

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

GOVERNMENT OF INDIA, MINISTRY OF RAILWAYS



सत्यमेव जयते

**Specification For
IP Based
Integrated Passenger Information System**

Specification No. RDSO/SPN/TC/108/2019, Ver. 1.0

**Issued by
S&T DIRECTORATE
(TELECOM SECTION)
RESEARCH DESIGNS & STANDARDS ORGANISATION
MANAK NAGAR, LUCKNOW-226011**

Issued by:	Director/Tele- I	Page 1 of 62
------------	------------------	--------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

I. AMENDMENT HISTORY

S. N.	Amendment date	Version	Reasons for Amendment
1.	07.02.2020	Version 0.0	First Issue, as per Railway Board letter No. 2010/Tele/9(1)/1 Pt. dated 18.6.2019. Approved by ED/Tele at page NP-5 of File No. STT/IP based IPIS/Spec/885.
2.	05.09.2023	Version 1.0	Integration with CAP & NTES as per latest API and to add some missing data communication protocol. Approved by PED/S&T on date 05.09.2023 at Note#113 in e-Office File No. RDSO-TELEOLKO(TECH)/6/2019-O/o Jt. DIRECTOR/TELE-1/RDSO

II. DOCUMENT DATA SHEET

Document Number:	RDSO/SPN/TC/108/2019 Version 1.0
Document Title:	Specification for IP Based Integrated Passenger Information System (IPIS)
Prepared by, Designation:	Director/Telecom- I
Approved by, Designation:	PED/S&T
Abstract: This document specifies technical specification of IP Based Integrated Passenger Information System Consisting of True colour Video-cum-Train Information Display Boards, Coach Guidance Display Boards and PC based Announcement System.	

III. DOCUMENT CONTROL SHEET

Designation	Organisation	Function	Level
SSE/Telecom	RDSO	Member	Prepare
Director/Telecom-I	RDSO	Member	Prepare/Review/Issue
PED/S&T	RDSO	Approving Authority	Approve

Issued by:	Director/Tele- I	Page 2 of 62
------------	------------------	--------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

IV. TABLE OF CONTENTS

Sr. No.	Name of the Item	Page No
1	Scope	5
2	System Description	5
3	System Requirements	5
4	Functional Requirements	14
5	Software Requirements	17
6	Power Supply	23
7	Data Communication Protocol	24
8	Tests and Requirements	24
9	Test Procedure	27
10	Quality Assurance	30
11	Marking & Packing	31
12	Documents to be supplied by Manufacturer	31
13	Information to be furnished by Purchaser	31
14	Training	32
15	Diagrams	32
16	Annexure- A	33
17	Annexure- B	57
18	Annexure- C	58
19	Diagram -1	59
20	Diagram -2	60
21	Diagram -3	61
22	Diagram -4	61
23	Diagram -5	62

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

V. SUMMARY:

This specification covers the general, functional, technical and performance requirements of IP Based Integrated Passenger Information System suitable for displaying Train arrival/ departure indication, coach guidance and PC based announcement system and for showing True colour Commercial Advertisements and video displays.

VI. SOURCE:

Draft specification No. RDSO/SPN/TC/108/2019, Ver. - 0.0 has been prepared by RDSO, Lucknow as per Railway Board letter No. 2010/Tele/9(1)/1 pt., dated: 18.6.2019.

VII. FOREWORD:

RDSO Specification No. RDSO/SPN/TC/108/2019 is issued as draft specification. This specification is circulated to customers/ Railways and field inspection units for comments.

In the absence of IRS specification, procurement may be made as per RDSO/SPN/TC/108/2019 specification.

This specification requires the reference to the following specifications:

IRS: S23	Electrical signaling and interlocking equipment
RDSO/SPN/144	The Safety and reliability requirement of electronic signaling equipment
IS:9000	Basic environmental testing procedures for electronic and electrical items

Wherever, reference to any specifications appears in this document, it shall be taken as a reference to the latest version of that specification unless the year of issue of the specification is specifically stated.

For the purpose of this specification, the terminology given in IRS: S23 and RDSO/SPN/144 shall apply.

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

1.0 SCOPE:

This specification covers the general, functional, technical and performance requirements of IP Based Integrated Passenger Information System used for giving train arrival/departure information and any other video/image/alert information to passengers, which includes different type of display i.e. Single Line, Multiline, True colour indoor and outdoor video display, At a glance, coach guidance and PC based announcement system, placed at various places of the station with feature of networking, Operations from local operator and remote monitoring from a central place.

2.0 SYSTEM DESCRIPTION:

2.1 The IP Based Integrated Passenger Information System (IPIS) will consist of Central Data Controller (CDC) loaded with software for announcement & display, Remote monitoring Software (RMS), PDC, LED display (TV) and display boards of different sizes like Single Line, Multiline, At a glance, True colour Indoor and outdoor video display, Coach Guidance.

2.2 **Multiline Display Board** to display train Information in mono colour i.e. Train number, Name, time of arrival/departure and platform number. It will show information of up trains/ down trains or both as decided by the purchaser. The multiline display boards will be placed at main entrance/ concourse of the station.

2.3 **True colour Indoor and Outdoor Video Display** shall display train information in multi-colour, commercials, entertainment programs and other information to passengers.

2.4 **Platform Display Board** to display the information of the train scheduled for arrival/departure from that platform i.e. Train number, Name, time of arrival/ departure in mono colour. The Platform display boards will be placed at suitable places on platforms/ foot-over bridges.

2.5 **At-A-Glance Display Board** for displaying information of the train arriving/ departing from that platform along with coach composition in mono colour.

2.6 **Coach Guidance Display Board** to indicate position of coach No. scheduled for arrival/ departure from that platform for guidance of passengers in mono colour.

2.7 **Display Monitor/ LED TV** (Industrial grade capable of working 24x7) to display train information being displayed on **Multiline Display Board**. Display monitor shall be provided in the enquiry offices, waiting rooms or at any suitable Indoor application only.

2.8 It should also be possible to network all systems provided at different locations at a station for carrying out operation from a centralized place.

