

Reasoned document to Final Draft Spec. no. 144 of EoTT for it's Revision 2:

Clauses of Draft Spec./comments received from	Description of clause/stakeholder comment/RDSO's reply
Clause 1.4	<p>SCOPE OF SUPPLY: This specification covers design, development, manufacturing, testing and supply of End-of-Train Telemetry (EoTT) System for Electric/Diesel Locomotives. Electric Locomotive has a DC supply of 110 Volts, whereas Diesel Locomotive have a DC supply of 74 Volts. EoTT system must be compatible to work with both type of Locomotives. Quantity per locomotive is one set. The detail is given under Chapter 5.</p>
BLW	Commissioning of EoTT on Loco to be added
TractionDte./RDSO	Suggestion of BLW is accepted and 'commissioning' added in concern clause.
Clause 1.5	<p>TRAINING: Firm shall arrange for demonstration of equipment and adequate training to Railway personnel of IR in field of its operation, routine checking/testing and in understanding fault diagnostics etc. Training modules shall be first approved by nominated agency of Indian Railways before they are executed by the firm</p>
BLW	Scope for DFCC person training to be added. Training venue and minimum person for IR officials (free of cost) to be added to avoid dispute.
TractionDte./RDSO	Suggestion of BLW is accepted and training for DFCCIL is included in clause 1.4. Hence this clause remain unchanged.
Clause 1.8	<p>FIELD TRIAL:</p> <p>1.8.1 Field trial shall be done to check EoTT reliability under rigorous environmental and actual train operating condition since this equipment has direct bearing on safety.</p> <p>1.8.2 After successful completion of type tests, EoTT equipment shall be subjected to field service trials. For completion of successful field trial, following conditions shall be met, whichever is later :</p> <p>(a) Two to Sixsets of EoTT should be put under field trial and at least twelve equipment months of field trial should be completed.</p> <p>(b) All the EoTTs under field trial shall earn at least 25,000 kms during field trials cumulatively.</p> <p>1.8.3 The numbers of trial EoTT equipment and venue shall be as agreed between the purchaser and the supplier. Locomotives provided with all EoTT systems on field trail locomotives shall be preferably based at one loco shed for the ease of monitoring and after sales support.</p> <p>1.8.4 Detailed trial scheme shall have to be drawn up by the supplier jointly along with RDSO. Tentative Field Trial Scheme is attached as Annexure-X. Tests that can not be performed during Field trials, should be performed during prototype testing . Firms must ensure inclusion of these tests into prototype test schedule.</p>

BLW	Scope for issuing of clearance for successful field trials by RDSO to be added along with qualification criteria, for successful field trials to be made minimum qualification only.
TractionDte./RDSO	Scope for issuing of clearance for successful field trials by RDSO is already mentioned in clause no. 1.8.2 of this specification. Hence no change required.
Clause 2.1.5	To send the Emergency message to Station Modules at nearest Stations/Control offices in case of emergency alongwith location of the train through tracking server.
SER	Distress signal during train parting, roll back (>100 mtr) & falling down of device should be sent through tracking server.
BLW	Details of Station module/corresponding specification to be mentioned. Provision for emergency messages in no mobile service area may also be specified.
TractionDte./RDSO	<p>Train parting and falling down of device shall displayed in HoT screen as 'Train Error' and same event shall be logged on server however station module shall receive message when LP shall give command of Emergency broadcast in case of any distress. Hence no change required in this clause. Communication protocol for Station module is under preparation & will issued by RDSO.</p> <p>LP/ALP are provided wakie-talkie and telephone socket are available at OHE Post at some distances. Provision for emergency messages in no mobile area shall be covered by LP/ALP as per standard communication practices followed in case of emergency. Hence no change required in this clause.</p>
Clause 2.1.6	To indicate passage of complete train over a particular location both automatically as well as when desired by LP by sensing the 'FM' locations through KAVACH or through separate RFID Readers & Tags
ECoR	KAVACH is yet to be implemented. So, sensing through RFID reader & tags is suggested alone at present.
SER	RFID signal can also be used for detecting entry and exit the region of fouling mark and speed restriction zone.
BLW	Provision for third party interfaces to be mentioned as separate RF reader & tags will attract additional installation and maintenance cost as well as spaceses.
TractionDte./RDSO	<ol style="list-style-type: none"> 1. Implementation of KAVACH is long process, however, The RFID readers will only be part of EoTT if the KAVACH isn't available in the locomotive. In case of locomotive already equipped with KAVACH, the necessary FM activation signal for EoTT will be taken from KAVACH itself. 2. The vendors shall made the provision of potential free contacts in HoT for receiving signals either from KAVACH or separately installed RFID readers therefore provision for both options made in the concern clause. 3. Provision of RFID readers & Tags have been made to clear the fouling mark w/o manual intervention and exit of F/M as well as Speed restriction zone feature shall made the EoTT system more complex. The detection of entry, exit and speed restriction zone are already being

