts etc.), Scan Interval
6. DI (Digital Input)
7. DO (Digital Output)
8. Etc.

21.5.2. Basic Asset / Equipment Configurator

It provides the features for adding, configuring and managing various type of equipment. There should be two separate steps for Equipment configuration as well as device configuration. Equipment is created with attributes information and then associated with devices as per provisioning details. Equipment Configuration: Equipment should be configured on the basis of equipment type; it should provide user interface:

1. To create a generic equipment with attributes information
2. To create any specific type equipment e.g. Water Level, Rail Temperature, Track Machine, Pump, Motor, Valve, Tank, Pipe, Panel, Switchgear, Transformer etc with their corresponding relevant attributes and their values etc.
3. This Interface should also capture following other attributes on the basis of their availability:

• Create Equipment	• Time Zone – IST etc.
• Business Entity	• Address Details
• Equipment Name	• Street Address 1
• Equipment Type	• Street Address 2
• Equipment Model	• City
• Serial Number	• Zip code
• Manufacturing Date	• Country
• Installation Date	• State
• Is Controllable	• Longitude
• Is Meterable	• Latitude
• Location	• Altitude

21.5.3. Device Provisioning & Registration

Device provisioning / configurations should provide the feature of managing and adding devices by choosing from pre defined SKU models. While creating a new device provisioning, user should be choosing the required functionalities from the possible set of all the functionalities that have been configured within the SKU model like (Meters, Analog Input (AI), Digital Input (DI), and/or Digital output (DO) etc.).

- SKU Number
- Internal Meter/ External Meter
- Meter Serial Number - Meter Model, Meter Name, Scan Interval, Publish Interval
- Relay
- Analog Input (AI) Sensor - Sensor Name, Sensor Model, Scan Interval
- Digital Input - Digital Input Model, Digital Input Name
- Analog Output
- Etc.

Once the device is provisioned, it should be associated with the equipment type and an output xml file should be generated to be inserted into the device.

21.5.4. Instant Control (Remote Management) and Scheduled Control Configurator

IRCETAP application should also have a feature for Instant control (Remote Management) and Time based Control (Schedule Management) from web based interface for devices to be controlled on MQTT protocol.

21.5.4.1. Remote Management

IRCETAP application should provide a web interface for any remote operation on the device. Remote operation can be for any of the features supported by installed device:

1. **On / Off operation**
2. **Group Remote Operation** - Software should provide an interface via which remote operation can be applied on a single equipment/asset or on a group of equipment / assets or on any group of existing groups.
3. **Additional Authentication** - Software shall have additional authentication for any remote operation on device, to improve security of the software. Authentication shall be based on user name and password.
4. **Time of Remote operation** - Software should have capability to show the time of execution of last remote operation.
5. **Equipment / Asset Status** - Software should have capability to show the current status of the equipment/asset on the field.
6. **Remote Operation History** - Software should have a feature by which user can view remote operation log / history and can export in excel file.

21.5.4.2. Schedule Management

IRCETAP application should have capability to apply schedules for ON/OFF timings on different equipment / assets as per application requirements. There should be following options for scheduled operations:

- Time Based Scheduling
- Fixed running hours based scheduling

Schedules should be simply created from menu driven web based user interface. Special engineering skills, programming skills shall not be required to make, edit or change the schedule and final output should be transmitted to the devices such that it is stored locally in device memory for local execution. In case, if there is network dis-connectivity of device at any particular time, software should re-attempt to publish schedule on device later. There should be following features / checks in schedule configurator:

1. Multiple schedule - Application Software should support multiple schedules on any equipment/asset.
2. Schedule conflict Resolution – Application Software should be able to resolve the case of (time based schedules being set up from server) schedule conflict i.e. in case of multiple schedules; it should not allow creating such schedules that are doing exactly opposite to any existing schedule on same time interval, and on same equipment.
3. Off-day/holiday type schedule - Schedule should accommodate off-day/holiday information so that energy usage can be optimized on that particular day.
4. Astronomical Calendar - Software should consider Sunrise and Sunset time (with preset / offset time to take benefit of twilight period) in case of schedule creation so that these assets (platform lighting, streetlights) can be used effectively as per requirements.
5. Group Scheduling - Software should provide an interface via which schedule can be applied on a single equipment / asset or on a group of newly created as well as existing equipment / assets.
6. Group creation for schedule - Software should support equipment/asset type, administrative unit wise grouping of equipment / assets so that a common schedule can be applied on these different groups as per the requirement.
7. Schedule Import - Software should also support import of ON/OFF schedules scheme from external sources - excel/csv files. Software should provide template to create ON/OFF schedule.
8. Schedule - Software should have feature by which user can view:
    a. All Schedules Created by User
    b. All Schedules Applied on Any Particular Device / Equipment
    c. Schedule Execution History
    d. Schedule Deletion from Enterprise Database
    e. Schedule Edit
    f. Schedule Reset/Delete from Device
    g. Software shall support printing of history of executed schedules
9. Software shall support querying the currently active schedules from device.
10. Schedule Status - Software shall maintain and display the current status of schedule. Status can be Executed, To be executed, To be published on devices etc.
11. Software should provide UI to create Master schedule having multiple sub-schedules. Master Schedule can be astronomical type also, each sub-schedule has options to
    a. Select sub schedule types
    b. Exception or Calendar, Exception sub schedule takes priority over other existing calendar schedule
    c. Applicable date range
    d. Schedule sub-type
    e. No Action – Starting action will be defined, end time action will not be defined
    f. Time Based – Start and End time action shall be defined
    g. Fixed running hours scheduling on a 24hr cycle such that running hours are stored and calculated on battery backup in case of power failure. Schedule will run for a given time duration in 24 hours to compensate running hour loss due to power failure during scheduled ON/OFF time range, it will reset again at midnight.
    h. Select weekdays on which schedule has to be executed, it can be all week days or any specific week days so that energy usage can be optimized on that particular day.
    i. After the creation of Schedule and its sub-schedules, it should be available to publish on Device

via the selection of connected equipment

21.5.5. Data Analytics Reporting and Charting

The Software should have the capability to generate various web based graphical, tabular reports to analyze WLMS / CRT Device Data, which would help Railway in taking various business / process decisions, for its resource utilization in optimal way.

