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GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

Technical Specification
For
Decision Support System
For
Electric Locomotive Asset Management Project
OF
Indian Railways

Specification No. RDSO/2008/EL/SPEC/0070, Rev'0', November' **2008**

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Section

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DSS For Electric Locomotive Asset Management

Introduction to the scope of Work

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1. Brief Description of Decision Support System for Electric Locomotive Asset Management (DSS):

Software for Decision Support System for Electric Locomotive Asset Management (DSS) project is a browser based Application which shall be designed, developed, installed, commissioned and maintained through this tender. The software shall be developed using J2EE technology and shall be deployed on web based central server. The Clients shall be PC's connected over local area network which in turn shall be connected through Internet Service Provider to Central Servers at Indian Railway Institute of Electrical Engineering Nasik (IRIEEN). The system shall be suitable to completely switch over from ISP to IP based wide area network in future. The DSS shall use RIA (Rich Internet application) web based technology and shall be deployed on central server. The DSS system is aimed at providing information regarding the electrical locomotives at all times. It shall provide information regarding locomotive asset maintenance, Inventory management, failure analysis etc. The data entry points shall be spread over entire Indian Railways and shall include locations like sheds, trip sheds, divisional/zonal headquarter, workshops, Chittranjan Locomotive Works (CLW), RDSO Lucknow and Railway Board New Delhi.

The system mainly aims at:-

i) Improving the reliability of electrical locomotives through easy and automated monitoring.

ii) Effective job scheduling and forecasting of the locomotive and their monitoring as per the various instructions, rules and business decisions.

iii) Material planning at shed level.

iv) Vendor performance monitoring depending upon the batch wise make wise analysis

v) Act as a tool for making the loco shed working with reduced paper work.

1.1. Development of the DSS application:

The DSS application shall be developed using J2EE and latest development tool. The database used shall be Latest Oracle or DB2. The DSS application shall be accessed through browser like Internet Explorer, Mozilla Firefox. The application development shall use standard Strutrs frame work software architecture (or any other frame work as agreed by the Purchaser and Supplier).

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1.2. Software Detailed Particulars:

The tenderer shall be required to develop the Software for DSS project using J2EE and RAD (Rapid Application Development) application development tools. The Successful tenderer shall be required to study the user requirement and make SRS / uses case, Software deign documents, flow diagrams. For making SRS the Supplier shall interact with SRS team of IR for review and approval. The tenderer shall carry out the development as per the international software development standards and practices using RAD application developer. The software shall also be tested at various steps for its functionality, Concurrency, scalability and response time. The list of modules in brief shall be:-

a) Electric loco shed module for asset maintenance, Inventory management, Staff management, Tool and Plant management and Laboratory Module;

b) Electric trip shed module for asset maintenance, Inventory management, and Staff management;

c) Lobby module;

d) Divisional headquarter/ TLC's Loco Operational statistics management module;

e) Zonal Railways headquarter / RDSO/CLW/Railway Board module;

f) Reports module;

g) SMS module; and

h) Html Help menu.

1.3. SMS:

SMS service shall be used for giving alerts to the DSS users. The SMS shall be issued from the data centre/central server at IRIEEN Nasik using GSM modem, to DSS users located in and around Indian Railways. Based on the configured parameters from the client Locations the SMS shall be sent through the Internet Service Provider or I.P. based wide area network link (FOIS network) to the central server. Central server shall in turn generate the SMS text and send it over to the users of any Mobile phone over the service provider's network. Mobile phone users shall also interact with the DSS central server for getting certain predefined response from the central database.

1.4. Data Centre/Central Server:

The data centre/central server on which the DSS application shall be deployed shall be generally LINUX / UNIX / WINDOWS based server's environment having the following broad breakup:-

- Application cum http servers;
- Database Servers;
- Load balancing / Edge servers;
- Directory Server;

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- Backup and antivirus server;
- LTO; and
- External Storage.

All these servers shall be located at IRIEEN Nasik and shall be provided by the tenderer.

1.5. Client or Nodes and networking:

Standard PC's with appropriate WINDOWS OS, Fire wall and Antivirus software shall be supplied by the Successful tenderer. These Locations shall be as follows:

Location type	Req. nodes per location	No. of locations	Total nodes required
Railway Board	1	1	1
RDSO	1	1	1
CLW	1	1	1
Zonal HQ	1	13	13
Workshops	1	9	9
Divisional HQ/ TLC	1	50	50
Lobby	1	25	25
Trip Sheds	1	25	25
Electric loco sheds	5	30	150
Total		**155**	**275**

In future IR may like to expand the system to the following requirements:

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Location type	Req. networking points per location	No. of locations	Total Networking points required
Railway Board	3	1	3
RDSO	3	1	3
CLW	4	1	4
Zonal HQ	4	13	52
Workshops	2	9	18
Divisional HQ/ TLC	3	50	150
Lobby	1	25	100
Trip Sheds	1	25	50
Electric loco sheds	24	30	720
Total		**155**	**1100**

The software shall be capable of handling the above requirements.

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1.6. Pilot Phase Location:

Before taking the supplies to full rollout phase spread over Indian Railways the tenderer shall establish the successful working of DSS project in the pilot phase. Locations for the pilot phase shall be as follows:-

Location	Req. nodes per location	No. of locations	Total nodes required	Places
Railway Board	01	01	01	New Delhi
RDSO	01	01	01	Lucknow Manaknagar
CLW	01	01	01	Chitranjan
Zonal Railway	01	02	02	Central Railway Mumbai, Northern Railways New Delhi
Workshop	01	02	02	Bhusawal, Nasik
Division/TLC	01	02	02	Nagpur, , Kota
Lobby	01	01	01	Nagpur
Trip shed	01	02	02	Ajni, Kota
Electric loco shed	05	02	10	Ajni, Tughlaqabad
Total		14	22	

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For the purpose of establishing the workability of the pilot phase the tenderer shall procure minimum hardware and middleware (central server software) including limited central server in a manner that the Pilot phase workability shall be established. On successful completion and acceptance of the pilot phase tenderer shall supply material for full central server and the Roll out phase.

1.7. Network:

DSS application shall utilize the ISP through leased lines or FOIS WAN for allowing clients to access the servers at IRIEEN Nasik. The end location connectivity of DSS shall be given through ISP by the Supplier. At server end, provision for connectivity of both ISP and FOIS shall be done by the Supplier.

1.8. Sizing Parameters:

Following is the typical load on the central server (sizing parameters):-

- Total no of user's locations = 1100
- The concurrency of users shall be approx. = 30 percent.
- Total size of transactions per min = 37.8 MB
- Total data additions per day = 1.1 GB per day.

1.9. Phase Wise execution:

The tender shall be executed in a phased manner. The following is the broad time schedule in weeks:

Award of Contract	D
Project Preparation	D + 2
Completion of SRS and Software designs	D + 10
Approval of SRS	D + 11
Process configuration in development environment	D + 15
Hardware deployment for the Pilot phase	D + 16
Delivery of main Central server components at IRIEEN Nasik	D + 16
Commissioning of Central server	D + 17
Hardware and network commissioned at Site	D + 17
Training of the Pilot phase for railways	D + 17
Start of Central System Administration	D + 23
Commissioning of Pilot phase	D + 23
Acceptance of Pilot phase by railways	D + 24
Scalability and Concurrency testing and acceptance by IR	D + 25
Roll out phase start	D + 25
Training of roll out phase	D + 35
Roll out Phase Ends	D + 65
Acceptance of Roll out phase	D + 70
Warranty support, AMC, Central server administration, Site support	From the date of Acceptance of the Pilot phase/Roll out Phase

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1.10. Data Centre/Central Server Management and Maintenance:

The tenderer shall be required to maintain and manage the central server. The server shall be manned for 7 x 24 Hrs by the tenderer. The tenderer shall be required to do database administration, server maintenance and related management functions effectively. He shall be required to keep a service engineer at site round the clock.

2. Scope of this tender:

The scope of the work necessarily but not exclusively includes the following activities:-

a) Design, Development and testing, maintenance and deployment of DSS software as per industrial standards.

b) Design, Supply, Testing, Commissioning, Maintenance and administration of central servers and back up servers including necessary wiring, air conditioning and supply of suitable diesel generator set for uninterrupted power supply.

c) Supply Installation commissioning and maintenance of PC's , Printers, UPS networking equipment, Cables for networking, patch cords, interfacing hardware and system software, Operating system, firewall, antivirus software Licenses and annual technical support at client locations at the remote locations.

d) Provide complete solution for SMS Application and interfacing with the DSS application.

e) Deploying the application at IRIEEN Nasik and the field sites and complete integration of the DSS system.

f) Attend to the warranty and AMC support at site.

g) Training to core development team of IR on the third party software / middleware and Training at each field locations.

h) Tenderer shall be required to visit the field locations and IRIEEN to have a first hand information of the site condition and the detailed quantum and to have a first hand knowledge of the site conditions.

3. Glossary:

ATS	Annual Technical Support for software maintenance with Upgrade and Updates with Web Based Support.
24 x 7 Standard support	Response time shall be 8 Hrs and Resolution time 24 Hrs
DSS	Software for Locomotive Asset Management
FOIS	Freight Operation Information System.
FOIS / Railnet Network	Internal WAN of Indian Railways.
GSM	Global System for Mobile Communications
Lobby	The Place of work at remote locations where the railways book there crew.
MVC	Model View Controller.
OEM	Original Equipment Manufacturer.
Offline Client	The Thin Client or the node installed at Lobby, which shall also be continue to support DSS application working ion the offline mode even in case of network disconnection.
Online Client	The Thin Client or the node installed at Lobby, which shall stop to support DSS application in case of network disconnection. The Thin Client which shall be working on the Active mode.
Purchaser	In case of this tender, it shall be IR / IR.
SAS	Serial Attached SCSI

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Supplier The Person / Company / Organization on whom order is placed to execute the work.

Tenderer The Person / Company / Organization quoting for this tender with a view to execute the work.

Third Part Software / Middleware The Software Purchase by the Tenderer for which License fees has to be paid.

4. Abbreviations:

RDSO	Research Design & Standards Organization
IR	Center for Railway Information System
ESMON	Energy & Speed Monitoring
HQ	Head Quarter
TLC	Traction Loco Controller
TrO	Traction Operation
POH	Periodic overhaul
MS	Modification Sheet
SMI	Special Maintenance Instruction
RAP	Reliability Action Plan
TC	Technical Circular
CLW	Chittaranjan Locomotive Works
PO	Purchase Order
EAC	Estimated Annual Consumption
ELS	Electric loco shed
ET	Engine Turner
MTBF	Meantime between failures
FRPCPY	Failure rate percentage per year
T&P	Tools & Plants
M&P	Machines & Plants
UES	Unit Exchange Spares
DEE	Divisional Electrical Engineer
IA	Inspection (Schedule) A
IB	Inspection (Schedule) B
IC	Inspection (Schedule) C
AOH	Annual Overhaul
IOH	Intermediate Overhaul
PPIO	Planning Progress Investigation Organization
OEM	Original Equipment Manufacturer
CC (ATFR)	Crew Controller / Assistant Traction Foreman
CCC (TFR)	Chief Crew Controller / Traction Forman
UOR	Unusual Occurrence
EMU	Electrical Multiple Unit
WRP	Wheel re-Profiling
DMU	Divisional Multiple Unit
DOR	Driver Objection Register
CEE	Chief Electrical Engineer
TI Schedule	Trip Inspection Schedule
CCC	Chief Crew Controller
CC	Crew Controller
IR	Indian Railways
DSS	Decision Support system
FOIS	Freight Operation Information System.
MVC	Model View Controller.
NCR	National Capital Region.
ISP	Internet Service Provider
SRS	System Requirement Specification
IRIEEN	Indian Railway Institute of Electrical Engineering
ERP	Entrepreneur resource planning
EAM	Entrepreneur asset management

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Section

2

DSS For Electric Locomotive Asset Management

General Conditions of Contract

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1.0 Tender pre-qualification criteria:

In this tender, sole tenderer with authorization from OEMs as per tender conditions or consortium of not more than three constituent members are permitted to participate.

The following prequalification conditions are mandatory requirement required to be fulfilled by the sole tenderer / lead member / implementation partner of the consortium or by specific product OEM as indicated below. Bidder may please note that no second opportunity shall be given to them for either submission of any clarification, additional information or support document in support of prequalification after opening of tender. **Any bid not found to be in conformance with any of the pre-qualifying conditions shall be summarily rejected and not considered for further evaluation.**

a) The firm shall have a minimum annual turnover of 150% of advertised tender value from the IT systems development and implementation work during the last three financial years.

b) Firm shall essentially have an ISO 9001 valid certificate. A copy of these certificates shall be enclosed by the tenderer while submitting the tender document.

c) The manufacturer of Servers, PC's, Printers, UPS, Networking Equipment etc. shall have a valid ISO 9002 certificate. A copy of these certificates shall be enclosed by the tenderer while submitting the tender document.

d) The tenderer shall have executed at least one project of similar nature and cost in the preceding 3 financial years from date of opening of this tender or 2 project of half the cost of the tender. The similar nature project implies development and deployment of software along with supply, erecting, networking to central server of at least 15 locations over a similar diverse geographical area. This shall be supported by providing copies of work/Letter of Award orders as documentary evidence. The tenderer shall also enclose satisfactory completion certification of the order.

e) The tenderer shall be a CMM Level 5 compliance company having at least 3 development experience in java software development (applicable for tenderers other than ERP/EAM OEMs).

f) In case, ERP/EAM product is offered, it shall have at least 20 implementations across the world with minimum 150 users.

g) The tenderer shall have successfully executed at least three demonstrable projects using Rich Internet application Technology.

2.0 Terms & Conditions:

The Purchaser reserves the right to reject any offer summarily or conditionally without assigning any reasons what so ever. Also incomplete offers or offers submitted in a casual manner shall be summarily rejected.

Documents prepared by the successful tenderer shall be the property of IR. Any drawings, specification designs, reports and other documents prepared by the vendor

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in execution of this project shall become and remain the property of IR, and before termination or expiry of the contract, the tenderer shall deliver all such documents to IR together with the source code of the application software provided to him for consultancy review & testing purposed under the contract along with a detailed inventory thereof.

In case of System Integrator developing the software, IR's software development team shall do periodic reviews of the DSS software development at Supplier's premises while the testing shall be conducted at a lab as mutually agreed between the tenderer and the Purchaser. The Tenderer shall use the standard practices and benchmarks for the consultancy reviews and performance testing of DSS. All the hardware, test lab facility, software etc. required for the consultancy review and testing shall be provided by the tenderer during the period of contract.

It shall be the responsibility of the tenderer to arrange for the licenses of the appropriate testing tools, which shall be used during the performance / other testing of the DSS application.

The tenderer shall indemnify IR against all third party claims of patents infringement of trade mark/ copy right or industrial design rights arising from the temporary use of the testing software or use of the testing scripts or any other related software used during the testing. In the event of any claim in respect of an alleged breach of a patent, registered design or trade mark being made against IR it shall notify to the tenderer and the tenderer shall, at its own expense, either settle any such dispute or conduct any litigation that may arise there from.

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3.0 Other Terms and Conditions:

a) The tenderer shall furnish a detailed site wise support plan along with relevant details such as customer support offices, spare inventory etc. in order to provide 03 year on-site comprehensive warranty maintenance and 07 years comprehensive AMC. The list of customer support offices shall include full details such as postal address/ telephone no., contact no. of resident engineer/representative etc..

b) The tenderer shall be required to keep at least one engineer at each electric loco shed for the commissioning who shall be available for 24 x 7 maintenance support. The name and address of the representative shall be made available to Purchaser as well as the local Railway authorities.

c) The tenderer must specify item-Wise Compliance to Technical Specifications. The technical compliance sheet must be vetted by respective OEMs. The Model and Make of the offered products shall be clearly specified. Schedule of Quantity and Rates shall be completed properly. IR reserves the right to establish the veracity of the document furnished in support before placing the purchase order.

d) The tenderer shall make available the product, if desired during the technical evaluation of bids for benchmarking and ensuring that there are no integration and compliance related issues.

e) The tenderer shall be required to demonstrate the Proof of concept for confirming the capability of software development.

f) The tenderer shall have its service center / administrative office so that any of the failure reported are attended and rectified within 24 Hrs of reporting.

g) Tenderer must also attach with his offer, a certificate in original, from the Original Equipment Manufacturer assuring full support for the installation, commissioning of the System and during the Warranty and AMC period shall be provided.

4.0 Completion of tender document:

All columns of the technical specifications compliance sheet must be filled. Any deviations shall be clearly indicated against individual line items. All rates in the bids shall be clearly filled. The rates must be in words and figures both. In case of any discrepancy unit rate in words shall take precedence. The authorized representative of the tenderer must duly attest any alteration. Each page of tender documents is to be signed and stamped (company seal) by the tenderer. Additional conditions/stipulations/deviations to the technical requirements and terms and conditions must be clearly brought out. IR reserves the right to consider or reject the same without assigning any reason. Tenderer shall submit all technical information and product brochures along with the bid. Tender documents with non-compliance of the above clauses are liable to be rejected.

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5.0 Acceptance of the tender:

If the tenderer submits wrong information, their tender is liable to be rejected. Non-compliance with any of the conditions set forth herein is liable to result in the tender being rejected. The submission of the tender shall be deemed to imply that the tenderer fully understands the scope of work involved. Any doubts related to the specifications must be clarified in writing 2 days prior to the tender submission.

The tenders received after the time and date specified for submission / opening time shall not be considered.

6.0 Acceptance Test Procedure:

The acceptance test shall be conducted at the site of installation by the authorised representative of IR in the presence of Supplier representative. The acceptance test shall comprise of the tests given in "Inspection and testing" item of this tender specification. Cost of all tests shall be borne by the tenderer.

7.0 Process to be confidential:

After the public opening of bids, information relating to the examination, clarification, evaluation and comparison of bids, and recommendations concerning the award of the purchase order shall not be disclosed to the tenderers or other persons not officially concerned with such process.

Any effort by the tenderer to influence the Purchaser in the process of examination, clarification, evaluation and comparison of bids, and in the decision concerning the contract, may result in rejection of his bid.

8.0 Clarifications of Bid:

To assist in the examination, evaluation and comparison of bids, IR may ask the tenderer individually for a clarification of his bid including breakup of unit rates. The request for clarification and the responses shall be in writing/fax but no change in price or substance shall be sought, offered or permitted except as required to conform the correction of arithmetical errors discovered by IR during the evaluation of bids. IR may ask the tenderer to provide the offered equipment for testing/bench marking during techno-commercial evaluation of bids.

9.0 Authorized Signatory:

The Signatory of the tenderer shall attach an authorization certificate from:

- The proprietor in case of "Sole Proprietor" firm.
- One of the partners in the case of a "Partnership" firm.
- The regional head in the case of a Limited Company.
- An official of requisite authority in the case of a government institution.

10.0 Validity:

The validity of the bid must be for a minimum of 180 days from the last day of bid submission.

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11.0 Prices:

All prices shall be quoted in Rupees – for items specified in section 7 (Schedule of quantity and rates). The prices must be inclusive of all taxes, freight insurance, octroi and levies applicable and no foreign-exchange/Import license shall be provided.

12.0 Price Fall:

The prices charged for the goods/services supplied under the contract by the tenderer shall at no event exceed the lowest price at which the tenderer sells the goods or offers to sell the goods of identical description to the any person/organization including the Purchaser or any department of State/Central Government, as the case may be during the currency of the contract.