	<p>done by KAVACH system.</p> <p>4. No further changes required.</p>
Clause 2.2.1	The display for the train driver should display the air pressure in the format- NN.N N.NN kg/cm ² i.e. up to two one place of decimal.
M/s Siemens	As per clauyse no. 3.3.18 c, the rear unit must be capable of measuring the brake pipe pressure on the rear vehicle from 0 – 6.5 kg/cm ² and display the same to the one place of decimal with least count of 0.1 kg/cm ² using sensor level output and not using software interpolation. Therefore, it is necessary to display the air pressure in NN.N format.
SER	Pressure up to one decimal point is adequate for driver.
TractionDte./RDSO	Proposed changed from NN.N format to N.NN format has been withdrawn as per suggestion of M/s Siemens,&SER, hence clause 2.2.1 shall be remain unchanged as in Revision '1' of Specification.
Clause 2.2.8	Logging of performance of the EoT device and HoT device at nominally every 60 seconds. The same should be stored internally for at least 30 days
SER	Data storage time should be same as Loco inspection interval (90) days.
TractionDte./RDSO	The internal storage duration of HoT&EoT data is 30 days however same data can be downloaded from server directly for 90 days (please refer clause 3.9.2). Hence no change required.
Clause 2.2.16 b	<p>..... one SIM card (2G/4G/latest technology) in EoT and at least two SIM cards(2G/4G/latest technology) of different operators for HoT shall be used for data transfer.....</p> <p>In case of emergency, EoTT will communicate with the nearest stations/Controls offices. Web server shall log the event of communication with the Station Modules.</p>
SER	Agreed
BLW	2G(GSM) option to be avoided as it may be obsolete in near future. Every supplier has to maintain its own server which will be accessed by Zonal Railways. When there will be more suppliers it will become costlier and require different logging portals & data processing. Hence, Scope of centralized server for EoTT to be analyzed for ease of working.
TractionDte./RDSO	<p>BLW: Specification specifies the latest/available technology to be used for this purpose.</p> <p>For centralized server kindly refer clause no. 2.2.16 h. The clause specifies that in future Railway may decide to setup its own server/CRIS Server for accessing the EoTT information of locomotives.</p> <p>Hence, no change is required.</p>
Clause 2.2.18	Maximum weight of the EoT with associated devices like couplers, pressure transducers, internal battery and air turbine/generator etc. fitted shall not exceed 9 kg .
M/s PPS	As per clause no. 2.2.18 of RDSO specification no. RDSO/2021/EL/SPEC/0144, Rev'1', the weight of EoT has been specified as maximum 12.5 Kg, however during the online meeting with RDSO, almost

