3319488/2024/O/o ED/QA/S&T/NDLS/RDSO

Reasoned Document

Amendment of Data logger Specification IRS:S:99/2006, Amndt. 4

Spec. Cl. No.	Existing Spec. Clause Description	Revised Spec Clause Description/shifted/Deleted	Comments received from Zonal Railways/Venders	RDSO Remarks
Clause no. 1.1	Inspection shall be carried out for data logger equipment consisting of FEP, Data logger, network interface devices, CMU software. Standard accessories used external to the data logger like PC for CMU, UPS for CMU and modem etc. shall be checked during inspection for their functional performance required for data logger system as per specification.	Inspection during acceptance test shall be carried out for data logger or FEP as per the ATR with required test setup. Standard accessories like COTS items (PC for CMU, SERVER, UPS, modems, LAN switches, Firewall, Printer etc) shall be checked during inspection for their functional/ Data sheet verification against specification.	**M/s Efftronics:** Inspection during acceptance test shall be carried out for data logger or FEP as per the ATR with required test setup. Standard accessories like COTS (CMU, Local Report System (LRS), SERVER, UPS etc) shall be checked during inspection for their functional/ Data sheet verification against specification. **Reason:** The above said inspection is not specifically mentions the context i.e., either during the type test or regular acceptance test. If it is during the acceptance test, performance test of the COTS items like CMU, UPS etc to cover all the specifications will be challenging the test duration. Also, as the COTS items specifications improves continuously and this specification addresses to consider the latest and better specifications, only functional/Data sheet verification may be sufficient. For Data Logger and FEP, the tests are covered by the ATR. **Southern Railway:** Suggestion of the RDSO is agreed to. However, it is suggested to continue with 32 input / 64 input RTUs and also to include the	Other railways should also comment on this so that a final decision can be taken.

			specification for smaller size Datalogger/RTU with 8-Digital & 8 Input RTUs, i.e mini-RTUs, to cater the followings: In auto section, at LC gates and at Station areas, Digital inputs like field relays and Analog inputs like BX110V AC, B110V DC and B24V DC voltages are available. As per RDSO standard circuits, in auto section, there are 3 Relays and 4 Voltages for each 4 Aspect Signal. To monitor the field relays and voltages at location boxes near to auto signals, huts/location boxes at LC gates and at Stations, smaller size RTUs will helpful. Outdoor voltage monitoring will help in checking the condition of cables, where le voltage/no voltage can be known, and field relays monitoring will help in checking the relay conditions during maintenance and hence help in early trouble shooting of failures by indicating the outdoor relays and voltage status. Considering the technological trend, the Datalogger & RTUs should be capable to work as an IOT devices, which can be used in RDPMS system as well.	
Clause no. 3.3	The equipment shall be capable of generating audio-visual alarm under defined conditions. In addition, it shall be able to deliver non-vital relay outputs on receipt of command from CMU. At least 8 non-vital relay outputs shall be provided. The non- vital		**M/s Efftronics:** There shall be provision in the Data Logger equipment to drive 8 number of nonvital relays which shall be controlled on receipt of command from CMU. The non-	It was commented that provision to drive 8 non-vital relay is not used in general. No comment has been received from user Railway in this regard. Zonal Railway/Other OEMs

	relay output shall be in the form of potential free contacts capable of driving 24V 'Q' series relays These outputs may be used for non-vital functions like radio patching of control circuits etc.		vital relay output shall be in the form of potential free contacts capable of driving 24V 'Q' series relays. These outputs may be used for non-vital functions like radio patching of control circuits etc. 8 nonvital relay module may be made as optional module, which shall be ordered by the purchaser separately. **Reason:** Since exceptions are removed from Data Logger equipment, this audio-visual alarm may not hold any significance. Since usage of nonvital output is not used in general, a provision to drive 8 nonvital outputs may be continued to be available. But supply of 8 nonvital relay module may be made as optional, which can be ordered based on the purchaser requirement.	please comment whether this requirement is needed otherwise it will be removed in next version.
Clause no. 3.14	Data validation, analysis and storage sub-systems at central location shall have redundancy to ensure data safety.	Data validation, analysis and storage sub-systems at central location shall have redundancy to ensure data security.	**M/s Efftronics:** Data validation, analysis and storage sub-systems at central location shall have redundancy to ensure data security. **Reason:** Data security means Confidentiality, Integrity, and Availability. Here in this context data security is more relevant than data safety.	Agreed and corrected.
Clause no. 4.1 (a) (v)	Data logger system consists of: (a) Data logger equipment which is provided near the signaling gears at station, cabins / gumties, interlocked LC gates,		**Southern Railway:** Dot Matrix printers has become obsolete. Hence, Datalogger	Other Railways and OEMs may comment on this.

	IBSs, Auto signal locations etc. to be monitored has following modules: (i) Processor module. (ii) Input module (digital/ analog) (iii) Signal conditioning module (iv) Communication module i.e. E1 converters, Ethernet converter & Media Converters module and Leased line Voice Modem(s) (v) Printer 80 Col. Dot matrix (Optional)		system specification should include the Laser printers instead of the Dot Matrix Printer.	
Clause no. 4.1 (c)	Data logger system consists of: (c) The validated events of data loggers and alarms generated by CMU are to be stored in parallel servers to ensure data safety.	Data logger system consists of: (c) The validated events of data loggers and alarms generated by CMU are to be stored in parallel servers to ensure data security.	**M/s Efftronics:** Data logger system consists of: (c) The validated events of data loggers and alarms generated by CMU are to be stored in parallel servers to ensure data security. **Reason:** Data security means Confidentiality, Integrity, and Availability. Here in this context data security is more relevant than data safety.	Agreed and corrected
Clause	The equipment shall cater for minimum 128 digital inputs (in		**Training Inst./ Signal/S&T/PTJ:**	Clause states that the Data logger shall cater for minimum

No.4.2.1	the form of potential free contacts) and 16 analog inputs. The system shall be expandable up to 4096 digital & 96 analog inputs by expansion/cascading the similar equipment.		Required analog inputs @ minimum, 1. AT1 2.AT2 3. EB/GEN 4. FINAL SELECTION (230V) 5-13. IPS MONITORING (9 Nos.) 14. Fire Alarm 15. Mini Data Logger power supply 16. RDPMS 17.TCAS 18.SPARE CELL CHARGING 19. ANY OTHER ADDITIONAL POWER SUPPLY MONITORING AS PER LATEST CIRCULARS 20. Solar charging 21. Telecom Equipment **Hence Analog inputs may be enhanced from 16 to 32**	16 analog inputs and this capacity can be expandable up to 96 by expansion/cascading. No change is required.
			<u>Southrn Railway:</u> Suggestion of the RDSO is agreed to. However, it is suggested to continue with 32 input / 64 input RTUs and to include the specification for smaller size Datalogger/RTU with 8-Digital & 8 Input RTUs, i.e mini-RTUs, to cater the followings: In auto section, at LC gates and at Station areas, Digital inputs like field relays and Analog inputs like BX110V AC, B110V DC and B24V DC voltages are available. As per RDSO standard circuits, in auto section, there are 3 Relays and 4 Voltages for each 4 Aspect Signal. To monitor the field relays and voltages at location boxes near to auto signals, huts/location boxes at	Other railways should also comment on this so that a final decision can be taken.

			LC gates and at Stations, smaller size RTUs will helpful. Outdoor voltage monitoring will help in checking the condition of cables, where le voltage/no voltage can be known, and field relays monitoring will help in checking the relay conditions during maintenance and hence help in early trouble shooting of failures by indicating the outdoor relays and voltage status. Considering the technological trend, the Datalogger & RTUs should be capable to work as an IOT devices, which can be used in RDPMS system as well.	
Clause No.4.2.2	~~The equipment shall have facility to interface with Remote Terminal Unit (RTU). The RTU shall have modules normally identical to that used in Data logger. A RTU shall cater for minimum 32 digital and 8 analog inputs. The RTU shall have its own processor & communication modules. RTU shall have facility to store at least 1 Lac events. RTU should be expandable up to 64 digital inputs and 16 analog inputs. The inputs of RTU can be taken as part of data logger system and the inputs of RTU shall be a part of the total capacity 4096 digital input and analog input capacity of 96. The programming of the individual digital & analog channels shall be controlled by the data loggers. It shall be~~		**Southrn Railway:** Suggestion of the RDSO is agreed to. However, it is suggested to continue with 32 input / 64 input RTUs and also to include the specification for smaller size Datalogger/RTU with 8-Digital & 8 Input RTUs, i.e mini-RTUs, to cater the followings: In auto section, at LC gates and at Station areas, Digital inputs like field relays and Analog inputs like BX110V AC, B110V DC and B24V DC voltages are available. As per RDSO standard circuits, in auto section, there are 3 Relays and 4 Voltages for each 4 Aspect Signal. To monitor the field relays and voltages at location boxes near to auto signals, huts/location boxes at LC gates and at Stations, smaller size RTUs will helpful. Outdoor	Other railways should also comment on this so that a final decision can be taken.