21.5.5.1. Reporting and Charting

1. Reporting Pattern - Software should support following reporting pattern:
    a. Hourly
    b. Daily
    c. Weekly
    d. Monthly
    e. Quarterly
    f. Yearly
2. Facility to query data on date & parameter basis
3. Software should have facility to query data on date & parameter wise.
4. Software should be able to show trend for single parameter & comparative trend for multiple parameters based on the user selection
    a. View data in Tabular / Graphical form
    b. Option should be provided to view data in both tabular as well as in Graphical format with selective or composite view of parameters and in different styles viz. bar and line
    c. Zooming/ Panning - Web Reports should have functionality of zoom in and zoom out.
    d. Web Reports should support the feature of panning the reports, to move reports horizontally or vertically.
    e. Support to Export Reports - The software should enable the user to export reports into Excel/Csv.
5. **Dashboard -** Software should provide various type of dashboards to show Equipment status, Metering Parameters, Power status, Relay status, Connectivity Status, DI status etc. Dashboard example could be like
    a. Equipment Meter Status
    b. Equipment Sensor Status
    c. Asset / Location Wise Dashboard
6. The Application should support different time zones based data interpretation.
7. EMAIL / SMS Engine– Software should have Email and SMS supporting feature to send mail and SMS as per user's need
8. Scheduled Reports – Software System should generate scheduled reports and send it intended users on its scheduled time – daily/monthly basis.
9. There should also be an option to calibrate Analog sensors on web such that raw packet values are processed as per analog signals.

21.5.5.2. Group Management

The Web Based Application Software and Services should have capability to create

1. Virtual Meter - Group of meters
2. Report Group – Meter and Virtual Meters and their parameters
3. Equipment Group – To be used to view group wise data
4. Control Group – Group of relays to perform ON/OFF operation on the equipment belong to group
5. Software should provide an interface to the user to interact with group management modules. User shall be able to:
    a. Create Groups
    b. Delete Groups
    c. Edit Groups

21.5.5.3. Alarms Management

IRCETAP application should have a web based alarms managements for alarms created from Rule Engine.

1. **Alarm Monitoring** - Software shall provide the capability to monitor alarms/events in real time. Software shall cater to alarms and events generate by rule engine.
2. **Alarm History** - Software shall provide facility to filter find the previous occurrences (with respective time of occurrence) of a particular alarm.
3. **Alarm Notification** - Software shall raise e-mail / SMS alerts automatically to specified list of users for selected alarms as defined in the Rule Engine of Software.
4. **User Access** - Access to alarm views shall be controllable based on user name and rights configurable by the software administrator based on the predefined profiles. Administrator shall have the right to define the above profiles.

21.5.5.4. Real time Device Behavior Management

There should be a functionality wherein the devices behavior connected on MQTT protocol can be updated from IRCETAP application server. Some of the key features that should be available but not limited to are as follows:

1. Changing the scan interval of Meters & Sensors from 5-60minutes
2. Adding / Removing / Editing of new inputs / outputs provisioning
3. Device Restart
4. Reset Data Pointer, Etc.

21.5.5.5. IRCETAP Application Integration with TMS / BMS

IRCETAP should be able to integrate with Indian Railways IT Application viz. TMS / BMS on defined guidelines. IRCETAP will act as a bridge between field sensor data collection and TMS/BMS. Two-way communication field devices and sensor data needs would be done on MQTT protocol, and need based data gathering on Cloud REST API. For Example: Water Level and CRT applications field devices working on MQTT protocol should connect to IRCETAP application and IRCETAP application should send data to TMS/BMS as per defined guidelines. Similarly, in future Track Machines raw location data shall be collected on REST API, and transferred to TMS as per desired guidelines for further analysis and reporting.

21.5.6. IFD Status / Diagnostics

IRCETAP application should provide user interface and reports to view various kind of diagnostic data generated by field devices and transmitted to web over MQTT protocol that shall help in timely detection of any possible issue with devices unit or other related issues. Device diagnostic data can be viewed by selecting specific type of diagnostic packet and data range selection.

21.5.7. User Management

Web Based Application Software should provide a login interface to the administrator to interact with user management module. Administrator shall be able to:

1. Manage User - Add User / Delete User / Edit User Information
2. Manage Role – Software should provide UI to create various Roles and assign UIs (web pages) to a specific role
3. Access of UI (web Pages to User – Via association of users to roles or assign UIs directly to the user
4. Manage User Role for User / Roles specific access to individual equipment – Software should provide UI to create / assign user / roles for the access of equipment to view or View & Control purpose.
5. Software should support the creation of role-based access of the information. It should have feature to define the privileges of user to access the limited information based on his/her role.
6. User should have two type password – one for only viewing purpose and another related with control operation of equipment (ON/OFF)
7. User Search - Software should provide the feature to search Users based on their name, roles etc.

8. Role Management (UIs Groups) - The Role Management provides features like creation of new role, assigning menu items to role and finally assigning role to user, which provides individual user to access various menus like control/ operation, reports, configuration of IFD device.
9. **Administrative / Operational Hierarchy –** Software should provide UIs to create
    a. Administrative/Operational Unit types – e.g. Zone, Division, Section etc.
    b. Define relationships between created Administrative / Operational Unit types e.g. Zone → Division → Section or Area → Sub-area → Pump House etc.
    c. Entry of actual administrative/operational unit creation e.g. Zone A, Division B, Section C, Area D
    d. Relationship between actual existing administrative / operational units e.g. Zone A → Division B → Section C
10. **Operational / Administrative Hierarchy to Navigate Equipment**
    a. Relationship between Administrative/Operational Unit to Field Equipment e.g. Equipment XYZ belong to Section C (Section C→ Equipment XYZ)
11. **Equipment Access Configuration** – Software should provide UI to configure access of equipment for view or control or for both based on:
    a. Role based access – Software should provide UI to select Role (e.g. Chief Engineer, AEN, XEN, JE, View, Control) Login Id and Administrative/Operational units to define role based access of equipment exists in Administrative/Operational units
    b. Either Role based or Admin Unit based or Login Id based selection of equipment access (View or View & Control)
    c. Individual User's Login Id based access of equipment

21.5.8. Communicator Module

Communicator application should be a MQTT client for any and every communication from IRCETAP rule engine and application server to device. Any information that to be pushed from server to the device should integrated via Communicator application and it must handle all the response from the device regarding same.

Basic feature of Communicator Application:

1. Control command management
2. Device Rule Management
3. Schedule Management
4. Provisioning Management
5. Other server to device communications as per Table 21.1.3
6. SMS/Email Execution as per gateway services.

21.6. HTTP Sever

1. SSL Implementation
2. 128 Bit Encryption
3. Domain Mapping

21.7. Post Go-Live and Production Environment Set Up

21.7.1. Manpower Support

Post Go-Live and Production Environment Set Up, agency should support the IRCETAP application for a period of one year (extendable) by having Project Manager / Team Leader, Sr. Application Developer, Web front end developer, System Administrator and and as per requirement (Electronics and Communication Engineer). Agency should have its resources in Delhi/NCR region, and RCIL shall decide for IRCETAP 1-2 support resources to be available in RCIL data centre. In this case, RCIL will provide infrastructure and seats in its own data centre on weekdays and routine working hours (Monday to Friday – 9:30am to 5:30pm).