	<p>all the EoTT vendors agreed that their EoTweight is around10 Kg. RDSO insisted to bring down EoT weight to 6 Kg.so that it is not heavy for ALP to carry EoT up tothelast wagon.</p> <p>Now in the draft specification no. RDSO/2021/EL/SPEC/0144, Rev '2', you have reduced EoTweightto 9 Kg instead of sticking to 6 Kgas requested.</p> <p>Please note that there is hardly a difference between 10 Kg and 9 Kg so it makes no sense to do the complete re-engineering only for 1 Kg weight reduction, the refore we propose that the weight of EoT should not be more than7 Kg.</p> <p>We hereby confirm that we can produce the EoT unit under 7 Kg weight</p>
SER	Detachable Lithium-ion or Lithium-Polymer batteries with power back up upto 96 hours may reduce weight.
TractionDte./RDSO	<p>During the meeting on 29.11.2022 through VC with all EoTT vendors, issue of maximum allowed weight of EoT was discussed. The existing weight of M/s Siemens make EoT is 8.3 kg, and M/s Siemens has declared that they will be able to reduce it up to 8.0 Kg. M/s Signotron confirmed that they will achieve 8.75 kg-9.0 kg. Weight of EoT of M/s Medha, M/s Lotus, M/s Hind Rectifier & M/s Tata lies between 10 to 12 kgs. They are still examining the possibilities of reduction of EoT weight. M/s PPS has declared that they can achieve weight of EoT as 7 kg. RDSO insisted all the vendors to bring down weight of EoT to as less as possible without compromising the robustness of portable item which must clear Drop test, IP 64 protection including vibration & shocks of track irregularity. Presently 3 vendors have managed to keep the EoT weight under 9 kg, RDSO has suggested maximum weight of EoT as 9 kg.</p> <p>The detachable battery on EoTissue was also discussed in the meeting. All the vendors are not in favour of detachable battery for EoT. The detachable battery on EoT isn't fessible because it's an outdoor deveice and installed on the CBC coupler of wagon, where the amount of shocks and vibration is very high. Apart from this, in case of emergency, battery shall be required to send message of Emergency broadcast and tracking and tracing through server in case of loss/dropping of EoT. Therefore, the battery needs to be placed on fixed housing. No change required.</p>
Clause 2.2.27	<p>..... In case of mishap,the information will be send to tracking server through GPRS& same shall be communicated to two nearest stations and control offices through station module devices. The displayed Emergency message will also contain the location of the train (HoT) as well as the train number. For this functionality Zonal railways shall assess the numbers of Stations & control offices and will procure & provide the station modules on each station/control offices. ZRs will provide the geographic position of all Stations/control offices over IR & same shall be stored in the tracking server.</p>
SER	Agreed
TractionDte./RDSO	No change required
Clause 2.2.29	The EoTT shall be required to check if the Last Vehicle has cleared the Fouling Mark/Caution order location. It shall then be possible for the driver to query the EoTTdevice for this information and the EoTTdevice shall send appropriate message to DU of HoT device if the Fouling Mark is "Cleared" or

	<p>“Not Cleared” by displaying the same on the DU of HoT device. Necessary hardware and software shall be built into the EoT device and HoT device for achieving this functionality. Firm may utilize signal from SPM junction box of the locomotive (except HHP Diesel Loco) to achieve the functionality accurately. However, their EoTT system should be compatible with all makes SPM arrangement in locomotive. Firm has to provide fuse of suitable rating inside the junction box before taping point of speed signal to protect the PG. Mounting & clamping of fuse must be rigid enough. This functionality shall not be achieved by GPS.</p> <p>To avoid the manual intervention of LP in achieving the ‘FM’ clearance functionality, there shall be a provision of sensing the ‘FM’ location through KAVACH or separate RFID readers & tags signals. Therefore, each HoT supplier make provision in their device to receive the output signal of KAVACH or RFID reader through voltage free contact so that HoT can be activated for starting fouling mark reading automatically once RFID reader reads RFID Tag.</p> <p>Zonal railways will assess the number of Fouling Mark Locations in their Zones and will procure and provide the RFID Tags on each FM Location.</p>
ECoR	This task may be assigned to Sr. DEN & Sr. DSTE of concerned division & this need to be mentioned in Specification.
M/s PPS	<p>We agree with your proposal however we have some doubts on which RDSO should specify to avoid any confusion. In case of Loop Line and sub Loop Line, KAVACH has to provide output signal for each RFID Tag it reads.</p> <p>Specification must clearly specify the duration of output signal (Volt Free Contact) so that HoT can identify that Signal received is from two different RFID Tags of two different loop lines and HoT must reinitiate the Fouling Mark check functionality.</p> <p>Out put signal or Volt Free Contact from KAVACH to HoT should be of 01 second duration.</p> <p>In case if RFID readers are included in the EoTT scope, supplier can configure the duration of Volt free contact by themselves before supply</p>
SER	<p>Procurement and Installation of RFID tags shall be responsibility of Zonal Railways as per their requirement of ‘FM’ Locations.</p> <p>Fouling Mark(FM) clearance functionality must be independent of loco pilot intervention. RFID location with identification number will need to be mapped in the system routewise and facility of route section need to be provided for correct functioning. Since loco work over Pan India basis, the mechanism of mapping of complete RFID data of IR need to be elaborated in specification. Sole dependence on ESMON is not desirable as in case of failure of ESMON system will not work. GPS should be provided and ESMON may be kept as backup for speed-distance calculation.</p>
BLW	Provision for third party interface with KAVACH to be mentioned as