2.9 All devices shall be connected at the station with LAN network. LAN network shall be arranged by the purchaser.

3.0 SYSTEM REQUIREMENT:

3.1 **Hardware Requirements:** The IP based IPIS shall Consist of following units/subsystems:-

- a) Central Data Controller (CDC)
- b) Central Data Switch (CDS)
- c) Platform Data Controller (PDC)
- d) Multiline Display Board (MLDB)
 - i. Mono colour MLDB
 - ii. True colour MLDB (Indoor video display (IVD) & Outdoor video display (OVD))

Issued by:	Director/Tele- I	Page 5 of 62
------------	------------------	--------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

- e) Platform Display Board (PFD)
- f) At-a-glance display Board (AGDB)
- g) Coach Guidance Display Board (CGDB)
- h) Display Monitor/ LED TV (industrial grade)
- i) RMS Server

3.2 Central Data Controller:

- 3.2.1 The Central Data Controller (CDC) shall consist of two CPUs (PCs) in redundant mode connected through an CDS for data synchronization, one 17" (minimum) Colour monitor to be connected through a Keyboard-Video-Mouse (KVM), speaker and microphone for live announcement.
- 3.2.2 The CPU of CDC shall be of industrial grade & reputed make having following minimum configuration:
- a) i5 processor or equivalent or higher processor
 - b) Min. 4 GB or higher RAM
 - c) Storage space: Solid State Disk Min. 500 GB or higher
 - d) Standard I/O Ports (Min. 4 USB)
 - e) Windows- 10 or higher version Operating System (OS)
 - f) Gigabit Ethernet Port- 10/100/1000 Mbps
 - g) Audio Input /Output ports
 - h) Keyboard & Optical Mouse
 - i) Schema based DBMS like MySQL/ SQL server 2000, MS Access, Oracle or schemaless like MongoDB, Tableau or any other type of file handling like XML file, JSON file or similar.
 - j) 2GB Graphic Card (If not inbuilt in CPU)
- 3.2.3 Both the CPUs of CDC shall be pre-loaded with necessary software and database packages for working of Integrated Passenger Information System (IPIS). There shall be continuous data synchronization between both the CPUs connected through a LAN link. At a time only one CPU will work but database of both CPUs shall be updated automatically.
- 3.2.4 It should be possible to operate CDC from a suitable control center or enquiry office, preferably a dust free or AC environment.
- 3.2.5 CDC shall be provided with voice recording and playback facility for making live PC based announcement. There shall be provision for one speaker with volume control to monitor the announcement.
- 3.2.6 The Audio output for PC based announcement shall be connected to existing audio amplifier of public address system eliminating any ground noise or hum.
- 3.2.7 UPS of minimum 1 KVA with minimum 25 minutes battery backup on 0.8 KVA shall be provided for uninterrupted operation of the CDC.
- 3.2.8 CDC should be switched OFF only after closing all running programs and with proper shut down operation.

Issued by:	Director/Tele- I	Page 6 of 62
------------	------------------	--------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

- 3.2.9 Cabinet of the equipment shall be well designed to sustain external vibration due to movement of trains.
- 3.2.10 Cabinet of CDC should be of standard design as per schematic shown in diagram-2 & made of Cold Rolled Closed Annealed (CRCA) sheet of minimum 1.2 mm thicknesses. It should be powder coated in ivory/gray colour to protect from rust. Shelves of suitable height shall be provided to accommodate the equipment. Proper power supply distribution with plugs & sockets of appropriate capacity and earthing connection point shall be provided on the cabinet. Gland plates shall be provided on the top panel of cabinet for cable entry.
- 3.2.11 The cabinet shall have locking arrangement for front and back doors for equipment safety. Front side of the cabinet may have two or three doors. Only keyboard & mouse shall be accessible to operator whereas the other equipment's remain in locked condition. Front door of the cabinet shall be of toughened glass/ transparent UV polycarbonate sheet.
- 3.2.12 **Integration with NTES:**
- 3.2.12.1 System shall be fully equipped with suitable hardware & software to acquire updated data of running trains from NTES via NTES REST API 951 & 952 using HTTPS protocol or any central server.
- 3.2.12.2 Backward Integration with NTES for PF Update: - System shall be able to send all changes in the Train Platform done by IPIS Software operator, from IPIS Software to NTES via NTES REST API 861.
- 3.2.13 **Integration with CAP:** System shall be able to get early warning information provided by National and State Disaster Management authorities through Common Alerting Protocol (CAP) based Integrated Alert System during emergencies like floods, cyclones and Covid pandemic etc.
- 3.2.13.1 In case of disaster situations, IPIS software shall be able to automatically announce the alert message through the existing PA system periodically and also send the disaster related message on the display boards. In Multiline Display Board (Mono colour & True colour MLDB) disaster message shall be displayed on the last line of display boards in a scrolling manner and when no alert is active/available, all lines should be used for displaying train information. For other display board like Platform Display Board (PFD) & At-a-glance display Board (AGDB) disaster message shall be displayed alternately along with train information in a scrolling manner. The display time of both the train information and the alert messages should be configurable and repetition interval of the announcements should also be configurable.
- 3.2.13.2 System shall be able to display message of min 306 character lengths in English, Hindi & Regional Language in scrolling manner.
- 3.2.13.3 Common Alerting Protocol (CAP) API shall be provided by C-DOT (Centre for Development of Telematics) of the Department of Telecommunications (DoT), Ministry of Communications, Government of India. Any change in data protocol shall be updated time to time.
- 3.2.13.4 IPIS operators shall be notified about the new alerts at the arrival of the same by generating a pop up window in the IPIS software which shall contain the alert details

Issued by:	Director/Tele- I	Page 7 of 62
------------	------------------	--------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

such as alert message, start time, end time, audio availability, urgency, severity and certainty as received through the CAP API.

- 3.2.13.5 A separate tab in the IPIS software shall be provided for displaying all the active alerts. Alert parameters like alert message, audio availability, urgency, severity, certainty, start time and end time as received through CAP API shall be displayed for viewing by the operator. This tab shall contain two buttons which can be used to override/pause message dissemination and audio dissemination of the selected alerts. The pause duration shall be configurable and Selection of alerts should be possible by a single click.

3.3 Central Data Switch:

- 3.3.1 The Central Data Switch (CDS) shall provide Ethernet and optical connectivity for data communication between both CPUs of CDC, PDC and Display boards.
- 3.3.2 Minimum 4 X SFP (optical) ports & minimum 8 LAN (copper) ports Layer 3 switch (as per site requirement or as specified by Purchaser) shall be used as Central Data Switch.
- 3.3.3 Data communication between CDS to display boards shall be on Ethernet using STP CAT-6 cable or it should be on Optical Fiber cable if distance is more.
- 3.3.4 CDS shall be of industrial grade & reputed make like HP, CISCO, Juniper, Brocade, IBM, Alcatel, Lucent, Avaya, Netgear, D-link, Moxa, Phoenix Contact, Digisol etc. or any other similar make.

Note: Local content (LC) shall be as per Table-A (List of telecom product, Services and works) issued by Department of Telecommunications, Ministry of communications vide notification published in the Gazette of India Extraordinary (Part I Sec. I), New Delhi, 29th August-2018.