If, at any time during the said period the vendor reduces the sale price, sells or offers to sell such goods to any person/organization including the Purchaser or any department of State/Central Government as the case may be at a price lower than the price chargeable under the contract, the vendor shall forthwith notify such reduction or sale or offer to sell to the Purchaser and the price payable under the order for supply of material after the date of coming into force of such reduction or sale or offer to sell shall stand correspondingly reduced.

13.0 General Requirements:

The installation of the ordered Systems shall be carried out without disturbing the ongoing working of the existing system. The contractor shall have to execute the contract in close coordination with respective Railway officials. The offer must be submitted on prescribed tender form only.

It shall be the responsibility of each tenderer to fully acquaint himself with all the Central and State Laws and Rules & local factors which may have any effect on the performance of the contract and price of the stores. The Purchaser shall not entertain any request for clarifications from the tenderer regarding such Central, State laws, Rules and local factors. Also no request for change of price shall be entertained after the tenderer submits the offer.

The price quoted shall be firm. The tenderer shall indicate for each item of the Schedule of Requirement all-inclusive unit price on free delivery to destination basis, which shall include all Central/State Taxes, Excise duty leviable and all charges towards packing, cartage, loading, forwarding insurance, Octroi charges. If an offer does not comply fully with the requirements mentioned in this Para, it shall be treated as commercially non-responsive.

Incomplete, vague and conditional offers are liable to be summarily rejected.

14.0 Earnest Money:

Tenderers are required to submit earnest money of 2% of tender value or Rs.2,00,000/- (Rs. Two Lakhs) whichever is less in the form of demand draft / Bankers cheque drawn in favour of IR payable at New Delhi issued by Nationalised / Scheduled Bank otherwise the same shall be rejected. EMD of the successful tenderer shall be returned after the receipt of the B.G.

15.0 Warranty:

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Tenderer shall warranty for a period of 36 months for entire set of equipments. The tenderer shall furnish a performance bank guarantee of 20% of the cost of the project to cover the warranty.

16.0 Income Tax:

Income tax shall be deducted at source by IR from all the payments made to vendor according to the Income tax Act, unless valid and complete documents for IT exemption are submitted by vendor prior to release of payment.

17.0 Suspension:

IR may by a written notice of suspension to the vendor, suspend all payments to the vendor under the contract, if the vendor fails to perform any of his/her obligations under the contract, provided that such notice of suspension shall specify the nature of failure and Shall request the vendor to remedy such failure within a specified period from the date of receipt of such notice of suspension by the vendor

18.0 Liquidated Damages:

Liquidated Damages for delayed supplies beyond stipulated period in the purchase order are liable for liquidated damages @0.5% of the tender order per week or part thereof restricted to 10% of the value of the contract at the discretion of IR.

19.0 Termination for Default:

IR may, without prejudice, to any other remedy for breach of contract, by written notice of default sent to the vendor terminate the contract in whole or part thereof if:

- The vendor fails to deliver any or all of the obligations within the time period(s) specified in the contract, or any extension thereof granted by the client.
- The vendor fails to perform any other obligation(s) under the contract.

20.0 Jurisdiction & Arbitration:

20.1 Jurisdiction:

If any dispute or difference of any kind shall arise between IR and the Contractor in connection with arising out of this Agreement (whether before or after the termination of this Agreement), it shall be referred to or settled by arbitration of a person appointed by the General manager, Central Railway, Mumbai.

20.2 Arbitration:

a) If any dispute or difference of any kind shall arise between IR and the Contractor in connection with or arising out of this Agreement (whether before or after the termination of this Agreement), it shall be referred to or settled by arbitration of a person appointed by the General manager, Central Railway, Mumbai.

b) The award of the Arbitrator shall be final and binding upon the parties. There shall be no objection if the Arbitrator is a Government servant or that he had to deal with the matters to which the contract relates or that he has expressed views on all or any of the maters in dispute or difference.

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c) The Arbitrator may, from time to time with the consent of the parties, extend the time for making the award. He shall give a reasoned award if the claim of either party exceeds five lakhs.

d) If the Arbitrator is unable or incapacitated or incapable to act as such by reason of death, resignation or otherwise, the Chairman, Governing Council, shall appoint a new Arbitrator in the same manner as provided in item (i) above. The new Arbitrator so nominated shall continue with the Arbitration proceedings from the stage at which the outgoing Arbitrator left the proceedings and such proceedings shall not be recommended or held denovo.

e) The existence of any dispute or difference or initiation or continuance of any arbitration proceedings shall not postpone the performance by the parties of their respective obligations pursuant to this agreement and no payment shall be withheld unless such payment is itself the subject matter of arbitration proceedings.

f) Subject as aforesaid, the Indian Arbitration and Conciliation Act, 1996 shall apply and the venue of the arbitration shall be at Mumbai.

21. Force Majeure:

Act of any war, or hostility, acts of the public enemy, civil commotion, sabotage, fires, floods, explosions, epidemics, quarantine restriction, strikes, lockouts or act of God (hereinafter referred to as events) provided notice of happenings of any such eventuality is given by either party to the other within 21 days from the date of occurrence thereof, neither party shall be reason of such event be entitled to terminate this contract nor shall either party have any such claim for damages against the other in respect of such non-performance or delay in performance, and deliveries under the contract shall be resumed as soon as practicable after such event may come to an end or cease to exist and the decision of the Purchaser as to whether the deliveries have been so resumed or not If at any time, during the continuance of this contract, the performance in whole or in part by either party or any obligation under this contract shall be prevented or delayed by reason shall be final and conclusive provided further that if the performance in whole or part of any obligation under this contract is prevented or delayed by reason of any such event for a period exceeding 60 days either party may at his option, terminate the contract provided also that if the contract is terminated under this clause, the Purchaser shall be at liberty to take over from the Successful tenderer at a price to be fixed by the Purchaser with mutual consent which shall be final. All unused, undamaged and acceptable materials bought out components and stores in course of manufacture in possession of the Successful tenderer at the time of such termination of such portions thereof as the Purchaser may deem fit excepting such materials bought out components and goods as the Successful tenderer may with the concurrence of the Purchaser select to retain.

22.0 Two Packet Tender Instructions:

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The tender shall follow a 2 part tendering system there shall be a separate technical and financial bids for the tender. Tenderer qualifying the technical bid shall only be considered for the financial bid. The tenderer shall submit separate sealed envelops marked TECHNICAL BID and FINANCIAL BID. All such documents shall be submitted in duplicate. The envelops shall be marked as Original and duplicate. For all purpose the particulars mentioned in the Original shall be considered as valid only in case of variation between the original and the duplicate. No financial figure shall be enclosed in the technical bid. The tenderer while quoting shall confirm the prequalification criteria. He shall enclose all the documents required in the check list in support of his confirming his technical suitability. Based on which the technical acceptance of the tender shall be considered. The techno commercial bid shall also contain the required EMD, without which the bid shall be summarily rejected.

23.0 Deviation from Tender and alternate offers:

No tender deviations shall be generally permitted to the tender condition. The tenderer shall be required to submit a NO Deviation Certificate while quoting for this tender. Tenders not accompanied by this certificate shall be summarily rejected.

The tenderer while quoting shall give an item wise confirmation of each and every clause of the tender paper.

24.0 Evaluation of the Tender:

For the purpose of evaluation of the offers, all-inclusive price for Supply, Installation, Acceptance Testing, Commissioning and 03 year comprehensive onsite warranty and AMC of all equipment and 02 years comprehensive AMC (optional) specified in the rate schedule shall be considered.

The Purchaser reserves the right to award the tender to the lowest offer or not. The lowest tenderer shall not have any claim what so ever on award of the full or part quantity.

25.0 Delivery Schedule:

The tender is a national level importance for IR. The tenderer shall strictly follow the time schedule as indicated in clause 1.9 of section 1. Supporting documents shall be furnished by the tenderer in support of completion of each activity.

26.0 Deviation from Tender and alternate offers

No tender deviations shall be generally permitted to the tender condition. The tenderer shall be required to submit a NO Deviation Certificate while quoting for this tender. Tenders not accompanied by this certificate shall be summarily rejected.

27.0 Terms of Payments

a) <u>Hardware</u>

80 % of the payment shall be payable on delivery at the location and Power ON test by the Railway Representative. (The list of consignees is as mentioned in this tender paper). The tenderer shall claim part payments. The following documents shall be required for release of the payments.

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i) Delivery challan duly acknowledged by the consignee. ii) Testing certificate as per item "Inspection and testing" of this tender paper.

ii) Pre dispatch inspection certificate for all hardware from the vendor premises/works certified by IR representatives that the material is as per tender specifications.

iii) Balance 20% on commissioning and satisfactory integration working in the field on furnishing of a bank guarantee of validity for three year covering the warranty period and confirmation that the integration has been successfully done.

iv) The failure of the PC's, UPS, networking equipments and printers shall be attended to within 24 Hrs of reporting. In case of delays penalty at the rate of Rs 1000 per day and part their off shall be charged from the tenderer for each failed equipment.

b) <u>SOFTWARE</u>

Payment shall be done in stages as per following

i)	SRS preparation and acceptance	20%
ii)	Software Design Document submitted by Supplier	10%
iii)	Test plan submitted by Supplier and successful testing of software in Lab	30%
iv)	Pilot phase completion and submission of source code, Compiler and necessary tools to IR	20%
v)	Commissioning and customization of software at other locations and on furnishing of a bank guarantee of validity for three year covering the warranty period	20%

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28.0 Checklist of the documents to be enclosed in the tender:

The following documents shall be attached by the tenderer in serial order in the sequence as given below and as per indicated format. Missing documents or documents not submitted shall cause a tenderer to be rejected.

a) Earnest money (refer section 2, item 14).

b) Confirmation on the annual turn over (refer Section 2, item 1(a)).

c) Valid ISO – 9001 certificate. (Copy of the certificate issued by the certification agency). (refer section 2, item 1(b))

d) Capability of executing similar projects of similar cost (refer section 2, item 1(d)).

e) List of service centers / locations from which the field locations shall be provided warranty support (refer Section 6).

f) Item wise compliance certificate of the Technical Specification (refer Section 6).

g) Week wise work Completion Plan in consonance with the delivery schedule.

h) No Deviation certificate (refer Section 6).

i) A certificate in original, from the Original Equipment Manufacturer assuring full support for the installation, commissioning of ISO 9002 certificate the System and during the Warranty and AMC period shall be provided (refer section 2, item 1(d)).

j) A certificate for CMMI level 5 compliance (refer section 2, item 1(e)).

k) Completion report along with name of organisations where implemented with contact person, telephone and email ID (refer section 2, item 1(f) and 1(g)).

l) Training Methodology.

m) List of derivables of hardware and software.

n) All other documents required as per this specification and any other document considered necessary by the Supplier

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Section

3

DSS For Electric Locomotive Asset Management

Data Centre/Central Server, Hardware and Networking Equipments Specification

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1. Central Server:

The scope of the work shall include supply assembly, erection and commissioning of the main and standby servers as per the below mentioned hardware specifications. Main and standby servers shall be provided in separate rooms which shall be provided by IR. The scope shall include air conditioning and wiring at the central server rooms at IRIEEN Nasik in a manner that the system works effectively. All wiring material, Plugs of adequate rating provision of grommets shall be in the scope of work. The scope of work shall also include wiring of the servers to the IP based WAN communication link available at IRIEEN for FOIS and Railnet connectivity and ISP provided by the Supplier. Wiring to the firewall at IRIEEN and wiring and interlinking of the various server units shall fall within the scope of the work. All wirings shall be properly numbered with ferules. The detailed drawing for interconnections shall be supplied to IR prior to commissioning.

The central server hardware shall be capable of working under following environmental conditions:

Ambient room Temperature :. 0 ^{O}C to 50^{O}C
Voltage : 200 V to 250 V.

1.1. Server Specifications and Quantity summary

Server	OS	Specification	Clustering	Qty.
Application Server + http web server	Linux/Unix/Windows 2003 Enterprise edition	Specification -1	Application Level Clustering	2
Database Server	Linux/Unix/Windows 2003 Enterprise edition	Specification - 1	Database Level Clustering & OS Level Clustering	2
Back up server	Linux/Unix/Windows 2003 Enterprise edition	Specification - 2	For back up	1
Directory Server	Linux/Unix/Windows 2003 Enterprise edition	Specification - 2	Application Level Clustering, Master/Slave Mode	1
Edge/Reverse Proxy Server	Linux/Unix/Windows 2003 Enterprise edition	Specification - 2	Application Level	1
Antivirus Server	Linux/Unix/Windows 2003 Enterprise edition	Specification - 2	For Antivirus	1
LTO	-	LTO	-	1
External Storage	-	External Storage	-	1

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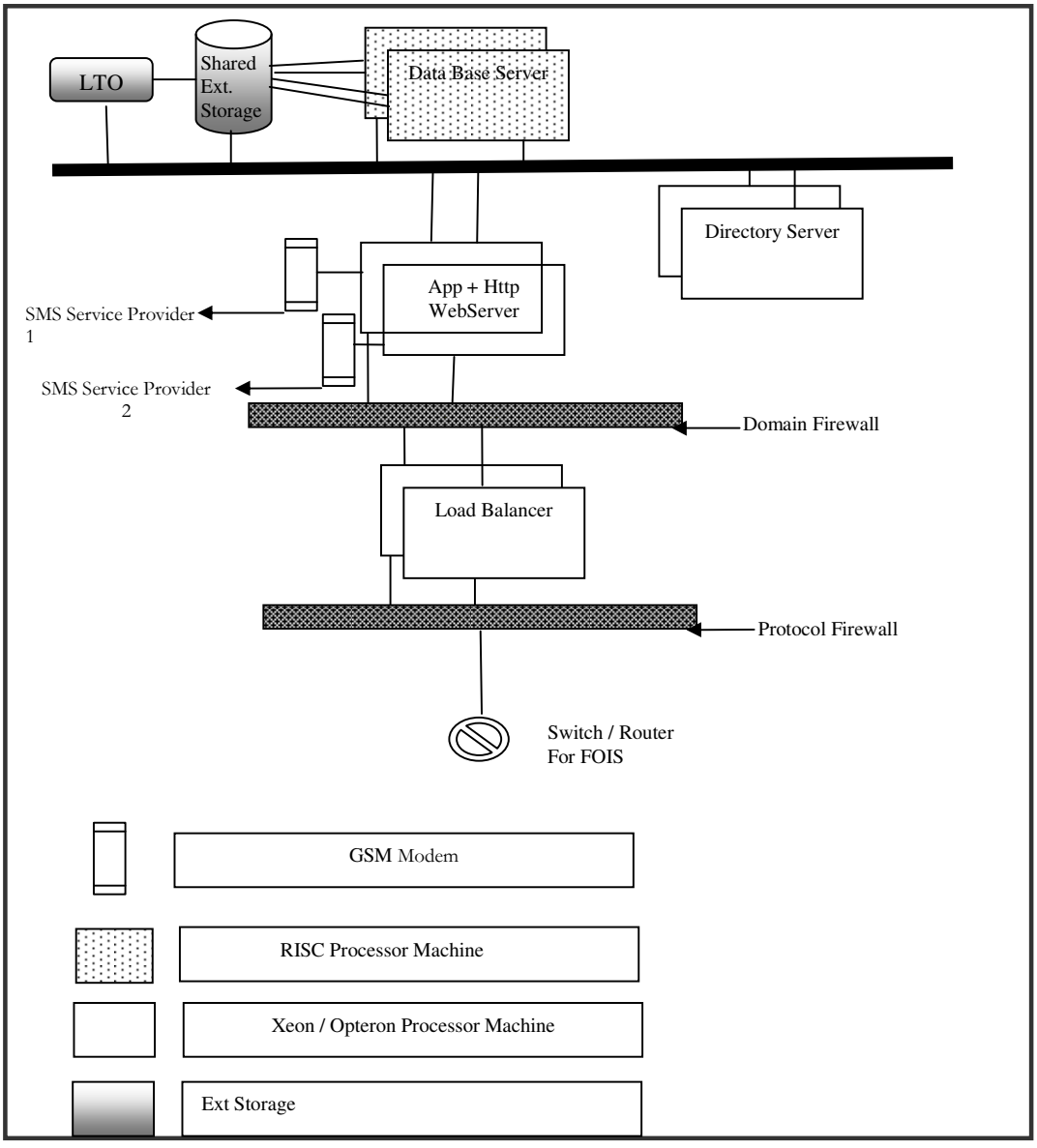
The above requirement is indicative only and depends upon solution being offered by the Supplier. The Tenderer shall qoute actual requirement as per solution offered to achieve requirements specified in section 5.

1.2 DSS Data Centre/Central Server Diagram:



1.3 Supply of Server as per Specifications – 1:

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Cluster Pair Configuration (For each Server)
Make: DELL/IBM / SUN / HP/HCL only
Processor: 8 x 1.6 GHz or higher (latest available), 64-bit high performance RISC/EPIC processor. The processor shall be quoted with latest clock speed in the proposed server at the time of bidding. The proposed server shall be scalable to 16 processors in the same system. If required, additional Processors shall be quoted in the same machine to meet the Tpcc requirement.
Performance: The number of Processor(s) shall be configured in such a way that the System shall support minimum Estimated 300,000 OLTPM/Tpmc & is scalable to support Estimated 5500,000 OLTPM/Tpcc. The Tpcc figures shall be certified by OEM. Necessary Documents shall be provided on the basis of Database workload and not on the basis of CPU workload
Partition: Server offered shall be capable of minimum 4 Partitions. Each partition shall be able to run independent Operating System Instance and shall be able to run two different applications. Any failure in one partition shall not effect the application on the other partition.
Memory : 32 GB scalable to 64 GB
Scalability: 16 Processors.
Cache : Cache shall be 16MB per processor
System Bandwidth : The peak bandwidth must be greater than 9GB/sec.
Internal System Disks: Minimum 2 x 146GB 10K RPM, SCSI Ultra 320/ FC-AL hot-plug drives for OS mirror.
Removable Media : 1x DVD ROM
Integrated I/O : -Support both 64-bit and 32-bit PCI I/O slots.
- At least 2 free PCI/ PCI-X I/O slots after configuring the servers as per the requirement.
• 2 x 10/100/1000 Mbps network independent cards, for redundancy, each with atleast single port for connecting to LAN (Each Servers shall provide the Bandwidth of 2Gbps to each LAN Switch)
• 2 x USB.ports
Additional Network & FC adapters : • 2 x 10/100/1000 Mbps Ethernet independent cards (Cluster Interconnect)
• 2 x 4Gbps Fibre Channel independent HBA
Power & Cooling: Redundant, hot swappable, power/cooling units.
Server RAS Features : • The system shall be able to detect and bypass a failed component.
• The server shall be able to dynamically allocate and de-allocate the resources
• Separate Service Processor

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Cluster Pair Configuration (For each Server)
Make: DELL/IBM / SUN / HP/HCL only
• Remote System Console for remote/centralized management over LAN
Shared Storage: The cluster systems shall utilize storage from the SAN. Refer the SAN section for details.
Cluster Components: The system needs to be configured provided with appropriate Cluster Components.