	~~possible to connect maximum of 4 RTUs. Alternatively, the RTU can exist with separate ID. There shall be no loss of data due to power failure.~~		voltage monitoring will help in checking the condition of cables, where le voltage/no voltage can be known, and field relays monitoring will help in checking the relay conditions during maintenance and hence help in early trouble shooting of failures by indicating the outdoor relays and voltage status. Considering the technological trend, the Datalogger & RTUs should be capable to work as an IOT devices, which can be used in RDPMS system as well.	
Clause no. 4.2.5	Configuration of analog channels may be as under; **Channel** / **Nominal Voltage DC or AC (RMS)** / **Voltage Range for noalarm (adjustable)** 1 / 230 AC / 207- 253 2 / 110 AC / 99- 121 3 / 110 AC / 99- 121 4 / 110 DC / 99- 121 5 / 60 DC / 55- 69 6 / 60 DC / 55- 69 7 / 24 DC / 22.5-28 8 / 24 DC / 22.5-28		**<u>Southern Railway:</u>** In order to alert the S&T officials take action before occurrence of the failure, it is suggested that the lower end threshold voltage for alarm may be increased and kept as under: • For 110 V AC, the lower threshold voltage should be kept as 103 V AC • For 110 V DC, lower end threshold voltage should be kept as 105 V DC This will give adequate time to mobilize the staff & resources before the actual failures happens due to power supply issues.	Voltage range adjustable so user can define the range as per their requirement. Hence No change is required.
Clause no. 4.2.13	Accuracy of measurement of analog signals shall be better than 1% within ±40% of nominal value.	Accuracy of measurement of analog signals shall be better than 1% within ±30% of nominal value.	**M/s Efftronics:** Accuracy of measurement of analog signals shall be better than 1% within ±30% of nominal value. **Reason:** Analog alarms are	Agreed and corrected.

			defined to the maximum of ±20% of the nominal value. Even majority of alarms are in the range of ±10% only. Under the scenarios of IPS power supply advancements and alarm definitions, having ±40% of nominal value is beyond the need of real purpose. The purpose may be revisited and may be changed to □30% of nominal value.	
Clause no. 4.2.17	Power Supply: The system shall work on 24V DC (+20%, -30%). Railways will provide 24VDC input supply.	Power Supply: The Data Logger system shall work on 24V DC (+20%, -20%). Railways will provide 24VDC input supply. The 24 VDC supply of Datalogger should be drawn from the DC-DC converter of the Integrated Power Supply (IPS). If IPS is not available in station or due to specific reason, the 230V charger with VRLA battery for the Datalogger may be installed in the IPS room with appropriate Class B and Class C protection. Battery charger and battery shall be procured from RDSO approved sources only.	**M/s Efftronics:** Power Supply: The Data Logger system shall work on 24V DC (+20%, -20%). Railways will provide 24VDC input supply. **Reason:** Since Railways power system for Railway Signalling is more streamlined with IPS power supply with better technologies. The voltage outputs are more reliable, hence the range on the minus side can be changed to 20% to make use of wider choices of DC-DC modules in the scenarios of increasing risk of faster obsolescence and to take advantage of technology advancements in the semiconductor technology. IPS specification also specifies supply voltage for Data Logger as 24V-32V vide clause 4.5.1 of RDSO/SPN/165/2023 ver.no:d1. As IPS 24V supply is not available at CMU location, FEP operating at	Agreed and corrected.

			12V DC will be compact enough to suit the space and maintenance constraints there at CMU location.	
			CSE/NCR(Received through whatsapp): For datalogger, previously there used to be a small VRLA battery inside to keep datalogger working in case of IPS failure for some duration. It is no longer there. May be because all are networked to a central server so data gets transmitted. But we had a couple of failures when data could not be retrieved after IPS failure.	There was no such provision in existing specification. Provision of Battery charger with VRLA battery may be site specific. An optional requirement is included in specification and OEM has to provide battery charger with battery, if Zonal Railway mention this requirement during placing information. Requirement is included in "Information to be supplied by the purchaser". In view of suggestion of M/s Efftronics, NCR and SR, the clause is modified and given in alongside column.
			Southern Railway: In the existing arrangement, Dataloggers fails whenever IPS system fails and hence the status of the signalling system is unknown during the period. Since datalogger is a vital item for monitoring the status of various relays and functions, any power failure shall disrupt the logging. Hence, it is suggested to provide Dual power supply to the Data loggers with 'O' ring diode or active power sharing modules. Out of the two power supply sources, one power supply can be through IPS system and the other one may be either from second IPS or SMPS charger with battery. Moreover, the Datalogger shall monitor these Dual Supplies	

			also and generate alarm in case of failure of any of these power supply source.	
Clause no. 4.2.19	Indicative network diagram is shown in the ANNEXURE-B6	Indicative network diagram is shown in the ANNEXURE-B2	**M/s Efftronics:** Indicative network diagram is shown in the ANNEXURE-B2 **Reason:** Typing mistake.	Agreed and corrected
Clause no. 4.2.20(old)	Communication between data logger shall also be as per communication protocol mentioned in clause 4.3.9.	Deleted	**M/s Efftronics:** This clause can be deleted completely. **Reason:** As RTU is removed from the specification itself.	Agreed and clause is deleted.
Clause no. 4.2.21	Cards and terminals required for up to minimum 1024 digital inputs 32 analog inputs, signal conditioning modules etc. shall be accommodated in one rack of 19" width.		**M/s Efftronics:** Cards and terminals required for up to minimum 1024 digital inputs 32 analog inputs, signal conditioning modules etc. shall be accommodated in one rack. **Reason:** Dimensions are deleted in the clause 4.2.18.	Other OEM and Zonal Railway please comment on rack size that whether rack size is to be mentioned or not.

Clause no. 4.2.22	For termination of external digital and analog inputs, international quality terminals of WAGO/ Phoenix etc. makes shall be used as per RDSO SPN/144. All wires should be neatly bunched in horizontal and vertical channels.	For termination of external digital and analog inputs, international quality terminals of WAGO/ Phoenix etc. makes shall be used as per RDSO SPN/144. All wires should be neatly bunched in horizontal and vertical channels. Preferably Push-In Type of terminals shall be used for termination of external digital and analog inputs.	**M/s Phoenix Contact:** Considering the importance of Push-In connection technology that provide easy tool-free wiring and reduce insertion force by 50% also Indian Railways has already started the usage of Push-In connection technology since years. **Suggested change:** For termination of external digital and analog inputs, international quality of **PUSH-IN Type of terminals** of WAGO/ Phoenix etc. makes shall be used as per RDSO SPN/144. All wires should be neatly bunched in horizontal and vertical channels.	Agreed and clause is modified and given in alongside column.
Clause no. 4.3.1	Any good database management system i.e. SQL server, Oracle server , IBMDB 2 , Maria DB etc . shall be used to cater for basic function of Data loggers at CMU level. Only licensed software shall be used.		**Southern Railway:** Suggestion of the RDSO is agreed to. However, the CMUs should be equipped with advanced analytics and use Artificial Intelligence in Data logger fault alarm generation for correctly predicting the failure well in advance, so that maintainer can reach the site and attend the equipment before it breaks down resulting in to signal failure.	Others Tools like RDPMS etc. are being develop to cater on Artificial Intelligence.
Clause no. 4.3.8	It shall be possible to send commands to various Data loggers to activate audio, visual alarm or operate an electromagnetic relay.		**M/s Efftronics:** The clause 4.3.8 may be removed. **Reason:** The same information already covered in clause no. 3.3.	Suggestion has already been dealt at Clause no. 3.3. Suitable decision shall be taken after receipt of suggestion from Zonal Railways and other OEMs.

Clause no. 5.5	Data transfer rate shall be 115200 BPS for Ethernet with fall back facility to lower rates.	Data transfer rate shall be 10 MBPS/57600 BPS for the data communication with respect to the type of Media. 5.5.1 Data transfer rate shall be 57600 BPS with fall back facility for Voice Modem. 5.5.2 Data transfer rate shall be 2MBPS for E1 and Dark fibre based on the network requirement. 5.5.3 Data transfer rate shall be 10MBPS for Ethernet communication.	**M/s Efftronics:** Data transfer rate shall be 115200/57600 BPS for the data communication with respect to the type of Media. 5.5.1 Data transfer rate shall be 57600 BPS with fall back facility for Voice Modem. 5.5.2 Data transfer rate shall be 115200/57600 BPS for E1 and Dark fibre based on the network requirement. 5.5.3 Data transfer rate shall be 115200 BPS for Ethernet communication. **Reason:** To support both existing and new (Ethernet communication) Data logger networks.	Clause is modified based on performance of various network available in Indian Railways. Other OEMs and Zonal Railways are also requested to offer suggestion based on their experience so that further modification can be done.
Clause no. 5.6	~~5.6.1 The Data logger equipment shall be capable of generating following exception reports;~~ ~~i) Battery Low voltage~~ ~~ii) Battery charger defective~~ ~~iii) Under wheel flashing of points~~ ~~iv) Signal lamp failure~~ ~~v) Blanking of Signals~~ ~~vi) Route section not released after passage of train due to track circuit failure.~~ ~~vii) Point Failure – point detection not available after set time period.~~ ~~viii) Track circuit failure~~ ~~ix) Fuse Blown OFF~~		**Sothern Railway:** Suggestion of the RDSO is agreed to. However, the CMUs should be equipped with advanced analytics and use Artificial Intelligence in Data logger fault alarm generation for correctly predicting the failure well in advance, so that maintainer can reach the site and attend the equipment before it breaks down resulting in to signal failure.	Datalogger logics are based on digital & analog Inputs logged in Datalogger. RDPMS is being developed to cater alerts on Artificial Intelligence.