21.7.2. Integration Formats

Agency should have above resources for review and exploration of any new IRCETAP based telemetry requirements, and accordingly provide integration formats.

21.7.3. Training and Documentation

Agency shall provide training and documentation to RCIL. RCIL will deploy manpower for technology transfer.

21.8. Data Centre Infrastructure and Services to be provided by Railtel - IRCETAP

Railtel will be providing below mentioned Infrastructure and services in its own data centre wherein IRCETAP application will be deployed, hosted and managed:

A. SERVER ENVIRONMENT - APPLICATION IRCETAP					
S.No	**Virtualized Machine**	**CPU Core**	**RAM**	**STORAGE**	**Application Module Deployment**
1	MACHINE 1	4	64 GB	250 GB	Production Environment Cloud Gateway requiring application server middleware
2	MACHINE 2	4	64 GB	250 GB	Production Environment Data Processing Engine requiring application server middleware
3	MACHINE 3	4	64 GB	250 GB	Production Environment Rule Engine requiring application server middleware
4	MACHINE 4	8	128 GB	500 GB	Production Environment Database requiring database middleware
5	MACHINE 5	8	128 GB	500 GB	Production Environment Enterprise Application Server requiring application server middleware
6	MACHINE 6	4	32 GB	250 GB	Production Environment Http Web Server
7	MACHINE 7	2	32 GB	120 GB	Testing & Release Environment Cloud Gateway requiring application server middleware
8	MACHINE 8	2	32 GB	120 GB	Testing & Release Environment Data Processing Engine requiring application server middleware
9	MACHINE 9	2	32 GB	120 GB	Testing & Release Environment Rule Engine requiring application server middleware
10	MACHINE 10	2	64 GB	120 GB	Testing & Release Environment Database requiring base edition database middleware
11	MACHINE 11	2	64 GB	120 GB	Testing & Release Environment Enterprise Application Server requiring application server middleware
12	MACHINE 12	2	16 GB	120 GB	Testing & Release Environment Http Web Server
13	STORAGE	-	-	40 TB	Storage - SAN Mode Etc. (Attached with Database Server)

B. SERVER ENVIRONMENT - COMMON INFRA SHARED ACROSS ALL 3 APPLICATIONS					
S.No.	**Virtualized Machine**	**CPU Core**	**RAM**	**STORAGE**	**Application Module Deployment**
1	MACHINE 1	4	16 GB	1 TB	Central Repository Server
2	STORAGE	-	-	40 TB	Storage for Back Up of Application/Data

C. DATA CETNRE NETWORK EQUIPMENTS / OPERATING SYSTEM AND SERVICES			
S.No.	**Items**	**Quantity**	**Remarks**
1	Unified Threat Management Appliance / Firewall	As per above Environment	
2	Rack with Dual PDUs, ATS, KVM with Console, Network Switches with required DC environment	As per above Environment	
3	Internet Lease line – IRCETAP Application Environment	16 Mbps	2-3 Nos. Static Public IP
4	RedHat Enterprise Linux with Anti Virus	As per above Environment	
5	Domain Name with SSL – 128bit Encryption	1 No.	
6	VM Ware / Virtualization Software	As per above Environment	
7	SMS Gateway / Email Services	1 Lot	

22. Detailed Technical Specifications - IRGDVAP

In line with IR requirements, IRGDVAP web application will access the available GeoVideo files in different resolutions (HD) and necessary geometadata data and centrally stored on the server. The GeoVideo will be played in GeoVideo player and enable synchronization with Map/satellite imagery by using Geo metadata such as Latitude, Longitude, Elevation, Camera information, Flying Height, Rotation angle formation (roll, pitch, Yaw). A user friendly GeoVideo player shall have the Video controls such as, zoom, pan, play, pause, backward, forward, speed control & video enhancement etc. Also chainage & asset based search will be made available using uploaded kml files for users for faster accessing and asset visualization. The application shall be made compatible to use map services available from Google Map API and should be compatible to develop further for integration with map serveries from other open source map services (as required). The facility of downloading data from centralized GeoVideo server in the local system will be made available.

IRGDVAP should allow the user to annotate the video and develop the annotated report. The annotated report can be shared via map annotation and list with description on the portal itself and it should have an option to convert the user annotation in a PDF format which can be downloaded. The geo-video should have access control. The user interface of IRGDVAP should allow the user to watch information about the video frame. The information should contain, latitude, longitude, average speed and flight distance of the drone. The icon representing the drone/camera location should be customizable. The path showing the drone/camera's complete path movement should be customizable with change in color.

IRGDVAP system will comprise of following key modules:

22.1. Upload Module

22.2. Video Data Processing Module

22.3. Database Module

22.4. Application Module

22.5. HTTP Module

22.6. IRGDVAP Application source code will be deployed in existing data center of RCIL, wherein RCIL will provide necessary infrastructure with required hardware, bandwidth, networking, OS and other related services. Operating System, Middleware for Application Server and database will be open source or in the scope of applicant.

22.1. Upload Module

Upload Module will primarily comprise of upload video module, KML files upload and Geo-video meta data validation. Video Uploaded should be on IRGDVAP and it will not be using any external services to serve the video in adaptive bitrate. Various IR users will upload videos with required geo-video meta data.

22.1.1. Upload Video

1. Validation check if video is in mp4 container (format)
2. Database entry of the video
3. It should allow users to upload video

22.1.2. KML Upload

1. Validation check if uploaded KML is valid

22.1.3. Geo-video Meta-data

1. Validation check if uploaded geo-meta data is valid
2. Geo-video meta data should contain latitude, longitude and height with respective timeframe of the video

22.2. Video Data Processing Module

Video data processing module will primarily comprise of the following features:

1. Video serving using adaptive bitrate
2. Transcoding - Converting video from mp4 format to respective format which allow streaming and support adaptive bitrate for seamless serving.
3. Processing of video data to create compatibility for sync functionality

22.3. Database Module

Database module will primarily comprise of Insertion & Storage of data with following features:

1. Project - Contain project related details such as project name, description, location etc.
2. Geo-Video - Contain information regarding which video belongs to which project with their respective user, project details and geo-meta data information.
3. User - User details along with their unique ID and access controls
4. KML - KML Data related to project should store in separate table
5. Annotation - Annotate information of the video and project should be stored in different collection.

22.4. Application Server Module

Application Module will primarily comprise of User management, Geo-video management, map integration and sync nodule

1. User Management module
    a. Authentication Module - It should allow user to login and register according to different access controls.
    b. Authorization Module - It should control which user should be allowed to see what according to their access permission
2. GeoVideo Management module
3. Integration with MAP Module – IRGDVAP would have google maps API and also option of open source map APIs etc as per requirement.
4. Video / Map Sync Module - Video timeframe and map location should be sync respectively in bi-directional manner.