1.4 Supply of Server as per Specifications – 2:

S. No.	Item	Description
	MAKE	DELL/IBM / SUN / HP/HCL only
1	CPU	2 x E5405- 45nm Quad core Xeon 2.0GHz Processors
2	Chipset	Intel 5000 series
3	Memory	2 x 4GB DDR-2 667MHz FBDRAM, scalable upto 32GB on 8 DIMM slots
4	HDD	2 X 160GB HS SATA on RAID 1, scalable upto max. 4 HDDs
5	HD Controller	6 Port SATA Controller
6	NIC	2 x Gb Ethernet controller with I/OAT support on Windows & Linux Environments
7	SMPS	600W NRP
8	Graphics Cotroller	nvidia Quadro FX370 with 256MB Video memory
9	I/O Slots	2 PCI-X 64bit, 1 PCI-e X4 & 1 PCI-e X16 slots
10	Ports	2 PS/2, 2 RJ-45, 1 Serial 6 USB & Std. Audio ports
11	ODD	DVD ROM or higher
12	Audio Codec	Realtek ALC260 - 2 CH High Definition audio Codec

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13	Management Features	Server Deployment Assistant, Alert Notification through pop up and E-mail / SMS, Hard disk drive space and virtual memory size monitoring, Asset tracking for different components like CPU, memory, HDDs, motherboard, CPU Process utilization, Autonomous Harware Event Logging, remote reboot and power off.
14	Cabinet Fans	Cabinet shall have min. 2 fans.

1.5 Supply of External Storage as per Specifications:

Make: IBM / SUN / HP/ EMC / Hitachi / NetApp only
Storage system shall be configured with 5 TB RAW using 4Gbps 146GB FC disks of 15k rpm and scalable to 16 TB RAW using 146GB FC disks.
Total cache of at least 2GB per Controller delivering 4GB Cache per storage system.
Should have atleast 4 nos. of 4GBps Front end FC ports per Controller to deliver 8 nos. of 4Gbps Front end ports per Storage Array or a host SAN bandwidth of 32Gbps
Should have atleast 2 nos. of 4GBps backend FC ports per Controller to deliver 4 nos. of 4Gbps backend ports per Storage Array or a Disk bandwidth of 16 Gbps
Should support hot swappable expansion and replacement of hard drives, redundant controllers, fans and power supplies
Should Support Mixed FC and SATA in the same enclosure
2 nos. of atleast of 16 port SAN switches at 4 Gbps and expandable up 24 ports.
Should support hardware based RAID 0, 1, 5, 6 and 10
Operating System Support
Windows
HPUX,
Sun Solaris,
AIX
Linux
Additional Features (shall support)
Dynamic Array Expansion
Dynamic Volume Expansion

Dynamic RAID migration
Dynamic Segment sizing of the LUN to match host I/O, while the application is online
Dynamic Replication mode switching between synchronous and asynchronous modes
Storage system must have battery for preserve data in cache memory in case of power failure.

1.6 Supply of Tape Library and back up software as per Specification:

Tape Library/LTO:

Make: IBM / SUN / HP only
The tape library offered shall be robotic controlled to identify media, load tape media into drives and put them back into corresponding shelves automatically.
The tape library shall be central library of tapes for all the servers offered in the system. The library shall be configured with 50 media slots and shall be scaleable to at least 500 slots.
The library shall be configured with minimum 2 x LTO Gen4 drives and shall be scalable to 18 LTO Gen4 drives.
The media shall have a minimum uncompressed capacity of 800 GB and 1600 GB compressed.
The robotics shall have the state of the art technology for accurate identification of bar-coded cartridges which is important for unattended and automated backup application
The library shall be able to do continuous automatic calibration and therefore shall not require downtime for periodic alignment
The library shall have automatic self configuring for cells, drives and Cartridge Access Ports
The tape library shall be configured with its management software to monitor the entire backup infrastructure – drives, library assets centrally from a single console

Back Up Software:

The proposed backup and recovery solution shall support heterogeneous platforms like Solaris, HP-UX, AIX, Windows and Linux.
The proposed solution shall be capable of performing both LAN free and Server Free backups.

The proposed Backup Solution Software shall have inbuilt GUI for centralized management of backup domains.
The proposed backup software shall have the facility of making duplicate backup copies for offsite storage for disaster recovery. Flexibility shall be there to create both concurrent (online) copy and offline copy
The proposed solution shall have the facility to provide control on network (LAN/ WAN) bandwidth utilization for backups. The administrator shall be able to specify the amount of bandwidth instead of just defining streams.
The proposed backup solution shall have capability of performing forever incremental /synthetic backups to reduce the backup window. The feature shall not be limited by size of backup/file.
The backup format shall be "tar" compatible, which allows backup to be restored (outside of Backup Software) utilizing native UNIX utilities.
The backup software shall support automated OS recovery from a crash situation for heterogeneous platforms like Solaris, HP-UX, AIX, and Windows NT/2000/2003. The backup software shall support dissimilar machine restore and dissimilar disk restore during automated OS recovery for maximum flexibility.
The proposed software shall support various options for disk based backup. It shall support SAN based backup to a central disk Pool instead of defining individual disk pools.
The proposed backup solution shall also support data de-duplication for disk based backups. Data de-duplication shall be supported on conventional storage arrays.
The proposed solution shall support checkpoint based restart for backups and recovery/ restore operations so that the backup and recovery operations, if interrupted, start from the point where they left instead of starting all over again
The proposed solution shall have the facility to provide control on network (LAN/ WAN) bandwidth utilization for backups. The administrator shall be able to specify the amount of bandwidth instead of just defining streams
Software shall support minimum Impact Backup of SAN Storage SNAPSHOTS.
Software shall support Raw device backup of Windows/Linux/UNIX based system
All necessary agents for all systems shall be provided and configured. SAN based backup for SAN connected and LAN based for NON SAN Connected Hosts.

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1.7 Supply of Rack KVM (Keyboard, Video, Mouse) Switch as per Specification:

S.No	Item	Description
1.	Make	Servers' OEM Recommended
2	KVM Switch	Rack Mounted – 8 Port Switch (2U). Server OEM / Supplier recommended.
3	Form Factor	All Items are to be Rack Mounted

1.8 Supply of Server-Monitor, keyboard Mouse etc. as per Specification:

S.No	Item	Description
1.	Make	OEM make or a make recommended by the OEM
2.	Monitor	19 inch TFT Color Monitor (Support 1024 x 768 NI Resolution) MPR-2 compliant. Should be capable of supporting 24 x 7 service requirements.
3.	Keyboard	Standard internet / windows based.
4.	Mouse	Standard 3 button optical mouse with mouse pad.

1.9 Firewall:

Branded Firewall shall be supplied and configured to protect the network from hacking and virus attacks. The firewall shall have following features:

Firewall Features:	
Should be a high-performance, high-density security services with Active/Active high availability & gigabit ethernet connectivity	
Throughput	Firewall throughput of at least 450 Mbps
Threat Mitigation Throughput(Firewall+IPS)	At least 375 Mbps
VPN Throughput	Should be at least 225 Mbps
Concurrent Sessions	At least 280000
IPSec VPN Peers	At Least 750
Interfaces	At least 4 Gigabit ethernet ports
VLAN's support	At least 150
High Availability	Should support both active/active & Active/standby configurations

.

New connections	At least 9000
Manageability	Should have at least 2 RJ 45; console & auxiliary ports
Memory Capacity	At least 512 MB DRAM & 64 MB Flash

Central server shall be connected to the firewall and only required ports shall be opened.

All the field locations also shall be supplied and connected through Firewall to the central server.

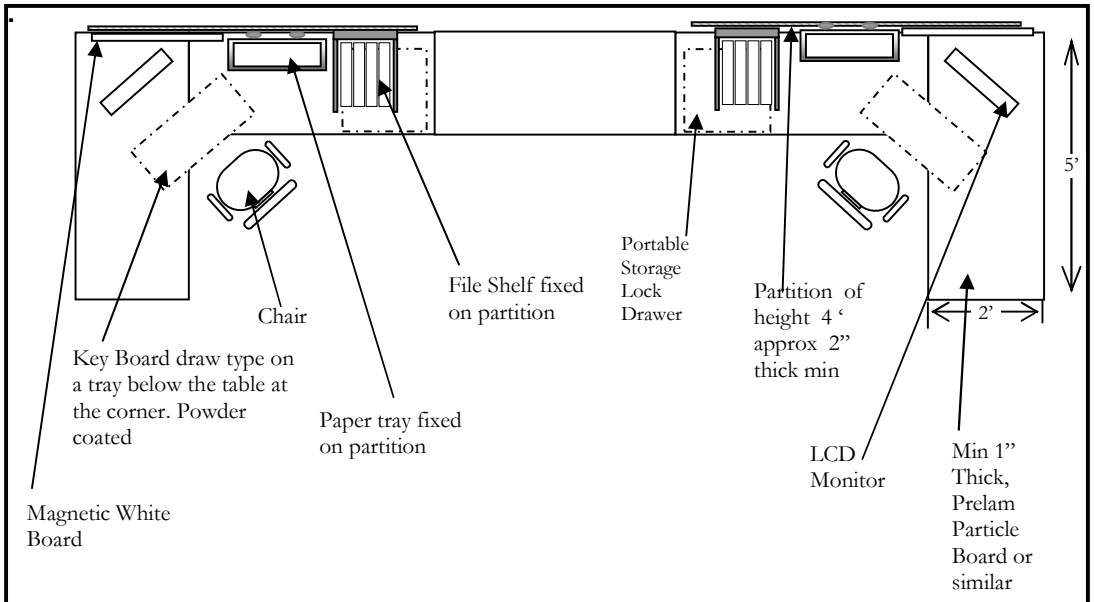
1.10 Rack (OEM Make/Vero President/ Rittal):

The servers shall be installed in a 36 / 42 U cabinet. The rack shall have cooling fans at Top and at the bottom and power plugs mounted inside the rack to support servers. The fans size and the number of fans shall be adequate to keep the servers within permissible temperature limits as specified by the server OEM. The rack shall be complete in all respects including wiring, Ferruling, Grommets etc. The Rack shall be capable of being opened from the front and rear through single hinge door. The door shall have adequate facility for locking. The Tenderer shall design the rack in a manner so that 30 % space is available for future expansion in the racks. There shall be Monitors with keyboard and Mouse in each rack controlled through KVM switch. Two PC shall be provided externally on a Table as defined in this tender for remote management of the central server.

1.11 Design, fabrication, supply & erection of DSS server control workstation:

The scope of work shall include design, fabrication, supply and erection of DSS server control console at IRIEEN Server Rooms. The tender shall while quoting for the tender give a proposal along with his offer including the model numbers etc. The detailed designs of the furniture for the DSS server control console shall be approved by the Purchaser or his representative before fabrication, supply and erecting.

The computer work station kiosk shall be Modular furniture, hi-tech precision design with a modern look. The furniture shall be rugged enough to last for at least 10 years. The furniture shall of Godrej make only and shall be flexible to be rearranged or expanded. Godrej Reflex model workstation with one side partition, PCH 6003A Godrej model, Portable 3 locked drawer storage, hanging file and tray fixed on shelf and magnetic white board on the partition shall be preferred. The scope of work shall also include neat cleating below the table the electric wiring and network cable connections so that they are not visible apparently to the user. A typical arrangement of the work station is as below.



Typical drawing of a DSS Server control workstation

1.12 Printer:

Network / LAN Printer of HP make similar to model number HP office jet 7208 or equivalent printer from HP. Detailed particulars to be mentioned while quoting by the tenderer.

2. Central Server Middleware / Software:

The central server architecture shall be scalable and more machines shall be added to configure in horizontally and vertically to ensure the high availability. The central server architecture shall have high-level security to access different functional components. The security shall be available in the infrastructure layer, application layer and at the user authentication layer to provide control access. Additionally the system shall be capable of being configured for Sockets Layer (Secured Socket Layer) Client Authentication.

The proposed solution shall integrate presently with any third party SMS network through GSM modems and DSS application, which shall interface with any Telecom Service Provider to send and receive the messages.

The various component of the central server are brought out as below. The tenderer while quoting for the tender shall ensure that the Middleware is appropriately chosen in a manner so that the mentioned requirement is achieved. Wherever there are more then one software which are bundled than it shall be mentioned while quoting.

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3. Application Server and HTTP / Web Server:

Application Server:

The Application server shall support Java 2 Platform, Enterprise Edition (J2EE) 1.4 or higher and Web services technology-based application server. The server shall be capable of, build, deploy and manage the DSS application and manage high-transaction volumes, extend back-end data & applications to the Web. The Application server shall support a wide range of scenarios, from simple administration of a single server to a clustered, highly available, high-volume environment. The application server shall be J2EE 1.4 Certified.

The Application server shall be available as an integrated product that provides facilities to develop applications based on Internet standards and to deploy and manage them reliably. The application server shall support deployment of applications based on open standards such as J2EE, XML and Web Services.

The Application Server shall provide comprehensive Enterprise Integration framework, modelling tools, Pre-built adapters and Web Services integration capabilities.

The Application Server Platform Suite shall support the following set of specific services.

a. *J2EE Services* – The application server shall support deployment of applications based on open standards. The Application server platform suite shall support development and deployment of Industry proven persistence framework such as Application Development Framework.

b. *Identity Management Services* – The application server shall support an LDAP compliant directory server with directory entries maintance. The Identity Management services shall provide management user accounts, access control privileges.

c. *Integration* – The Application server shall enable to integrate Web Sites, Internet Applications, with Packaged Applications using a set of open standards such as J2EE, JMS, JCA, and XML messaging standards.

The application server platform shall support performance scalability features such as:-

i. *Web Cache* – The platform shall support Dynamic and static web caching technologies. The Web cache shall provide rule based caching methodologies, providing declarative and programmatic methods for defining caching rules.

ii. *Clustering and High Availability* – The platform shall support capabilities to cluster enable J2EE applications, Web Servers providing no single point of failure in the deployment.

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iii. *Load Balancing* – The application server suite shall support in built load balancing algorithms. The application server shall support hardware and software based load balancers.

iv. *Management* – Provide single window view to manage application server deployment. The Management console shall support comprehensive drill down analysis and provide capabilities to define Application Performance levels. The application server shall support:

1. Comprehensive Monitoring facilities to measure resource utilization and diagnose faults.
2. System Configuration and Management

Web/http Server:

HTTP server shall be installed on the same machine on which the application server is residing. The HTTP web server shall be capable of forwarding the request to the application server. HTTP Server shall use the caching technique to store the static pages so as to enhance the performance of the solution. For high availability purpose this shall be installed in Active / Active mode and in the event of one server falling the second server shall take over the entire load. It shall have tools, which shall be capable of monitoring the web performance.

4. Directory Server:

Directory server shall be on a separate machine. The Directory server shall store the user's profile with their authentication and authorization access rights. The application server shall interface with the Directory server for getting the user's credentials before allowing him to access any application & data hosted onto the web site. A user shall be allowed to access any application, data based on his access rights in the system. For high availability purpose this shall be installed in master / slave configuration with Application / Database server.

The product chosen shall have Key Identity Management services. Features shall include -

- Native LDAP v3 server supporting all LDAP2000-compliant RFCs, including LDAP v2 and v3 RFCs;
- Supports the X.500 information, naming, and storage model
- Extensible directory schema for online modifications with no downtime
- LDAP developer APIs in Java, C, and PL/SQL to assist with application development.
- Self Service Console allowing end users and administrator to search for and manage data in the directory.
- Sophisticated Password Management features and ability to store passwords using variety of hashing algorithms.
- Support synchronization with 3rd party LDAP directory servers.

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5. Data Base Server:

Database Server shall be in a High Available cluster environment. The high availability configuration is achieved by providing DB2/Oracle in cluster mode with active-active configuration in the event of one server failing the second server shall take over the entire load. Clustering solution shall have various synchronization options i.e. sync, async or real sync options for data replications to achieve the high availability configuration. The database server shall have management console facility for partitioning, diagnostic, tuning and change management and shall come complete with clustering support.

The various features of the database server proposed shall be as follows :-

1. Database shall provide recovery mechanism for Tables, Rows, and databases from accidental / induced human errors and also shall support time-based recovery.
2. Should provide functionality to transfer data in a table space between systems (homogeneous or heterogeneous operating systems) without any extraction from the physical structure.
3. Database Server shall be highly available with every processing node providing Single View and Concurrent access to the data. In case of failure of one server / instance, each remaining server / instance in the cluster shall provide full access to all the data at any point in time.
4. Database Server must support active clustering using current and future generation of storage, network and interconnect technologies.
5. Should provide client connection load balancing and failovers – to provide continuous availability.
6. Should provide functionality to add or remove clustering nodes with minimal disturbance.
7. The database cluster shall be able to provide support for 3rd party clusterware available in the market as well as the native clustering support within the database.
8. Should provide functionality to allow archived redo log files to be automatically propagated by the server to multiple disaster recovery sites with consistency and correction mechanisms.
9. Automated Disaster Recovery solution to maintain transactional consistent copies of database, providing an option of zero data loss where required.
10. Should provide usage of the disaster recovery system as reporting database / backup database.
11. Shall support flexibility and effortless scalability without re-distributing the data or any modification to the application.
12. Database shall provide automatic performance diagnostic and advanced system monitoring functionality.

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13. Should provide database administrators with expert performance management for the database environment including SQL tuning and storage optimizations.

14. Should have Storage solution with functionalities like Volume Manager, File System equivalent File Management for Database, I/O load balancing integrated into database distribution.

6. Operating System Software:

The Latest Linux / Unix / Widows 2003 Enterprise edition shall be chosen by the tenderer for the server OS and mentioned while quoting for the tender Redhat, AIX, Hp-UX, SUSE or Solaris.

7. Installation, Integration and Commissioning of the central server:

The scope of work shall include Installation, assembly, integration and commissioning of the main and standby servers supplied by the tenderer. The entire installation and commissioning shall be done by the OEM representative only. The OEM representative shall do central server configuration for optimum server performance. The scope shall include wiring at the central server rooms at IRIEEN, in a manner that the system works effectively in unison. All wiring material, Plugs of adequate rating provision of grommets shall be in the scope of work. The scope of work shall also include air conditioning and wiring of the servers to the communication link available for ISP and FOIS and Railnet connectivity. Wiring to the firewall and wiring and interlinking of the various server units shall fall within the scope of the work. All wirings shall be properly numbered with ferules. The detailed drawing for interconnections shall be supplied to IR prior to integration and commissioning. The network cards, LAN cards, PCI cards, Controller cards, Connectors, Power supply plugs cables and similar accessories not mentioned in the hardware specifications but required for all the server to work in unison as a central server shall fall within the scope of this work. The scope of work shall also include supply, installation and commissioning of 2 MODEMS to the central server also. The scope of work shall also include assisting IR DSS development team to deploy / launching of the DSS application.

8. Back up diesel generator set:

A suitable diesel generator set of suitable capacity shall be supplied and commissioned at IRIEEN to provide uninterrupted power supply to main and stand by servers in case of power cut.

8.1 Diesel Generator Set: Qty : 01 no

Diesel Engine Liquid cooled Self start four stroke Multi cylinder diesel engine 37 BHP at 1500 RPM. The Engine is suitable for generating set application and fitted with the following standard accessories.

01. Electronic / A1 class Governor
02. Battery Charging Alternator
03. Engine safety Sensors (LOP & HWT)
04. Air Cleaner

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05. Lube Oil Filter
06. Fuel Filler

8.2 Alternator

STAMFORD/ L.S. at 1500 RPM AT 0.8 lagging power factor at 240 , 415 Volts suitable for 50 Hz, 3 phase system. The alternator shall confirm to IS: 4722/BS: 2613 and shall be suitable for tropical condition.