	~~x) Timer not properly set for 120 Sec.~~ ~~xi) Sluggish relay operation~~ ~~xii) Signal cable low insulation~~ ~~xiii) Route not set when operation is valid.~~ ~~xiv) Push button stuck.~~ ~~xv) Signal over shoot.~~ ~~xvi) Wrong operation~~ ~~xvii) Axle Counter RX low level~~ ~~xviii) Bobbing of track, point, signal, crank handle, Level X-ing or Ground frame repeater relay~~ ~~xix) Point repeated operation~~ ~~xx) Non sequential shunting of tracks~~ ~~5.6.2 The CMU shall be capable of generating following additional exception reports.~~ ~~i) Emergency cancellation of route~~ ~~ii) Panel failure due to power failure~~ ~~iii) Late start of a train (train operation)~~ ~~iv) Late operation of signals with respect to local trains (train operation)~~ ~~v) Route failure online indication with analysis of the stage at which it had failed.~~ ~~vi) Non-signal movement (train operation)~~ ~~vii) Total on time of lamp (to assess working life of signal~~			

	~~lamp)~~ ~~viii) Total number of operations of the relay (to assess life of relay)~~ ~~ix) Emergency Point operation~~ ~~x) Emergency Route Release~~ ~~xi) Emergency Sub Route Release~~ ~~xii) Overlap release~~ ~~xiii) Emergency Crank Handle release~~ ~~xiv) Calling on operations~~ ~~xv) Slot operations~~ ~~xvi) Historical replay of events in a yard in graphical manner.~~ ~~xvii) Circuit progression. Railway shall provide logic for the same.~~ ~~xviii) Any other exception report.~~			
Clause no. 6.2.1	**Test Equipment** i) Dual beam oscilloscope of 20 MHz bandwidth ii) Digital mustimeters - 3.1/2-digit display with facility of diode & transistor testing with 1% accuracy. iii) EPROM Programmer and UV eraser 5 iv) Megger (500V) v) PC vi) Test jig vii) Any other test equipment considered necessary.	**Test Equipment** i) Dual beam oscilloscope of 20 MHz bandwidth ii) Digital mustimeters - 3.1/2-digit display with facility of diode & transistor testing with 1% accuracy. iii) Megger (500V) iv) PC v) Test jig vi) Any other test equipment considered necessary.	**<u>M/s Efftronics:</u>** **Test Equipment** i) Dual beam oscilloscope of 20 MHz bandwidth ii) Digital multimeters - 3.1/2-digit display with facility of diode & transistor testing with 1% accuracy. iii) Megger (500V) iv) PC v) Test jig vi) Any other test equipment considered necessary. **Reason:** EPROM Programmer and	Agreed. EPROM Programmer and UV eraser deleted.

			UV eraser is outdated technology & not significant anymore. Hence it should be removed.	
Clause no. 7.1.1	System level Checking: ➢Constructional details. ➢Dimensional check. ➢General workmanship. ➢Configuration. ➢Mechanical polarization on cards.		**M/s Efftronics:** System level Checking: ➢Constructional details. ➢General workmanship. ➢Configuration. ➢Mechanical polarization on cards. **Reason:** Dimensions are deleted in the clause 4.2.18.	In clause no 4.2.18 has been made generic by deleting 19' rack size, however during system level checking, the dimension shall be recorded, hence no change is required.
Clause no. 8.3.1	Plant & Machinery: i) Ultrasonic cleaner/Aqueous cleaner for automatic cleaning. ii) Burn in chamber. iii) Anti-static assembly iv) EPROM Programmer and UV v) Microprocessor development system	Plant & Machinery: i) Ultrasonic cleaner/Aqueous cleaner for automatic cleaning. ii) Burn in chamber. iii) Anti-static assembly iv) Microprocessor development system	**M/s Efftronics:** Plant & Machinery: i) Ultrasonic cleaner/Aqueous cleaner for automatic cleaning. ii) Burn in chamber. iii) Anti-static assembly iv) Microprocessor development system **Reason:** EPROM Programmer and UV eraser is outdated technology & not significant anymore. Hence it should be removed.	Agreed. EPROM Programmer and UV eraser deleted.
Clause no. 9	**PACKING** The equipment and its sub-assemblies shall be packed in thermocole boxes, and the empty spaces shall be filled with suitable filling material. Before keeping in the thermocole box, the equipment shall be wrapped with bubble sheet. The equipment shall be finally	The equipment and its sub-assemblies shall be packed in boxes/crate with suitable packing materials, and the empty spaces shall be filled with suitable filling material. Before keeping in the box/crate, the equipment shall be wrapped with bubble sheet. The equipment shall be finally	**M/s Efftronics:** **PACKING** The equipment and its sub-assemblies shall be packed in boxes, and the empty spaces shall be filled with suitable filling material. Before keeping in the box, the equipment shall be wrapped	Agreed. Clause is modified and given in alongside column.

	packed in a wooden case of sufficient strength so that it can withstand bumps and jerks encountered in a road/ rail journey.	packed in a wooden case of sufficient strength so that it can withstand bumps and jerks encountered in a road/ rail journey. Each box shall be legibly marked at one end with code numbers, contents. quantity and name of manufacturer/ supplier. The upside shall be indicated with an arrow. Boxes should have standard signages to indicate the correct position and precaution "**Handle with Care**" with necessary instructions.	with bubble sheet. The equipment shall be suitably packed and strong enough to withstand bumps and jerks encountered in a road/ rail journey. **Reason:** Due to change in the environmental policies, restrictions imposed on packing materials and changing time to time as per laid down policies.	
Clause no. 11.4	**a)** Central monitoring equipment (CMU) required - Yes/No **b)** FEP required- Yes/No **c)** Apps Based messaging system required - Yes/No **d)** Requirement of data transmission interface: V.32 Modem for voice channel/E1 interface/Ethernet interface/ (one or more to be selected)	**a)** Central monitoring equipment (CMU) required - Yes/No **b)** FEP required- Yes/No **c)** Apps Based messaging system required - Yes/No **d)** Requirement of data transmission interface: V.32 Modem for voice channel/E1 interface/Ethernet interface/Media converters (Serial to Dark fibre) (one or more to be selected)	**M/s Efftronics:** **a)** Central monitoring equipment (CMU) required - Yes/No **b)** FEP required- Yes/No **c)** Apps Based messaging system required - Yes/No **d)** Requirement of data transmission interface: V.32 Modem for voice channel/E1 interface/Ethernet interface/Media converters (Serial to Dark fibre) (one or more to be selected) **Reason:** In clause 4.2.19, OFC transmission also included as communication media. To meet that, media converters (serial to	Agreed and media converter is added.

			Dark fibre) is also listed.	
Clause no. 11.6(New)		Whether battery charger and battery required with data logger (at the station) : Yes/ No		New requirement is added as per discussion while dealing the suggestion received against Clause No. 4.2.17
Clause no. A3.	**Message Formats** Two types of message formats have been implemented. One for Commands from CMU to any Data Logger / FEP and other is for event packets transmission in the network. **Commands.** Between CMU and Data Logger / FEP CMU Data Logger/FEP (a)Request Respond Request ⟶ Accept request Accept response ⟵Send response (b)Send all get Reply Broadcast request ⟶Accept Broadcast request Accept reply ⟵ Reply from all	**Message Formats** Two types of message formats have been implemented. One for Commands from CMU to any Data Logger / FEP and other is for event packets transmission in the network. **Commands.** Between CMU and FEP / Data logger CMU FEP / Data logger (a)Request Respond Request ⟶ Accept request Accept response ⟵Send response (b)Send all get Reply Broadcast request ⟶Accept Broadcast request Accept reply ⟵ Reply from all Reason: Typing mistake & clause number missing.	**Message Formats** Two types of message formats have been implemented. One for Commands from CMU to any Data Logger / FEP and other is for event packets transmission in the network. **Commands.** Between CMU and FEP / Data logger CMU FEP / Data logger (a)Request Respond Request ⟶ Accept request Accept response ⟵Send response (b)Send all get Reply Broadcast request ⟶Accept Broadcast request Accept reply ⟵ Reply from all Reason: Typing mistake & clause number missing.	Agreed and clause modified

Clause no. A4.	Between two Data Loggers or Data Logger and FEP Data Logger*n* — Data Logger / FEPn-1 Send eventpacket #1 → Receive event packet#1 Send eventpacket #2 → Receive event packet#2 Send eventpacket #3 → Receive event packet#3 Receive event packets Confirmation packet ← Send event packets Confirmation packet For 3 packets Data Loggern — Data Logger / FEPn-1 Send eventpacket #1 → Receive event packet #1 Send eventpacket #2 → Receive event packet #2 Time out (300milliseconds) ↓ Receive event packets Confirmation packet ← Send event packets Send event packets For 2 packets Data Logger n — Data Logger / FEPn-1 Send eventpacket#1 → Receive event packet	Between two Data Loggers or Data Logger and FEP Data Logger*n* — Data Logger / FEPn-1 Send eventpacket #1 → Receive event packet#1 Send eventpacket #2 → Receive event packet#2 Send eventpacket #3 → Receive event packet#3 Receive event packets Confirmation packet ← Send event packets Confirmation packet For 3 packets Data Loggern — Data Logger / FEPn-1 Send eventpacket #1 → Receive event packet #1 Send eventpacket #2 → Receive event packet #2 Time out (300milliseconds) ↓ Receive event packets Confirmation packet ← Send event packets Send event packets For 2 packets Data Logger n — Data Logger / FEPn-1 Send eventpacket#1 → Receive event packet	Between two Data Loggers or Data Logger and FEP Data Logger*n* — Data Logger / FEPn-1 Send eventpacket #1 → Receive event packet#1 Send eventpacket #2 → Receive event packet#2 Send eventpacket #3 → Receive event packet#3 Receive event packets Confirmation packet ← Send event packets Confirmation packet For 3 packets Data Loggern — Data Logger / FEPn-1 Send eventpacket #1 → Receive event packet #1 Send eventpacket #2 → Receive event packet #2 Time out (300milliseconds) ↓ Receive event packets Confirmation packet ← Send event packets Send event packets For 2 packets Data Logger n — Data Logger / FEPn-1 Send eventpacket#1 → Receive event packet	Agreed and clause modified