22.4.1. Key Features of IRGDVAP application will be as follows:

1. Application should be a browser based, with a centralized server. Both application and databases will be fully centralized.
2. Video Zoom / Pan
3. Video Speed Control from 0.5 X to 4 X
4. Data should be displayed & synchronized (Latitude, Longitude, Height, Distance Traveled by Drone, Speed)
5. Video Enhancement Filters (Brightness, Contrast, Grayscale, Hue, Saturate, Sepia)
6. Video download function in same quality as it has been uploaded
7. Video should be converted to Mpeg-Dash format to transmit in adaptive bitrate and which should be compatible with portal's video player as well.
8. Option to viewing various resolutions (Upto HD) of video
9. Video player should be annotation compatible which can be re-visited later.
10. Option to generate report of the annotated data in a pdf format
11. Path of the Drone which should be visible on map.
12. Video Location synchronization with the map in the bi-directional format.
    a. On clicks at timeline of video, Sync with relative position on the map
    b. On click on a location on the map, Sync with relative position on the video.
13. Color of Geovideo path and navigation marker on Map should be customizable according to the project.
14. Annotation on the video should perform following actions:
    1. Mark a position on the map
    2. Save annotation point on the video
    3. Saved in database to revisit and look at same annotation again

15. Annotation should have capabilities to directly annotate on the map as well.
16. Map should have option to change base map as provided in Map API services
17. The map should option to show different KMLs uploaded by the user.
18. KML layers can be turned on and off as per user preferences.
19. Different level of hierarchies to view the project
20. Project can be searched using location, Project Name, Zone, Division
21. Search and move to location in GeoVideo based on loaded KML data
22. A single project can contain following objects
    1. Multiple Videos
    2. Multiple KML Data
    3. Multiple video geo-meta files
23. Project view should be available in three different ways:
    1. List View - should show all the details of the project in row-wise manner
    2. Grid View - should show image of the project along with its description and project name
    3. Map View - should show different areas on the map where project has been created
24. Project should be allowed to edit later once project has been created:
    1. Delete video (Multiple and Single)
    2. Delete KML (Multiple and Single)
    3. Delete Project (Complete Project along with all the data inside it)
25. User should have following level of hierarchy:
    1. User – Can Create the Project and upload data
    2. Admin – Can View the Projects for the user reporting under him
    3. Super – admin – Can see everyone's project
26. Video and map should be had adjustable containers, with can increase and decrease width of the both map and the video.
27. User Creation - Proper UI to create user with specific set of hierarchy.
28. Project Creation - Proper UI to create a new project and add relevant data mentioned above
29. Project creation should have following details:
    1. Name
    2. Latitude / Longitude
    3. Zone
    4. Division
    5. Description
    6. Image of the project
30. Project Management - Project can be edit after creating such as adding new data or deleting previously uploaded data.
31. Upload Data - Show progress bar while uploading the data.
32. Historian Data Access with time series

22.5. HTTP Sever Module

1. SSL Implementation - Support for HTTPS
2. Encryption - Password should be stored in encrypted HASH
3. Domain Mapping

22.6. Post Go-Live and Production Environment Set Up

22.6.1. Manpower Support

Post Go-Live and Production Environment Set Up, agency should support the IRGDVAP application for a period of one year (extendable) by having Team Leader and Sr. Application Developer. Agency should have its resources in Delhi/NCR region, and RCIL shall decide for IRGDVAP support resources to be available in RCIL data centre. In this case, RCIL will provide infrastructure and seats in its own data centre on weekdays and routine working hours (Monday to Friday – 9:30am to 5:30pm).

22.6.2. Integration Formats

Agency will provide requisite geo-video meta data formats for uploading the correct videos, and should also have resources for review and exploration of any new IRGDVAP based drone recording requirements, and accordingly provide requisite integration formats.

22.6.3. Training and Documentation

Agency shall provide training and documentation to RCIL. RCIL will deploy manpower for technology transfer.

22.7. Data Centre Infrastructure and Services to be provided by Railtel – IRGDVAP

Railtel will be providing below mentioned Infrastructure and services in its own data centre wherein IRGDVAP application will be deployed, hosted and managed:

A. SERVER ENVIRONMENT - APPLICATION IRCETAP					
S.No.	**Virtualized Machine**	**CPU Core**	**RAM**	**STORAGE**	**Application Module Deployment**
1	MACHINE 1	4	16 GB	1 TB	Production Environment Application / Web Server
2	MACHINE 2	4	16 GB	1 TB	Production Environment Database Server
3	MACHINE 3	32	128 GB	1 TB	Production Environment Streaming Server
4	MACHINE 4	2	8 GB	120 GB	Testing & Release Environment Application / Web Server
5	MACHINE 5	2	8 GB	120 GB	Testing & Release Environment Database Server
6	MACHINE 6	4	32 GB	250 GB	Testing & Release Environment Streaming Server
7	STORAGE	-	-	15 TB	Storage

B. SERVER ENVIRONMENT - COMMON INFRA SHARED ACROSS ALL 3 APPLICATIONS					
S.No.	**Virtualized Machine**	**CPU Core**	**RAM**	**STORAGE**	**Application Module Deployment**
1	MACHINE 1	4	16 GB	1 TB	Central Repository Server
2	STORAGE	-	-	40 TB	Storage for Back Up of Application/Data

C. DATA CETNRE NETWORK EQUIPMENTS / OPERATING SYSTEM AND SERVICES			
S.No.	**Items**	**Quantity**	**Remarks**
1	Unified Threat Management Appliance / Firewall	As per above Environment	
2	Rack with Dual PDUs, ATS, KVM with Console, Network Switches with required DC environment	As per above Environment	
3	Internet Lease line – IRGDVAP Application Environment	1 Gbps	1-2 Nos. Static Public IP
4	Anti Virus	As per above Environment	
5	Domain Name with SSL – 128bit Encryption	1 No.	
6	Map API Services – Google till based on free usage or requirement as well free Open Source option	As per above Environment and IR Requirement	Shall be extra at actuals if required on Paid Services
7	VM Ware / Virtualization Software	As per above Environment	
8	Email Services	1 Lot	

23. Detailed Technical Specifications - IRCCCAP

In line with IR requirements, IRCCCAP application will be a central software application wherein there will be an option to create Indian Railway organization (Zone / Divisions / Sections), departments and designations, create users and groups, create projects. There will be a module to configure compatible / web accessible CCTV cameras, and accordingly associate CCTVs to Projects to Users to Railways Zones-Divisions-Section etc. IRCCCAP application is required to provide live feed of the installed secured web accessible CCTVs, and there would not be any requirement of storage of CCTV footage on IRCCCAP application. Once the CCTVs are associated to projects, users and organization, IR users can login into a common platform and view live feeds of various CCTVs from this common platform.