3.4 Platform Data Controller (PDC):

- 3.4.1 The Platform Data Controller shall drive Platform display boards, At-a-glance display boards and Coach guidance display boards.
- 3.4.2 The Platform Data Controller Shall act as a Gateway for all the platform devices.
- 3.4.3 The Platform Data Controller shall have Layer-2 switch compatibility features for routing packets between CDC and field devices like Platform display boards, At a Glance Display Board and Coach Guidance display boards.
- 3.4.4 The PDC shall have minimum six optical Ethernet ports with single mode optical interface and at least four Copper Ethernet ports for connecting CDC through CDS and field Display Devices.
- 3.4.5 The Platform Data Controller design should be based on minimum 32-bit microcontroller. The PDC shall route the data/ instructions coming from the Central Data Controller to the downstream display devices and health/ diagnostics information from the display devices to CDC.
- 3.4.6 Connectivity of coach guidance display shall be on daisy chain like structure and in case of failure (like power down) of any device, extension of communication link shall not be affected. Also, in case of removal of any Display Board for repair it should not affect working of other display Boards.

Issued by:	Director/Tele- I	Page 8 of 62
------------	------------------	--------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

- 3.4.7 All the ports shall have LED indications for monitoring the communication status of the connected devices.
- 3.4.8 Platform Data Controller shall be installed on each platform to cater data connectivity requirement of all the display board Connected to It.
- 3.4.9 It should be possible to mount PDC on wall. PDC, fiber termination box, power strip etc. shall be accommodated in a standard 19" Euro Rack of suitable height.
- 3.4.10 The PDC shall communicate with the CDC and display devices connected to it.
- 3.4.11 All Ethernet copper ports of PDC should be standard RJ-45 Ethernet connector. The pin out of RJ-45 connector shall be as per as per IEEE802.3.
- 3.4.12 All Optical ports of PDC should be standard SC or LC type connector.
- 3.5 General Requirements of Mono colour multiline display, At a glance display, platform display board & coach guidance display board:**
- 3.5.1 Following character sizes shall be used for displaying information on Display boards:
- Preferably Character Size on display board with 16 Rows of LEDs: For English and Numeric, the character size shall be adjusted to appropriate character width subject to maximum of 16X10 & for Hindi or Regional Language it should be maximum up to 16X14 LED matrix. There should be a gap of min. 16X1 LED matrix between two consecutive characters and 16X3 LED matrix between two consecutive words. However, actual character size may depend on type of font used.
 - Character Size for coach composition data display:
For English, the character size shall be preferably of 7X5 LED matrix. There should be a gap of minimum 7X1 LED matrix between two consecutive characters and 7X3 LED matrix between two consecutive words. However, actual character size may depend on type of font used.
- 3.5.2 Protective grid made of Glass filled Nylon/ PC-ABS of black colour shall be provided on LED matrix for uniform intensity of the display boards.
- 3.5.3 All display boards shall be protected with U.V. stabilized polycarbonate sheet having thickness of 3mm $\pm$ 0.3mm for better visibility and protection against dust/Rain.
- 3.5.4 Only single polycarbonate sheet without any joint should be used to cover all type of display boards however for Multi line display boards of more than two lines can be covered either by a single polycarbonate sheet for complete board or for individual line.
- 3.5.5 Material used for the printed circuit board (PCB) shall be copper clad glass epoxy of grade FR-4 or equivalent. The PCB thickness shall be 1.6 mm $\pm$ 0.16mm.
- 3.5.6 All Display boards (multi & mono colour) shall be manufactured using 16 X 48 LED matrix. The pitch of mono colour LED matrix shall be 10 $\pm$ 0.5 mm.
- 3.5.7 The housing of various display boards should be made of Cold Rolled Closed Annealed (CRCA) Sheet of minimum 1.2 mm thickness. It should be powder coated in black colour to protect from rust.
- 3.5.8 The Mechanical dimensions of display board shall be as under:

Issued by:	Director/Tele- I	Page 9 of 62
------------	------------------	--------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

Display board Type	Physical Dimensions in mm
Multiline display board (Single Colour) (for Min 2 lines)	3550(L) ± 10 x 600(H) ± 5 x 150(D) ± 5 - Single sided. 3550(L) ± 10 x 600(H) ± 5 x 200(D) ± 5 - Double sided. Gap between two adjacent lines: 80±5 Increase in Height for each additional line: Max 240
Single line display board	3550(L) ± 10 x 350(H) ± 5 x 150(D) ± 5 - Single sided. 3550(L) ± 10 x 350(H) ± 5 x 200(D) ± 5 - Double sided.
At-a-glance display board	2150(L) ± 10 x 500(H) ± 5 x 150(D) ± 5 - Single sided 2150(L) ± 10 x 500(H) ± 5 x 200(D) ± 5 - Double sided
Coach guidance display board	540(L) ± 5 X 250(H) ± 5 X 200 ± 5 (Depth Top) & 178 ± 5 (Depth Bottom)

Note: At-a-glance display board, Coach guidance display board and Single line display board shall be as per Diagram-3 to Diagram-5.

- 3.5.9 Sun guard/ rain hood made of CRCA Sheet of minimum 1.2 mm thickness shall be provided on the top of all type of display boards to protect them from direct sun light, rain and dust.
- 3.5.10 Field format of Single/multiline display board, each line consisting of the LED matrix of 16X336 should be preferably as per following format:

55	3	192	3	45	3	10	3	22
Train No.		Train Name		Expt. Time		A/D		PF No.
5 Digits				4 Digit + Colon		1 Char.		3 Digits
44444		AAAAAA	AAAA	EXP		20:45	A	10

- 3.5.11 Display format of Single & multiline display board (16 x 336) shall be as under:

TRAIN No.	TRAIN NAME	EXPT. TIME	A/D	PF No.
12345	RAJDHANI EXPRESS	10:10	A	10

Single Line ↑ Multiline Line ↓

TRAIN No.	TRAIN NAME	EXPT. TIME	A/D	PF No.
12345	RAJDHANI EXPRESS	10:10	A	10
22345	GOMTI EXPRESS	11:05	D	2
12356	BHOPAL SHATABDI	11:15	D	3
31235	ITARSHI LOCAL	CANCELLED		
12347	GAYA EXPRESS	12:30	A	4

- 3.5.12 Field format of At-a-glance Display board shall be preferably as per following format with LED matrix of 32x192. However, actual format will depend on the font type and information to be displayed.

Issued by:	Director/Tele- I	Page 10 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

64	3	53	3	28	3	38
Train No.		Expt. Time		A/D		PF No.
5 Digits		4 Digit + Colon		1 Char.		3 Digit
44444		20:45		A		10

3.5.13 At-a-glance display board shall be display coach composition information in a four-line LED matrix of each 8 x 192.

3.5.14 Display format for at a glance Display Board (32 x 192) shall be as under:

TRAIN No.	EXPT. TIME	A/D	PF No.
12345	ENG GRD SLR S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 PC B1 B2 B3 A2 A3 H1 SLR <=> LAD GEN GEN		

3.5.15 It shall be possible to give Train information on at a glance Display Board as a two lines LED matrix of each 16 x 192. The display shall preferably be as per the following format. Train information & coach composition information are to be shown alternatively.