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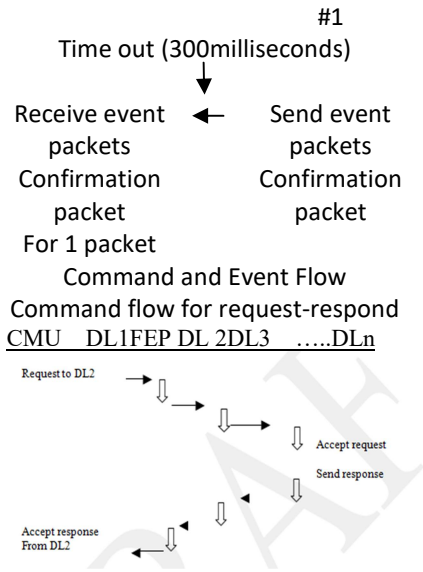
<td> 
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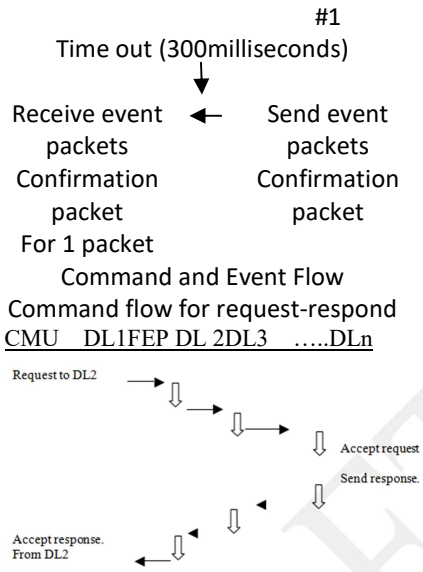
<td> 
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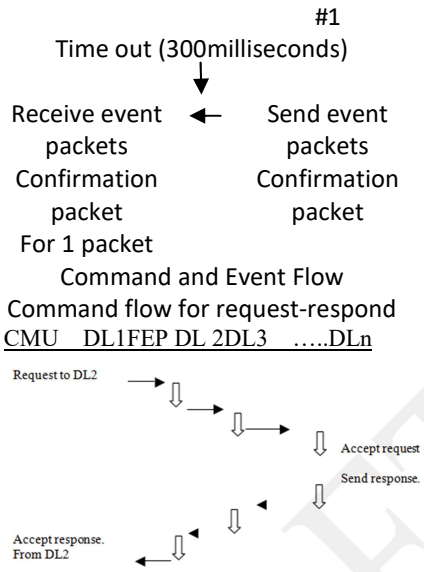
<td> 
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Reason: Typing mistakes & clause number order mismatches.</td>
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<td>ID NO: This is used for the identification of various devices like FEP, DATALOGGER and RTU.
The ID numbers allotted for each device is listed below.
<table>
<tr><th>DEVICE</th><th>ID RANGE</th></tr>
<tr><td>~~FEP~~</td><td>00H</td></tr>
<tr><td>RTU</td><td>01H - 40H</td></tr>
<tr><td>DATALOGGERS</td><td>41H – 7FH</td></tr>
</table></td>
<td>ID NO: This is used for the identification of various devices like FEP and DATALOGGER. The ID numbers allotted for each device is listed below.
<table>
<tr><th>DEVICE</th><th>ID RANGE</th></tr>
<tr><td>FEP</td><td>00H</td></tr>
<tr><td>DATA LOGGERS</td><td>01H-FEH</td></tr>
<tr><td>CMU</td><td>FFH</td></tr>
</table>
Reason: Deletion of RTU from specification brings those ids reserved for RTU into Data Loggers. Data Logger id extended to the free addresses to accommodate more DL into the network. CMU id brought</td>
<td>ID NO: This is used for the identification of various devices like FEP and DATALOGGER. The ID numbers allotted for each device is listed below.
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<tr><th>DEVICE</th><th>ID RANGE</th></tr>
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<tr><td>CMU</td><td>FFH</td></tr>
</table>
Reason: Deletion of RTU from specification brings those ids reserved for RTU into Data Loggers. Data Logger id extended to the free addresses to accommodate more DL into the network. CMU id brought into this</td>
<td>Agreed and clause modified</td>
</tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td>into this table for better information presentation which is already described in A.6.1 Block0 in the previous version specification itself.</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>The nominal voltages and their corresponding maximum voltages are shown in the below table.

<table>
<tr><th>Nominal voltage</th><th>Maximum voltage</th><th>Maximum value</th></tr>
<tr><td>230V AC</td><td>330V AC</td><td>4095</td></tr>
<tr><td>110V AC</td><td>170V AC</td><td>4095</td></tr>
<tr><td>110V DC</td><td>170V DC</td><td>4095</td></tr>
<tr><td>60V DC</td><td>90V DC</td><td>4095</td></tr>
<tr><td>24V AC</td><td>50V DC</td><td>4095</td></tr>
<tr><td>24V DC</td><td>50V DC</td><td>4095</td></tr>
<tr><td>18V DC</td><td>50V DC</td><td>4095</td></tr>
<tr><td>12V DC</td><td>25 VDC</td><td>4095</td></tr>
<tr><td>150mv</td><td>150 mv</td><td>4095</td></tr>
<tr><td>3V or 2V, 5KHZ</td><td>3000mv</td><td>4095</td></tr>
<tr><td>6V DC</td><td>10V DC</td><td>4095</td></tr>
</table></td>
<td>The nominal voltages and their corresponding maximum voltages are shown in the below table.

<table>
<tr><th>Nominal voltage</th><th>Maximum voltage</th><th>Maximum value</th></tr>
<tr><td>230V AC</td><td>330V AC</td><td>4095</td></tr>
<tr><td>110V AC</td><td>170V AC</td><td>4095</td></tr>
<tr><td>110V DC</td><td>170V DC</td><td>4095</td></tr>
<tr><td>60V DC</td><td>90V DC</td><td>4095</td></tr>
<tr><td>24V AC</td><td>50V DC</td><td>4095</td></tr>
<tr><td>24V DC</td><td>50V DC</td><td>4095</td></tr>
<tr><td>18V DC</td><td>50V DC</td><td>4095</td></tr>
<tr><td>12V DC</td><td>25 VDC</td><td>4095</td></tr>
<tr><td>6V DC</td><td>10V DC</td><td>4095</td></tr>
</table></td>
<td><table>
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<tr><td>110V AC</td><td>170V AC</td><td>4095</td></tr>
<tr><td>110V DC</td><td>170V DC</td><td>4095</td></tr>
<tr><td>60V DC</td><td>90V DC</td><td>4095</td></tr>
<tr><td>24V AC</td><td>50V DC</td><td>4095</td></tr>
<tr><td>24V DC</td><td>50V DC</td><td>4095</td></tr>
<tr><td>18V DC</td><td>50V DC</td><td>4095</td></tr>
<tr><td>12V DC</td><td>25 VDC</td><td>4095</td></tr>
<tr><td>6V DC</td><td>10V DC</td><td>4095</td></tr>
</table>

Reason: 5KHZ channels are deleted from the table to reflect changes in the clause numbers 4.2.4 & 4.2.5.</td>
<td>Agreed and clause modified.</td>
</tr>
<tr>
<td></td>
<td>CONFIGURATION BYTES:

Byte1: Higher nibble (B7-B4) contain version value Lower nibble will give Revision value.

Byte2: Bit 7 is to differentiate data logger from relay hut.If it is ‘1’ , it is a Data logger

If it is ‘0’ , it is a relay hut.

Bit 6 is not used.</td>
<td>CONFIGURATION BYTES:
Byte1: Higher nibble(B7-B4) contain version value.
Lower nibble will give Revision value.

Byte2: Bit 7 is not used.
Bit 6 is not used.
Bit 5 is not used.

Bit 4 is to indicate whether analog channels are enabled or not.</td>
<td>CONFIGURATION BYTES:
Byte1: Higher nibble(B7-B4) contain version value.
Lower nibble will give Revision value.

Byte2: Bit 7 is not used.
Bit 6 is not used.
Bit 5 is not used.

Bit 4 is to indicate whether analog channels are enabled or not.</td>
<td>Agreed and clause modified.</td>
</tr>
</table>

Bit 5 is not used.

Bit 4 is to indicate whether analog channels are enabled or not. If '0' , analog channels are disabled.

If '1' , analog channels are enabled. Bit 3 is not used .
Bits B2,B1, B0 will indicate the digital inputs configuration.

B3	B2	B1	B0	Number of digital inputs configured
0	0	0	0	512
0	0	0	1	1024
0	0	1	0	1536
0	0	1	1	2048
0	1	0	0	2560
0	1	0	1	3072
0	1	1	0	3584
0	1	1	1	4096

Byte3: Reserved

If '0' , analog channels are disabled.

If '1' , analog channels are enabled.

Bits B3, B2, B1, B0 will indicate the digital inputs configuration.

B3	B2	B1	B0	Number of digital inputs configured
0	0	0	0	512
0	0	0	1	1024
0	0	1	0	1536
0	0	1	1	2048
0	1	0	0	2560
0	1	0	1	3072
0	1	1	0	3584
0	1	1	1	4096
1	0	0	0	128
1	0	0	1	192
1	0	1	0	256

Byte3: Reserved
Reason: RTU is removed from the specification, to accommodate additional variants from 128 the table is modified and reserved bit B3

If '0' , analog channels are disabled.