IRCCCAP would comprise of following key modules:

23.1. Organization Management Module

23.2. User Management Module

23.3. Project / Sites Management Module

23.4. CCTV Configuration / Access Management Module

23.1. Organization Management Module - Organization Module should have the following:

1. Create / Manage Organization
2. Create / Manage Zones / Divisions / Sections
3. Create / Manage Department
4. Create / Designation

23.2. User Management Module – User Management Module should have the following:

1. Create / Manage User
2. Create / Manage User Group

23.3. Projects / Sites Management Module - Projects / Sites Management Module should have the following:

1. Create / Manage Projects / Sites
2. Manage Project / Sites Information
3. Projects Access / Association Management

23.4. CCTV Configuration / Access Management

1. Create / Manage CCTVs
2. Manage CCTV Configuration
3. CCTVs that are accessible through secured web will be required to be integrated with IRCCCAP application.

CCTVs will be associated with Projects, which in turn will be associated with Users and respective Organizations. In case Indian Railways would require to have common user and organization management details from existing TMS/BMS application, then IRCCCAP would be required to expose its web service in consultation with IR technical team. In this case, agency shall coordinate with IR technical such that team managing TMS/BMS would implement the web service of IRCCAP such that whenever there is any addition/ edition and deletion in TMS / BMS, it is automatically updated in IRCCAP application based on the requirements as defined by IR Technical team.

23.5. Post Go-Live and Production Environment Set Up

23.5.1. Manpower Support

Post Go-Live and Production Environment Set Up, agency should support the IRCCCAP application for a period of one year (extendable) by having a Sr. Application Developer. Agency should have its resources in Delhi/NCR region, and RCIL shall decide for IRCCCAP support resource to be available in RCIL data centre. In this case, RCIL will provide infrastructure and seats in its own data centre on weekdays and routine working hours (Monday to Friday – 9:30am to 5:30pm).

23.5.2. Training and Documentation

Agency shall provide training and documentation to RCIL. RCIL will deploy manpower for technology transfer.

24. Technical Compliance Checklist **Annexure "A"**

24.1. IRCETAP

S.No.	Clause	Details	Remarks	Compliance (Yes / No)
1	21.1 21.1.1 21.1.2 21.1.3	Cloud Gateway - MQTT Gateway Server & Cloud Service API (REST) Layer		
2	21.2	Data Processing Engine		
3	21.3	Rule Engine		
4	21.4 21.4.1	Database		
5	21.5	Application Server Layer		
5.1	21.5.1 21.5.2 21.5.3	SKU (Stock Keeping Unit) Configuration Basic Asset / Equipment Configurator Device Provisioning & Registration		
5.2	21.5.4 21.5.4.1 21.5.4.2	Instant Control (Remote Management) and Scheduled Control Configurator		
5.3	21.5.5 21.5.5.1 21.5.5.2 21.5.5.3	Data Analytics Reporting and Charting		
5.4	21.5.5.4	Real time Device Behavior Management		
5.5	21.5.5.5	IRCETAP Application Integration with TMS / BMS		
5.6	21.5.6	IFD Status / Diagnostics		
5.7	21.5.7	User Management		
5.8	21.5.8	Communicator Module		
6	21.6	HTTP Sever		
7	3.1	Readiness of Solution on similar middleware platform viz. TMS/BMS .		

24.2. IRGDVAP

S.No.	Clause	Details	Remarks	Compliance (Yes / No)
1	22.1 22.1.1 22.1.2 22.1.3	Upload Module		
2	22.2	Video Data Processing Module		
3	22.3	Database Module		
4	22.4 22.4.1	Application Server Module with functionalities		
5	22.5	HTTP Server		

24.3. IRCCCAP

S.No.	Clause	Details	Remarks	Compliance (Yes / No)
1	23.1	Organization Management Module		
2	23.2	User Management Module		
3	23.3	Project / Site Management Module		
4	23.4	CCTV Configuration / Access Management Module		

25. Format for statement of Deviation

The following are the particulars of deviations from the requirements of the Instructions to bidders:

S.NO	CLAUSE	DEVIATION	REMARKS (IncludingJustification)

26. Phases with Timelines and Responsibilities

26.1. Phases with Timeline and Responsibilities – IRCETAP

PHASES	Railtel	Agency	Timeline
Phase I	Railtel to Provide IT Infrastructure and Services at its Data centre.	Agency to Assist in Infra set up, Network Configuration, Operating System Set Up etc with RCIL Data centre team.	Within 30 Days of Award of LOA *(As per RCIL DC)*
		Agency to Set Up and configure development as well as testing & release environment along with necessary Middleware application and database server(s).	Within 60 Days of IT Infra set up
		Agency to Set Up and configure Central Repository Sever with IRCETAP application source Code for development as well as testing & release environment.	
Phase II	Sites / Locations to be facilitated in consultation with Indian Railways – Zones/Divisions.	Agency to demonstrate TMS integrated any existing 5 Nos. of WLMS and CRT combination of field devices, transferring data directly to newly configured Testing and Release Environment.	Within 60 Days of IT Infra Set Up
Phase III	Railtel to provide SMS Gateway, and Email Server Settings	SMS Gateway and Email Integration in production environment.	Within 30 Days of Completion of Phase II
		Set Up production environment and configure the middleware as well as application source code to make production environment up and running.	
		Agency to transfer WLMS and CRT integrated field devices from Testing and Release environment to Production environment already demonstrated in Phase II.	
Phase IV		Handholding, Customization and Support on Monthly basis	To Start at the end of Phase III
Phase V		Integration Formats and Protocols publishing for MQTT based Field Devices with sensors as well as REST API based services.	To Start anytime after end of Phase III
Phase VI	Railtel to set up time/location and teams who shall undergo training.	Training, Documentation and Technology Transfer	To Start anytime after end of Phase III / IV /V

26.2. Phases with Timeline and Responsibilities – IRGDVAP

PHASES	Railtel	Agency	Timeline
Phase I	Railtel to Provide IT Infrastructure and Services at its Data centre.	Agency to Assist in Infra set up, Network Configuration, Operating System Set Up etc with RCIL Data centre team.	Within 30 Days of Award of LOA *(As per RCIL DC)*
		Agency to Set Up and configure Central Repository Sever with IRGDVAP application source Code for development as well as testing & release environment.	Within 60 Days of IT Infra set up
Phase II		Agency to demonstrate any existing 5 Nos. Drone videos as per technical specifications to newly configured Testing and Release Environment.	Within 60 Days of IT Infra Set Up
Phase III	Railtel to provide Email Server Settings	Email Integration in production environment (As Required).	Within 30 Days of Completion of Phase II
		Set Up production environment and configure application source code to make production environment up and running.	
		Agency to transfer drone video files from Testing and Release environment to Production environment already demonstrated in Phase II.	
Phase IV		Handholding, Customization and Support on Monthly basis	To Start at the end of Phase III
Phase V		IRGDVAP Geo-meta data formats publishing.	To Start anytime after end of Phase III
Phase VI	Railtel to set up time/location and teams who shall undergo training.	Training, Documentation and Technology Transfer	To Start anytime after end of Phase III / IV / V