TRAIN No.	EXPT. TIME	A/D	PF No.
12345	10:10	A	10
RAJDHANI EXPRESS			

3.5.16 CGDB shall be double faced & other Display Boards can be single or double faced as specified by the purchaser. However, if not specified default will be single face.

3.5.17 Display format for Coach Guidance Display Board:

TRAIN /COACH No. 15046	TRAIN /COACH No. S12	TRAIN /COACH No. GEN	TRAIN /COACH No. ENG
TRAIN /COACH No. एस-12	TRAIN /COACH No. अना.	TRAIN /COACH No. इंजिन	
Train No.	Coach No.	Coach No.	Coach No.

3.6 General Requirements of True Color Video Display Board (OVD & IVD):

3.6.1 The LED video display board shall be made up of multiple LED modules and cabinets. Each module shall consist of LEDs and respective drivers. LED modules/cabinets shall be arranged vertically and horizontally to construct the actual display. These LED modules shall be interchangeable and shall be used anywhere.

3.6.2 LED Display module shall be manufactured using 16 X 48 LED matrix.

3.6.3 Glass filled nylon / PC-ABS based LED trays shall be used to fix LED panels.

Issued by:	Director/Tele- I	Page 11 of 62
------------	------------------	---------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

- 3.6.4 Fans shall be provided for circulation of air inside the cabinets of the display board. Air filters are also to be provided to avoid dust entry into these cabinets.
- 3.6.5 Each cabinet shall have water and dust proof connectors for data in and data out and power cables.
- 3.6.6 Audio output shall be available from display controller which may be connected to a suitable audio amplifier.
- 3.6.7 The mechanical mounting of LED matrix should be easy for replacement of LED module in case of repair. Such replacement shall not affect operation of any other modules of the system.
- 3.6.8 Display Board cabinet shall be made up of minimum 1.2 mm thick CRCA sheet with powder coating.
- 3.6.9 The door shall be provided with gaskets to avoid water and dust entry into the cabinet.
- 3.6.10 Multi-line train info display format on Video Display Board shall be as under:

TRAIN NO.	TRAIN NAME	EXPT. TIME	A/D	PF NO.
17031	HYDERABAD EXP.	10:45	A	10
15046	GORAKHPUR EXP.	18:20	A	04
57642	REPALLY PASSENGER	18:20	D	04
12236	GUWAHATI RAJDHANI EXP.	CANCELLED		
12004	SWARN SHATABDI EXP.	06:15	D	01
12229	LUCKNOW MAIL	22:10	D	01

- 3.6.11 **General Requirements Outdoor Video Display (OVD) Board:**
- 3.6.11.1 The pitch of Outdoor video display boards shall be of 10 mm± 0.5 mm.
- 3.6.11.2 Front side of LED Modules shall be protected from rain and dust with suitable protective material.
- 3.6.11.3 The outdoor video display board shall be IP 65 front and IP 54 back for environmental standard compliant to protect it against dust & rain.
- 3.6.11.4 Parameters of outdoor video display boards:

SN	Description	Specifications		
		6-Line	12-Line	18-Line
1.	Pixel LED	3-in-1 (RGB) SMD LED		
2.	Pixel Resolution (W x H)	432 x 128	432 x 256	432 x 384
3.	No. of lines	6 Line	12 Line	18 Line
4.	Color Processing	12-Bit per color or more		
5.	Line Height	20 pixels		

Issued by:	Director/Tele- I	Page 12 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

6.	Scan Rate	1:4 Scan
7.	PCB Thickness	1.6 mm $\pm$ 0.16 mm
8.	PCB Mask & Legend	Black/Green Mask & White Legend

3.6.12 General Requirements Indoor Video Display (IVD) Board:

3.6.12.1 The pitch of Indoor video display boards shall be of 7.5 mm $\pm$ 0.5 mm.

3.6.12.2 Parameters of Indoor video display boards:

SN	Description	Specifications		
		6-Line	12-Line	18-Line
1.	Pixel LED	3-in-1 (RGB) SMD LED		
2.	Pixel Resolution (W x H)	432 x 128	432 x 256	432 x 384
3.	No. of lines	6 Line	12 Line	18 Line
4.	Color Processing	12-Bit per color or more		
5.	Line Height	20 pixels		
6.	Scan Rate	1:8 Scan or better		
7.	PCB Thickness	1.6 mm $\pm$ 0.16 mm		
8.	PCB Mask & Legend	Black/Green Mask & White Legend		

3.7 Specification of LED:

3.7.1 LEDs specification for Mono colour multiline display, at a glance display, platform display board & coach guidance display boards:-

3.7.1.1 Cool White colour Chip Type SMD LEDs of uniform intensity shall be used for better visibility in all types of display boards. However Amber Color SMD LED may be used in all type of Display boards except CGDB, **if specified by the Purchaser**.

3.7.1.2 Diffused Chip Type SMD LED meeting following parameters shall be used for display boards.

S. No	Parameters	White LED	Amber LED
1.	LED Type & Size	Chip Type SMD 3.6mm x 3.6mm (Over all max. dimension)	
2.	Color	White	Amber
3.	Wave Length	Color Temperature 6500 $\pm$ 10 %	595 $\pm$ 7nm
4.	Viewing Angle (50% I _v in mcd)	Minimum 90°	
5.	Luminous Intensity @ 20mA biased current	$\geq$ 1500 mcd	$\geq$ 500 mcd
7.	Make	Avago / Nichia / Osram/ Everlight/ CREE	

Issued by:	Director/Tele- I	Page 13 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

3.7.2 LED for Indoor & outdoor Video Display Boards:

3.7.2.1 Super bright 3-in-1 (RED, GREEN and BLUE) SMD type LEDs of uniform intensity shall be used for true color with longer visibility in Indoor & outdoor Video Display boards.

3.7.2.2 3-in-1 (RGB) SMD type LEDs for Indoor Video Display (IVD) & outdoor Video Display (OVD) shall have the following parameter:

S. No.	Parameters	Board Type	RED LED	GREEN LED	BLUE LED
1.	LED Type & Size	IVD	SMD 3-in-1 (RGB) LED 3.5mm x 3.5mm (maximum)		
		OVD	SMD 3-in-1 (RGB) LED 5.5mm x 5.5mm (maximum)		
2.	Wave Length	IVD & OVD	626 ± 10nm	530 ± 10nm	470 ± 10nm
3.	Viewing Angle (50% I _v in mcd)	IVD & OVD	Minimum 90°		
4.	Luminous Intensity @ 20mA	IVD	≥ 270 mcd	≥ 750 mcd	≥ 190 mcd
		OVD	≥ 680 mcd	≥ 1800 mcd	≥ 400 mcd
5.	Make	IVD & OVD	Avago / Nichia / Osram/ Everlight / CREE		

3.8 General Requirements of LED Monitor Display Board (TV)

3.8.1 Monitor Display Board (LED TV) of minimum 40 inch or as specified by the purchaser shall be used for Display of train information for Indoor application only.