If '1' , analog channels are enabled.

Bits B3, B2, B1, B0 will indicate the digital inputs configuration.

B3	B2	B1	B0	Number of digital inputs configured
0	0	0	0	512
0	0	0	1	1024
0	0	1	0	1536
0	0	1	1	2048
0	1	0	0	2560
0	1	0	1	3072
0	1	1	0	3584
0	1	1	1	4096
1	0	0	0	128
1	0	0	1	192
1	0	1	0	256

Byte3: Reserved
Reason: RTU is removed from the specification, to accommodate additional variants from 128 the table is modified and reserved bit B3 used in this.

		used in this.		
	CHANNEL NUMBER: 1 TO 64	**CHANNEL NUMBER: 1 TO 96**	**CHANNEL NUMBER: 1 TO 96** **Reason:** Typing mistake.	Agreed and clause modified.
	B. SOURCE: This byte signifies from where the command is originated. **C. DESTINATION:** The byte indicates the destination to where the command has to reach. For above two control bytes the identifications are i. CMU: The identification for CMU was FFH. iii. DL: Identification range was 41H to 7FH	**B. SOURCE:** This byte signifies from where the command is originated. **C. DESTINATION:** The byte indicates the destination to where the command has to reach. For above two control bytes the identifications are i. CMU: The identification for CMU was FFH. ii. FEP: Identification for FEP was 00H iii. DL: Identification range was 01H to FEH **Reason:** FEP need to be continued. Deletion of RTU from specification brings those ids reserved for RTU into Data Loggers. Data Logger id extended to the free addresses to accommodate more DL into the network.	**B. SOURCE:** This byte signifies from where the command is originated. **C. DESTINATION:** The byte indicates the destination to where the command has to reach. For above two control bytes the identifications are iv. CMU: The identification for CMU was FFH. v. FEP: Identification for FEP was 00H vi. DL: Identification range was 01H to FEH **Reason:** FEP need to be continued. Deletion of RTU from specification brings those ids reserved for RTU into Data Loggers. Data Logger id extended to the free addresses to accommodate more DL into the network.	Agreed and clause modified.
Clause No. 12(New)		**WARRANTY AND AVAILABILITY REQUIREMENTS:** The Datalogger system including its equipment and subsystems such as FEP, CMU	**Training Inst./ Signal/S&T/TC/ PTJ:** warranty/Guaranty is not mentioned in this specification, may be 5 years for all accessories from Installation/ purchasing duly	Agreed. A new clause "**WARRANTY AND AVAILABILITY REQUIREMENTS" is added.**

		software, software, SERVER and modems shall be under warranty for three years from the date of commissioning of complete system. However, purchaser can specify additional warranty if considered necessary. Warranty of COTS items such as UPS, printer LAN switches etc shall be as per warranty provided by the respective manufacturer. Requirement of spare parts of each type for the first line maintenance shall be indicated for better system availability. The MTBF of all vital modules shall be more than one lac hours. System availability (Operational Availability of complete system, including power supply, wiring etc.) shall be 99.98% or better. The supplier to give the detailed calculation to achieve this.	supplied by OEM. OEM is bound to come for AMC/ARC during supply of material.	
			Training Inst./ Signal/S&T/TC/ PTJ: Possibilities of automatic communication changeover may be provided (Quad/OFC/Wi-FI)	Requirement is not clearly understood because in what circumstances automatic communication changeover required. Other OEM and Zonal Railway please comment.

				
			Training Inst./ Signal/S&T/TC/ PTJ: ELD/Fuse Auto Changeover/Fire Alarm - fault triggering may be generated as per given below logic created by OEM (for ELD). Like this, possibilities of generating alarms of different equipment (as per OEM) may be explored for utilization of site requirement. Generation and updation of logics may be done by OEM as free of cost.	Fault related to ELD has already been incorporated in specification based on PF contact. Provision of other equipment that is Fuse auto changeover /Fire Alarm has already been incorporated but methodology of integration depend upon make wise as there is no standard protocol define in RDSO Specification.
Annexure-B1	Recommended digital & analogue inputs		**Southern Railway:** RDSO may examine the feasibility to incorporate the provision for monitoring of the internal fault logic bits of Electronic Interlocking system through Data logger and generating the fault alarms.	EI already has maintenance terminal where Electronic Interlocking health can be monitored. In Datalogger, it is not possible as EIs being used over IR don't have a standard protocol.

Annexure B1 (xvi)	List of Analog inputs xvi. Where IPS is provided: 1. 230 V AC -- All the primary power supplies given as input to IPS - (Ex. UP AT supply, DN AT supply, Local supply, standby generator-1, standby generator-2, Selected suppl of the above to feed the IPS) 2. 110V DC supply (output of SMPS charger and battery bank in parallel) 3. 110V DC for EI 4. 110V AC supply to UP track circuits 5. 110V AC supply to DOWN track circuits 6. 110V AC supply for UP signals lighting 7. 110V AC supply for DOWN signals lighting 8. 110V AC Location lighting DC -to- DC converters output voltages: 1. Internal 2. External-1 3. External-2 4. Block local supply-1 5. Block local supply -2 6. Block line supply-1 7. Block line supply-2 8. Data Logger 9. Axle Counter 10.EKT 11.Spare Cells 12.EI 13.Panel indication		**Southern Railway:** The provision of in-built logging mechanism should be provided in IPS for comprehensive monitoring & diagnosis of various parts/ components of the IPS such as parameters of voltage, current and temperature etc. with self-diagnostic system, and the logged data may be transferred/copied to Datalogger or Datalogger network through a COM port. The suggestion pertains to the IPS specification. However, considering its significance, it is suggested to review the IPS specification.	Requirement is not pertaining to Data logger. Necessary incorporation in IPS specification has been already done.
Annexure B1 (xvii)	List of Analog inputs xvii. Where IPS is Not provided: 1. 230V AC - UP AT supply, DN AT supply, Local supply, standby generator-1, standby		**Southern Railway:** It is suggested to add the followings in the Note: “Inbuilt SPD protection for Analog scanner card	IPS already has SPD at input so additional SPD is not required.

<table>
<tr><td></td><td>generator-2, Selected supply of the above)
2. 110VDC Point – UP
3. 110VDC Point – DN
4. 110V AC supply to track circuits 5. 110V AC supply for UP signals lighting
6. 110V AC supply for DOWN signals lighting
DC power supplies
1. Internal
2. External – 1
3. External – 2
4. Axle Counter
5. Data Logger
6. Block local – 1
7. Block local – 2
8. Block line – 1
9. Block line – 2
10. EKT 11. EI 12. Panel Indication</td><td></td><td>is required for the channels used for monitoring unregulated Power Supply from AT, also this will avoid equipment failure due to surges from AT CLS Panel.”</td><td></td></tr>
<tr><td>Annexure-B5</td><td><table>
<tr><td colspan="2">Ethernet Parameters</td></tr>
<tr><td>connector</td><td>Standard Ethernet Connector</td></tr>
<tr><td colspan="2">Serial Communication Port Parameters</td></tr>
<tr><td>Interface Types</td><td>RS485 – 3 Ports and RS 232 - port</td></tr>
<tr><td colspan="2">Power Supply Parameters:</td></tr>
<tr><td>Supply</td><td>2 pin RT male</td></tr>
</table></td><td></td><td>M/s Phoenix Contact:
Industrial grade ethernet connector are suitable for application to transmit data up to 10 Gbit/s with Bi-Color LEDS and Halogen-free V0 material, shall sustain vibration level up to 2KHz (20g) and shock up to 50g/11ms, and withstand temperature variation from -40^{O}C to 105^{O}C type reliable Ethernet port must be provided.

Industrial Grade D-type Crimp connectors with Gold plated crimp contacts are reliable for long term communication with industrial</td><td>Other OEM and Zonal Railway please comment.</td></tr>
</table>

	Connector: pluggable Terminal Block connector		grade crimp connection method suitable for high vibration application and rugged environmental condition. Industrial Grade Pluggable Connector suitable for high vibration application and rugged environmental condition. Push-In connection technology that provide easy tool-free wiring and reduce insertion force by 50%.	
Page 84 of 91	Firewall: Ethernet Port Speed: 10/100/1000GBEPort		**M/s Phoenix Contact :** Industrial grade ethernet connector are suitable for application to transmit data up to 10 Gbit/s with Bi-Color LEDS and Halogen-free V0 material, shall sustain vibration level up to 2KHz (20g) and shock up to 50g/11ms, and withstand temperature variation from -40^{O}C to 105^{O}C type reliable Ethernet port must be provided.	Other OEM and Zonal Railway please comment.
Page 84 of 91	LAN SWITCH: Routing: Floating Static Route Power Supply: Power Supply: 110-240V AC		**M/s Phoenix Contact :** Industrial Grade LAN SWITCH are word under extreme environmental condition which operates at -40 to +75C. Redundancy will provide you more uptime and make the system safer and reliable.	Other OEM and Zonal Railway please comment.
Other Suggestion			**Southern Railway:**	1. Agreed. Annexure-B6 has been modified.

