EAST CENTRAL RAILWAY
(S&T Department)

Office of the
General Manager(S&T)
Hajipur

No.ECR/S&T/Correspondence/RDSO/2023   Dated:- 24.04.2023

Director General(S&T)
Research Designs & Standards Organisation.
(Ministry of Railways).
Manak Nagar, Lucknow-226011

(Kind Attention: Sri Dipu Shyam,ED/Signal-II**)**

Sub: Observation on FRS for RDPMS(Document no.RDSO/RDPMS/FRS/2024)

     Kindly find enclosed the observations from ECR on FRS for RDPMS version 2.0
for kind consideration.

DA:- Observations on FRS for RDPMS Version 2.0

Digitally signed by
RAKESH RANJAN
Date: 2024.04.25
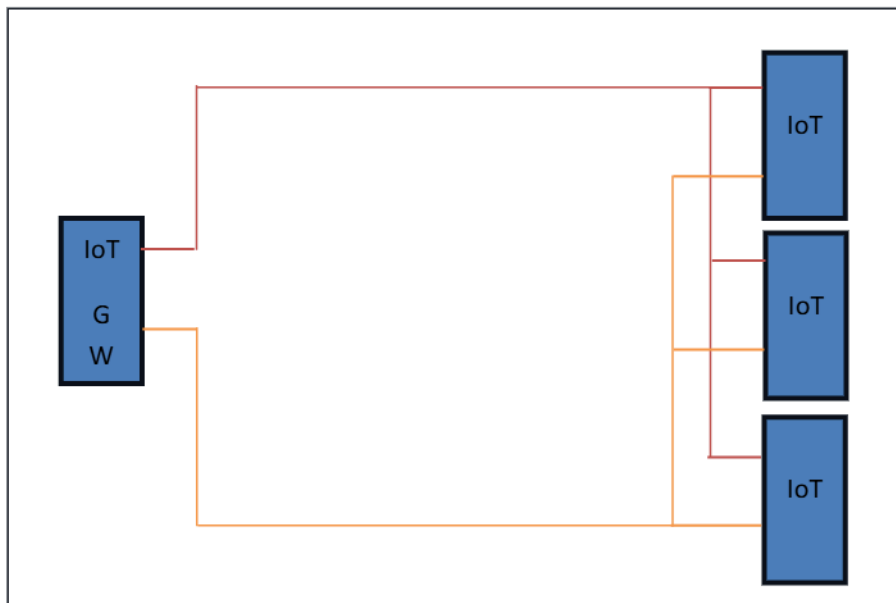'08:06:53 +05'30

(Rakesh Ranjan)
Chief Signal Engineer-I
For GM(S&T)/ECR

Clause No.	Observation
3.4	FRS allows wired/wireless communication for connectivity between the IOTs and station gateway. However, the type of communication is not specified and no redundancy has been specified. Standardizing this will lead to ease of maintenance. It is indicated that maintenance of RDPMS will become a critical activity in near future. For commissioning the RDPMS, it is understood that different clusters of IOTs will be formed. These clusters will them be connected to the station gateway. It is suggested that the FRS specifies Optical fibre based industrial Ethernet network to connect these clusters and the station gateway. Redundancy in the form of ring can be made. For the communication between station gateway and CCSP, existing optical fibre or use of MPLS has been specified. For redundancy, LTE network has been considered. It is further suggested that VPN for IOTs may be setup on Railway/RailTel network MPLS infrastructure. For the purpose of redundancy, the industrial 4G LTE router that is proposed to be used in the LTE work be specified to create better market and allow the advantage of economy of scale for the manufacturer of the LTE router in support of Make-In-India initiative of the Government. Th architecture diagram proposed is as under: - Redundancy for LTE router is not proposed as the data is not considered critical in nature and STNGW can store data locally as per clause 6.5. - Redundancy for STNGW is not considered as the data is stored in IoT for 10days as per clause 4.2.2 - LTE router to have the same specs as defined in the LTE work for reasons explained above.
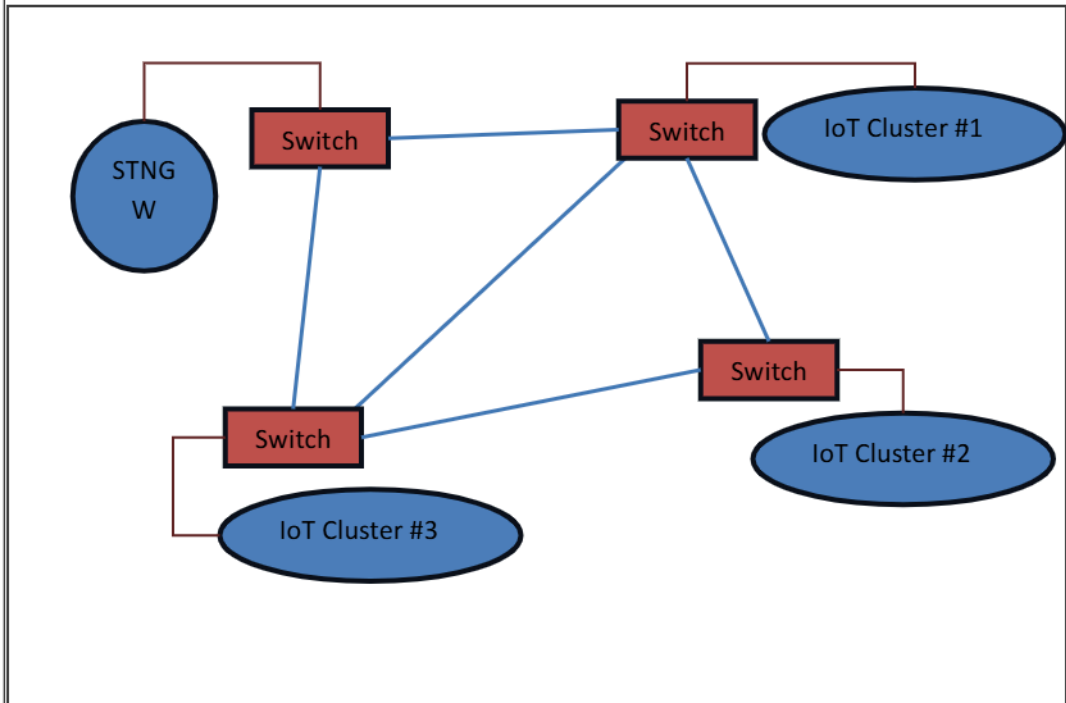
- Industrial Ethernet switches with 4 SFP cage and one RJ-45 port preferred.
- All gigabit Ethernet
- DIN Rail mount switches.
- Using this architecture will enable Railways to setup a high speed LAN/WAN in the station. Using appropriate protocol like OpenSafety etc., this network can be used in future for exchange of signaling information. It will also bring in standardization of communication in the station yard.