8.3 Digital Manual Control Panel:

Digital Manual is equipped with 16 bit high speed RISC Processor based DES-9 controller. It displays the following parameters:

- Voltage
- Frequency
- Current
- KVA
- KW
- Pf
- Rpm
- Cumulative Run Hours
- Oil Pressure
- Coolant Temperature
- Charging Current (DC Amp Meter)

The DES -9 Processor provides the following safety to the engine:

- Under & Over Voltage
- Under & over Frequency
- Under & Over Speed
- Overload
- Low Lube Oil Pressure
- High Coolant Temperature
- Emergency Off

8.4 Acoustic Enclosure:

- Silent DG Set enclosure is of modular construction with the provision to assemble & dismantle easily as per site condition. Lifting arrangement is also an integral part of the enclosure.
- There are no protruding parts.
- The enclosure is fabricated out of CRCA sheet of 16 SWG.
- The fuel level is indicated with the help of fuel gauge meter.
- Battery is accommodated in a separate tray in the enclosure.
- The doors are gasketed with high quality EPDM gaskets to avoid leakage of sound.

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- The door handles are lockable type.
- Sound Proofing of enclosure is done by high quality imported PU fire resistant foam of 25 mm thickness.
- A special residential silencer is provided with the enclosure to control exhaust noise.
- Specially designed alternators are provided to control sound at air entry to the container and exist from the container.

- To make system vibration free, engine & alternator is mounted on specially designed anti-vibration pads.
- Adequate ventilation is provided to meet air requirement for combustion heat removal.
- Temperature of enclosure does not exceed beyond 5 degrees of ambient temperature.
- Noise level is 75 dB (A) at 1 meter distance. The enclosure meets the norms as specified by CPCB

8.5 Accessoriers:

- Fuel Tank: Daily service fuel tank of sheet metal of suitable size complete with air vent, inlet and outlet connections.

8.6 BATTERIES:
One / Two Nos. batteries of 12 volts each in dry and uncharged condition of Exide / Prestolite or equivalent make with its leads.

9. UPS for Data Centre/Servers:
UPS – 120 KVA (2 Nos.)

It is proposed to have two UPS systems working in parallel redundancy mode, capable of feeding the power required for servers at. Data Centre .Bidders have to give minimum of 120 KVA of UPS. If the Data centre load is more than 120 KVA, bidders are free to size accordingly, complying to the minimum specification given below.

A	INPUT	Parameter	Vender to Specific
1	Input voltage	415V,3 Phase,4Wires	
2	Input voltage tolerance	+15%,-20%	
3	Input frequency	50 Hz	
4	Input frequency tolerance	+/- 5%	
5	Input Power factor at nominal voltage and full load	0.95 with super filter	
6	Nominal Input current during Normal running condition	184amps	

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8	Power walk – in period	30 seconds [selectable]	
8	Input circuit	SCR Rectifier	
9	Input Circuit harmonic distortion	<5%	
B	**OUTPUT**	**PARAMETER**	
1	Module full load rating KVA/ KW	120KVA	
2	Rated voltage	380/400/415 V, 3 Ph	
3	Rated current	For 120KVA ups system rated current is 167amps.	
4	Phase Voltage asymmetry a) Balance load b) 100% unbalanced load	 1 % 2 %	
5	a) Balance load b) 100% unbalanced load	Applicable to 3 Phases UPS only.	
6	Output voltage adjustment rage	+/- 5%	
7	Phase displacement a) Balance load b) 100% unbalanced load	 120 deg. +/- 1 deg 120 deg. +/- 1 deg	
8	Output power factor support capability	0.6 lag to unity	
9	Internal oscillator stability	+/- 0.1%	
10	Mains synchronization tracking	+/- 1 Hz (settable to +/-2)	
11	Max. rate of change of frequency Output voltage harmonics	1 Hz. Per second	
12	a) Linear load b) Non-linear load (Crest factor of 3:1)	< 1% < 5 %	
13	Crest Factor	3 : 1 or better	
14	Overload rating	110% for 60 minutes 125% for 10 minutes 150% for 60 seconds 200 %single phase for 30 seconds	
15	Overload trip	10 min at 125% reducing to 60 seconds at 150%	
16	Overall Efficiency	93%	

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17	Transient Response a) 100% load change b) Manual transfer of load from UPS to bypass and vice-versa c) Automatic transfer of load form UPS to bypass	< +/- 5% msecs when in sync msecs in sync	

18	Transient recovery time	+/-1% in 20 msec	
C	**DC Charactristics**	**Parameter**	
1	Nominal DC bus voltage	408 V DC	
2	Battery isolation	Manually closed circuit breaker with under voltage release and over current trip	
3	Battery fully discharge voltage	357	
4	Allowable voltage drop in battery cables	3 volts at end of discharge voltage.	
5	Battery float voltage	459 V	
6	Battery end voltage	357 V	
7	DC Bus voltage ripple	< 1 RMS	

10. PC's

The tenderer shall supply PC's of HP/IBM/Dell/HCL make only with following configuration and WINDOWS operating system and antivirus software:

S.No	Item	Features
1	**Processor**	Intel Pentium Dual Core E2180 processor (2.0 GHz, 1 MB L2 Cache, 800 MHz FSB)
2	**Chipset**	Intel G31 Express chipset
3	**Motherboard**	OEM motherboard with following features. *4 DIMM Slots *Supports for 45 NM processor (1333 FSB also) *Support for 800 MHz RAM
4	**Memory**	1(2*512 MB) GB DDR-II 667 MHz dual channel
5	**Floppy Drive**	
6	**Hard Disk Drive**	160 GB SATA II 3.0Gbps with 4 SATA Ports

7	**Optical Drive**	20 X DVD Writer
8	**Graphics**	Integrated Intel GMA 3100 with 128 MB Video Memory
9	**RAID**	
10	**Ethernet**	Integrated 10/100/1000 Mbps Ethernet controller with PXE and WOL support
11	**Bays**	2*Front Accessible 5.25", 2*Front Accessible 3.5", 1*Internal 3.5"
12	**Slots**	2 PCI, 1 PCI Express X16,1 PCI Express X1
13	**I/O Ports**	Front : 2 PS/2, 1 Serial, 1 parallel, 1 VGA, 1 RJ-45, 4 USB Rear : 2 USB
14	**Audio Port**	Front : 1 MIC In, 1 Audio out Rear : 1 Line In, 1 Line Out, 1 MIC In,
14	**Form Factor**	Micro ATX
15	**Power Supply**	250 W ATX 12 V Surge Protected
16	**Monitor**	16" Color TFT/LCD with TCO 03 & 1360 x 768 resolution
17	**Keyboard**	104+14 BUTN INT/MM PS/2 Black
18	**Mouse**	Button Optical USB mouse with scroll
19	**Operating system**	Windows Vista Business
20	**Management Features**	Browser based desktop management software with following features. *Inventory of assets like motherboard, memory, hard disk etc. *asset tracking & management. *alerts on clients machine. *performance monitoring of CPU, Physical memory, Virtual Memory, Logical drives
21	**Security**	*Administrator & Boot up Password *Enabling/disabling serial port, parallel port & USB port. *Password Protection of all Storage Drives
22	**Protection Tool**	Protection Tool shall significantly increases the system up time in following conditions • Accidental File / Folder deletion or overwrite • System down at critical moments • System corruption by viruses, spy-wares or Trojans • Accidental formatting of the any of the hard disk partitions
23	**Compliance**	DMI 2.0, ACPI 1.0, PCI 2.2 & RoHS
24	**certificates**	Machine : Windows Vista & Red Hat Linux certified Monitor : TCO 03

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11. UPS for PC's:

Supply, erecting, testing, interfacing with PC's the ON Line UPS with the following specification is required to provide with each PC:

600VA line interactive UPS	
Parameter	**Desired Feature**
Capacity	600VA
Input voltage & Frequency	170V ac to 280V ac, 50Hz +/- 5 Hz
Output voltage	220V + 8%(Main Mode) 220V + 5% (Battery Mode)
Output Waveform	Simulated sine wave
load	Load on AC Load on DC Over Load / Low Battery Trip
Harmonic Distortion	< 33%
Built In Battery SMF	1*12 V (7AH)
Maximum Charging Voltage	13.8 V
Environment Temperature Humidity	 0º to 45º C 30 % to 95%
90% Recharge time	3 to 4 Hours
Efficiency	AC to DC > 98% DC to AC 85%
Transfer Time	<5 Milli Second
Acoustic Noise Lev el	< 40 db at one meter
Interface	RS-232

12. Printer field locations:

Laser printers (Laser 10 p/m) shall be supplied.

13. Additional requirements:

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Windows Operating systems and anti virus software for the PCs shall be provided by the Supplier.

Internet connection for field locations which shall be used to connect to Central Server, shall be provided by the Supplier. All the required Documents and authorizations for acquiring the internet connection from ISP shall be provided by Indian Railways. Internet connection shall be in the name of Indian Railways. Cost of internet connection shall be covered in the scope of the project. This includes the leased line for Central server. Running expenditure of hiring leased line for ISP at server and internet connections at field locations shall be included in the cost of project for project and warranty duration.

All the field locations shall have minimum 256 kpbs of internet bandwidth and Central server shall have minimum 8 mbps of bandwidth.

Where FOIS network is available, connectivity of field locations to server shall be done with FOIS.

All the Hardware system supplied shall have the minimum specification which has been mentioned in this specification, at the time of delivery if the specified specification is not available, tenderer shall supply the equivalent or higher model of hardware without any additional cost to Indian Railways.

Any other components, which are not mentioned in this specification and which are required for the project, shall be mentioned in the Bid document quoting separately.

14. Supply of Networking Equipments:

14.1 24 Ports LAN Switch as per Specification (Layer 3):

Make	Cisco/3COM/Nortel Only
Port Requirement	Should have at least 24 10/100/1000Mbps thernet ports & at least 4 SFP uplinks.
Stackability	Should be stackable upto at least 8 switches as a single logical unit.
Switching Fabric	Should have minimum 32 Gbps switching fabric
Packet Forwarding Rate	Should have minimum 38 mpps packet forwarding rate

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VLAn ID's support	Should have support for atleast 4000 VLAN ID's
Features Support	IEEE 802.3z; 802.3ad; 802.3af; 802.3x; 802.3ae etc
Other Features	IEEE 802.1x; 802.1w; 802.1s; 802.1D; 802.1p etc
Wireless Features	Should be able to integrate with wireless Lan controllers
QoS Support	Should support superior QoS features
Ipv6 Support	Ipv6 Support shall be available at hardware level
Egress queue Support	4 egress queues per port required
Encryption Functionalities	Should support SSH, SNMPv3 & other related protocol for encryption.
Management	Should be able to manage with telnet, SNMP, web based browser technique

14.2 8 Port LAN Switch:

Make	Cisco/3COM/Nortel Only
Port Requirement	8 10/100 Base TX; Option for 1 dual Purpose Uplink (Ethernet/SFP)
Packet Forwarding Rate	At least 4.2Mpps
MAC Address	At least 8000
Memory Capacity	At least 32MB SDRAM & 4 MB Flash
Features Supported	IGMP Snooping, 802.1D, 802.1w, 802.3ad, port mirroring
VLAN Support	At least 255
QoS	802.1p standard, TOS & DSCP Support
Management	Support for web based GUI, CKI, Telnet, SNMP v1,v2,v3; SNTP & DHCP

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14.3 Routers:

Feature Support	Should be capable of supporting data, security, voice, and wireless services
Encryption Features	Should support embedded encryption acceleration on the mother board and DSP Slots
Security Features	Should support IPS, firewall functionalities & optional integrated call processing & voice mail support
Memory Options	Should have minimum 256MB DRAM & 64MB Flash
USB Ports Availability	Should have at least 2 USB Ports support
Onboard LAN Ports	At least 2 10/100 Mbps ports
Expansion Slots	Should have expansion slots capable of supporting network module & interface card for WAN connectivity
VPN Hardware Acceleration	DES, 3DES, AES 128, AES 192, and AES 256
Management Ports	At least 1 console & auxiliary ports.
Redundant Power supply	Should support redundant power supply option.

14.4 Passive equipments:

1	**Cat 6 UTP Cable Box of 305 Meters**
	4 Pair Cable ,23 AWG Copper with integral cross-member pair separator for uniform characteristic impedance.Should Meets or exceed the TIA / EIA 568-B.2-1 uniform characteristic impedance.Should Meets or exceed the TIA / EIA 568-B.2-1 UL Listed .Should be certified by independent test lab (ETL etc.) to meet Cat-6 Standards.
2	**Cat 6 SMB with IO**
i	Should confirm or exceed TIA/EIA-568-B.2-1 and IEC 60603-7-4 standards requirements for Cat-6.Should have integral hinged dust cover and integrated termination process on the jacks at 90 degree angle.
ii	Bidder shall offer a mechanism to maintain the quality of the termination irrespective of the skill level of the termination staff.
iii	Should have options for various colours (Black ,Almond, Blue, Green ,Red, White, Yellow , Orange) .

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iv	Durability: 750 mating cycles on modular jack and 200 termination cycles on 110-block
v	Should be UL Listed and have third party (CSA etc.) approval.
3	**24 Port Cat 6 Jack Panel with accessories**
i	Should be a 24 port modular/ Discrete patch panel.IDC Connectivity at rear end & RJ-45 jack on front panel,19" rack mountable. Ports shall be individually replaceable & Consistent port-to-port performance. Each port shall have integral hinged dust cover and integrated bend-limiting strain-relief unit for cable entry. Should confirm or exceed TIA/EIA-568-B.2-1 and IEC 60603-7-4 standards requirements for Cat-6.Metallic high strength & 1U height, Conforming to EIA/TIA 568 B wiring pattern.
ii	Should be UL Listed and have third party (CSA etc.) approval.
4	**Cat 6 UTP Patch Cord 7 Feet**
i	Should confirm or exceed TIA/EIA-568-B.2-1standards requirements for Cat-6.Should have factory fitted Slimline transparent boots on patch cord RJ-45 plugs at both ends.Tested for return losses ,shall ensures Zero-bit errors
5	**Cat 6 UTP Patch Cord 3 Feet**
i	Should confirm or exceed TIA/EIA-568-B.2-1standards requirements for Cat- 6.Should have factory fitted Slimline transparent boots on patch cord RJ-45 plugs at both ends.Tested for return losses ,shall ensures Zero-bit errors
6	**24 Port LIU with fully loaded adapters and connectors and other accessories**
i	Should be a 24 port modular/ Discrete patch panel.IDC Connectivity at rear end & RJ- 45 jack on front panel,19" rack mountable. Ports shall be individually replaceable & Consistent port-to-port performance. Each port shall have integral hinged dust cover and integrated bend-limiting strain-relief unit for cable entry. Should confirm or exceed TIA/EIA-568-B.2-1 and IEC 60603-7-4 standards requirements for Cat- 6.Metallic high strength & 1U height, Conforming to EIA/TIA 568 B wiring pattern.
ii	Should be UL Listed and have third party (CSA etc.) approval.
7	**Fibre Components**
i	Armored Optical Fiber Cable Multi Mode
ii	Multimode OM3 optical fiber cable
iii	Should be designed and tested in accordance with EIA/TIA 455, EIA/TIA 568-B.3
iv	Performance specifications shall be measured in accordance with the Fiber Optic test procedures (EIA/TIA-455 documents)and test procedures of IEC 60793 and IEC 60794.
v	Maximum Attenuation 3.5 dB/Km @ 850nm and 1.5 dB/Km @ 1300nm
8	**Optical Fibre Connectors**
i	SC Types, Epoxyless, field terminated with required accessories& consumables,required for terminating 50/125 micron MM fibre.

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ii	Optical Fibre Patch Cords MM 10 Meters Duplex ,50/125 micron OM3 MM fiber,SC connectors at both ends shall have factory mount ceramic connector at both end.

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Section

4

DSS For Electric Locomotive Asset Management

Software Development

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1. Software Development:

a) The software reviews and testing shall normally be done by the Purchaser at Supplier's premises by IR's team. However Purchaser shall also use the assistance of an external expert to do few such reviews. All such reviews shall be based at IR Supplier's premises. The detailed testing of the software shall be carried out at a lab with sufficient testing facilities to be provided by the tenderer.

b) IR shall have full copyright and complete and sole ownership of the software / system (Server as well as client) developed by the successful bidder including the source code, object code of the software, associated material (media and printed materials) and any 'online' / electronic documentation. The successful bidder shall not sell, use, rent, lease, license, demonstrate, republish the system or documentation (electronic or printed) anywhere outside IR. All these details shall be supplied to IR after successful implementation of pilot phase.

c) Documents / Software prepared by the successful tenderer shall be the property of IR. All application software plans, drawings, specification designs, reports and other documents prepared by the vendor in execution of this project shall become and remain the property of IR, and before termination or expiry of the contract, the tenderer shall deliver all such documents to IR together with the source code of the application software so developed under the contract along with a detailed inventory thereof.

d) The Tenderer shall warrant that the software developed under the contract is specially designed and developed for IR. The tenderer shall indemnify IR against all third party claims of patents infringement of trade mark / copy right or industrial design rights arising from the use of the supplied, software and related services or any part thereof. In the event of any claim in respect of an alleged breach of a patent, registered design or trade mark being made against IR it shall notify to the tenderer and the tenderer shall, at its own expense, either settle any such dispute or conduct any litigation that may arise there from.

e) Further, IR and their assigns shall have unrestricted and exclusive rights, usage of the copies of the software in consideration of the cost paid. IR or its successor shall be at liberty to use the developed system at any number of places/machines or share it with anybody. IR and their assigns shall also have the unrestricted right to enhance, modify, port, develop and deploy the software application anywhere without limitations of any kind. IR shall further have the sole and exclusive intellectual property rights for any application software thus developed/ acquired and deployed by it.

f) IR shall have unlimited rights in use of the software/system along with the right to modify / enhance/ deploy the software at its discretion anywhere without limitation of any kind.

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g) The Tenderer shall develop the software using standard software development practices for development of the software. Additional hardware like PC's, thin client, modem etc. required for the development shall be used by the tenderer for the duration of the development of the software. The tenderer shall involve the software team of IR for development of the software in the entire process of software development. The Tenderer shall also give the Software Development Life Cycle (SDLC) documents.

h) The tenderer shall use Software engineers who have developed such application earlier. They shall have an experience of minimum 5 years on software developments using J2EE platforms. The tenderer shall be required to submit their bio Data at the time of tendering as per the format enclosed.

i) The Supplier shall give training to IR personnel for doing modification in the software.

2. Time Schedule of Work:

The work shall be completed as per the time schedule indicated in the Section – 1 of this tender document. Based on this time schedule the tenderer shall make out a week wise detailed time schedule for completion of the work and submit within 1 week of award of the contract.

3. Software Engineers

The tenderer shall use software engineers as per the below mentioned requirement for the DSS software development. The software engineers minimum be a BE/MCA/M.Sc(Comp. Sc). The software engineers shall have sufficient exp in the specific field mentioned as below. The software engineer shall be conversant with use of Websphere and Rational software or latest development tools.

Web Designer:

Graphic designing, Adobe Photoshop CS, Macromedia Flash, Any GIF animation tools, Web Page designing tools with good experience of HTML and cascading style sheets (CSS). Experience in any portal related projects is an added advantage. Should have been developing the Web pages for over 3 years continuously. Detailed BIO Data particulars shall be enclosed as in section 6.

Functional Consultant:

Should have sufficient experience in implementation / use of technology which is being proposed to be implemented at IR.Should have good understanding of the business processes being implemented at IR. Should have been doing system implementation role for the last 3 years. Detailed BIO Data particulars shall be enclosed as in section-6.

J2EE developer:

Java,J2EE, EJB, JSP, Struts, JSF, Web Services,AJAX,J2ME,XML,JDBC and exposure to Apache project frameworks like Ant. Should have sufficient exposure to RDBMS.

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Experience in any portal related projects is an added advantage. Should have been developing applications using java and Oracle / DB2 for over 4 years continuously. Detailed BIO Data particulars shall be enclosed as in section 6.