s:			1. It is suggested that, instead of using Commercial PCs for interfacing with Datalogger/ CMU/ COA, Embedded or Industrial Grade PC should be used as it is more reliable and efficient. 2. Since datalogger is a vital item for monitoring the status of various relays and functions, it is essential that its functioning is not disrupted. Hence, from maintenance & troubleshooting points of view, Data logger shall have NMS facility (Similar to NMS for Telecom equipments) which will display the details of the cards available, working status of cards, their serial numbers, channel losses and any other essential information required by the user.	2. Other Railways and OEMs may also comment on NMS facility and its utility in Datalogger.
Clause No. 4.8(New)		**4.8 Cyber Security Requirement:** Following points shall be complied to ensure Cyber Security of Data logger system: i. Any unauthorized software should strictly be prohibited in Data logger PC. Only those software should be allowed which are essential for		Cyber security OT audit of Electronic Interlocking system has been done by NSCS (National Security Council Sectt.) Audit and Assessment Team (NAAT) at few installations over Indian Railways. Based on the audit done by the agency, few observation were made for Datalogger for ensuring cyber security. Subsequently, RDSO

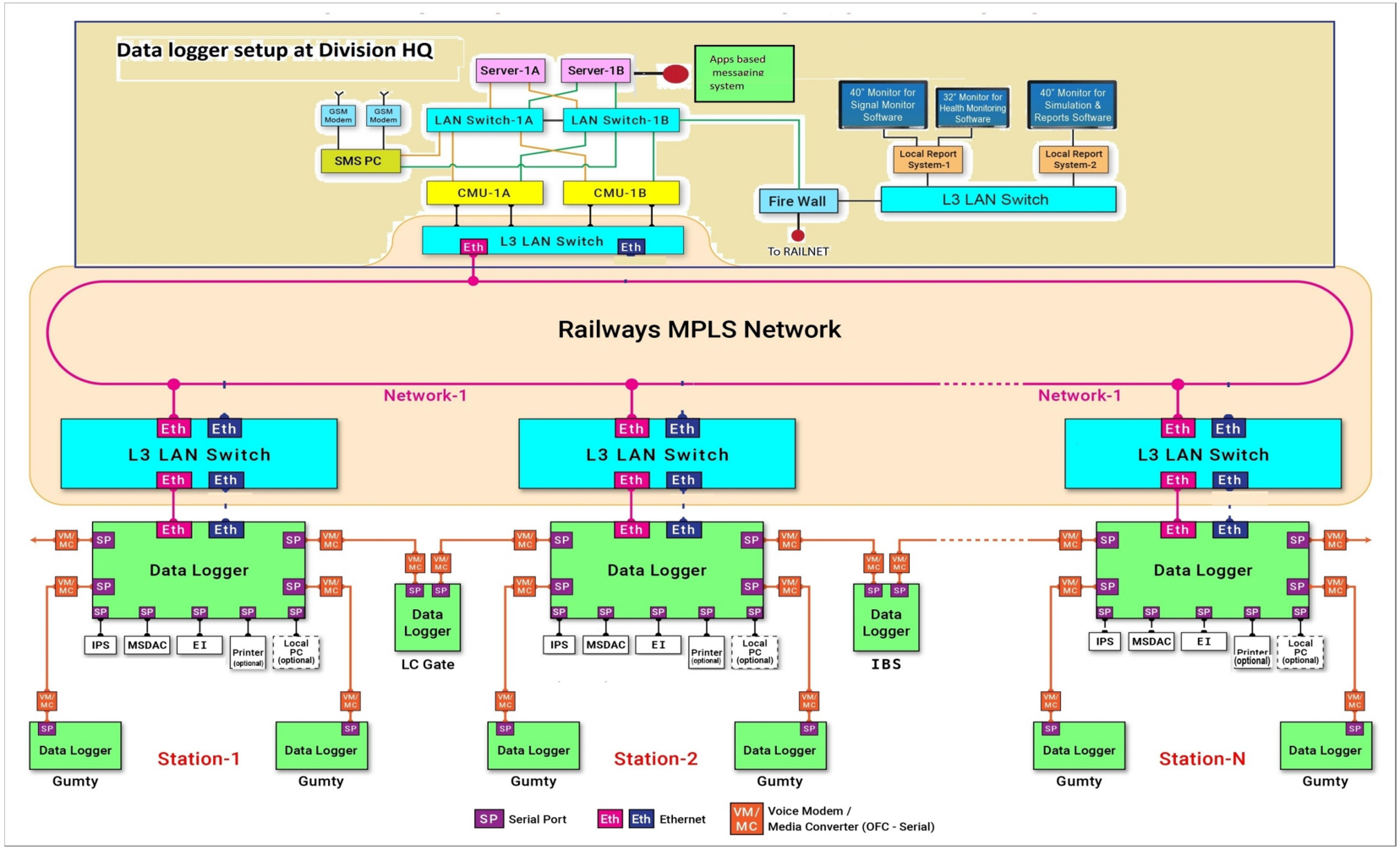
		operation of CMU. A list of software (with version number) installed in the PCs should be maintained at stations/Divisional HQs. ii. Internet connection and installation of remote access software like “Any Desk” on Data logger PC should strictly be prohibited. iii. Wireless keyboard and mouse should not be used on Data logger PC. If any such PC is using wireless keyboard and mouse using a bluetooth USB dongle, this may be replaced with the wired keyboard and mouse. iv. It is recommended to use only genuine operating system and other software products in the system. It is suggested to install anti-virus software in the Data logger PC. v. The officials must use username and password for accessing Data logger PC. It is advised that the password used may contain a mix of alpha, numeric and special characters. Employees should be sensitized and properly trained to keep passwords in secure manner.		issued a letter on dated 07.10.2024. Accordingly, a new clause is added for Cyber Security Requirement.

		vi. Unused ports should be disabled. vii. Dedicated laptop shall be used for installation of software in Data logger. viii. System documentation shall be maintained in station and it should have software and Hardware related information like version, revision. History, validation, checksum etc. ix. The management of log data and its security must be assigned to an individual. A network administrator level official from Railways is suggested to monitor the activities at the Centralized Data logger room. Railways should maintain visitor records at data centres. In stations physical access to Datalogger room/Relay room should be restricted using key and key accessing logs to be maintained properly. It is suggested that access logs of Data logger room and Datalogger equipment should be maintained properly.		
Annexure-B7				Some faults list which have been missed as per Annexure-11A1 of IRSEM have been added to Annexure B-7.

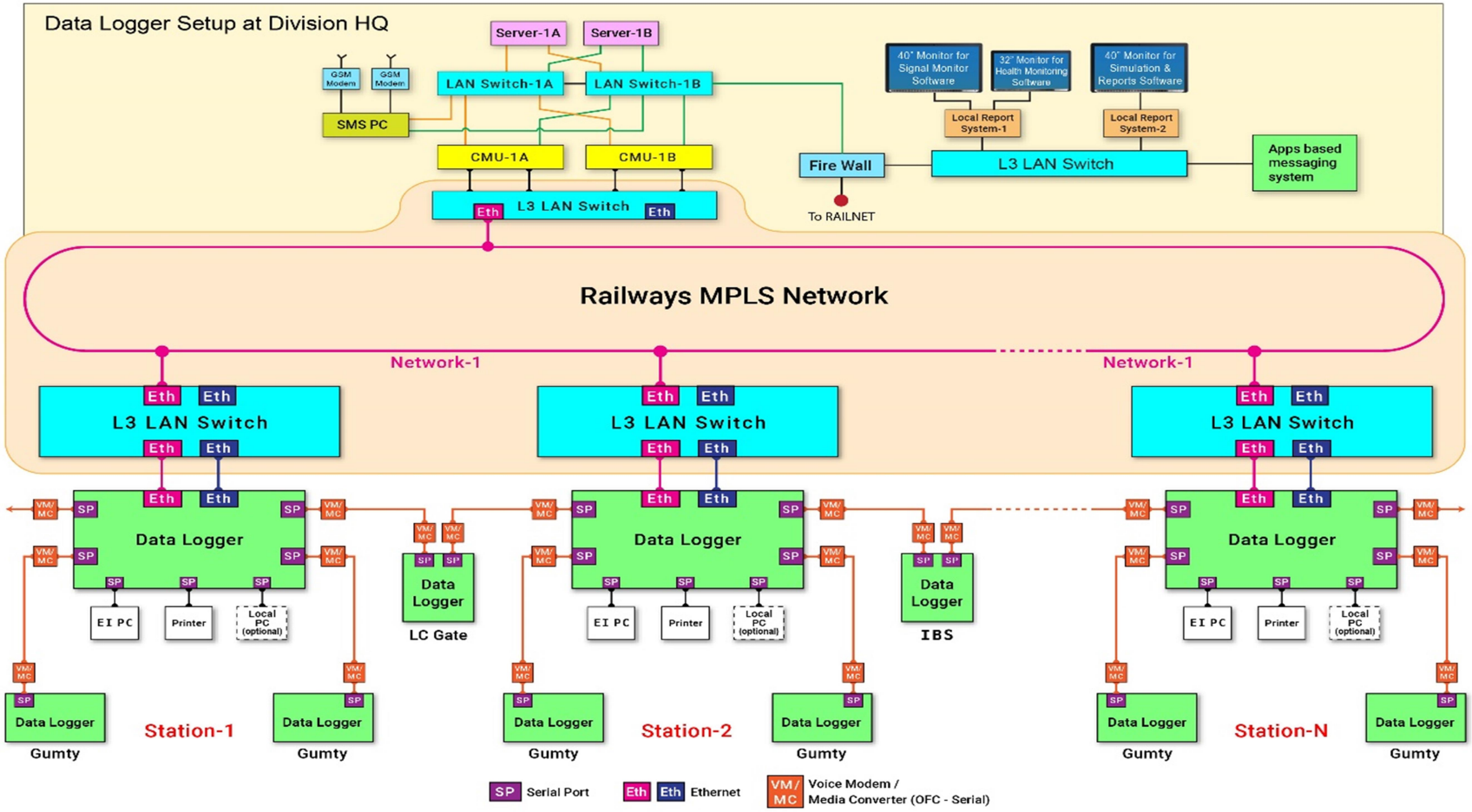
24) Clause no. A. **Annexure-B2**

Schematic architecture of networking of Ethernet compatible Data logger:

Existing:



Modification:



NOTE: Distance between Data logger & L3 LAN Switch shall be within the required range of 100TX. If it is out of the limits of 100TX, then suitable converters need to be adopted to meet the site conditions.