26.3. Phases with Timeline and Responsibilities – IRCCCAP

Phase I	Railtel to Provide IT Infrastructure and Services at its Data centre.	Agency to Assist in Infra set up, Network Configuration, Operating System Set Up etc with RCIL Data centre team.	Within 30 Days of Award of LOA *(As per RCIL / IR requirements)*
		Agency to Set Up and configure Central Repository Sever with IRCCCAP application source Code for development as well as testing & release environment.	Within 60 Days of IT Infra set up and finalization with IR TMS/BMS Team
Phase II		Agency to demonstrate any 5 Nos. CCTV live feeds from IRCCCAP platform to newly configured Testing and Release Environment.	Within 60 Days of IT Infra set up and Phase I
Phase III	Railtel to provide Email Server Settings	Email Integration in production environment (As Required).	Within 30 Days of Completion of Phase II
		Set Up production environment and configure application source code to make production environment up and running.	
		Agency to transfer CCTV live feeds from Testing and Release environment to Production environment already demonstrated in Phase II.	
Phase IV		Handholding, Customization and Support on Monthly basis	To Start at the end of Phase III
Phase V		IRCCCAP type of CCTV live feeds compatibility modes publishing.	To Start anytime after end of Phase III
Phase VI	Railtel to set up time/location and teams who shall undergo training.	Training, Documentation and Technology Transfer	To Start anytime after end of Phase III / IV / V

27. Financial Bid and Schedule of Rates **Annexure B**

Annexure B: Financial Bid Schedule Cover Letter

Supply and Implementation of IT application for Collection and Assimilation of Field Sensor Data viz. Rail Temperature & Bridge Water Level, CCTV and Drone Recording).

(To be submitted in on Letter Head sealed envelope marked "Financial-EOI Number RCIL/EOI/CO/DNM/2021-22/IT services to RCIL customer/01 dated 05.04.2021")

Date: .....
Invitation for EOI No.: .....
Name of Bidder: .....

Schedule of Rates:
The financial bid schedule is divided into following four items / application schedules along with phases, timelines and payment terms:

Schedule Number	Items / Application Platform	Basic Composite Amount in INR (A1)	Basic Composite GST Amount in INR (B1)	Total Amount in INR (A1+B1)	Total Amount in INR in (Words)
27.1	IT Hardware & Middleware - IRCETAP Middleware, Desktop, Laptops and Printers				
27.2	IRCETAP				
27.3	IRGDVAP				
27.4	IRCCCAP				
	GRAND TOTAL				
GRAND TOTAL AMOUNT in INR in (Words)					

(Applicant should enter the composite rates based on below mentioned individual schedule of rates as in Clause "27.1", Clause "27.2", Clause "27.3" and Clause "27.4")

We offer to execute the Work in conformity with the Bidding Documents;

Name .....
In the capacity of .....
Signed .....
Duly authorized to sign the Bid for and on behalf of .....
Date

27.1. Financial Bid and Schedule of Rates – IT Hardware & Middleware – IRCETAP Middleware, Desktops, Laptops and Printers.

Work Item		Unit	Qty (Q1)	Rate (R1)	Basic Amount in INR (A1 = Q1xR1)	Basic GST Amount in INR (B1 = A1x18%)	Total Amount with GST (A1+B1)
S. No.	SCHEDULE A – Middleware Supply and Environment Set-Up						
1	Supply of Application Server software latest version with HTTP Web server for server lot as per requirements of Clause 21.8 (A).	Lot	1				
2	Supply of Database Server software latest version for server lot as per requirements of Clause 21.8 (A).	Lot	1				
3	Supply of Desktops for Development & Support (Intel Core i7, 16GB RAM, ITB Storage with latest Windows Operating System).	Nos.	10				
4	Supply of Laptops (Intel Core i7, 16GB RAM, ITB Storage with latest Windows Operating System).	Nos.	5				
5	Supply of Printers (HP Make MFP M477fnw or equivalent).	Nos.	5				
					Total	Schedule A	

27.2. Financial Bid and Schedule of Rates – IRCETAP (Indian Railways Civil Engineering Telemetry Application Platform)

Work Item		Unit	Qty (Q1)	Rate (R1)	Basic Amount in INR (A1 = Q1xR1)	Basic GST Amount in INR (B1 = A1x18%)	Total Amount with GST (A1+B1)
S. No.	SCHEDULE B – Software Deployment and Environment Set-Up (IT Infrastructure, Network Configuration, Operating System Set Up support to Railtel data centre team as well as configuration of Central Repository Sever)						
1	Development Environment Set Up with necessary installation and configuration of Application and database Server licences.	Lot	1				
2	Testing and Release Environment Set Up with necessary installation and configuration of Application and database Server licences.	Lot	1				
3	Production Environment Set Up with necessary installation and configuration of Application and database Server licences.	Lot	1				
					Total	Schedule B	

Work Item		Unit	Qty (Q1)	Rate (R1)	Basic Amount in INR (A1 = Q1xR1)	Basic GST Amount in INR (B1 = A1x18%)	Total Amount with GST (A1+B1)
MODULE	SCHEDULE C - Supply of IRCETAP IT Application Software with Source Code for IR Civil Engineering Telemetry Application						
MODULE A	Cloud Gateway - (MQTT Broker Application / Cloud Service API, source code of below mentioned modules)	Nos.	1				
	Device Connect Acknowledgement with time synchronization						
	Subscription / Publishing of IR Defined Topics						
	Ping Request for active client MQ Connections						
	Device Disconnect Acknowledgement with Last Will Testament feature (LWT)						
	Handling and Acknowledgement management of Data/Command packets						
	Basic user Authentication with device registration Web Service						
	Connect / Disconnect Web Service						
	Device Data/Diagnostic Web Service						

MODULE B	Data Processing Engine - Deployable EAR with Source Code in JAVA						
	One Time Data Parser for Individual Equipment						
	Receipt, Validation and Persistence of Data, CRC, Data Length						
	Data Parser						
	Invalid Data Rejection						
MODULE C	Rule Engine - Deployable EAR with Source Code in JAVA						
	Real time Configuration and Execution of Rules for Individual / Combination of Device Data						
	Alerts and Alarms – SMS / Email Etc.						
	Two Way Communication with Control						
MODULE D	Database Schema						
	Database Schema, Table Structure, Index with Keys etc. DDL						
	Entity Relationship Diagrams						
MODULE E	Enterprise Web Application Software - Deployable EAR with source code in JAVA						
	Web Module user interface for application features						
	SKU Configuration, Asset Configurator, Asset Field Data Template Mapping to Device						
	Device Provisioning & Registration Module - Field Device Configurator – Sensor / Actuator: Analog Input (AI), Analog Output (AO), Digital Input (DI), Digital Output (DO), High Speed Digital Input Configurator (HSDI).						
	Control - Instant and Schedule Configurator						
	Data Analytics Reporting, Charting, Report Timer Module						
	User Authentication, Role and Access Management						
	Device Health & Diagnostics Monitor						
	Communicator Module - JAVA based MQ Client for Enterprise to Device(s) communication						
					Total	Schedule C	