Database Professional (Developers and Administrators):

Should have sufficient experience in use of technology which is being proposed to be implemented at IR. Should have been associated with the development of applications using DB2 / Oracle for over 4 years continuously. Detailed BIO Data particulars shall be enclosed as in section-6.

Testing Professionals:

Should have sufficient experience in testing role of technology which is being proposed to be implemented at IR. Should be able to create and automate test scripts. Should have been testing applications for over 3 years continuously. Detailed BIO Data particulars shall be enclosed as in section-6.

System Administrators:

Should have sufficient experience in use of technology which is being proposed to be implemented at IR. Should have been doing system admin role for the last 3 years. Detailed BIO Data particulars shall be enclosed as in section-6.

Database Administrators:

Should have sufficient experience in use of technology which is being proposed to be implemented at IR. Should have been doing database admin role for the last 3 years continuously. Detailed BIO Data particulars shall be enclosed as in section-6.

Team Leader / Group leaders:

The team leader group leader shall have been working on application development and implementation for over 7 years on the technology being proposed. He shall have the ability to develop, evaluate, and execute implementation plans by defining scope, objectives and deliverables. They shall have worked as team leaders for at least 3 consecutive years. Detailed BIO Data particulars shall be enclosed as in section-6.

IR shall be at the liberty to screen such candidates by doing interview/selection system test.

4. Broad Scope of software modules to be developed:

Decision Support System (DSS) for Railways envisages automation and creation of paperless environment for all maintenance, operation, production and monitoring related activities / processes at all maintenance, operation, production, and administrative establishments for electric locos across the length and breadth of India. For achieving this objective, Railways wants development of a software application with the following modules:

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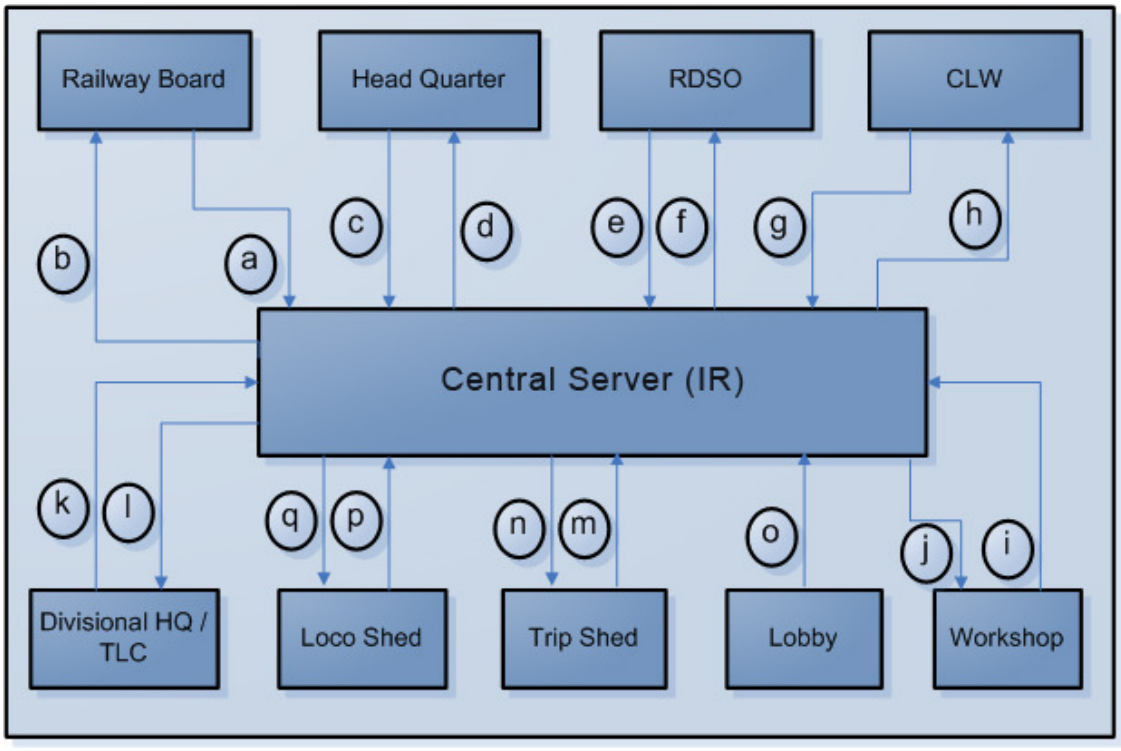
a) Loco Shed module
b) Trip shed module
c) Lobby module
d) Divisional HQ / TLC
e) Work shops
f) Railway Board module
g) Headquarter module
h) CLW module
i) RDSO module
j) Report module
k) SMS module
l) Help module

The details of above modules shall be finalized by the Supplier in SRS documents. For this Supplier is supposed to visit each type of locations for proper understanding of the work. For making SRS, the Supplier shall interact with SRS team of IR. The SRS team shall also be responsible for review and approval of SRS.

The following diagram represents the context level flow diagram of the system.



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Railway Board

a) Policies, Sanctioned work Details.

b) Details of Performance, Trend Analysis, Implementation of MS/SMI/RAP, Daily Outage, Dead Loco, Status of Locos, Availability of Material, Training Details, Performance of CLW.

Head Quarter

c) Details of MS/SMI/RAP, Sanctioned work, Policies, Trainings.

d) Details of Shed & Workshop Performance, Implementation of MS/SMI/RAP, Daily Outage, Dead Loco, Maintenance status of Locos, Material, Sanctioned Works.

RDSO

e) Details of MS/SMI/RAP, Vendor List, and Test Trial Report.

f) Details of Implementation of MS/SMI/RAP, Failure Analysis equipment wise, Vendor Performance, Trial Equipment.

CLW

g) Details of Vendors List, Production Plan, Cost of Production, implementation ofMS/SMI with cut in loco numbers..

h) Details of Vendor Performance.

Work Shop

i) Details of POH, Material, and Expenditure for POH/Repair, Out turn.

j) Details of Overdue Locos, Equipment Under Overhaul.

Divisional HQ/ TLC

k) Details of Loco Failure, breakdown, implementation of Special Instructions.

l) Details of Loco, Special drive

Trip Shed

m) Details of Trip, logbook, Trip Inspection, Action Taken/Work Done, Loco Health, ESMON, Joint Check, Special Drive Implementation, Material.

n) Details of special Drives, Loco Status.

Lobby

o) Details of Energy consumed by Loco, Distance covered by Driver and check in check out details.

p) Defects noticed by driver in loco.

.

Loco Shed

q) Details of Loco, Job card, Defects of Unscheduled Loco, Work Done Details, Defects apart from JC, MS/SMI/RAP, Special instructions, UES Details, Material Details, Test Lab Details, M&P/T&P Details, Spares Details, Sanctioned work details.

r) Details of Locos, Checklist, UES, Material, Sanctioned work, Loco History, Work done, Status of M&P/T&P, Tracking POs

All these modules shall work in complex integration with each module representing a part of complete business processes of all maintenance, production, operation, and administrative establishments of Railway

Processes, types of reports and formats of various forms / checklist shall vary between similar maintenance, operation, production, and administrative establishments of Indian Railway. Hence system shall take care of these variations so as to maintain uniqueness at each maintenance, operation, production, and administrative establishments.

System shall facilitate creation of three types of users / roles: Admin, Data feeder, and viewer. There shall be provision to assign access rights / roles to users of each of the establishment / department. Also there shall be provision to provide access of different modules to each of the department.

4.1 Loco Shed Module:

Loco shed are the establishments of Indian Railways which look after maintenance of loco motives. Loco shed comprises of various sections such as progress planning investigation, traction motor, bogie, auxiliary, pneumatic etc and departments such as stores, laboratory etc, each specifically meant for maintenance of locos in it domain.

Loco comes to loco shed when either it due for scheduled maintenance (IA, IB, IC, IOH, AOH; each performed after a specific time period), or needs repair (unscheduled maintenance) or it is a new loco. For each of the case, loco is received by Planning Progress Investigation Organization (PPIO) and details of the loco are recorded in the loco entry form such as time and date of arrival, loco number, etc and also it is tested by PPIO/other section based on a check list.

When new loco comes it is commissioned by loco shed so as to check its proper functioning. In case of scheduled or unscheduled maintenance Job Card (JC) is issued by PPIO to concerned sections and departments. Each section does its work and returns the JC with the details of the work done. Then the loco is again tested and inspected by Traffic Representative (TFR) / Engine Turner (ET) and if any defect is found, it is passed to PPIO and then the same cycle follows. Only when the TFR/ET approves the loco and consequently when the engine health certificate is issued, then only it is passed to Traction loco controller (TLC) (TLC is responsible to allot the locos to different Train No.).

Loco Shed module shall comprise of various sub-modules namely PPIO module, Section module, Laboratory module, Machine & Plants / Tools & Plants module, and stores module. Functionalities in each of the sub-module are as follows:

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4.1.1 Planning Progress Investigation Organization (PPIO)

Loco comes to loco shed when either it due for scheduled maintenance (IA, IB, IC, IOH, AOH; each performed after a specific time period), or needs repair (unscheduled maintenance) or it is a new loco. For each of the case, loco is received by Planning Progress Investigation Organization (PPIO) and details of the loco are recorded in the loco entry form such as time and date of arrival, loco number, etc and also it is tested by PPIO/other section based on a check list.

The following are the functional requirements for this PPIO module.

Item #	Description
1.	System shall maintain the entry and exit of loco times i.e., in time and out time of the loco in the loco shed.
2.	System shall facilitate feeding the various details of the loco such as date of commissioning, time period for scheduled maintenance (IA, IB, IC, AOH & IOH), last scheduled maintenance date etc and its various equipments such part number, date of installation, previous defects encountered etc. This holds good for new as well as old loco.
3.	System shall display the details of loco as and when loco number is fed in to the system.
4.	System shall provide option for entering & editing various types of checklist for each type schedule maintenance (IA, IB, IC, AOH & IOH).
5.	System shall display applicable checklist for each loco on its scheduled maintenance and allow printing, in which PPIO shall feed details.
6.	System shall give flexibility to users for customizing check list.
7.	System shall provide interface for displaying all the locos due for schedule maintenance.

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8.	System shall provide interface for showing details of locos on feeding of loco number and shall also prompt PPIO if loco is due for any.
9.	System shall automatically generate & Issue job cards based on the type of schedule maintenance, RAP and seasonal precautions measures. These Job Cards (JC) shall carry details of jobs (as are there in the Performa of IA, IB, IC, AOH & IOH and as per standard check lists) to be performed and send them across to concerned departments.
10.	System shall give flexibility to users for customizing various Performa.
11.	For unscheduled maintenance, system shall provide facility to feed details of the defects and also JC shall be issued to concerned departments based on the class of the defects.
12.	System shall maintain history of defects and work done on loco & its equipments during its visit to various maintenance establishments across India.
13.	System shall also track the transfer of equipments / sub-equipments from one loco to another.
14.	System shall facilitate generation of Engine fitness certificate & printing only on the completion of work on loco.
15.	System shall provide facility for Planning in advance for scheduling of maintenance of locos.
16.	System shall provide option for viewing and printing the JC for each department. Should display only jobs related to that department
17.	System shall facilitate feeding of work done in the loco by each department according to JC for both scheduled and unscheduled maintenance.
18.	System shall be capable to capture reasons for the delay and the extra time taken in any type of maintenance and PPIO shall be able to see it. Also shall send warning/reminder to the sections and PPIO to 'hurry up'.
19.	System shall facilitate feeding of investigation details of on line/ shed detected failures.
20.	Monitoring of developmental items provided on locos (make, date provided, Taken out date etc.)
21.	Technical circulars/codes/instructions, modifications etc. – Index and search.
22.	Wheel data record
23.	Bogie stress points record.
24.	Progress of implementation of RAP, MS, SMI.
25.	Progress of implementation of RAP, MS, SMI.
26.	To support integrated maintenance and engineering activities, the system should be able to create and maintain engineering and maintenance information in an integrated fashion that reflect engineering and configuration changes and make them available at all points. Information that should be included are: assembly,

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	disassembly, kits, part number, unit of measure, unit of assembly, specific item replacement factors, as configured (includes serialized items), accumulated utilization data etc.

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27.	The application to support configuration control for both master and unit configuration, configuration as built and as maintained. It must generate alerts whenever there is deviation from permitted structure as per design details.
28.	The application to support serialized component tracking throughout its life time since production, shop activity, in store life and since installation in loco or next higher assembly.
29.	The system to be able to calculate or forecast due dates for all maintenance items, schedule for component removal with time control, *deferred component removal control, component modification control, loco maintenance event forecasting* from maintenance planning for sample checks, maintenance planning for special maintenance programs, repetitive maintenance event control, all maintenance activities on one loco as per standards.
30.	The system to be able to plan, control and create work package to be performed for each loco or equipment based upon the loco utilization counters with automatic warning for maintenance items or jobs prior to their due date. The generation must be based on factors like usage term, period, lead time and periodicity, with automatic generation in association with job and task identification number in the work package and *incorporation of deferred maintenance, special planning for medium and short term, with information management* for a task, and monitoring of all open tasks.
31.	The application to facilitate planning and control of resource utilization towards the activity. It should *automatically verify* material, tool/ equipment, facility, down time, task selection process, actual workload and available man-power comparison, resource requirement for each loco visit or each loco maintenance activity.
32.	The system to be able to define and structure the maintenance activities and assign maintenance staff to those activities, do shift planning, assign maintenance activities or job-card/tasks to maintenance staff (group or individual) based on skill set.
33.	The system to be able to analyze maintenance key performance indicator (KPI) for line maintenance productivity such as actual man-hour and standard man-hour comparisons, evaluate the cause of any performance degradation, daily performance analysis for work accomplished.
34.	The system be able to define and structure the maintenance activities and assign maintenance staff to those activities, do shift planning, assign maintenance activities or job-card/ task to maintenance staff (group or individual), task assignment with regard to their skill set.
35.	The system to be able to do resources planning for loco / equipment line maintenance for long term, medium term and short term, human resource requirement planning, material requirement planning, tool and equipment, and facility requirement planning.
36.	The system to be able to provide information on *performance analysis.*

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37.	The application to be able to track and control various maintenance requirements that need to be performed for heavy maintenance and associated activities. The application must also enable monitoring of *deferred items and open items that may have been transferred as a heavy maintenance requirement,* modification requirements, special maintenance programs, sampling programs etc.
38.	The application to support automatic creation / alteration in overhaul work package, which includes all maintenance requirement activities for each individual loco heavy maintenance check, routine work for each check type, non-routine work such as modification, component removal, add, select or transfer open job/task, combine multi-work types (routine, non-routine etc,) into a single package, automatically eliminate duplicity in work , dynamically generate and group job-cards based on event content package.
39.	The application to be able to track and control work package , *create work break down structure*, add/ change/ delete individual job within routine work, non-routine work, snag or discrepancy, monitor status, monitor and control incomplete tasks/ deferred tasks and automatically alert the planner.
40.	The system to be able to create sanctioned work package for managing sanctioned work. The sanctioned work management plan should be according to the work break down structure, estimated time to complete the sanctioned work package in percentage or days with automatic optimization of the plan based on resource availability and constraints.
41.	The system to be able to *simulate the sanctioned plan* with respect to resource requirement (man-power, material, tool/equipment), maintenance slots etc.
42.	The system to be able to track work performed and automatically keep as history record.
43.	The system to be able to generate reports on completion status, estimated time to complete the sanctioned work against the actual status, alerts or warning if the status of the sanctioned work or task is behind the schedule , display the production flow and critical path of the project in the Gantt chart , drill down from the Gantt chart to view the status of the task/job, highlight the critical task or job that will affect the schedule of the project plan and alert the planner in case delays are likely.
44.	The system to be able to collect the resource details such as man hours, manpower, material and provide real time status check and *controlling of maintenance costing.*
45.	*The application to be able to establish a function to assess the overhaul cost planning* , comparing the actual cost with the planned cost , real time on-line data transfer of man-hour, material and tool/equipment usage for loco maintenance cost accumulation.
46.	The system to be able to forecast the component removal and provide alert messages to planner for remaining time for the same and next higher assembly as applicable including the time such component shall not be available.
47.	The application to support up dation of manpower (skill sets) availability into the

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	project resources schedule. The planning must be based on assignment of defined templates for linked activities and tasks to activities.
48.	The process to support constraint based scheduling of activities within an event, rescheduling if necessary, *analyse schedule and resource conflicts,* determine potential solutions (reduce work/demand, increase resource availability, change / extend check dates) and rescheduling of work package.
49.	The system to be able to comprehensively plan and reschedule resources across multiple maintenance lines and support requisition based on predictive provisioning.
50.	The application to be able to generate progress status of complete maintenance activities at a shop, unit.

4.1.2 Sections Module:

Every section is responsible for work on locomotive when it comes to shed as per details defined in check lists.. In case of scheduled or unscheduled maintenance Job Card (JC) is issued by PPIO to concerned sections. Each section does its work and returns the JC with the details of the work done.

The following are the functional requirements for this section module:

Item #	Description

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1	System shall have a provision to enter the defects identified in the department during maintenance activity other than scheduled jobs.
2	System shall provide option for viewing and printing the JC, Should display only jobs related to this Section.
3	System shall facilitate feeding the result based on the parameter defined in the checklist of various scheduled maintenance.
4	If section notices some more defects which are not mentioned in JC, then system shall facilitate entering those details and they shall be brought into notice of PPIO by the system.
5	System shall be able to append / consider MS - modification sheet and SMI-Special Maintenance Instruction during generation of JC or Check Lists and Notify concerned departments on any such changes.
6	Entry and Monitoring of implementation of MS/SMI/RAP issue by respective designated establishment
7	When MS is issued by any designated establishment then it needs or need not be approved by higher authority based on its rank in the hierarchy (for e.g. if RDSO issues MS then it need not be approved). System shall facilitate feeding of this information and online approval process.
8	System shall provide option for entering feedback by the maintenance staff. When loco shed makes reliability action plan to improve reliability of loco on railway track, it needs to be approved by zonal HQ and may be by higher authorities. System shall facilitate feeding of this information and online approval process.
9	System shall notify the feedback to concerned designated establishment and seek approval on the same

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Item #	Description
10	Unit Exchange Spares (UES) are the main equipments of loco motives (for e.g. tap changer, transformer, bogie, rectifier block etc.) and are stored in less quantity which is proportionate to number of loco in the loco shed and also to life span of equipment. System shall facilitate feeding of UES details, their threshold level
11	System shall prompt user when UES falls below threshold level.
12	System shall facilitate feeding of material details required by the section, their threshold level
13	System shall prompt user when material falls below threshold level.
14	Each equipment of loco is made up of various parts; each part is made of sub parts and so on. DSS shall support entry of the cause of failure and remedial action taken up to 5 level of equipment.
15	System shall facilitate feeding of information about the equipment that has to be condemned / scraped.
16	In every budget railway allocates some fund for works such as extension of a loco shed, construction / augmentation of trip loco shed, loco shed etc. System shall facilitate feeding of information about sanctioned work and track the status of that.
17	Some parts / equipments are send by loco shed to workshop for repairs and a target is given, as to when repair shall be completed on certain number of equipments. System shall facilitate feeding of information mentioned above and also flow of these information to workshop.
18	System shall maintain Over haul check sheet of all sections of all locos and its equipments shall be in master record. Also the user shall be able to fill in, save and take the print of the check sheets in the system.

4.1.3 Tool Room Module:

Tool Room is responsible for storage, upkeep, maintenance and calibrations of various tools and measuring equipments. System shall maintain health of tools, maintenance requirements of tools, calibration status of tools etc.