Reason: Any system shall access the data from servers through firewall for data security.

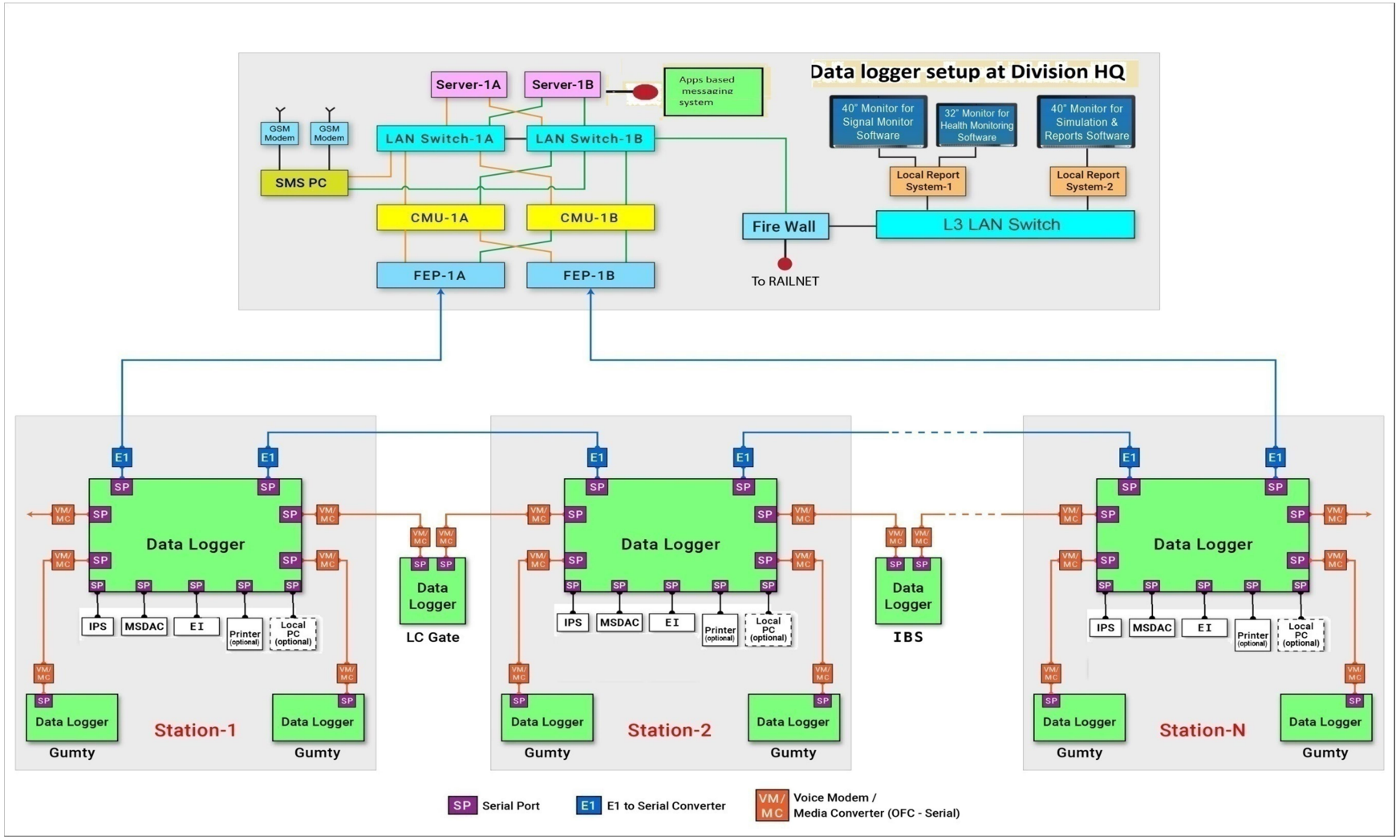
'NOTE' added to give the details of distance between Data logger and L3 LAN switch.

IPS and MSDAC units deleted as these units are already incorporated in RDPM specification.

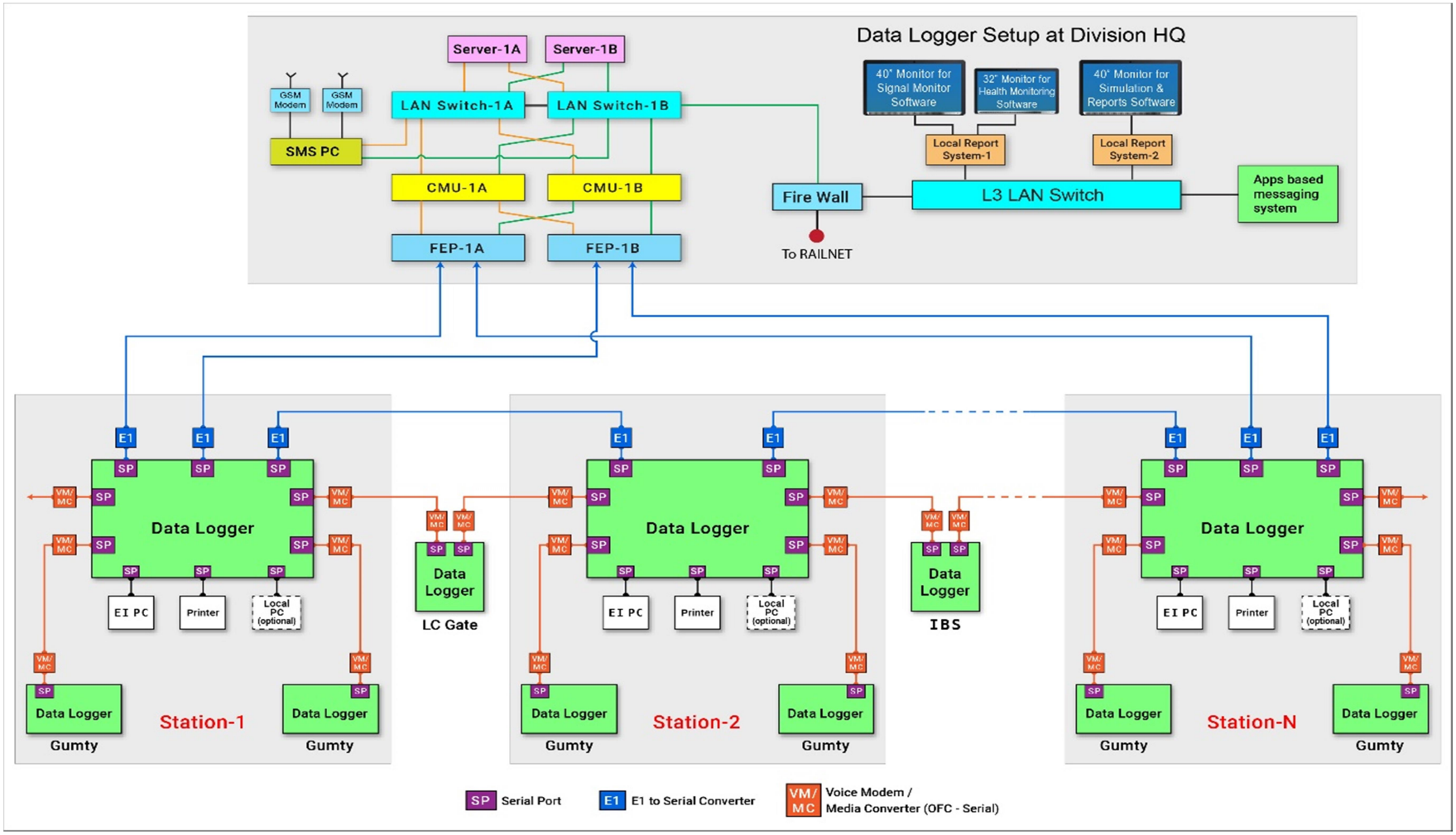
Clause no. B.

Schematic architecture of networking of Data logger with E1 channels:

Existing:



Modification:



Reason: Any system shall access the data from servers through firewall for data security.
To represent the redundancy connections to FEP.
IPS and MSDAC units deleted as these units are already incorporated in RDPM specification.

Annexure-B5

Ethernet modules shall comply following parameters:
Existing.

Ethernet Parameters	
Number of Ports	2 Number of 100Base -TX
Standard	IEEE 802.3 compatible
connector	Standard Ethernet Connector
Serial Communication Port Parameters:	
Interface Types	RS485 – 3 Ports and RS 232 - port
Serial Port Connector	5 pin RT male pluggable Terminal Block connector
Baud Rate	up to 115200.
Protocol	Datalogger Compatible
Power Supply Parameters:	
Input Voltage Working Range	18 to 32V DC.
Supply Connector	2 pin RT male pluggable Terminal Block connector
Power Consumption	5Watt (Max.)
Thermal Characteristics:	
Operating Temperature	-10˚C to +70˚C

Modification:

Ethernet Parameters	
Number of Ports	2 Number of 100Base -TX
Standard	IEEE 802.3 compatible
connector	Standard Ethernet Connector
Serial Communication Port Parameters:	
Interface Types	Serial
Baud Rate	up to 115200.
Power Supply Parameters:	
Input Voltage Working Range	18 to 32V DC.
Power Consumption	5Watt (Max.)
Thermal Characteristics:	
Operating Temperature	-10˚C to +70˚C

Reason: Made more generic to accommodate variations due to technology advancements.