	• Defining standard Modbus RTU protocol for communication between IoTGW and IoT will standardize this and enable interoperability. Redundancy can be achieved in this communication by utilizing two RS485 ports at each IoT and IoTGWdeciding which one to use.
3.6.4	Mobile application from different OEMs is not recommended. This will be used by the ESM/SSE of the section. It is quite possible that RDPMS of multiple venders is installed in the section of a particular SSE. Getting alert on different Mobile applications will lead to confusion. It is further suggested that the interface to obtain data/alert for a particular station is standardized in the mobile app. In such a case, the Mobile application can be configured to show data/alert of a particular station. Any vendor and not just OEM of RDPMS can develop the Mobile App. The SSE will also use only one Mobile App and can get alerts from RDPMS from stations under his control irrespective of the RDPMS OEM. This will foster competition among various mobile app vendors and will allow the ESM/SSE to use the app of their own choice.
3.6.9	It has been prescribed a copy of data can be send from CCSP to Railway cloud for storage of raw data for future use. However, it has not been specified that how and where this will be stored. It is desired that this be clearly specified as the data will be very important for development of AI/ML algorithm for predictive maintenance by third party.
4.3.1	Parameters for L.C.gate has not been specified in Annexure-C.
4.4.2	Monitoring paramters of IPS is not specified in Annexure-C.
4.4.8	Monitoring paramters of ELD is not specified in Annexure-C.
5.4	The IOTs are proposed to work at 24V DC. Provision for working with 110V AC as a 2nd option has been specified. It is suggested that the OEM is given option to provide of separate power supply unit (DIN Rail Mounted) to power the various sensorsIOTs in the location box. With this arrangement, universal device design can be used leading to better competition and use of common-off-the-shelf equipment.
5.9	The measurement of ruggedness and industrial grade may also be specified in this clause like certifications, temperature range etc.
6.5	It has been specified that storage of 50 lac events or event log for minimum 10 days should be provided in station gateway. The definition of event is not clear here. This may be specified whether an event is a set of measurement done on an equipment at a time or each of the measurement being done for a particular gear. It is further suggested that this be specified in MB rather than No. of events.
6.6	It has been indicated that the station gateway shall be a modular embedded electronic unit. It is suggested that the use of one or more generic server also be allowed for better flexibility.
6.9	The FRS specifies use of approved type of software written in a structure form so that the purchaser can reconfigure the same. It is suggested that standard PLC language as per IEC 61131-3 be specified in this clause. It is pertinent to mention that the Electronic Interlocking uses ladder logic as language for logic specification which is standardized as per IEC 61131-3. PLC languages like Ladder logic/Structured Text can be specified here for uniformity.
7.2.1 & 7.2.2	Lora/Zigbee wireless technology are not preferred for communication between IOT station gateway as per clause 7.2.1. However, in clause 7.2.2, it has been allowed. This may kindly be looked into. Further, ECR remarks against clause 3.4 may also be perused for standardizing this communication.

7.2.7	Details of pock mount antenna needs to be specified clearly as well the mounting arrangement. It is suggested that this shall be kept uniform for all the vendors.
11.1	The AI/ML analysis layer of RDPMS application can be developed by any one and not just the RDPMS OEM. This should be allowed. It is further suggested that the RDPMS configuration application and the AI/ML analysis application be separated so that more agencies can work on developing AI/ML models for predictive maintenance. It is very important that the measurement data is opened to the industry academia so that they can design AI/ML models for predictive maintenance and test the accuracy of the model as per clause 13. Opening up of test data will allow Railways to involve industry at large to get better models for predictive maintenance and hence this information should not be restricted only to RDPMS OEM.
11.8	It has been mentioned that RDPMS application should not permit login from multiple devices in a single account. This may kindly be considered as many a time this application will be access from Mobile as well as Laptop/PC simultaneously especially by the officers of the division.
12.7	It is suggested that the clause brings out the type of agreement that needs to be signed between Railway and the RDPMS OEM so that the clause can be implemented for protection of IR's intellectual property rights.
Annexure -B 3.1	It may be clarified as to who will do this and what role Railway has to play for this purpose.
Annexure -B 6.3.2	It is suggested that Railway should have its own Certificate Authority (CA) for this purpose.