	<p>separate reader & tags will attract installation and maintenance cost as well as more optional wiring & spaces. A locomotive fitted with KAVACH and EoTT may have 3 RF readers.</p>
TractionDte./RDSO	<p>ECoR: Zonal railways will decide to assign the installation work of RFID tags and Station Module in their zone. EoTT spec is being prepared for establishing the functional requirements not the implementing agency.</p> <p>PPS: It should be clear to all vendors that every HoT shall have the provision of Volt free contact so that signal received either from KAVACH or separately installed RFID reader may sense by HoT to achieve this functionality.</p> <p>The tags to be installed on track and reader shall be installed on loco under frame, hence possibility of sensing wrong tags is remote. However Signal dte has been advised to kept the duration of output signal from KAVACH to HoT as 1 sec. RFID readers are already included in scope of supply of EoTT supplier.</p> <p>SER: There is no need to map all FM Locations by Zonal Railways. If mapped locations of Tags is to be utilized for FM clearance, in such case GPS of EoTT will come into picture. It has already been established through trials over SER that GPS is not able to give desired accuracy. So it is planned that one Reader will be provided in only one cab of each locomotive (say cab-1). The Reader will be provided in the underframe on Draft-gear housing. As the loco will enter in the loopline & passes over the FM tag, a signal will be sent to HoT & EoTT will start the odometer count to calculate the distance covered by train after crossing the FM location. When the distance covered becomes equal to train length, Fouling mark clear message will be displayed on the HoT display. No RFID reader will be provided on EoT as it is neither required nor advisable as it will increase the weight of EoT drastically. For better clarity, clause is further modified.</p> <p>BLW: No change required.</p>
Clause 2.6	<p>Emergencies Duties of Guard for any untoward situation:</p> <p>After implementation of EoTT system on Goods Trains over IR, it is supposed that brake van along with Guard will be removed. In such situation, Emergency duties of the guard may be devolved on LP/ALP. ZRs shall prepare Joint Procedure Order for running of Goods Trains equipped with EoTT system.</p> <p>Further, ZRs are also advised to make provisions in their block working rules similar to running of goods train without guard as per provisions made in GR 4.25 (3) for protecting infringed adjacent lines.</p>
ECoR	<i>It's a part of JPO which will be formed by Zonal Railways separately.</i>
SER	No comment
TractionDte./RDSO	Zonal Railways will include this Emergencies Duties of Guard for any untoward situation in their JPO's. Hence no change required
Clause 2.3.8	The rear unit shall be fitted on Centre Buffer Coupler of wagons to drawing no. WD-81010-S-03

BLW	Drawing version to be mentioned and attach the drawing as Annexure
TractionDte./RDSO	Drawing of Centre Buffer Coupler of wagons to drawing no. WD-81010-S-03 is already attached as annexure-IV.
Clause 3.3.18 (a)	Automatically and continuously, monitor BP pressure of the locomotive as well as the last vehicle on train every 60±5 seconds and to provide its accurate readings within ±0.21 kg/cm ² to driver at regular randomized intervals of 60±5 seconds with randomization as per clause 2.1.2 of AAR S-9152.V2.1. If there is any change in BP pressure then reading should be immediately displayed in CU
SER	Sampling time for BP Pressure may be reduced to 10 seconds from proposed 60±5 seconds.
TractionDte./RDSO	As per existing specification, if there is no change in BP pressure, it should be updated at every 60±5 seconds however when BP pressure changes from ±0.21 kg/cm² it instantly update the current reading. Hence no change is required.
Clause 3.7.1	To ensure interoperability requirement for EoTT device (i.e. any EoT device can be paired with HoT device of any make), radio specification and communication protocols between EoT&HoT needs to be standardized. For this purpose, radio specification shall be compliant as per clause 2.3 of AAR S-9152 and communication protocols between EoT&HoT shall be compliant with RDSO's technical circular (Annexure-XIII). Since the communication protocol (Annexure-XIII), specification of radio & spot frequency has been standardized, different make of EoTT system shall be interoperable.
SER	Agreed
TractionDte./RDSO	No change required
Clause 3.7.4	Department of Telecommunication has confirmed that assigned spot i.e. 429.90625 MHz, Bandwidth 11.2 KHz has been identified as a common frequency for Indian Railway's End of Train Telemetry (EoTT) equipment on all freight locomotives. EoTT devices shall be designed in such a way that same radio can operate in frequency band (400 to 430 MHz) in future without any hardware changes.
SER	424 MHz to 430 MHz issued for DPWCS to avoid signal interference, operation of EoTT should be outside DPWCS bandwidth.
M/s Signotron	The assigned frequency 429.90625MHz may be a problem, since it is on a 6.25kHz channel spacing interval. 12.5kHz channel spaced frequencies, like those specified for the EOTT, should be on a 12.5kHz interval, for example, 429.90000 or 429.91250 MHz to prevent interference with neighbouring radio frequency channels.
TractionDte./RDSO	As per clause 2.3 of AAR, minimum Modulation designation (bandwidth) is 11K2F2D/11K2G1D/11K2F2D (i.e. 11.2 kHz maximum bandwidth) and same was allotted by WPC. However, WPC may be approached in future for amicable solution if any problem is faced during execution.
Clause 3.11	LV Marking on EoT 'LV' of suitable size (as per drawing at Annexure- IX) shall be written on the EoT with retro reflective material. Since, EoT also works as Tail lamp (TL)/Last