The system to have the ability to notify that an item is due for calibration. A schedule report with detail of items due must be produced for the equipment owner for a programmable period. This data should also be available for viewing online.
Overdue notice When a tool or piece of test equipment is overdue for calibration and the system status has not been changed, notices should be generated and forwarded

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to the concerned authority and inventory holder for further action. Deferral till accepted period may be permitted.

Trend Analysis: The system to have the ability to analyse the calibration data for trend analysis. The data should also be exportable. In order to adjust the calibration period of a tool it is necessary to hold a complete calibration history including results to determine trends in the equipment's reliability. This analysis should be performed periodically or when an out of tolerance occurs.

4.1.4 Technical Cell Module:

Technical section maintains technical records and prepares and sends various reports to Head Quarters, RDSO and railway Boards. These include PCDO/MCDO, Failure reports, loco availability reports, UES report, implementation of MS/SMI/RAP report etc. The cell also issues technical instructions/ action plans to be implemented by various sections based on HQ/RDSO/RB guidelines. System shall be able to generate various reports as desired based on various parameters and technical instructions/ action plans.

4.1.5 Laboratory module

Laboratory conducts various types of tests and there is a gap of particular duration between each test. Each test is scheduled on one or more type of scheduled maintenance. There are chances that same test is scheduled before its due date in the scheduled maintenance because of the reason that time duration between two scheduled maintenance is less than the duration between the same test.

RDSO and CLW approves vendors based on some parameters and the most trustful vendor or vendor with highest grade supplies maximum quantity of material to Railway / loco shed. Also vendors' performance is appraised frequently. But in spite of this, each material supplied by vendor is tested in the laboratory of the loco to ensure the quality. Tests are performed on each material and each material needs to clear the test based on some test parameters. For eg. 1) Check of hardness for specialized pin. 2) Carbon content level in washers (shall be less than 2 %). System shall support entry of material name, its various test parameters, and calculate results based on test etc, so as to allow loco shed to approve or reject material / vendor.

RFP Item #	Description

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1	System shall prompt the user on any equipment due for maintenance. For example let us assume that the engine comes for IA today and shall come for AOH after 4 months of IA and the same is scheduled in each overhaul, then the system shall prompt the user on arrival of loco for AOH that a test which had been done in IA need not be done in AOH. Also system shall facilitate feeding of information about test results in various forms.
2	System shall include the equipments details in the JC which are due for lab test.

Item #	Description
3	System shall provide option for view and print JC applicable for Laboratory.
4	System shall support entry in JC for work done and results of tests corresponding to job assigned in JC for both scheduled and unscheduled maintenance
5	System shall support maintenance of data history corresponding to the each test performed and their results on various equipments of loco for both scheduled and unscheduled maintenance.
6	System shall support entry of material name, its various test parameters, and calculate results based on test so as to allow loco shed to approve or reject material

4.1.6 Machine & Plants OR Tools and Plants Module:

This department maintains machinery and plant used to do repair and perform overhauls of the loco. Machine & Plants / Tools and Plants needs to be maintained by loco shed for better performance.

Item #	Description

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1	System shall allow feeding of various details of various Machine & Plants / Tools and Plants & its various parts (if any), their scheduled overhaul details in a checklist during overhaul, current status of overhaul, past and current defect & its repair details.
2	System shall maintain details of each Machine & Plants like Description, Expiry Dates, etc.
3	System shall generate alert for the overdue of must change items in the machines and safety equipments.
4	System shall facilitate feeding of spare / material details required by this section, their threshold level and also system shall prompt user when material / spare falls below threshold level.
5	System shall generate a report carrying various details on the current status of Machine & Plants & its various parts.
6	System shall prompt user about the scrap date of various Machine & Plants, calculate the life time of Machine & Plants and also Tools & Plants
7	System shall generate report for oil consumption of various Machine & Plants and also their up and down time in a particular period of time.
8	System shall maintain the history (Break down defects)
9	System shall maintain the details about the material i.e., spare parts etc.

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4.1.7 Stores Module

Stock items are items of daily consumption and needs to be stored in large quantities. Vice versa is the definition of non-stock items. The proposal generated to convert non-stock items to stock items is known as stocking proposals.

The following are the functional requirements:

Item #	Description
1	System shall facilitate feeding of spare / material details required by various departments and their threshold level.
2	System shall prompt user when material / spare falls below threshold level.
3	System shall generate report on the availability of various materials / spares in each department, custody store, and store depot of loco shed for a particular instance of time.
4	System shall generate report on consumption pattern of various spares / equipments/ material and also estimate annual consumption of various spares / equipments/ material in a loco shed.
5	System shall facilitate generation of indents and tracking its status.
6	System shall facilitate tracking of purchase order status placed by Railway to various vendors.
7	System shall generate report on the out-flown and in-flown spares / equipments/ material of various section, custody store, and store depot.
8	System shall facilitate generation of stocking proposals.
9	Imprest (Like Petty Cash) is the fund given to any department for carrying out daily expenditure. Credit and debit of this need to be automated in DSS. (Date wise)
10	In stores perspective, in every budget railway allocates some fund for purchase of various spares / equipments/ material. This is known as sanctioned works. System shall facilitate entry of details of sanctioned works and tracking their status
11	Vendor performance – Equipment, make, type, Supplier, fitment/failure date etc.
12	Scrap – Generation & disposal – Quantity & dates.

4.2 Trip shed module

Trip shed (TS)/ Out pit deals with trip inspection (TI) and visual inspection (VI) of loco and it is done for preventive maintenance of loco. TS is headed by Sr. DEE (Traction Operation / TRO). TI is of 2-3 hours duration. Both TI (Trip Inspection) and VI (Visual Inspection) are performed after specified interval. Whenever loco arrives to TS after the journey, the reading of kM earned by the loco is taken and if it has traveled the specified distance, then TI is planned and done. Other wise only VI is planned and executed.

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After TI / VI / required maintenance (found in log book or during VI) is performed, loco is linked to train number (as per time table issued by zonal HQ) by maintenance department of TS. In case of exigencies when loco shall not be linked to train on time, then TS in coordination with TLC (which is located in TS and headed by Sr. DEE ((TRO / RSO) means traction operation)) arranges for another engine.

In joint check, one representative from operation side (shall be driver, TLC etc), one representative from maintenance side and one neutral person (shall be train examiner) jointly checks the engine and submits a report on the cause of failure of engine. In the event of an equipment failure (which is manufactured by an OEM), one representative from OEM, one representative from railways jointly checks the equipment and submits the joint report. This joint check is performed so as avoid clash between various parties (drivers, maintenance staff) because each one of them shall claim that loco / equipment has become faulty due to other party. System shall facilitate entry of details of joint report. It needs to be maintained in the database.

The following are the functional requirements:

Item #	Description
1	System shall prompt the TS for the overdue of TI and VI.
2	System shall facilitate feeding of log book defects, defects found during the trip inspection (TI) and the action taken / work done on the defects.
3	System shall facilitate entry of result for parameters in the check sheet of TI and also the work done for each parameter. System shall give flexibility to users for customizing check list format of TI.
4	System shall track the status details such as work done in TI, health of loco, deficiencies in loco etc. when it arrives to and when leaves trip shed.
5	System shall support integration of reader with the system so as to upload the readings in the system. For conventional locos, system shall facilitate feeding of speedometer reading, when loco arrived at TS.
6	At the trip shed, inspection is done by a group of people on the loco, in the event of loco failure or equipment failure then a group of people from different departments shall go there and resolve the defect and a joint report is submitted by them to TS. System shall facilitate to enter the details of joint report.
7	Special drives mean instructions circulated by RDSO, Railway board, or Divisional HQ / TLC to do some special checks, maintenance etc for safety and increasing reliability of all locos (for e.g. to check for the proper functioning of sander). In response to that every trip shed does the required work. System shall facilitate entry and tracking of details of special drives.
8	System shall facilitate feeding of healthy material / T & P details required by trip shed, their threshold level and also system shall prompt user when healthy material / T & P falls below threshold level.

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4.3 Lobby module:

Lobby is the place from where a driver is booked on to a loco or driver signs on to take the charge to drive a loco from one point to another. Also it is the place where driver signs out or is relieved from the duty. Lobby is headed by Chief crew controller (CCC) / Traction Foremen (TFR) and Crew controller (CC) / Assistant traction foreman (ATFR) is the person junior to CCC.

At lobby, driver communicates defects in signal, track and over head equipment (if any) and enters them in the driver observation register. This information is communicated to TLC for rectifications. Also driver feeds the reading of energy meter (energy consumed by the engine) and distance travelled, in the register.

Item #	Description
1	System shall facilitate feeding above mentioned information in the system.
2	There shall be automatic flow of information between lobby and other sub systems within the DSS.
3	When loco commute from one destination to another he/driver comes across many lobbies, so there are possibilities that he/driver communicates same defect to many lobbies. System shall be intelligent enough to avoid multiple entries of defects.

4.4 Divisional HQ / TLC Module

TLC is responsible for arranging locos for running the trains as per requirements of operating department. TLC also arranges with drawl of locomotive from service and sends them to base maintenance sheds/ trip sheds for various preventive maintenance schedules. TLC acts as a interface between maintenance sheds and operating department.

During journey on the railway track if driver encounters any problem / defect in the loco, then he communicates it to TLC (traction loco controller headed by Sr. DEE, TRO, who resides at Divisional HQ) of the division in which he is travelling, through wireless phone. TLC assists driver in solving problem. In case loco encounters some problem that shall't be rectified by the driver then loco is brought to the trip shed / loco shed and problem / defect is communicated by TLC to trip shed if minor/ loco shed if major (shall be mother or foreign loco shed, depending on where loco is travelling). If loco is brought to foreign loco shed and problem shall't be rectified due to unavailability of spare equipment / part, then TLC of that division communicates the problem to its Sr. DEE (TRO) at Divisional HQ (operations), who further communicates with Sr. DEE, Traction Rolling Stock / TRS (Sr. DEE, TRS is in charge of loco shed) at Divisional HQ maintenance of the mother loco shed. Mother loco shed either sends the required equipment to foreign loco shed or request foreign loco shed to send the loco to it or devise any other feasible solution.

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In case there is a breakdown of the loco and loco shall't move any further, then TLC immediately arranges for another loco from TS or sends maintenance staff on the field where a loco has halted and conveys the same to the mother shed in the same way as mentioned above.

Item #	Description
1	System shall facilitate feeding of all information related to loco failure / breakdown during journey and also shall automate the flow of information between departments
2	System shall facilitate tracking of locos due / overdue for the scheduled maintenance during a particular period of time, based on information feed from loco shed module.
3	System shall facilitate feeding of all information related to special check. Sr. DEE circulates special checking instructions in coordination with RDSO, and Railway board and communicates it to TLC which further passes them to loco shed and trip shed. Loco shed and trip shed performs necessary actions to execute these orders.
4	System shall track the status and also automate the flow of information between establishments.
5	System shall provide option for entering MS and SMI details. MS (issued by Railway Board, RDSO, HQ, and Divisional HQ and also by loco shed) is modification sheet which contains certain instructions to do modifications in the design of loco or its equipments, and SMI (issued by Railway Board, RDSO, HQ and Divisional HQ). is special maintenance instruction which carries instructions to do some specific maintenance which is generally not carried out in scheduled overhauls. MS and System shall facilitate feeding of MS and SMI and also track the status of implementation on locos.

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4.5 Work shop Module

Workshop is the maintenance establishment of Indian Railway where Periodic Overhaul (POH) and repair / overhaul of various equipments of loco is carried out.

Item #	Description
1	System shall facilitate feeding of POH details like Performa of POH, time duration of POH, Status, POH planning for the year etc.
2	Based on the loco data entered in loco shed module and in the above, system shall generate a report carrying loco details which are due / over due for maintenance.
3	System shall track the status of equipment under overhaul / repair and data/ record of major equipments.
4	Some parts / equipments are send by loco shed to workshop for repairs and a target is given, as to when repair shall be completed on certain number of equipments. System shall provide an interface to maintain these details.
5	System shall prompt concerned user on due dates of various parts / equipments that are to be delivered to locos.
6	System shall allow user of loco shed, Railway HQ, Railway Board, and work shop to track the status of equipment overhaul / repair.
7	System shall facilitate feeding of material details required by work shop, their threshold level.
8	System shall prompt user when material falls below threshold level.
10	System shall facilitate feeding of all outturn details of locos. Out turn means number of locos overhauled / repaired in a particular period of time. Outturn details are details of loco when it leaves work shop after maintenance such as entry and exit date of loco in the shed, defects found in the loco, any special maintenance done on the loco, and deficiencies with which loco moves out of work shop.
11	Position of non availability of must change items shall be available on system.

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4.6 Headquarter module

This establishment of Indian Railway monitors functioning of various maintenance and operation establishments based on the information fed by them. The following are information that this establishment shall sought.

Monitoring of shed and workshop performance: Performance of loco shed is measured on down time of loco in the shed, failure of loco after coming out of loco shed or trip shed i.e., frequency of loco failure, failure rate percentage per year (FRPCPY) (equal to ((number of locos failed per year) / (holding of locos in a loco shed)) X 100), mean time between failure (MTBF), reliability and availability of loco motives, cost of maintenance of loco and engine failures.

Workshop performance is measured on quality of work being done in POH, reliability of loco after POH, manpower and material planning, time management in executing POH, cost incurred in POH (one railway (say northern railway) charges another railway (southern railway) for performing POH on its loco motive), down time of loco, outturn performance (targets achieved in terms of loco overhauled in a particular period of time), and failure within first 100 days of overhaul.

In every budget railway allocates some fund for works such as extension of a loco shed, construction / augmentation of trip loco shed, loco shed, purchase of various spares / equipments/ material etc. This is known as sanctioned works. System shall facilitate feeding of this information and also tracking the status of the same.

Item #	Description
1	System shall generate report carrying all the above performance parameters for shed and workshop.
2	System shall provide option for entering MS and SMI details MS (Modification sheet contains certain instructions to do modification in the design of loco or its equipments), SMI (special maintenance instruction means instructions to do some specific maintenance which is generally not carried out in scheduled overhauls), and RAP (reliability action plan) are issued by RDSO, HQ and Divisional HQ to loco shed and trip loco shed to perform some special jobs on the loco. System shall track the implementation of all the above instructions.

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Item #	Description
3	System shall generate report on Daily outage (Number of locos on track from a particular loco shed / work shed) of various loco sheds / work shop / division / zone at a particular instance of time.
4	System shall track dead loco (When loco shall not move even by isolating the defect, then it is referred to as dead loco) movement of various loco shed / division / zone.
5	System shall track the status of locos under scheduled / unscheduled maintenance of various loco shed / work shop / division / zone.
6	System shall facilitate tracking availability of material / spares at various loco sheds / work shops and let user of HQ know when material falls below threshold level.
7	System shall facilitate feeding of sanctioned work information and also tracking the status of the same.
8	System shall allow feeding details of employees who undergo training in various training schools of Railway. This information shall also be accompanied by the training plans / training details of employees. System shall also allow feeding feedback by employees on training / by trainer / boss on employees during training / after training (feedback on performance at job place). System shall facilitate feeding of these details at only divisional HQ, shed and HQ.
9	System shall allow uploading of scanned copies of policies / instructions
10	System shall provide option for entering MS and SMI details

4.7 RDSO Module

RDSO (Research Design & Standards Organization) is a technical wing / department of railway that monitors performance of loco shed / trip shed, issue Modification sheet (MS) / Special Maintenance Instruction (SMI) / technical circular for loco motive and its equipments. It also issues guidelines for the infrastructure to be installed at loco shed. RDSO issues various specifications about locomotive and its equipments and ensure standardisation. It also develops vendor for certain items of locomotive / EMU and monitors their field performance and issues vendor directory at periodic interval.

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Item #	Description
1	System shall allow uploading of various circulars such as specifications, Special Maintenance Instruction, Modification sheet and Technical circular in to the system.
2	There shall be a facility to track the status of work done in accordance to these circulars at various maintenance establishments.
3	RDSO shall have the facility to restrict the distribution of circulars to various maintenance establishments.
4	System shall perform trend analysis on loco failures, class wise as well as shed wise.
5	System shall provide a facility of drilling down so as to know the exact cause of loco failure.
6	RDSO approves vendors for purchasing technical items based on some criteria and also assign grades depending on the quality of material supplied in the past. In system this list and other information related to vendor shall get updated by RDSO and shall be viewable by concerned departments / establishments only.
7	In every 6 months performance of vendors is reviewed. System shall track the performance of vendors based on data of period evaluation.
8	Vendor with highest grade gets the highest percentage of order and vice versa is true for vendors with lower grade. New class of equipment / spare purchased by either higher / lower grade vendor is kept under observation / trial. System shall facilitate entering of this information and also tracking the same.
9	System shall track the performance of the equipments that are maintained in the loco sheds and trip sheds that is on trail as well as in other cases also.
10	System shall provide option for entering MS and SMI details

4.8 Chittaranjan Locomotive Works (CLW) Module

For manufacturing loco, a committee comprising of CLW and Railway board shortlist vendors based on some criteria and also assign grades to them depending on the quality of material supplied by them and performance of vendor. The approved list of vendors shall be referred by any establishment of railway. Vendor with highest grade is preferred the most and gets the highest percentage of order. In every 6 months performance of vendors is reviewed. In DSS only CLW shall have the rights to update the list of vendors and other related information. For rest of the departments this list shall only be for viewing.

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Item #	Description
1	In this system, CLW shall have the rights to update the list of vendors and other related information. For rest of the departments, System shall restrict this list only be for viewing.
2	System shall track the performance of vendors based on data of period evaluation.
3	Based on the requirement of Indian Railway, CLW prepares a plan for the production of various class and type of locos. Also for achieving the production target material planning is done. For e.g. To manufacture 'n' number of locos of various types and class, various equipments / spares in 'x' quantity needs to be either procured by vendors or manufactured in house. System shall facilitate feeding of these data and shall restrict the viewing to concerned departments only.
4	System shall facilitate calculation of production cost of loco, taking in consideration the cost of equipment or spare purchased / manufactured, man power, other supporting infrastructure and miscellaneous expenses.
5	RDSO issues circulars for modifications to be done on locos and date from which they come in to effect is known as cut in date. System shall facilitate CLW to update the implementation status in the system.
6	Vendor performance shall be measured based on some parameters i.e., lifetime of a material / spares or equipments that are bought from a vendor etc.
7	Facility to upload / publish various policy instructions in the system.
8	System shall provide an interface to monitor Various activities that are carried in the Loco shed.
9	Unit exchange spares – pending indents consignee-wise, indents supplied, availability, supply date etc. shall be available on system

4.9 Railway Board Module:

This establishment of Indian Railway also monitors functioning of various maintenance, production and operation establishments based on the information fed by them. The following are information that this establishment shall sought

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Item #	Description
	System shall support uploading of scanned documents of policies and shall only viewable to the concerned departments.
2	System shall track the performance details of Sheds/Workshops/Railways and CLW based on the data fed in other modules.
3	System shall perform trend analysis on loco / equipment failures, class wise as well as shed wise. There shall be a facility of drilling down so as to know the exact cause of loco / equipment failure.
4	System shall track the implementation of MS / SMI / RAP circulars.
5	System shall generate report on Daily outage (Number of locos on track for a particular loco shed / workshop) if various loco sheds / workshop / division / zone at a particular instance of time.
6	System shall provide facilities for tracking maintain & viewing of dead loco movement of various loco sheds / division / zone.
7	System shall provide facilities for tracking maintain & viewing the status of locos under scheduled / unscheduled maintenance of various loco shed / workshop / division / zone
8	System shall facilitate tracking availability of material / spares at various loco sheds / work shops and let Railway Board know when material falls below threshold level.
9	System shall facilitate feeding of details of sanctioned works and also tracking the status of the same.
10	System shall also allow tracking of training details of officers and supervisors.
11	Performance of CLW is measures on 'Zero defect rate achievement' and also on effective and timely implementation of instructions issued by concerned department / establishment and production plan. This information need to be tracked by system for Railway Board consumption.
12	Availability of the material shall be able to monitor.
13	System shall facilitate user to enter and maintain time table used for linking train numbers to locos and for various inspections.
14	System shall provide options for Future Loco Planning. Planning for loco requirement for any further electrification planned by Railway Board.