3.8.2 Smart Industrial Grade LED TV (capable of working 24x7) shall be used for Monitor Display Board.

3.8.3 All Monitor display Board shall be connected over LAN as per IP Schema.

3.8.4 There shall be provision to play media with audio on Monitor display Board.

3.8.5 Monitor Display Board shall automatically switch between active servers (Primary/ Secondary).

3.9 RMS Server

3.9.1 RMS Server shall be provided at the each station for remote monitoring.

3.9.2 CDC shall be connected to RMS & RMS can be connected to Railnet/ any other compatible network for remote monitoring.

3.9.3 Configuration of RMS Server shall be as per Clause No. 3.2.2.

4.0 FUNCTIONAL REQUIREMENTS:

4.1 Display board shall be of five types, depending on its location.

a) True colour Video Display Boards for displaying information of multiple trains in multi colour and Railway promotional videos or commercial advertisement etc.

b) Monochrome MLDB shall be used for display of multiple train information.

Issued by:	Director/Tele- I	Page 14 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

- c) Monochrome Platform Display Board for displaying information of single train.
 - d) Monochrome At-A-Glance Display Board for displaying information of the train arriving/departing from that platform with coach composition.
 - e) Monochrome Coach Guidance Display Board to indicate position of coach No. scheduled for arrival/departure from that platform for guidance of passengers.
- 4.2 Hardware and software of IPIS of the different vendors shall be interoperable. Addition of any new device of any approved vendors shall require configuration of IP in the network and the new device should run in the existing LAN network.
- 4.3 The software shall be designed as per Annexure-A (protocol) so that software shall be independent of the hardware and interoperable with different vendors.
- 4.4 All the equipment of the system shall be connected on a single network at the station. This network will be connected through CDC. CDC shall be connected to RMS Server & RMS can be connected to Railnet/ any other compatible network for remote monitoring.
- 4.5 All Display Board except CGDB shall be having inbuilt two Ethernet ports (one Copper and other optical) for data transfer. CGDB shall be having one Ethernet port (Copper/optical).
- 4.6 Multiline display board shall be located at the concourse/ main entrance of the station. Platform display boards shall be placed at the respective platforms. The exact location is to be indicated by the purchaser.
- 4.7 Multiline mono colour display board shall be of 2 lines or more and maximum up to 10 lines. Purchaser has to specifically mention the number of lines in each main display board as per site requirement.
- 4.8 True colour video display (IVD & OVD) shall be 6-Lines/ 12-Lines/ 18-Lines. Purchaser has to specifically mention the number of lines in each OVD & IVD display board as per site requirement.
- 4.9 At major stations separate multiline display boards for UP and DN trains are to be provided if specified by the purchaser, otherwise a common display board showing information of all trains can be provided.
- 4.10 Data transfer from CDC to all display boards shall be only on Ethernet using standard TCP/IP and UDP (for broadcast) protocol.
- 4.11 In case, the information is more than the number of lines in display board then information shall be displayed on time slot basis.
- 4.12 The Platform Display board (PFD) shall display the information of a train scheduled for arrival/departure on that platform. If the platform display board is common between two or more platforms, it can be used to display the train information of trains scheduled on all the configured platforms sequentially.
- 4.13 Fixed titles on all display boards except CGDB viz. train number, name, expected time, arrival/ departure, platform number shall be screen printed or stickered preferably in white/ yellow colour on the top of first display line on casings in capital letters. The character size of these titles shall be minimum 6 cm height. Title language shall be decided by the purchaser.
- 4.14 It should be possible to mount or fix a display board on wall at the platform entry or inside a concourse/main entry of a Railway station.

Issued by:	Director/Tele- I	Page 15 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

- 4.15 The information on display boards shall be displayed in English, Hindi and also in a Regional language, if required by the purchaser. The information shall be displayed for a specific period of up to 30 seconds and shall be selectable in the step of 10 seconds from the Central Data Controller.
- 4.16 LEDs with equal fringe and uniform intensity are to be used to manufacture display boards to ensure that the information being displayed is with excellent contrast & without any visible black patches on the display screen and it shall be flicker free.
- 4.17 All display boards shall be constructed using PCB modules. Fixing of these modules shall be such that easy replacement of PCB module should be possible in case of failure. Such replacement shall not call for removing any other PCBs.
- 4.18 Intensity of display board shall be adjustable by software in manual mode or automatic timer mode basis. The selection of the mode shall be user configurable. It shall be possible to adjust intensity of selected display board through software from CDC in steps of minimum 25% in the range from 25% to 100%.
- 4.19 ICs used for the display board should be preferably of surface mounted devices (SMD) to ensure high reliability.
- 4.20 The Coach Guidance Display (CGD) Board shall indicate the Coach No./ Train No. scheduled to arrive/depart from that platform.
- 4.21 Individual coach display board across the platform should display Train No & Coach No. alternatively like GEN, D1, S10, B1, A1, H1 in English and “अना., डी-1, एस-10, बी-1, ए-1, एच-1” etc. in Hindi. The information of Train No/ Coach No shall be displayed alternatively at an interval of 10 second. The information of Train No/Coach No. shall be displayed in Hindi and English alternatively with synchronization. Time period for display of information should be programmable in step of 10 second.
- 4.22 The display systems shall be suitable for working in AC/ DC electrified and non-electrified sections. It shall be suitable in all sections including where locomotives thyristor controlled single phase or 3-phase induction motors having haul passenger or freight trains and chopper-controlled EMU stocks are operated.
- 4.23 Performance of the system shall not be affected in AC/DC electrified area.
- 4.24 When there is no data to be displayed, it should not display any garbage on the display board. The boards shall have proper built-in recovery mechanism like watchdog timers to automatically recover the information in case the processor goes haywire.
- 4.25 Construction of different type of display boards should be modular, such that any defective module (i.e. PCB, connector, cable, power supply unit etc.) can be easily replaced to make the system functional.
- 4.26 Display board of IPIS of various vendors shall be interoperable. It should be possible to receive & display train information data coming from CDC of other Firm using standard data protocols. From CDC, it should be also possible transfer data to display boards of other make and monitor link status & health of the display devices connected in the system.
- 4.27 Conformal coating shall be applied on assembled and tested printed circuit boards to protect them from Humidity, Dust and dirt, Airborne contaminants like smoke and

Issued by:	Director/Tele- I	Page 16 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

chemical vapors, conducting particles like metal clips and filings, Accidental short circuit by dropped tools, fasteners etc.