	Vehicle(LV) board; therefore, the external appearance of the EoT should be of Post Office RED colour.
Traffic Dte	Drawing of LV Board has been attached in the document of draft specification as Annexure-X. however, it is mentioned in para as annexure-IX
TractionDte./RDSO	Drawing of LV Board is Annexure IX in all places but during uploading of Draft Specification on website it was shifted some upward and next Annexure number was shown on same page. Hence no change required.
Clause 3.12	Station Module for Communication with ASM A Station Module to be installed at every station& control, shall be equipped with a processing core, a display with an audible alarm and cellular communication capability. When a train becomes disabled, the locomotive crew will activate the Emergency Broadcast Feature on the HOT. The EOTT will notify the Remote Tracking Server about disabled train condition. Upon receiving the notification, the Remote Tracking Server will search its database containing the locations of all stations &control offices in the network, comparing the EOT location with the location of the stations &control offices to find the stations as well as control offices closest to the disabled train. The database will also contain the network address of the notification device in each station/control office. Once the pertinent stations&control offices are identified, the Tracking Server will send a message to the Station Module devices in these stations &control offices via cellular communication. The messagefrom the Remote Tracking Server will contain Train ID, location of the disabled train along with the distance between the disabled train and the station. Network address of each station device must be shared with all EoTT vendors so that they can made provisions in their server to communicate with them at the time of requirement. This equipment shall be procured by Zonal Railways fromEoTT vendors as per their requirement.
Traffic Dte	Designation of ASM has been changed to SM. Therefore suitable correction may be made in the para.
M/s Hind Rectifier	More details are required if the EOTT unit needs to be communicated with station units: a. Need proper IP details of Remote tracking server mentioned, without the IP EOTT web server will not be able to send the data to other server. b. Data format and sequence of data to be sent to Remote tracking server needs to be finalized, because it has to be displayed on the Station module in standardized format. As every other EOTT vendor should send the required data to server in proper format. c. More information about Station Module needed possible size and weight constraint, and where it will be mounted.
M/s PPS	Please clarify the type of message communication which is expected in