4.10 Reports Module

System shall have the facility to generate flexi bilingual reports (report wizard), so as to generate reports for any combinations of fields / parameters relevant to that particular establishment and that too sorted by fields / parameters wise. Reports shall be in both graphic and data form. In addition to this system shall perform trend analysis.

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To give brief idea on the reports generated at various establishments of IR, the following are the few reports:

Item #	Description
1	Monthly reports of locos which have undergone scheduled and unscheduled maintenance carrying details of the defects and type of maintenance.
2	Monthly reports showing outage of locos (online locos) in percentage terms and also statistcal (24 hrs +) and minor (less than 24 hrs) defect locos in the loco shed in %.
3	Monthly report for delay by number of hours due to a particular equipment of a loco.
4	Monthly report for 3 phase locos for the availability of loco online and under maintenance at shed.
5	When loco number is fed system shall be able to display the details of equipment selected based on various parameters.
6	History of each and every equipment at most up to 5^{th} level (parts, sub-parts and so on) of equipment.
7	Reports illustrating equipment / parts / sub-parts replacement based on life.
8	Monthly report for the failure of bogies/ any part for certain duration of time.
9	Over due and planning report for the test to be performed in the laboratory.
10	List of locos, which are needed to give Priority attention having some previous trouble.
11	Training of staff
12	Stock items causing anxiety
13	Non Stock items causing anxiety
14	Material Drawl Position
15	Sanctioned and in progress works
16	Progress of M&P
17	Critical M&P under repair & status of M&P
18	Must change items not changed during AOH/IOH
19	Scrap disposal
20	Cause wise equipment failure analysis
21	Status of Bogie Stress points
22	Pending warranty failures.
23	Pending warranty failures of equipments in works contract

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24	Unscheduled visit & lifting of locomotives
25	Position of Capital and Unit exchange spares
26	Contracts in progress
27	RAP in progress of incomplete items
28	CELE monitored items of incomplete items
29	Progress of Local RAP of incomplete items
30	Summer/Winter/Monsoon precautions
31	Expenditure VS spending limit
32	Inspections carried by officers
33	Inspections carried by supervisors
34	**Wheel wear analysis of locos: Due to wear and tear the curve of the wheel at the joint of flange and route of the wheel goes out of proper curvature. This is tire turned to bring it back to normal shape. Due to this the dimension of the flange and dia got reduced. There is some range in which the diameter and flange of the wheel shall be maintained. Each time when the loco arrives at the shed these dimensions are measured and fed in to the MIS. The following is the report to be generated:** Dia and flange loss for different locos per month, which in turn shall be able to calculate the life of the wheel.
35	Bifurcation of reported wheel skidding cases of locomotives
36	Status of wheel disc diameter
37	Failure of TMW repaired items
38	Filling of Vacancies in Safety Category Staff
39	Staff strength & pending indents & progress of selection
40	Status of Developmental / trial items
41	Cumulative performance of new auxiliary machine
42	Cumulative performance of rewound auxiliary machine
43	Performance of single bottle Vacuum Circuit Breaker (VCB)
44	Performance of double bottle VCB
45	Performance of Tap Changer / SMGR
46	Cumulative performance of Relay
47	Performance of safety equipments on line
48	Cumulative DBR performance
49	Reliability Action Plan for AC locomotive
50	Progress of Local RAP
51	POH defects within one year
52	POH defects within one year

This list is not exhaustive and shall be finalized during SRS preparation. All the reports shall be importable in MS Excel/Access.

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4.11 SMS Module:

i) ON Line Failure reproting through SMS

ii) Group SMS

I. Manual Typed message issue

II. Automated Alerts for numerical value going down or up a standard value. (Number of Loco under maintenance Exceeded in the Shed beyond it capabilities)

III. Automated Alert for to be issued every day at 08:00 AM (Morning Position)

IV. Automated Alert for dates exceeding defined date / Time. (Locos Overdue in shed)

4.12 HELP Module:

i) The help menu shall be developed using a standard tools for development. The license of one such tool shall be included in the cost of this item of work.

ii) The help menu development tool shall have facility for providing items like content, index, search and tip of the day. The tool shall also have facility for using images and flash objects.

5. Software Design and development

a. Design of the software

The tenderer shall understand the basics functional requirement of the DSS software by visiting at lease 10 different locations spread over the Indian Railways. He shall study the detailed flow at these locations and produce following design ;_

a) Functional / Software requirement specification

b) Detailed design document

c) Deployment architecture

d) Sizing parameters perceived

e) Infrastructure Plan for the proposed solution

f) Future Plans of expansion of the software

The design documents (high level as well as low level), Flow diagrams, Use cases, Data flow diagram, UML diagrams shall all be made in consultation with software development team and standard templates to be followed shall be got approved by IR before start of the detailed designs.

On completion of all the design documents the Tenderer shall submit the draft for approval and do a workshop of considerable length to conclude the designs and get it approved by IR's software development team.

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b. Development of the software

The development of the software shall follow industrial standard coding procedures. The application shall be developed using Rapid Application Development tools to increase the quality of output. All convention of coding and quality control shall be documented and approved by IR before start of the coding. The tenderer shall provide IR with the industry standard benchmarks and best practices in enterprise technology architecture and identify opportunities for adoption within DSS project of IR. The Tenderer shall offer way and means to monitor on line progress for software development. IR shall depute its Software development team to give useful information from time to timer. All the codes produced shall be well commented and description of functions, Variable shall be clearly expressed in the code.

The solutions proposed shall be vendor independent and shall be proposed on J2EE programming platform. All the work related to database bulk input of the database particularly in the master tables shall fall within the scope of work. Where such entry is to be made the same shall be entered by a data entry operator who shall be provided by the tenderer within the scope of work of the contract.

c. Software Reviews and Quality control

This shall include complete review/assessment of Enterprise Technology Architecture (EA), which shall include all the components viz.

- system design review,
- database architecture review,
- hardware infrastructure review,
- networking infrastructure review,
- application code review
- documentation review

While conducting the review matters like required network bandwidth, network link and future expansion to all India level shall be borne in mind.

Based on the technology landscape assessment and the functional requirements gathered, and the reviews of IR the tenderer shall take corrective action in achieving the scalability and performance. The key areas which shall be deliberated are:-

a) Complete review of the documents .

b) Recording the observations

c) Analysis and Reporting of the Consultancy Review observations

d) Review that all assumptions & dependencies with respect to DSS application are properly documented

e) Flaws if any in the application, database designs of the DSS application and the proposed changes / solution architecture along with reasons for the change.

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f) Scalability of the application software to meet the future requirements from DSS application

g) The expected performance of the DSS application on the hardware platform chosen

h) Comments on the changes recommended if any along with techno-financial reasons for changes / up gradation.

6. Testing Of DSS software

All the testing shall follow a proper documented procedure. The tender shall be required to submit Test Plans for each testing, all activities related to preparation of a test case and developing a test case to suit the requirement of testing shall fall within the scope of testing.

a. Unit level Testing

The tender shall be required to complete all unit level testing before offering the software for testing. The testing shall be done by the software development team module wise. Module wise testing shall involve testing by software development team for the testing and clearance module by module the software. This testing shall be done in a lab environment only.

b. Integration testing

The integration testing shall be completed at the tenderer works by the software development team. This shall be a lab level testing. On certification by the team the software shall be rolled out for the pilot phase. The application shall be tested on a central server with minimum hardware and software (middleware) installed on the central server. Once the application is accepted by the user for the pilot phase. The Application shall be subjected to Performance testing as below. However during the Integration testing phase performance testing at a lower number of nodes of around 100 nodes shall be completed before taking the application for a full-fledged Performance testing.

c. User Acceptance tests

The application shall be subjected to user acceptance tests. The software development team of Indian Railways shall be called at the tenderer premises to test the application extensively. On the basis of the field testing on a pilot phase and user Acceptance test results and acceptance by the user the DSS application shall be accepted for taking into the rollout phase.

d. Performance testing

On acceptance of the DSS application , the performance and scalability testing of the application shall be carried out.

The scope of work shall involve performance and integration testing of the fully developed DSS software once the components procured from the external vendors are integrated with the DSS. All temporary user licenses for load testing, Lab testing facility, hardware, networking equipment and testing / measuring equipment facility shall fall

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within the scope of the tenderer. The Purchaser shall only supervise the test to his satisfaction.

i. Performance Testing of DSS application

The scope of work shall involve doing a performance testing of the DSS application being developed to 1100 or so nodes. The DSS application shall be lab tested at a standard testing lab as mutually agreed between the Tenderer and the Purchaser for the purpose of Performance Characterization of the DSS application. Lab shall comply with, ISO 9001 : 2000. Lab shall have its own test tools to conduct the performance test and shall be able to replicate the production servers and data. The lab shall have test tools for performance test which shall be able to produce a load on the application and able to accurately report transaction rates and report times. The lab test environment shall accurately represent the production environment.

The measurement shall be done in real time load on the application. This workload must be represented in terms of transaction; metrics data for performance characterization must be identified like

- Number of clients
- Reporting data
- Business transactions
- MIS information – representation
- Key performance parameters for online transactions as defined the scope section below

After the metrics have been identified the test environment must be configured with a suitable load generator tool. The testing tool used shall be as mutually agreed between the Tenderer and the Purchaser however the particulars of the same shall be indicated while quoting for the tender. Appropriate scripts representing the identified workload shall be developed by the tenderer. A review of the scripts to verify the workload shall be conducted by the Purchaser. Then the load generator along with the scripts shall be used to load the DSS and the system performance shall be measured using suitable monitoring tools. Analysis of the characterization shall be carried out. It is envisioned that 3-tier, 2-tier and single tier performance characterization shall be conducted.

The applications shall be reviewed and reported on the process of performance characterization of application against the following key performance parameters as follows:-

- Number of concurrent transactions possible at any time during the day
- Number of concurrent transactions possible at the peak time
- Number of transaction processes per second (TPS)
- Average processing time per transaction
- Average response of top (number to be defined later) critical business processes

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- Resource Utilization (CPU and Memory Utilization)
- Resource Utilization (CPU and Memory Utilization) – during peak time
- Average response times using different network speeds
- To certify the performance characterization results for application for specified hardware and architecture and transaction mix

ii. Methodology of the testing

The tenderer shall provide load testing consultant, application consultant and adequate software engineers to complete the activity within 3 weeks. This activity shall be performed in a solution center as mutually agreed between the Tenderer and the Purchaser. The appropriate test processes have to be created for day to day activities and the test Methodology used for verification shall based on the standard performance test methods. Application has to meet the entrance criteria and upon completion of the performance test, meets the exit criteria.

The scope of work shall include arranging all hardware and software licenses required for the testing of the DSS application.

Workload or Transaction Mix

Various metrics is to be measured in a business transaction that is simulated in the testing tool. The workload is a mix of update/modify (non-query) and query (read) transaction. For non-query transactions the values for the fields shall be taken for a database recorded earlier. All the transactions must be processed full to qualify as complete business transactions. Each business transaction shall have multiple simple transactions.

The defined workload which represents a business workload shall run for 30 minutes (1800 seconds). This is defined as the performance characterization run time and is considered for all calculations. The total number of business transaction processes between 0 seconds and 30 seconds shall be considered for calculations.

The following depicts the details of some of the tests that shall be required to be performed:-

i. Transaction Per Second (TPS)

Transaction per Second shall be calculated by dividing the total number of transaction by the run time (1800 seconds). The number of business transaction (both inquiry and non inquiry) for 30 minutes must be decided before the load run. Thus the total number of business transactions converted to transactions - by multiplying the respective business transaction with the number of transaction its represents.

ii. Weighted Average Response Time

The Load generator shall record the average response time for each business transaction. These average response time for each type of transaction shall be used to calculate weighted response time for the workload

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Weight Average response time = ∑ (Average Transaction processing time for a particular type * Number of transaction of that type)/Total number of transactions

This shall be done for the peak load and average load.

iii. *CPU Utilization*

CPU Utilization for each server shall be obtained from system monitoring tool in 5 minute intervals, and an average CPU utilization shall be calculated for the load run.

Average CPU Utilization = ∑ (average CPU utilization per server * number of processors for that server) / ∑ (number of processor per server)

This shall be done for the peak load and average load.

iv. *Memory Utilization*

Memory Utilization for each server shall be obtained for a system monitoring tool in 5 minute intervals and an average of memory utilization shall be calculated for the load run.

∑ (average memory utilization per server * Memory for that server) ∑ (Memory of Individual servers)

This shall be done for the peak load and average load.

v. *Load Test 1*

The load test with the defined workload shall be carried for three tier architecture with Database, application and web server tiers. The load generator shall be from 4 client's machines. Appropriate systems monitoring tools from the individual tiers shall report the CPU and memory utilization. The load generator shall report the TPS and from which average processing time per transaction shall be derived.

vi. *Load test 2*

The load test with the defined workload shall be carried for two tier architecture with Database tier 1 as one system, application and web server tier 2 as second system. The load generator shall be from 4 client's machines. Appropriate systems monitoring tools from the individual tiers shall report the CPU and memory utilization. The load generator shall report the TPS and from which average processing time per transaction shall be derived.

vii. *Load test 3*

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The load test with the defined workload shall be carried for single tier architecture with Database, application and web server in single 4 CPU systems. The load generator shall be from 4 client's machines. Appropriate systems monitoring tools from the individual tiers shall report the CPU and memory utilization. The load generator shall report the TPS and from which average processing time per transaction shall be derived.

7. Software support after DSS software acceptance

For all software requirement beyond the acceptance of the software they shall be classified as a bug or an enhancement request jointly by the Purchaser and the tender. Errors, abnormal values, Left out validation errors shall al fall under the bug fixing support. Bug fixing support shall be provided by the tenderer for a period of 36 months from the date of acceptance of the software.. Bug fixing supports shall normally not be paid addition to the tenderer.

All enhancement requests shall be jointly decided between the tenderer and the Purchaser for execution within the scope of the tender or not. All such enhancement request identified by the tender shall be approved before incorporating in the software up gradations. All such upgrades shall be release once in three months after extensive testing and acceptance of the changed software.

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Section

5

DSS For Electric Locomotive Asset Management

Warranty, AMC, Training etc

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1. Warranty

For all the hardware components, network equipments & software the warranty shall be three years including onsite support and AMC.

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The scope of work shall include rectification and replacement of the failed components within 24 Hrs of reporting of failure by the user. All such issues related to network disconnections of patch cord, power supply disconnections from supply for which the tenderer has done the integration shall fall within the scope of the work. There shall be no separate rates for this item however the release of the Security Deposit amount shall only be accomplished only on satisfactory completion of the warranty clause. The warranty of the system shall be considerer to have been started only on issue of a commissioning certificate.
The Tenderer shall be required to attend within 24 Hrs of lodging the complaint. In case of delays the penalty shall be levied at the rate of Rs 1000/- per day or part there off for each failed equipment. If any of the parts are not available tenderer shall inform Indian Railways in writing to avoid penalty being imposed and the defective part shall be replaced within 3 working days (this shall not be applicable for readily available hardware in the market).
In case of abnormal delays in attending to the warranty support the Purchaser shall be at liberty to carry out the rectification and debit the cost of the rectification to the tenderer as per the standard norms of working out cost of rectification by IR.

The Tenderer shall be required to visit the all field locations once a month to carry out routine monthly maintenance required for satisfactory operation of the equipments installed by the tenderer. Prior information of the visit shall be advised to the site in charge, and a monthly maintenance certificate shall be taken from the site in charge. Three monthly positions for compliance for each site shall be given to IR.

2. Central Server Management and Maintenance

The tenderer shall quote for maintenance and management of the central server system for a period of ten years from the date of commissioning of the central server. The server shall be manned for 7 x 24 Hrs from the date of advice by the Purchaser. The tenderer shall be required to do database administration, server maintenance and management functions effectively, backup of database. Management of software bugs, hardware failures and replacement has to be promptly attended to. Apart from this the tender shall provide assistance to site support over telephone, addressing the issues related to site coordination liaison with network group of IR. The tenderer shall employee staff of with 5 years experience in software and minimum 2 years experience in maintaining similar central serves. The Bio-Data of the staff that shall be deployed shall be submitted while quoting for the tender. All the staff shall be screened and approved by IR before being used for central server administration. The payment shall be released on monthly basis. Normally such staff shall be required from the date the 1st location of the pilot phase is commissioned. During the pilot phase one person may be sufficient however once the rollout phase is commissioned 2 staff shall be needed for maintenance.

Any unplanned server interruption of > 5 minutes shall have penal implications at the rate of 1000 Rs per minute of central server interruption. (example an interruption of 22 minutes shall have penalty of 22 – 5 = 17 minute x 1000 = 17000 Rs)

3. Training Support

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The successful tenderer shall be required to give a training support to the IR software development team, core implementers, and the railway staff at each field locations.

a. Training of CORE implementers

Railways shall identify CORE implementers which shall be 1 per location for where the client locations are less then 5 and 2 per locations where the client location is 5. Once the Product has been accepted by the Purchaser the tenderer shall give two weeks training to the CORE implementers at IRIEEN Nasik. This shall cover detailed functionality, SRS, design of the software performance of the software issues.

During the training the tenderer shall make available training material like Hardcopy and softcopy of the manual, CD containing media files for making the trainees conversant in use of the software, paper, pen folders, training schedule. All such training shall be done using a Power Point presentation and a projector. For hands on a setup of 25 PC's shall be made available by the tenderer temporally till the testing / training exercise has been accomplished.

b. Training support for Site Locations

The successful tenderer shall give a minimum training support of 10 calendar days for each Electric loco shed and 05 calendar days for other locations. In this training the tenderer shall expose around 15 – 20 trainees at each Electric Loco shed and 5 - 10 trainees at other locations. During this training the tenderer shall expose the trainee to, the network component and architecture, details of the hardware at locations, software configuration, configuring the clients, Operation and working of the DSS software. The training shall be on the job training and shall be exposure to the working knowledge of the DSS system (hardware + software). On completion of the training the Tenderer shall take a satisfactory training completion certificate from each location. Based on which the payments of the training shall be released to the tenderer. The list of locations are as in section 6 of the tender.

During the training the tenderer shall make available training material like Hardcopy and softcopy of the manual, CD containing media files for making the trainees conversant in use of the software, paper, pen folders, training schedule. All such training shall be done using a Power Point presentation and a projector. For hands on the actual material available at site shall be used and live data entry shall be done.

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4. Annual Maintenance

The tenderer while quoting in for the tender shall quote for 3 year (warranty period) AMC support of equipment supplied by him.

The AMC shall cover all the hardware components, network equipments, antivirus & software supplied by the tenderer. The scope of work shall include rectification and replacement of the failed components within 24 Hrs of reporting of failure by the user. All such issues related to network disconnections of patch cord, power supply disconnections from supply for which the tenderer has done the integration shall fall within the scope of the work. The rates of these items shall be on monthly basis. The tenderer shall be required to submit a Bank guarantee of 20 % of the contract value for the period of the AMC to cover the AMC. Release of this B.G. shall be done after a satisfactory completion certificate has been issued by the tenderer.