Work Item		Unit	Qty (Q1)	Rate (R1)	Basic Amount in INR (A1 = Q1xR1)	Basic GST Amount in INR (B1 = A1x18%)	Total Amount with GST (A1+B1)
S.No.	SCHEDULE D - Hand Holding, Manpower Deployment for Support						
1	Hand Holding, Manpower Deployment for Customization, Support and Technology Transfer having Resources - Project Manager / Team Leader, Sr. Application Software Developer, Web Frontend Developer, System Administrator, Electronics and Communication Engineer as required	Per Month	12				
					Total	Schedule D	

Work Item		Unit	Qty (Q1)	Rate (R1)	Basic Amount in INR (A1 = Q1xR1)	Basic GST Amount in INR (B1 = A1x18%)	Total Amount with GST (A1+B1)
S.No.	SCHEDULE E - Integration Formats and Protocols for Existing Sensor Deployments						
1	Water Level Monitoring System	Nos	1				
2	Continuous Rail Temperature Monitoring System	Nos	1				
3	Track Machines Monitoring System	Nos	1				
					Total	Schedule E	

Work Item		Unit	Qty (Q1)	Rate (R1)	Basic Amount in INR (A1 = Q1xR1)	Basic GST Amount in INR (B1 = A1x18%)	Total Amount with GST (A1+B1)
S.No.	SCHEDULE F – Training and Documentation						
1	Training & Documentation	Sessions	3				
					Total	Schedule F	
				Grand Total	Schedule B to Schedule F		

27.3. Financial Bid and Schedule of Rates – IRGDVAP (Indian Railways Geo Drone Video Application Platform)

Work Item		Unit	Qty (Q1)	Rate (R1)	Basic Amount in INR (A1 = Q1xR1)	Basic GST Amount in INR (B1 = A1x18%)	Total Amount with GST (A1+B1)
S. No.	SCHEDULE G – Supply of Software and Environment Set-Up (IT Infrastructure, Network Configuration, Operating System Set Up support to Railtel data centre team as well as configuration of Central Repository Sever)						
1	Supply, Installation and Development of web based IRGDVAP application source code along with Development, Testing & Release and Production Environment set up.	Lot	1				
					Total	Schedule G	

Work Item		Unit	Qty (Q1)	Rate (R1)	Basic Amount in INR (A1 = Q1xR1)	Basic GST Amount in INR (B1 = A1x18%)	Total Amount with GST (A1+B1)
S. No.	SCHEDULE H – Hand Holding, Manpower Deployment for Support						
1	Hand Holding, Manpower Deployment for Customization, Support and Technology Transfer having Resources - Team Leader, Sr. Application Software Developer as required	Lot	1				
					Total	Schedule H	

Work Item		Unit	Qty (Q1)	Rate (R1)	Basic Amount in INR (A1 = Q1xR1)	Basic GST Amount in INR (B1 = A1x18%)	Total Amount with GST (A1+B1)
S. No.	SCHEDULE I – Training and Documentation						
1	Training and Documentation	Lot	1				
					Total	Schedule I	
				Grand Total	Schedule G to Schedule I		

27.4. Financial Bid and Schedule of Rates – IRCCCAP (Indian Railways Closed Circuit Camera Application Platform)

Work Item		Unit	Qty (Q1)	Rate (R1)	Basic Amount in INR (A1 = Q1xR1)	Basic GST Amount in INR (B1 = A1x18%)	Total Amount with GST (A1+B1)
S. No.	SCHEDULE J – Supply of Software and Environment Set-Up (IT Infrastructure, Network Configuration, Operating System Set Up support to Railtel data centre team as well as configuration of Central Repository Sever)						
1	Supply, Installation and Development of web based IRCCCAP application source code.	Lot	1				
					Total	Schedule J	

Work Item		Unit	Qty (Q1)	Rate (R1)	Basic Amount in INR (A1 = Q1xR1)	Basic GST Amount in INR (B1 = A1x18%)	Total Amount with GST (A1+B1)
S. No.	SCHEDULE K – Hand Holding, Manpower Deployment for Support						
1	Hand Holding, Manpower Deployment for Customization, Support and Technology Transfer having Sr. Application Software Developer as required	Lot	1				
					Total	Schedule K	

Work Item		Unit	Qty (Q1)	Rate (R1)	Basic Amount in INR (A1 = Q1xR1)	Basic GST Amount in INR (B1 = A1x18%)	Total Amount with GST (A1+B1)
S. No.	SCHEDULE L – Training and Documentation						
1	Training and Documentation	Lot	1				
					Total	Schedule L	
				Grand Total	Schedule J to Schedule L		

28. Payment Terms:

Payment Terms will be separated based on individual application technical scope, phases and delivery.

S.No.	Schedule of Rates Clause	Schedule Reference	Payment Terms	Remarks
1	Clause 27.1	Schedule A	100%	On Supply of Middleware Licenses along with Desktop, Laptops and Printers.
IRCETAP				
2	Clause 27.2	Schedule B – Sr. No 1	100%	On Completion of Phase I – Clause 26.1
		Schedule B – Sr. No 2	100%	On Completion of Phase I – Clause 26.1
		Schedule B – Sr. No 3	100%	On Completion of Phase III – Clause 26.1
		Schedule C Combined Modules	20%	On Completion of Phase I – Clause 26.1
			60%	On Completion of Phase II – Clause 26.1
			20%	On Completion of Phase III – Clause 26.1
		Schedule D	Per Month	To Start after Completion of Phase III – Clause 26.1
		Schedule E – Sr. No 1	100%	On Delivery - After Completion of Phase III – Clause 26.1
		Schedule E – Sr. No 2	100%	On Delivery - After Completion of Phase III – Clause 26.1
		Schedule E – Sr. No 3	100%	On Delivery - After Completion of Phase III – Clause 26.1
		Schedule F	100%	On Delivery-clause 26.1and (After Completion of Phase III – Clause 26.1)
IRGDVAP				
3	Clause 27.3	Schedule G	20%	On Completion of Phase I – Clause 26.2
			60%	On Completion of Phase II – Clause 26.2
			20%	On Completion of Phase III – Clause 26.2
		Schedule H	Per Month	To Start after Completion of Phase III – Clause 26.2
		Schedule I	100%	On Delivery – Clause 26.2 and (After Completion of Phase III – Clause 26.1)
IRCCCAP				
4	Clause 27.4	Schedule J	20%	On Completion of Phase I – Clause 26.3
			60%	On Completion of Phase II – Clause 26.3
			20%	On Completion of Phase III – Clause 26.3
		Schedule K	Per Month	To Start after Completion of Phase III – Clause 26.3
		Schedule L	100%	On Delivery – Clause 26.3 1and (After Completion of Phase III – Clause 26.1)

29. Completion Period of Association/Validity of Agreement

The completion period will be governed as mentioned in Phases and timeline section. Post deployment, contract will be for one year for support services, however Contract Tenure may be extended further by RCIL based on mutually agreed terms & Conditions.