	<p>this clause and its methodology.</p> <p>We can propose the communication between Station module and EoTT System can be achieved in two ways</p> <p>a) IP based Communication: In this type of communication a Station Module with Internet facility shall be installed at each station and control office.</p> <p>In case of any emergent situation at Train, LP will press an emergency broadcast message on HoT and the same information will be logged at tracking server.</p> <p>Station Module will constantly communicate with tracking server to check emergency situation. If there is a new emergency message logged at tracking server, then this station module will fetch this detail like Train No., GPS Location from server and accordingly Station module will analyse the distance of event location from station.</p> <p>If the distance of the affected train is in defined range of Station module, then Station module will generate alarm to Station Master.</p> <p>This is a reliable communication as every time on exchange of information the station module will send a confirmation to server for message receiving.</p> <p>To make it interoperable, a communication protocol shall be defined by RDSO</p> <p>b) Short Message Service (SMS) on cellular Network: In this type of communication, a Station Module with inbuilt cellular communication and Simcard shall be installed at each station.</p> <p>A data base with GPS location and mobile number of all Station modules shall be updated in tracking Server.</p> <p>In this case, whenever an emergency situation is logged at tracking server then, tracking server will compare the GPS coordinates received from HoT device with GPS location of each station module. Once tracking server identifies the station module in specified perimeter range then, it will send SMS to these station modules in pre-defined format.</p> <p>Based on the communication from tracking server, station module will generate an emergency alarm at station.</p> <p>With the usage of Simcard, we can also achieve the functionality as defined above in Point no. (a).</p>
<p>SER</p>	<p>Distress signal to nearest station module should be automatically activated in case of collision/large impact on driving cab, and extreme low BP pressure (for more than 01 minute) outside station limit</p> <p>EoTT server should be owned and operated by Railway and not by vendors. The communication protocol between EoTT devices,</p>

	Station Module, Divisional control office/ monitoring unit and server should be unique and designed by railways. All the vendors should use same communication protocol, so that they can be inter-changeable.
BLW	Details of Station module/corresponding specification to be mentioned. Provision for emergency messages in no mobile service area may also be specified
TractionDte./RDSO	<p>Traffic dte:ASM has been changed as SM in concerning clause.</p> <p>HRT:For better clarity on methodology & concept of station module, a separate annexure-XV has been added with this specification. Communication protocol between server & station module will also finalized by RDSO in consultaion with vendors for ensuring interoperability.However weight and size of Station module is left with designer and may be wall mounted.</p> <p>PPS:As suggested two options by M/s PPS, IP based communication shall be adopted. During the meeting on 29.11.2022 through VC with all EoTT vendors, Most of the vendors (except M/s Lotus & M/s Medha) suggested togo for server to server communication over direct communication from server to Station Module.The Station Module shall be procured by Zonal Railways by EoTT vendors and same is already incorporated in Draft Specification.</p> <p>SER:Station Module will receive message only when LP will press the Emergency Broadcast button. With existing system, it is not possible automatic after train collision/impact. For centralized server kindly refer clause no. 2.2.16 h. The clause specifies that in future Railway may decide to setup its own server/CRIS Server for accessing the EoTT information of locomotives. For interoperability of Station Module, a common communication protocol is being prepared by RDSO.</p> <p>BLW:Methodology and conceptual details of Station Module is attached as Annexure-XV. Provision for emergency messages in no mobile area shall be covered by LP/ALP as per standard communication method followed in case of emergency. Hence no change required in this clause</p>
Clause 3.13	<p>RFID Readers & RFID Tags :</p> <p>RFID Reader& tags has to be supplied by vendor for automatic detection of fouling mark locations. To ensure the compatibility with KAVACH system,RFID Readers & Tags shall be complied to clause no. 3.6.4 &3.5.2 respectively of RDSO Specification No. RDSO/SPN/196/2020 Version 4.0 of June 2022 or latest. Each locomotive will be equipped with one RFID reader. Zonal railways shall assess the requirement of RFID tags on their zones & procure accordingly.</p>
ECoR	As per clause 3.13, RFID Readers & tags has to be supplied by vendor. Hence, during tender, ZRs should clearly indicate the number of RFID tags, RFID readers & Station Modules required after getting the assessment from Sr.DSTE of the concerned division. It will be a one time procurement irrespective of the no. of EoTT in service. Hence, Clause 5.3 (XVI) & (XVII) to be modified accordingly.
M/s Hind Rectifier	a. According to the clause, RFID Reader and Tags are both need to be procured by Vendor, butTags can be procured by railways as its installing