- 4.28 The solder masks (green/black/combination of both) shall be applied on the solder side and component side of the card/PCB.
- 4.29 Wiring between different modules should be done with the help of male/female type of connectors. There should not be any requirement of rewiring, re-soldering/de-soldering for replacement of defective module.
- 4.30 Suitable 'Earthing' point shall be provided for earthing the body of display board. Brass bolt of 6 mm diameter shall be provided at appropriate place & suitably marked.
- 4.31 Proper Earthing arrangement shall be ensured by Railways for display boards.
- 4.32 The Earthing arrangement is to be provided by the OEM to ensure that all display boards along with CDC should have resistance not greater than 2 Ω .
- 4.33 For installation of coach guidance display board on uncovered portion of the platform shall be provided using GI pipe of minimum 3-inch diameter or as specified by purchaser.
- 4.34 Manufacturer shall maintain proper account of LEDs being used. The record shall include various details like source of supply, procurement invoice number & date, quantity, incoming rejection, lot wise consumption etc. which can be verified by the inspecting officials.
- 4.35 LEDs used in LED display units shall be of high-performance quality and from reputed manufacturers as stipulated by RDSO. LED make & their part number shall not be changed without prior approval of RDSO.
- 4.36 Following information shall be etched/ screen printed on the component side of the PCB.
 - a. Manufacturer's name
 - b. PCB name/Part number
 - c. Component outline (in proximity of the component)
- 4.37 Following information shall be engraved or marked with permanent ink on the PCB
 - a. Card serial number
 - b. Month and year of manufacture

5.0 SOFTWARE REQUIREMENTS:

5.1 General Software Features:

- 5.1.1 The software dealing with operational transactions like train arrival/ departure & platform specific data entry should be standard windows /web based application.
- 5.1.2 RMS (Remote Monitoring software) should be a web-based application loaded in RMS Server. This shall allow the access to the applications from any of the standard PCs remotely connected in LAN, having standard browser tool only for monitoring and reporting purpose.

Issued by:	Director/Tele- I	Page 17 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

- 5.1.3 It should be possible to categorize users. Creation of a new category user shall also be possible. Data integrity should be maintained in both servers (CDC & RMS) even though the system is being accessed and controlled by different user.
- 5.1.4 It should be possible to generate different reports in both servers (CDC & RMS) as per requirement for all operational & functional activities being done in the system like announcement, train send for coach display and trains send for TADDB.
- 5.1.5 Any failure in data transfer from CDC to display boards shall be available in the both systems (CDC & RMS) as an event for use of Administrator. Event logging shall also be available.
- 5.1.6 History of events or log of information transferred to various display boards shall be available in CDC for 45 calendar days for analysis & logs beyond 45 days shall be automatically deleted. However, Logs in RMS server should be maintained at least 90 days.
- 5.1.7 It should be clearly distinguished from user interface that which train information has been sent to display and which is yet to be sent.
- 5.1.8 HELP menu shall be provided.
- 5.1.9 All the master data entry forms and configuration screens shall be provided for the initial installation of the system, for any station.
- 5.1.10 Different display colors shall be configurable to different train status messages being displayed on OVDs & IVDs.

5.2 Video Display Software Feature:

- 5.2.1 The CDC shall accept different file formats of video content and images to be played on Video Display Boards. A minimum of the following formats should be supported by the display system: (i). Image: .bmp, .jpeg, .jpg, .png, .tiff (ii). Video: .mpeg, .mp4, .wmv, .dat, .avi, .mov.
- 5.2.2 Software shall accept the user/operator configuration about the schedule of items, where each item may be of any still, animated and video format data. Software shall accept to store different play lists, each with different user-configurable name. Software shall play continuously item after item sequentially for the selected play list. If all the items in the play list are completed over a time, the play list shall be repeated.
- 5.2.3 Software shall provide the option to configure the different display & clearing effects/ transition effects in case the item being inserted into the play list is of still image format.
- 5.2.4 The display controller of indoor or outdoor video display board shall accept the schedule configuration and the data for the scheduled items from the CDC. It shall be possible to configure the attributes like repeat count, stay time, etc., for each of the items in the play list.
- 5.2.5 The software shall be customized to get the specific train arrival/ departure information or any other passenger service-related information as desired by the purchaser, from railway designated server system, through standard & open protocols/interfaces, if specified by purchaser. Software shall be customizable for processing the obtained data and displaying

Issued by:	Director/Tele- I	Page 18 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

the information in pre-configured formats on the display board. Protocol of such system is to be arranged by purchaser.

- 5.2.6 All operations related to display board scheduling, schedule content changing & pushing the train arrival/departure information to the display board shall be possible from the CDC to all the display controller over Network.
- 5.2.7 Preview of files feature shall be available to the user such that user shall be able to view the content of selected item or selected schedule and make alterations if necessary in schedule before display on the display board.
- 5.2.8 Feature of adjustable display time for still images shall be available which shall allow the user to adjust the display time or stay time (in seconds) for the still images on display boards. It shall be also possible to set different durations for different images.
- 5.2.9 Feature of display of special messages during live display shall be available which shall facilitate user to display some special messages (flashing or stay for configured time in the bottom of display boards) on display boards. These messages shall be displayed in English / Hindi or regional language in different font sizes and different colour.
- 5.2.10 Feature of fit to display board maintaining the aspect ratio shall be available. This feature at CDC shall be helpful when the actual data referred in the scheduled items (still or animated or video) are bigger / smaller than the actual display screen in terms of pixel resolution. This feature is to avoid unnecessary efforts of the operator to reduce / increase the actual data sizes.

5.3 Train Arrival/Departure Information Entry Features:

- 5.3.1 It should be possible to configure the language of information to be displayed through software i.e. English, Hindi and regional language.
- 5.3.2 It shall be possible to apply various effects like Scrolling effects, typing effects, flashing effects, Curtain effects, etc. through configuration menu to the information being displayed.
- 5.3.3 It should also be possible to increase/decrease running speed of display information.
- 5.3.4 It shall be possible to add, modify & delete timings of existing trains in the master data base. These modification transactions should be logged for security reasons.
- 5.3.5 The entry into Master Data Base should be password protected. It should be also possible to add data of new trains. There should be provision to change the password.
- 5.3.6 Mouse click should be used to transfer data from CDC to various Display Boards.
- 5.3.7 The information displayed at various boards (PFDs and CGDs) shall be selected automatically related to those boards only based on the platform number.
- 5.3.8 Whenever user modifies details of a train (arrival time, departure time, late, PF number etc.) and sends the data to the board, the application has to take care of automatically updating user database.
- 5.3.9 The modified information shall be automatically saved as soon as it is transferred to the display board, so that in case of any failure the information data remains updated.
- 5.3.10 Health status of display boards should be available on the central data controller.

Issued by:	Director/Tele- I	Page 19 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

- 5.3.11 If two Trains are merged to form a single Train at a particular station, it should be clearly indicated on display boards by showing number of both Trains alternatively and shall be suitable announced on a PA system about the two merged Trains.
- 5.3.12 There should be provision to display the status of train like late, rescheduled, cancelled, diverted, indefinite late etc. In case of reschedule of train, reschedule time and “reschedule” text should be displayed alternatively in arrival/departure field of display board. Similar sequence of display shall be given for the status 'Change of Source', 'Terminated at' (i.e. Change of Destination) and Diverted'.
- 5.3.13 Different stages of train arrival/departure information shall be displayed based on the following formats.