30. Other Terms and Condition

1. Bidders are requested to quote their best prices.
2. Unless otherwise specified all prices quoted must remain firm except for statutory variation in taxes and duties during contractual delivery period. Any increase in taxes and duties after expiry of the delivery period will be to vendor account.
3. Quotations should preferably be typewritten and any correction or over- writing should be initialed. Rates to be indicated both in words and figures.
4. Sealed quotations in envelope super scribing tender enquiry number and due date of opening must be sent by Registered or Speed Post or to be dropped in the Tender Box specified for the purpose. Quotations received after specified date and time are liable to be rejected.
5. Quotation should be valid for a minimum period of 180 days from the date of opening of tender.
6. Printed conditions on the back side of the offers will be ignored.
7. Any increase in taxes and duties after expiry of the delivery period will be to supplier's account. This will be without prejudice to the rights of RCIL for any other action including termination.
8. RCIL shall have the right to terminate the contract by giving 30 days notice without assigning any reasons thereof. However, in the event of any breach of terms of the contract, RCIL will have right to terminate the contract by written notice to the Seller.
9. FORCE MAJEURE: Any delay or failure to perform the contract by either party caused by acts of God or acts of Government or any direction or restriction imposed by Government of India which may affect the contract or the public enemy or contingencies like strikes, riots etc. shall not be considered as default for the performance of the contract or give rise to any claim for damage. Within 7 days of occurrence and cessation of the event(s), the other party shall be notified. Only those events of force majeure which impedes the execution of the contract at the time of its occurrence shall be taken into cognizance.
10. In case of any dispute or difference arising out of the contract which can not be resolved mutually between RCIL and vendor, it shall be referred to a Sole Arbitrator to be appointed by the CMD, RCIL.
11. The Arbitration and Conciliation Act, 1996 and rules made there under shall apply to the Arbitration Proceedings.
12. The contract shall be governed by and construed according to the laws in force in India and subject to exclusive jurisdiction of the Courts of Delhi only.
13. RCIL may place the order in full or partial manner based on customer requirement.

31. Format for COVERING LETTER

COVERING LETTER (To be on company letter head)

EoI Reference No: RCIL/EOI/CO/DNM/2021-22/IT services to RCIL customer/01 dated 05.04.2021

Date:
To,

DGM/IT
RailTel Corporation of India Ltd.
Plate-A, 6th Floor, Office Tower-2,
NBCC Building, East Kidwai Nagar, New Delhi-110023

Dear Sir,

SUB: Participation in the EoI process

Having examined the Invitation for EoI document bearing the reference number _____ released by your esteemed organization, we, undersigned, hereby acknowledge the receipt of the same and offer to participate in conformity with the said Invitation for EoI document.

If our application is accepted, we undertake to abide by all the terms and conditions mentioned in the said Invitation for EoI document.

We hereby declare that all the information and supporting documents furnished as a part of our response to the said Invitation for EoI document, are true to the best of our knowledge. We unterstand that in case any discrepancy is found in the information submitted by us, our EoI is liable to be rejected.

Authorized Signatory
Name
Designation
Contact Details

32. Proforma for Performance Bank Guarantee Bond

Form No. 1

PROFORMA FOR PERFORMANCE BANK GUARANTEE BOND
(On Stamp Paper of Rs one hundred)

(To be used by approved Scheduled Banks)

1. In consideration of the RailTel Corporation of India Limited, having its registered office at Plate-A, 6th Floor, Office Tower-2, NBCC Building, East Kidwai Nagar, New Delhi-110023 having agreed to exempt ……(Hereinafter called "the said Contractor(s)") from the demand, under the terms and conditions of an Purchase Order No……dated……made between……and…….. for (hereinafter called " the said Agreement") of security deposit for the due fulfillment by the said Contractor (s) of the terms and conditions contained in the said Agreement, on production of a Bank Guarantee for Rs. ……(Rs …….. only). We …… (indicate the name of the Bank) hereinafter referred to as "the Bank") at the request of ……. ……. Contractor(s) do hereby undertake to pay the RailTel an amount not exceeding Rs. ……. against any loss or damage caused to or suffered or would be caused to or suffered by the RailTel by reason of any breach by the said Contractor(s) of any of the terms or conditions contained in the said Agreement.

2. We, ……. Bank do hereby undertake to pay the amounts due and payable under this Guarantee without any demur, merely on demand from the RailTel stating that the amount is claimed is due by way of loss or damage caused to or would be caused to or suffered by the RailTel by reason of breach by the said Contractor(s) of any of terms or conditions contained in the said Agreement or by reason of the Contractor(s) failure to perform the said Agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs . ……

3. We, …….. bank undertake to pay to the RailTel any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s) / Tenderer(s) in any suit or proceedings pending before any court or Tribunal relating thereto our liability under this present being, absolute and unequivocal. The payment so made by us under this Bond shall be a valid discharge of our liability for payment there under and the Contractor(s) / Tenderer(s) shall have no claim against us for making such payment.

4. We, ……. Bank further agree that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the RailTel under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till RailTel certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this Guarantee. Unless a demand or claim under the Guarantee is made on us in writing on or before the ……. …… We shall be discharged from all liability under this Guarantee thereafter.

5. We,…… (indicate the name of Bank) further agree with the RailTel that the RailTel shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the Agreement or to extend time of to postpone for any time or from time to time any of the powers exercisable by the RailTel against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation, or extension to the said Contractor(s) or for any forbearance, act or omission on the part of RailTel or any indulgence by the RailTel to the said Contractor(s) or by any such matter or thing

whatsoever which under the law relating to sureties would, but for this provision, have affect of so relieving us.

This Guarantee will not be discharged due to the change in the Constitution of the Bank or the Contractor(s) / Tenderer(s).

(indicate the name of Bank) lastly undertake not to revoke this Guarantee during its currency except with the previous consent of the RailTel in writing.

Dated the day of 2021

for ……..
(indicate the name of the Bank)
Witness

1. Signature
   Name

2. Signature
   Name

******** **End of Document** ********