Annexure-B6

Existing.

Hardware specifications CMU, SERVER, FIREWALL, LAN Switch

Following are the minimum required specification; it is always acceptable to provide IT equipment with higher features than the listed specification.

CMU PC:

1	Processor	Intel® Core™ i7-11700 Processor 16M Cache, up to 4.90 GHz or latest
2	RAM	16 GB Memory or as required for latest OS and application software
3	HDD	256*2 SSD
4	Ethernet Port	Dual Gigabit Ethernet ports
5	Serial Ports	2 Serial Port
6	I/O Devices	Keyboard (USB)
7		Mouse (USB Optical)
8	Operating System	Windows 10 Professional OS
9	Antivirus	Kaspersky, Quick heal, McAfee or any reputed brand.
10	Monitor	22” LED Monitor-1 No
11	Make	Make: HP/IBM/DELL or any reputed brand.

Modification:

Hardware specifications CMU, SERVER, FIREWALL, LAN Switch

Following are the minimum required specification; it is always acceptable to provide IT equipment with better features than the listed specification.

1	PC Type	Industrial Grade
2	Processor	Intel® Core™ i7-11700 Processor 16M Cache, up to 4.90 GHz
3	RAM	16 GB Memory or as required for latest OS and application software
4	HDD	256*2 SSD
5	Ethernet	Dual Gigabit Ethernet ports
6	Serial ports	2 serial ports
7	I/O Devices	Keyboard (USB)
8		Mouse (USB optical)
9	Operating System	Windows 10 Professional OS
10	Antivirus	Kaspersky, Quick heal, McAfee or any reputed brand.
11	Monitor	22” LED Monitor-1 No
12	Make	Make: HP/IBM/DELL or any reputed brand.

Reason: Higher is changed to better.

Server:

Existing.

1	Processor	Intel(R) Xeon(R) X5650 2.66GHz, 12M cache or latest
2	RAM	32GB Memory (8x4GB) or as required for latest OS and application software
3	HDD	3 * 900GB SSD
4		RAID Controller 2GB Cache
5	Ethernet Port	Dual-port Gigabit Ethernet
6	Power Supply	Redundant Power Supply
7	DVD Writer	DVD Writer, SATA
8	I/O Devices	Keyboard (USB)
9		Mouse (USB Optical)
10	Operating System	Windows 2019 server standard edition 64 bit
11	Antivirus	Kaspersky, Quick heal, McAfee or any reputed brand.
12	Monitor	22” LED Monitor
13	Make	Make: HP/IBM/DELL or any reputed brand.

Modification:

Server:

1	Processor	Intel(R) Xeon(R) X5650 2.66GHz, 12M cache
2	RAM	32GB Memory (8x4GB) or as required for latest OS and application software
3	HDD	3 * 900GB SSD
4		RAID Controller 2GB Cache
5	Ethernet port	Dual-port Gigabit Ethernet
6	Power supply	Redundant power supply
7	DVD Writer	DVD Writer, SATA
8	I/O Devices	Keyboard (USB)
9		Mouse (USB optical)
10	Operating System	Windows 2019 server standard edition 64 bit
11	Antivirus	Kaspersky, Quick heal, McAfee or any reputed brand.
12	Monitor	22” LED Monitor
13	Make	Make: HP/IBM/DELL or any reputed brand.

Reason: Higher is changed to better.

LAN SWITCH:

Existing:

1	Ethernet Ports	Combo SFP Slots
2		Open Slot for 10-Gigabit Uplink Modules
3	Console	RS-232 Console Port
4	Routing	L3 Routing
5		Floating Static Route
6		Policy Based Route
7	VLAN's	Multiple IP Interfaces per VLAN (Up to 5)
8	Power Supply	Power Supply: 110-240V AC

Modification:

L3-LAN SWITCH:

1	Ethernet Ports	Combo SFP Slots
2		Open Slot for 10-Gigabit Uplink Modules
3	Console	RS-232 Console Port
4	Routing	L3 Routing
5		Floating Static Route
6		Policy Based Route
7	VLAN’s	Multiple IP Interfaces per VLAN (Up to 5)
8	Power supply	Nominal 230V AC
9	Ports	Minimum 24

Reason: Number of ports added. The ranges are changing and becoming universal, hence nominal voltage mentioned.

L2-LAN Switch:

1	Ethernet Ports	4 port Connector: RJ-45 10/100/1000 Base-T
2	Power Supply	Nominal 230V AC
3	Ports	Minimum 24

UPS:

i. 1KVA ONLINE UPS for 30min backup for each Server separately Make: APC/Vertiv/Numeric
ii. 3KVA ONLINE UPS for 3hours backup for two Server, LAN Switches, Fire wall Make: APC/Vertiv/Numeric
iii. 5KVA ONLINE UPS for 3hours backup for four Server, LAN Switches, Fire wall Make: APC/Vertiv/Numeric
iv. 1KVA OFF-LINE UPS for 30min backup for each PC separately Make: APC/Vertiv/Numeric
v. 1KVA ONLINE UPS for 30min backup for each CMU separately Make: APC/Vertiv/Numeric

Reason: L2-LAN Switch and UPS specification added as per RDSO issued guideline for impoving the usefulness of datalogger system vide letter No. STS/E/Data logger /Vol.XX Dated 12.09.2011

Annexure-B8

C. Optical Fiber Transceiver Parameters:

Existing:

Medium type	single mode fiber
Fiber Termination connectors	SC connector
Medium Wavelength	1310nm ±40nm
Data rate	up to 2Mbps
Transmission Distance	20Km {Max) is under standard test conditions.
Serial Communication Port Parameters:	
Interface Types	RS485
Serial Port Connector	5 pin RT male pluggable Terminal Block connector
Baud Rate	up to 115200.
Power Supply Parameters:	
Input Voltage Working Range	External Media Converter: 18 to 32V DC. Inbuilt Media Converter: 5 V DC.
Supply Connector	2 pin RT male pluggable Terminal Block connector for external media converter
Power Consumption	1Watt (Max.)
Thermal Characteristics:	
Operating Temperature	-10˚C to +70˚C

Modification:

Medium type	single mode fiber
Fiber Termination connectors	SC connector
Medium Wavelength	1310nm ±40nm
Data rate	up to 2Mbps
Transmission Distance	20Km {Max) is under standard test conditions.
Serial Communication Port Parameters:	
Interface Types	Serial
Baud Rate	up to 115200.
Power Supply Parameters:	
Input Voltage Working Range	External Media Converter: 18 to 32V DC. Inbuilt Media Converter: 5 V DC.
Power Consumption	1Watt (Max.)
Thermal Characteristics:	
Operating Temperature	-10 ˚C to +70˚C

Reason: Made more generic to accommodate variations due to technology advancements

D. Modem Parameters

Existing:

Line Rate	14400 bps
Standard	ITU V.32
Operation	4-wire / 2- wire full-duplex leased line
Line Impedance	600 ohms
Line Isolation	1000Vrms
Serial Communication Port Parameters:	
Interface Types	RS 232 - port
Baud Rate	up to 115200.
Diagnostics	Loop back test
Power Supply Parameters:	
Input Voltage Working Range	External modem 18-32V DC. Inbuilt modem 5 V DC
Supply Connector	2 pin RT male pluggable Terminal Block connector for external modem
Power Consumption	5Watt (Max.)
Thermal Characteristics:	
Operating Temperature	-10˚C to +70˚C

Modification:

Modem Parameters:

Line Rate	14400 bps
Standard	ITU V.32
Operation	4-wire / 2- wire full-duplex leased line
Line Impedance	600 ohms
Line Isolation	1000Vrms
Serial Communication Port Parameters:	
Interface Types	Serial
Baud Rate	up to 115200.
Diagnostics	Loop back test
Power Supply Parameters:	
Input Voltage Working Range	External Modem: 18 to 32V DC. Inbuilt Modem: 5 V DC.
Power Consumption	5Watt (Max.)
Thermal Characteristics:	
Operating Temperature	-10 ˚C to +70˚C

Reason: Made more generic to accommodate variations due to technology advancements.

E. Modem Parameters:

Existing:

Line Rate	2.048 Mbps
Standard	E1 interface as per G.703
Operation	4-wire / 2- wire full-duplex leased line
Line Impedance	120 ohms (Balanced)
Connector	RJ45 for balanced
Serial Communication Port Parameters:	
Interface Types	RS 232 - port
Baud Rate	up to 115200.
Power Supply Parameters:	
Input Voltage Working Range	External converter 18 to 32V DC. Inbuilt converter 5 V DC
Supply Connector	2 pin RT male pluggable Terminal Block connector for external converter
Power Consumption	5 Watt (Max.)
Thermal Characteristics:	
Operating Temperature	-10˚C to +70˚C

Modification:

Line Rate	2.048 Mbps
Standard	E1 interface as per G.703
Operation	4-wire full-duplex
Line Impedance	120 ohms (Balanced)
Connector	RJ45 for balanced
Serial Communication Port Parameters:	
Interface Types	Serial
Baud Rate	up to 115200.
Power Supply Parameters:	
Input Voltage Working Range	External converter: 18 to 32V DC. Inbuilt converter: 5 V DC.
Power Consumption	5Watt (Max.)
Thermal Characteristics:	
Operating Temperature	-10 ˚C to +70˚C

Reason: Made more generic to accommodate variations due to technology advancements.