Main Status	Sub Status	Status Code	English and Hindi Display		
			Exp. Time	A/D	PF No.
ARRIVAL	Running Right Time	0x01	05:30	A	1
	Will Arrive Shortly	0x02	05:30	A	1
	Is Arriving On	0x03	05:30	A	1
	Has Arrived On	0x04	Arrived / आ चुकी है		1
	Running Late	0x05	05:30	A	1
	Cancelled	0x06	Cancelled		रद् की गई है
	Indefinite Late	0x07	Indefinite Late		अनिश्चित देरी से
	Terminated At	0x08	Terminated At		<स्टेशन का नाम>
			<Station Name>		तक जायेगी
	Platform Changed	0x09	05:30	A	1
Departure	Running Right Time	0x0A	05:30	D	1
	Cancelled	0x0B	Cancelled		रद् की गई है
	Is Ready to Leave	0x0C	05:30	D	1
	Is on Platform	0x0D	05:30	D	1
	Departed	0x0E	05:30	D	1
	Rescheduled	0x0F	Rescheduled		परिवर्तित समय
			05:30	D	1
	Diverted	0x10	Diverted		परिवर्तित मार्ग
			<Route in English>		<स्टेशन का नाम>
	Delay Departure	0x11	05:30	D	1
	Platform Change	0x12	05:30	D	1
	Change of Source	0x13	Start at		<स्टेशन का नाम>
			<Station Name>		से जाएगी

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

For example, Expected Time is taken as “05:30 Hrs” & platform number as “01”.

- a. For the types “Running Right Time”, “Running Late”, “Rescheduled”, “Cancelled”, “Indefinite Late” & “Change of Source”, platform number is optional. For the rest, it is mandatory.
- b. For the types “Rescheduled”, “Terminated at”, “Change of Source” and “Diverted” two separate display texts containing as shown above shall be displayed alternatively with configurable duration.

5.4 Coach Guidance Software Features:

- 5.4.1 The software should have preloaded information of coach composition of all the trains arriving or departing from the station. When the train is likely to arrive at station or depart from the station, the concerned operator is required to enter the train number and update position of coaches i.e., from ENGINE to GUARD Brake Van.
- 5.4.2 It shall be possible to acquire & update data of coaches for Rake formation of a train from the central server of Coach Operation Information System (COIS) via NTES REST API 951 or any other central server using HTTPS protocols having information of coach composition. The protocols will be arranged by the concerned Railways.

Important: At many stations of IR, Train/rake Reversal takes place i.e. Engine is detached from one end and attached to the other end. Due to that coach position is reversed at that station & all upcoming stations in the train route. So, for those stations where Train/rake Reversal takes place, it should be possible to show Coach position according to both Train Arrival & Departure events. i.e. it takes at least 15 minutes for Train reversal, so once the train arrives at reversal station, IPIS should show the Coach position as per the Arrival event. Once the engine is detached & attached at the other end, it should start showing coach position as per Departure event.

Example:

Train No. 12963, it reverses at “COR” Station. So at “COR station” it should show both Arrival & Departure coach position according to engine detachment & attachment.

1. Arrival Coach Position

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
ENG	GEN	GEN	GEN	S1	S2	S3	S4	S5	S6	S7	B6	B5	B4	B3	B2	B1	A2	A1	H1	GEN	GEN	PWR
ENG	GEN	GEN	GEN	SL	SL	SL	SL	SL	SL	SL	3A	3A	3A	3A	3A	3A	2A	2A	1A	GEN	GEN	PWR

2. Departure Coach Position

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
ENG	PWR	GEN	GEN	H1	A1	A2	B1	B2	B3	B4	B5	B6	S7	S6	S5	S4	S3	S2	S1	GEN	GEN	GEN
ENG	PWR	GEN	GEN	1A	2A	2A	3A	3A	3A	3A	3A	3A	SL	SL	SL	SL	SL	SL	SL	GEN	GEN	GEN

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

- 5.4.3 On the corresponding platform the train coach positions details are displayed on the individual display boards (double faced), installed for display of each coach across the platform.
- 5.4.4 Information display period shall be programmable from the control console with respect for Coach No. & Train number.
- 5.4.5 It should be possible to display data on Coach Guidance Display Boards in English & Hindi only.
- 5.4.6 It should be possible to add, modify, insert, shift (Left & Right), reverse & delete coach composition of trains in the master table and local table.
- 5.4.7 There shall be provision for adding new coach type in coach master database.
- 5.4.8 The entry into Master Data Base shall be password protected. It shall also be possible to add new trains. The operator shall be able to enter details by typing only train number and modification to coach nos.
- 5.4.9 While deleting or modifying any train entry on the monitor, the software shall prompt user before transferring data, so that the information at board always matches with monitor information.
- 5.4.10 The modified information shall be saved as soon as it is transferred to the display board, so that in case of any failure the information remains updated.

5.5 Features of Announcement System:

- 5.5.1 The system supplied shall be of Windows based fully programmed for the announcement of all type of passenger carrying trains through key board and GUI.
- 5.5.2 Fixed audio messages shall be recorded in digital format and shall be added to audio files list.
- 5.5.3 It should be possible to make repeated announcements without affecting other operations. However, for making a repeated announcement just by repeated pressing of keys shall not be possible until the initiated announcement is finished successfully or stopped by the operator.
- 5.5.4 The format of the operation for the updating and announcement shall be user friendly.
- 5.5.5 Software shall be user friendly to the maximum extent so that addition and alterations can be done by the Railway Engineer without the help of suppliers and programmer. For any newly added train, it shall be possible to record a file externally and attached to the train through user interface. The application shall take care of placing the recorded file at appropriate internal application folder. However, any newly added train shall automatically play unless the train name or station is specific.
- 5.5.6 The system shall have provision to select messages and language to be broadcasted. The announcement shall be fluent and professional enough to avoid unnatural pauses between two pieces of voice clips.
- 5.5.7 The entire voice recording shall be done in a sound proof professional studio.
- 5.5.8 Mainly there will be three types of announcements one for a train arriving on platform, one for train arrived on platform and one for train departing from platform in English,

Issued by:	Director/Tele- I	Page 22 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

Hindi & a regional language as per user preference. It should be possible to update announcement if Platform No./Train No. is changed.