	<p>on the different location is in the scope of zonal railways. RFID reader can be procured by the vendor.</p> <p>b. A signal conditioning box that will be needed to communicate the RFID reader to HOT unit needs to be installed near the RFID reader unit, need proper details of mounting and size and exact location of the unit.</p>
SER	<p>RFID reader and tags of all make should be inter-changeable and compatible to Central server.</p> <p>Zonal railway will only map geographical locations of F/M, signals and IB signal and feed it to server owned by railway. Vendors may have access to read these locations and program the RFID & EoTT for the designated route. Specification for RFID tag should be specify in specification for maintaining uniformity during execution. Work need to be sanctioned and executing agency need to be decided for provision of RFID tags on trade.</p>
TractionDte./RDSO	<p>ECoR: Assessment of FM locations and quantity assessment to be carried out by Zonal Railways and accordingly, Tags will be procured by Zonal Railways. Some correction has done in Clause 5.3 (XVI) & (XVII) of Spec.</p> <p>HR: Signal processor box may be part of Reader assembly. However if it is to be installed in locomotive separately, it need to fixed in consultation with IR personals during protyp commissioning.</p> <p>SER: RFID Readers & Tags shall be procured by same specification by Vendors and ZRs, hence these are inter-changeable. Zonal Railways need not to map the geographical locations of FM. Specification of RFID Readers & Tags is already provided in Draft Specification which are similar to KAVACH.</p>
Clause 3.14	<p>Clamp for Tail Lamp/LV Board: In case of failure of HVML light or falling of EoT device in extreme situations, provision of separate clamp along with mounting arrangement (on CBC) need to supplied by vendor. In case of HVML failure, this clamp shall be taken out from Locomotive and attached with CBC coupler for hanging of Tail Lamp. This clamp shall be kept in Locomotives when not in use.</p>
M/s Hind Rectifier	<p>a. According to the clause, it is not clear whether to mount the clamp on EOT unit or directly on CBC coupler through a separate arrangement. Clarification needed.</p> <p>b. GA drawing of tail light required to design the clamp on which it will be hung.</p> <p>c. It is better if separate arrangement can be made ,as this will add some extra weight on EOT.</p>
SER	<p>Agreed. Mounting arrangement must be properly designed to absorb jerks and protect the electronic circuits of EoTT.</p>
TractionDte./RDSO	<p>Clamp for Tail Lamp/LV Board shall be mount separately on CBC coupler. Suggestion of SER is accepted and clause is modified accordingly.</p>
Clause 5.3 (V)	<p>RFID Reader along with processing module – 1 set per loco set</p>
M/s PPS	<p>This requirement is completely depending on the KAVACH system installed on Loco and therefore it is suggested that Purchaser/Zonal Railway must specify the quantity required while tendering.</p>
SER	<p>03 per loco. One on each driving cab and other at EoT.</p>
TractionDte./RDSO	<p>PPS: Zonal Railways has to take care the quantity while tendering.</p>

	However relevant clause modified. SER: May pl refer RDSO comment against clause 2.2.29.
Clause 5.3 (VI)	Clamp along with mounting arrangement for Hanging of Tail Lamp/LV Board- 1 set per loco
M/s PPS	It will be difficult for LP/ALP to keep separate clamp in Loco and there could be a chance that this clamp is lost in the Loco therefore, it is suggested that EoTT Supplier either provide provision of clamp in EoTT unit itself or a separate clamp to be provided along with EoTT System. Clamp is not necessary if the provision is already provided in EoTT device itself. So, Quantity specified in clause no. 5.3 (VI) under scope of supply is optional.
SER	Agreed
Traction Dte./RDSO	To keep weight of EoTT least provision of separate clamp plate/LV Board proposed. Clamp along with mounting arrangement for Hanging of Tail Lamp/LV Board will be used very rarely. It may be hand clamp in Loco at suitable place to avoid loss of it.
Clause 5.3 (XVI)	RFID Tags - To be procured as per requirement by ZRs. Same can be procured separately also by ZR after accessing the requirement.
ECoR	As per clause 3.13, RFID Readers & tags has to be supplied by vendor. Hence, during tender, ZRs should clearly indicate the number of RFID tags, RFID readers & Station Modules required after getting the assessment from Sr.DSTE of the concerned division. It will be a one time procurement irrespective of the no. of EoTT in service. Hence, Clause 5.3 (XVI) & (XVII) to be modified accordingly
SER	Agreed. But RFID readers of all the vendors should be compatible and inter-changeable.
Traction Dte./RDSO	ECoR: Clause modified accordingly. SER: Having the same specification of RFID Readers and Tags, will be compatible and inter-changeable.
Clause 5.3 (XV)	Data extraction unit (Laptop) (Minimum Requirement: Processor-Intel Core i5 or equivalent, OS-Microsoft Windows 10, Memory-8 GB RAM, Storage-500 GB internal, Display-14" LCD with carrying bag) 1 no. against every 25 sets of EoTT
BLW	Item description: Add scope of softwares with perpetual software license.
Traction Dte./RDSO	Purpose of Laptop supplied by EoTT vendors is only data downloading for EoTT system hence no change required for this clause.
Clause 5.3 (XVII)	Station module for EoTT system – To be procured as per requirement by ZRs. Same can also be procured separately by ZRs after accessing the requirement.
ECoR	As per clause 3.13, RFID Readers & tags has to be supplied by vendor. Hence, during tender, ZRs should clearly indicate the number of RFID tags, RFID