The tenderer shall quote additional comprehensive AMC for all hardware components, network equipments, antivirus and software supplied for further 2 years as per requirements stated above.

The Tenderer shall be required to attend within 24 Hrs of lodging the complaint. In case of delays the penalty shall be levied at the rate of Rs 1000/- per day or part there off for each failed equipment.

In case of abnormal delays in attending to the AMC support the Purchaser shall be at liberty to carry out the rectification and debit the cost of the rectification to the tenderer as per the standard norms of working out cost of rectification by IR.

The Tenderer shall be required to visit all the field locations once a month to carry out routine monthly maintenance required for satisfactory operation of the equipments installed by the tenderer. Prior information of the visit shall be advised to the site in charge, and a monthly maintenance certificate shall be taken from the site in charge. Three monthly positions for compliance for each site shall be given to IR.

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Section

6

DSS For Electric Locomotive Asset Management

Annexure, Forms & Format of the Tender

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1. List of Locations for Trip Sheds and Lobbies

Trip Sheds

Number of Nodes at each location = 1

S.No	Trip shed Location	Divisional HQ	Zonal HQ
1.	Bhusaval	Bhusaval	Central
2.	Igatpuri	Bhusaval	Central
3.	Ajni	Nagpur	Central
4.	Mumbai Kalyan (DC)	Mumbai CST (DC)	Central
5.	Vidya Vihar (DC)	Mumbai CST (DC)	Central
6.	Mumbai CST (DC)	Mumbai CST (DC)	Central
7.	Lonawala (DC)	Mumbai CST (DC)	Central
8.	Pune Pune (DC)	Mumbai CST (DC)	Central
9.	Bamangachi	Howrah	Eastern
10.	Narkeldanga	Sealdah	Eastern
11.	Andal	Asansol	Eastern
12.	Mughalsarai	Mughalsarai	Eastern Central
13.	Gujandhi	Dhanbad	Eastern Central
14.	Gomoh	Dhanbad	Eastern Central
15.	Khurda Road	Puri	Eastern Cost
16.	Waltier	Waltier	Eastern Cost
17.	Kirandul	Waltier	Eastern Cost
18.	Delhi	Delhi	Northern
19.	Tuglakabad	Delhi	Northern
20.	Firozpur	Ludhiana	Northern
21.	Ambala	Ambala	Northen
22.	Allahabad	Allahabad	North Central
23.	Kanpur	Allahabad	North Central
24.	Tundla	Allahabad	North Central
25.	Agra	Agra	North Central
26.	Hazrat Nizamuddin	Agra	North Central
27.	Jhansi	Jhansi	North Central
28.	New Delhi	New Delhi	North Central
29.	Tiruvattur	Chennai	Southern
30.	Basin Bridge	Chennai	Southern
31.	Trivandrum	Ernakulam	Southern
32.	Secunderabad	Secunderabad	South Central

33.	Vijawada	Vijawada	South Central
34.	Guntakal	Renigunta	South Central
35.	Tata Nagar	Chakradharpur	South Eastern
36.	Bandamunda	Chakradharpur	South Eastern
37.	Dongaposi	Chakradharpur	South Eastern
38.	Kharagpur	Kharagpur	South Eastern
39.	Santragachi	Kharagpur	South Eastern
40.	Anara	Adra	South Eastern
41.	Bhilai	Raipur	South East Central
42.	Bangalore	Bangalore	South Western
43.	BAMY	Mumbai Central	Western
44.	Ratlam	Ratlam	Western
45.	Ahmedabad	Ahmedabad	
46.	New Katni Junction	Jabalpur	West Cental
47.	Itarsi	Bhopal	West Cental
48.	Kota	Kota	West Central
49.	Paradeep		
50.	Barauni		
51.	Bhubneshwar	Bhubneshwar	

Lobbies:

2. List of Locations for Electric Loco Shed:

Number of Nodes at each location = 5

S.No	Loco shed Location	Divisional HQ	Zonal HQ
1.	Bhusaval	Bhusaval	Central
2.	Ajni	Nagpur	Central
3.	Kalyan	Mumbai CST	Central
4.	Howrah	Howrah	Eastern
5.	Asansol	Asansol	Eastern
6.	Gomoh	Dhanbad	Eastcost
7.	Mugalsarai	Mugalsarai	Eastcost
8.	Waltier	Waltier	Eastcost
9.	Angul		
10.	Ghaziabad	Delhi	Northern
11.	Ludhiana	Firozpur	Northern
12.	Kanpur	Allahabad	North Central
13.	Jhansi	Jhansi	North Central
14.	Arkonam		Southern
15.	Erode	Palghat	Southern

16.	Roya Ratan	Chennai	Southern
17.	Lalguda		South Central
18.	Vijayawada		South Central
19.	Kazipet	Kazipet	South Central
20.	Santragachi		South Eastern
21.	Tata Nagar		South Eastern
22.	Bondamunda		South Eastern
23.	Bokaro Steel City		South Eastern
24.	Bhilai	Raipur	South Eastern Central
25.	Valsad	Bombay Central	Western
26.	Vadodra	Vadodra	Western
27.	New katni	New Katni	West Central
28.	Itarsi	Bhopal	West Central
29.	Tuglakabad	Kota	West Central
30.	Khan Alampur	Muradabad	Northern

3. List of Locations for POH shops, CLW, RDSO

Number of Nodes at each location = 3

S.No	POH shop, etc Location	Phase	Divisional HQ	Zonal HQ
1.	Bhusaval	Pilot	Bhusaval	Central
2.	Nasik - TMW	Rollout	Bhusaval	Central
3.	Kanchrapara	Rollout	Howhara	Eastern
4.	Charbagh	Rollout	Lucknow	Northern
5.	Kanpur	Rollout	Allahabad	North Central
6.	Perambur	Rollout	Chennai	Chennai
7.	Kharagpur	Rollout		
8.	Dahod	Rollout	Ratlam	Western
9.	Vadodra	Coming up	Vadodra	Western

Note :-

The shed marked coming up are under construction and in case they are ready before entering the rollout phase they shall be included in the list of shed else they shall not be in the scope of work.

4. Deviation from Tender and alternate offers

Normally no tender deviations shall be generally permitted to the tender condition. The tenderer shall be required to submit a NO Deviation Certificate in the below mentioned format. Only if there are distinct technical as well as financial advantages to the Purchaser, the tenderer shall quote for alternate proposal. However in such a case he shall quote for the condition as mentioned in the tender conditions as well as he shall give his alternate offer also. The tenderer in such cases shall bring out the detailed financial advantages as well as technical advantages in the form of separate write up, fact sheet, diagrams, statistical data. For all tenders submitted the tenderer shall be required to submit the following certificate even if there is no alternate offers, a no deviation certificate has to be submitted.

Certificate

It is here by certified that I/we have gone through the entire tender document carefully and I/we herewith conformed acceptance of all the tender clauses as laid down in the tender.

I offer the following alternate offers for the following tender clauses for which IR shall have distinct technical and financial advantages.

Tender clauses No.	Details of tender clauses for which deviation proposed	Deviations proposed	Price / Cost advantage of the proposal in Rs.	Technical Advantages of the proposal

(Signature, Name, Designation of Tenderer along with stamp and seal with Date)

Tender not accompanied by this certificate shall be summarily rejected without specifying any cause to the tenderer.

Purchaser shall be at liberty to accept partially or wholly the alterations offered to the tender document or reject them completely without specifying any reason to the tenderer

5. Bio Data of staff :

1.	Name of the staff	
2.	Nationality	
3.	Shall be used for	
4.	Designation, Firm name	
5.	Academic Qualification and year of passing [&]	
6.	Date of Birth	
7.	Date of entering the Tenderer's firm	
8.	Present HQ	
9.	Experience in years with company [#]	
10	Shall be used as	Software Development / Server Administration / Maintenance / Commissioning engineer / etc [$]

[#] Give an outline of staff member's experience and training most pertinent to the assignment. Describe degree of responsibility held by staff member on relevant previous assignments and give dates and locations.

[&] Summarize college/university and other specialized education of staff member, giving names of schools, dates attended, and degrees obtained.

[#] Starting with present position, list in reverse order every employment held. List all positions held by staff member since graduation, giving dates, names of employing organizations, titles of positions held, and locations of assignments. For experience in last ten years, also give types of activities performed and client references, where appropriate.

[$] Strike which ever is not applicable

It is herewith certified that the following staff member shall used for executing the work in the event the tender is awarded to us. It is herewith certified that the information furnished is true to best of my knowledge and belief.

(Signature of the tenderer with date and seal)

6. Tenders particulars / capability assessment:

The tenderer shall furnish the below mentioned information regarding his company and works carried out in the last 3 years which are similar to this work. Attach supporting document to substantiate your particulars.

1. Name of the Company

2. Address, Contact Information, Contact person, Phone, email address

3. Annual turn over figure for last 3 years

4. ISO 9001 Details

5. Details regarding CMM Level 5 / CMMi Level 5 and other similar certifications.

6. List of Similar Project done in last 5 years along with period of contract with Name and Particulars of contact persons from whom this shall be verified

It is herewith certified that the information furnished is true to best of my knowledge and belief.

(Signature of the tenderer with date and seal)

7. Warranty:

WARRANTY

We warrant that the equipment to be supplied by us hereunder shall be brand new, free from all encumbrances, defects and faults in material workmanship and manufacture and shall be of the highest grade and equally consistent with the established and generally accepted standards for material of the type ordered shall be in full conformity with the specifications, drawings or samples, if any, and shall operate properly. We shall be fully responsible for its efficient and effective operation. This warranty shall survive inspection of and payment for and acceptance of the goods, but shall expire thirty six (36) months after their successful installation and acceptance by the Purchaser.

We also warrant that the function contained in the system software if any shall meet the manufacturer's specification together with any clarifications given by us and that the operation of these firmware shall be uninterrupted and error free and all software defects, if any shall be corrected by us.

The obligations under the warranty expressed above shall include all costs and taxes relating to labour, spares maintenance (preventive and unscheduled) and transport charges from site to manufacturers works and back and for repair/adjustment or replacement at site of any part of equipment which under normal care and proper use and maintenance proves defective in design, material or workmanship or falls to operate effectively and efficiently or conform to the specifications and for which notice is promptly given by the Purchaser to the Supplier.

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Signature of the Witness Signature of the Tenderer

Date:

Seal of the company

8. Bank Guarantee Bond:

BANK GUARANTEE FOR CONTRACT PERFORMANCE GUARANTEE BOND

REF: ..... Date: ..... Bank Guarantee No....

To,

FA&CAO
GM office
Central Railway
Mumbai

Dear Sir,

1. Against Tender No. ..... Dated ..... Covering supply of ..... for IR. Project (hereinafter called the said 'contractor') this is to certify that at the request of the Contractor we ..... Bank Ltd., are holding in trust in favor of IR, the amount of ..... (write the sum here in words) hereinafter called the said amount to indemnify and keep indemnified IR against any loss or damage that may be caused to or suffered by or resulting to IR or to Indian Railways by reason of any breach by the contractor of any of the terms and conditions of the said decision of IR, whether

any breach of any of the terms and conditions of the said contract and/or in the performance thereof has been committed by the Manufacturer or Contractor and the amount of loss or damage that has been caused or suffered by IR or Indian Railways shall be final and binding on us and the amount of the said loss or damage shall be paid by us forthwith on demand and without demur to the IR.

2. We, ... Bank Ltd. further agrees that the guarantee herein contained shall remain in full force and effect for a period up to ____ months from the date of this guarantee hereinafter called (date) and that if any claim accrues or arises against us ..... Bank Ltd., by virtue of this guarantee before the said date, the same shall be enforceable against us ..... Bank Ltd. Notwithstanding the fact that the same is enforced within six months after the said date, provided that notice of any such claim has been given to us ..... Bank Ltd. by IR before the said date. Payment under this letter of guarantee shall be made promptly upon our receipt of notice.

3. It is fully understood that this guarantee is effective from the date of the said contract and that we ……..... Bank Ltd. undertakes not to revoke this guarantee during its currency without the consent in writing of IR.

4. We undertake to pay to IR the said amount so demanded notwithstanding any dispute or disputes raised by the contractor in any suit or proceedings pending before any court or Tribunal relating thereto our liability under this present bond 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 shall have no claim against us for making such payment.

5. We ..... Bank Ltd. further agree that IR shall have the further liberty, without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said contract or to extend time of performance by the contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by IR against the said contract and we ……..... Bank Ltd. shall not be released from our liability under this guarantee by reason of any such variation or extension being granted to the said contractor or for any forbearance and/or omission on the part of IR or to the said contractor or by any other matter or thing whatsoever which under the law relating to sureties shall but for this provision have the affect of so releasing us from our liability under this guarantee.

6. This guarantee shall not be discharged due to the change in the constitution of the Bank or Contractor.

Date .....

Place ..... Signature .....

Witness ..... Printed Name .....

.....
(Designation)

Bank's common seal

9. Tenders particulars / capability assessment

The tenderer shall furnish the below mentioned information regarding his company and works carried out in the last 3 financial years which are similar to this work. Attach supporting document to substantiate your particulars.

1. Name of the Company

2. Address, Contact Information, Contact person, Phone, email address

3. Annual turn over figure for last 3 years
   1.
   2.
   3.

4. ISO 9000 Details
   - Thin client
   - Biometric Devices
   - Printer
   - Touch Screen
   - UPS
5. List of Similar Project done in last 5 years along with period of contract with Name and Particulars of contact persons from whom this shall be verified. Cost of each project and satisfactory completion certificate shall also be submitted.

It is herewith certified that the information furnished is true to best of my knowledge and belief. Supporting documents, certificates are as enclosed.

(Signature of the tenderer with date and seal)

10. Authorized Partner Ship certificate:

The tenderer shall enclose certificates from OEM for Thin client, Biometric Devices, Printer, Touch Screen and UPS vendors in the enclosed format.

Authorization Letter
On Company letter pad

Dated : _____

To,

Chief Electrical Engineer
Central Railway
3rd Floor, Parcel building
Chatrapati Shivaji Terminus
Mumbai
Dear Sir,

Tender Reference : _____

We, _____ who are established and reputable manufacturers of _____ (name and description of goods offered) having factories at _____ (address of factory) do hereby authorize M/s _____ our authorized Business partner and service provider to submit a bid, and sign the contract with you for goods manufactured by us against your above mentioned requirements for manufactured by us. We assure you that in the event M/s _____ is not being able to fulfill it's obligations as service provider of our products we shall continue to meet these the warranty terms of this tender through alternate available arrangements.

Yours faithfully

(OEM, Signature, Name designation
Contact information)

Note: This letter of authority shall be on the letterhead of the manufacture and shall be signed by a person competent and having the power of attorney to legally bind the manufacture.

11. List of Service centers:

Service Center Location	Service Center Contact Details			Name of the Lobby location covered for Warranty Support
	Detailed Address	Contact Number	Contact Person	

12. Item Wise Compliance certificate:

Item Number of Tender Specification	Complied	Remarks
	Yes / No	

13. No deviation certificate:

Normally no tender deviations shall be generally permitted to the tender condition. The tenderer shall be required to submit a NO Deviation Certificate in the below mentioned format. Only if there are distinct technical as well as financial advantages the tenderer shall quote for alternate proposal. However in such a case he shall quote for the condition as mentioned in the tender conditions as well as he shall give his alternate offer also. The tenderer in such cases shall bring out the detailed financial advantages as well as technical advantages in the form of separate write up. For all tenders submitted the tenderer shall be required to submit the following certificate even if there is no alternate offer a no deviation certificate has to be submitted.

Certificate

It is here by certified that I/we have gone through the entire tender document carefully and I/we herewith confirm acceptance of all the tender clauses as laid down in the tender.
I offer the following alternate offers for the following tender clauses for which IR/IR shall have distinct technical and financial advantages.

Tender clauses No.	Details of tender clauses for which deviation proposed	Deviations proposed	Price / Cost advantage of the proposal in Rs.	Technical Advantages of the proposal

(Signature, Name, Designation of Tenderer
along with stamp and seal with Date)

1. Tender not accompanied by this certificate shall be summarily rejected without specifying any cause to the tenderer.
2. Purchaser shall be at liberty to accept partially or wholly the alterations offered to the tender document or reject them completely without specifying any reason to the tenderer

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Section

7

DSS For Electric Locomotive Asset Management

Schedule of Quantity and Rates

Sl No	Item Description	Qty	Unit Cost	Total cost
A	**Hardware**			
1	Database Server in active - active clustering	2		
2	Application Server in active - active load balanced mode	2		
3	Back up Server*	1		
4	Directory Server*	1		
5	Antivirus Server*	1		
6	Edge/Reverse Proxy Server*	1		
7	External storage/Shared storage box	1		
8	SAN Switch	2		
9	Tape Library/LTO along with back up software	1		
10	Desktop PCs with UPS	275		
11	Printer (Laser 10 p/minute)	100		
	TOTAL of item A			
B	**Networking and infrastructure set up for Data Centre**			
1	24 port 10/100/1000 Mbps Layer 3 switch	2		
2	Firewall with support for up to 100 concurrent sessions	2		
3	Routers for connecting to the WAN	2		
4	Cat 6 UTP Cable (Box of 305mtrs)	2 Boxes		
5	Information Outlet Single	50		
6	Patch Cord: 7 feet	25		
7	Patch Cord: 3 feet	25		
8	24 port Cat 6 Jack Panel	2		
14	Racks:19" 42 U with essential Accessories	2		
15	Data Centre UPS	1		
16	Printer	1		
17	Air conditioning of 25 tons	Lump sum		
18	DG Set (125 KVA)	1		
19	Others including work station, electrical fittings, Fire control system, Smoke sensors, water sensors, Glass doors, partitioning etc.	Lump sum		
	TOTAL of item B			
C	**Networking for remote location**			
1	8 port 10/100 Mbps switch	155		

2	Single information Outlet	275		
3	Cat 6 UTP Cable (Box of 305 m)	7 Boxes		
4	Patch Cord 3 feet	275		
5	Patch Cord 7 feet	275		
6	Rack: 19" 12U with essential accessories	155		
7	24 port Cat 6 Jack Panel	155		
	TOTAL of item C			
D	**System Software**			
1	Redhat Linux/ Unix / Windows OS	8		
2	Oracle 10g / DB2 Database Software	2	-	-
3	Anti Virus with three years licence for Servers	8		
4	Anti Virus with three years License for PCs	275		
	Total of item D			
E	**Application Software**			
	Application Software (including any middle ware required such as Web logic/Web Sphere) for 275 users	Lump sum		
F	**Internet Charges**			
	Lease line & 8 MB 1:1 bandwidth charges (for 3 years)	1		
	Broadband Internet connections at remote location with 256 kbps speed (for 3 years)	155	-	
	Total Internet Charges			
G	**Annual Maintenance Charges (during 3 years warranty period)**			
	Annual Maintenance Contract for "A + B+ C" for three years	Lump sum		
	Annual Maintenance Contract for "D " for three years	Lump sum	-	
	Annual Maintenance Contract for "E " for three years	Lump sum		
	TOTAL AMC charges			
H	**Annual Maintenance Charges (Optional, after 3 years warranty period))**			
	Annual Maintenance Contract for "A + B+ C"	2 years		
	Annual Maintenance Contract for "D "	2 years		
	Annual Maintenance Contract for "E "	2 years		
	TOTAL AMC charges			

*** Note:** The above requirement is indicative only and depends upon solution being offered by the Supplier. The Tenderer shall qoute actual requirement as per solution offered to achieve requirements specified in section 5.

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