	readers & Station Modules required after getting the assessment from Sr.DSTE of the concerned division. It will be a one time procurement irrespective of the no. of EoTT in service. Hence, Clause 5.3 (XVI) & (XVII) to be modified accordingly
SER	Must be compatible and interchangeable among vendors..
TractionDte./RDSO	ECoR: Clause modified accordingly. SER: Having the same specification of RFID Readers and Tags, will be compatible and inter-changeable.
Annex-X Sn. D3	<u>HoT Display Unit:</u> A. <u>Parameters</u> Following parameter will be shown in HoT display, when no EoT device is paired with HoT device. a. Loco Number (up to 6 digits numeric value) b. Train Number (up to 10 digits alpha-numeric value) c. Crew ID (up to 10 digits alpha-numeric value) d. Date & time of HoT device e. Speed of locomotives f. Battery percentage of HoT g. Status of EoT pairing (not connected to any EoT). h. Battery voltage of HOT Following parameter will be shown additionally in HoT display, when an EoT device is paired to HoT device: a. Unique ID of EoT paired b. BP Pressure of rear wagon in the format-NN.n kg/cm ² i.e. up to one place of decimal. c. Battery Status in (%) percentage of EoT d. Speed of EoT e. Date & time of EoT device f. Various Alarm Status & messages sent by EoT g. Status of HVML& DTWL h. Train Length i. Train Integrity Indication j. Integrity of the radio communication
M/s PPS	It is mentioned that Battery Voltage and Battery Percentage must be displayed in HoT Display. It is suggested to keep either Battery Voltage or Percentage to be displayed in HoT&EoTdisplays.
TractionDte./RDSO	Concerning clause is modified as Battery Voltage of HoT deleted from format.
Annexure-X	Tentative EoTT field Trial Format
BLW	Add scope of testing of RF reader and other new items viz RFID tags, Station Module etc.
TractionDte./RDSO	Testing of RFID Readers, Tags and Station Module are included as clause no. 6.2.5, 6.2.6 and 6.2.7 in Final Draft Specification.

General comment	
M/s PPS	<p>With the implementation of RFID Reader along with EoTT, it has become easier to implement the feature of <u>Train Collision Warning System (TCWS)</u> by slightly modifying the EoTT software communication protocol.</p> <p>While installing the RFID Tags on track for EoTT, we can provide a unique ID to each Tag which will also have the information of direction of movement on track.</p> <p>Implementation of TCWS is described with the help of below case.</p> <p><u>Case</u></p> <p>RFID reader installed in Loco A for EoTT system will read these tags and can identify the direction of movement of the complete train. This EoTT unit is constantly broadcasting its Tag details to nearby Locos fitted with EoTT devices within 2.5 Km radio range.</p> <p>Assuming that the other Loco B (EoTT Fitted Loco) is also coming from opposite direction and on the same track. Loco B is also broadcasting the RFID Tag details.</p> <p>Now, Loco A receives the tag details from Loco B and with the help of Tag ID it identifies that the Loco B is also coming on same track. Loco A will start generating emergency Alarm in Loco and alerts LP that other Loco is also there on same track.</p> <p>Similarly, Loco B will also start generating emergency alarm in Loco and alerts LP. LP in Both the Locos will take appropriate actions accordingly.</p> <p>This way we can achieve additional feature of Train Collision Warning system without providing any additional hardware.</p> <p>We can also further extend this feature to apply loco braking in case of emergency if we provide interface with Brake interface unit (BIU).</p>
Traction Dte./RDSO	<p>These are additional functionalities which can be extended in future with updation in EoTT system. Once EoTT with present functionalities is established over IR, these additional functionalities will be given a thought as per railways requirements.</p>