- 5.5.9 Provision shall be made for the operator to send announcement related to train number, platform numbers, and arrival/ departure just by entering the train number, platform number and status in conditions.
- Late arrival of trains.
 - Platform No. of arriving/ arrived trains and change in platform No.
 - Right time arrival of trains.
 - Departure of trains at scheduled or unscheduled time.
 - Announce/display that trains is arriving/ departing shortly or terminated or and Current status of the train.
 - Cancellation of train
 - Route Diversion of train
 - Any other message required to be announced/ displayed regarding train arrival/departure.
 - Terminated at
 - Change of Source
- 5.5.10 Voice files used in announcement for hour, minute and status (i.e. बजकर, बजे etc.) shall be recorded by the same announcer & same shall be used.
- 5.5.11 Announcements of newly added trains shall be automatic without any recording to be modified unless the train name or station name is specific.
- 5.5.12 Format for online data entry screen for announcement & display of train's details shall be preferably as per the Diagram- '1'.

6.0 POWER SUPPLY:

- 6.1 Switch Mode Power Supply (SMPS) modules of standard make of suitable capacity working on AC source of 160V to 270 Volts of appropriate current capacity shall be used in all types of display boards. SMPS modules shall be DIN Rail Mountable (DIN Rail Mountable is optional) of reputed make like lambda, Meanwell, OMRON, Delta, Phoenix Contact etc. or any other make which shall be meet following requirements:
- Suitable DC out-put may be selected depending upon type of display or controller used. The out- put voltage shall be within $\pm 2\%$ of the rated output voltage.
 - Power supply module shall have input under voltage cut-off of $160\text{VAC} \pm 10\text{V}$ & over voltage cut-off of $270\text{V} \pm 10\text{V AC}$.
 - Power supply module shall be protected against over/under voltage, short circuit and over load.
 - Power supply should have normal convection cooling with air.
- 6.2 Overall load on power supply units shall not exceed more than 70% of rated capacity.
- 6.3 Suitable Class C surge protection shall be provided at input of the power supply to protect against transient voltages suspected in the power supply source shall be provided. The parameters of Class C protection device shall be as per clause no. 5.9 of specification no. RDSO/SPN/TC/98/2011, Rev.0 or latest. Applicable parameters are given below:-

Issued by:	Director/Tele- I	Page 23 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

SN	Parameters	Limits	
		Between Line & Neutral	Between Neutral & Earth
1.	Nominal Voltage (UO)	230V	230V
2.	Maximum continuous operating voltage (UC)	≥300V	≥255V
3.	Nominal discharge current 8/20μs (In)	≥3KA	≥3KA
4.	Maximum discharge current 8/20 μs (Imax)	≥5KA	≥5KA
5.	Voltage protection level (UP)	≤1.5 KV	≤1.5 KV
6.	Indication	Mandatory	Optional
7.	Degree of Protection	IP20	IP20
8.	Housing	Fire retardant as per UL 94	Fire retardant as per UL 94

- 6.4 Flexible PVC insulated 3-core x 2.5 sq. mm multi strand power cables provided for each of the display boards shall conform to specification no. IS: 694:1990 reaffirmed 1995 or latest.

7 DATA COMMUNICATION PROTOCOL:

- 7.1 Standard TCP/IP protocol shall be used for data transfer to PDC, PFD, AGDB, MLDB, IVD, OVD & CGDB over Ethernet.

8 TESTS AND REQUIREMENTS:

8.1 Conditions of Tests:

- 8.1.1 Unless otherwise specified all tests shall be carried out at ambient atmospheric conditions.
- 8.1.2 For inspection of material, relevant clauses of IRS: S 23 and RDSO/SPN/144 shall apply.
- 8.1.3 Inspection and testing shall be carried out to the effect that all requirements of this specification are complied with.
- 8.1.4 Inspection shall be carried out for various types of display boards, control units and software. PC for Central Data Controller, Remote Monitoring System, Central Data switch etc. shall be checked during inspection for their functional performance required for proper working of complete system as per specification.

8.2 Routine Tests:

- 8.2.1 The following shall comprise the routine test and shall be conducted by manufacturer on each equipment and the test results shall be submitted to the inspecting authority before final inspection. The application software shall also be submitted to the inspection authority in advance in proper format.
- i. Environmental Stress Screening tests (ESS) on PCBs :100%
 - a) ON-OFF test on power supply modules: 60 cycles for 1 hour.
 - b) Thermal cycling (rapid temperature) on assembled boards: 9 cycles of 0°C to 70°C & stay for ½ Hour at each Temp and 1 hour at each temp. for 10th cycle.
 - ii. Card-level functional tests on all the cards.

Issued by:	Director/Tele- I	Page 24 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

- iii. High Voltage Test (Clause 9.3)
- iv. Insulation Resistance Tests (Clause 9.2)
- v. Visual inspection of complete system (Clause 9.1)
- vi. Performance test (Clause 9.5)
- vii. System level functional tests
- viii. LED parameter test (Clause 9.7)

8.3 Acceptance Tests:

8.3.1 Following shall constitute the acceptance test which shall be carried out by the inspecting authority for the purpose of acceptance on 20% of the lots (minimum 2 each type of system) offered for inspection by the Firm:

- i. Insulation Resistance Tests (Clause 9.2)
- ii. Applied High Voltage Test (Clause 9.3)
- iii. Visual inspection of complete system (Clause 9.1)
- iv. Performance test (Clause 9.5)
- v. System level functional tests.
- vi. LED parameter test (Clause 9.7)
- vii. Endurance Test (Clause 9.6)

8.3.2 Any other tests shall be carried out as considered necessary by the inspecting authority.

8.4 Type Tests:

8.4.1 For type test, complete system consisting of different size of display boards shall be subjected to following tests as applicable:

- i. Visual inspection (Clause 9.1)
- ii. Insulation Resistance Test (Clause 9.2)
- iii. Applied High Voltage Test (Clause 9.3)
- iv. Environmental/ Climate Tests (Clause 9.4)
- v. Performance Test (Clause 9.5)
- vi. Endurance test (Clause 9.6)
- vii. Card-level functional tests on all the cards.
- viii. System level functional tests.
- ix. Test for interoperability
- x. LED parameter tests (Clause 9.7)

8.4.2 Separate prototype module of 16x48 three-line single sided card each from MLDB PFD AGDB to be assembled in single unit, prototype module of IVD and OVD of minimum 32 X 48 matrix size with proper enclosure shall be fabricated for carrying out environmental/ climatic tests. LED modules, processor cards, driver cards & power supply modules should be taken from multiline/ platform display board/AGDB, IVD and OVD, on which

Issued by:	Director/Tele- I	Page 25 of 62
------------	------------------	-----------------------------

functionality tests were carried out, for constructing these prototype test modules. The display pattern of these proto type modules shall be: all LED glow.

8.4.3 Following tests are to be carried out as per details given below:

Tests	Prototypes Modules			Display Boards					
	MLDB/ PFD/ AGDB (16x48 three-line single side)	IVD (32x48 min)	OVD (32x48 min)	PFD Single\double side	AGDB Single\double side	MLDB min. 3-Lines	IVD min. 6-Lines	OVD min. 6-Lines	CGDB one no.
Visual Inspection	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Performance Test	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Insulation Resistance test	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Applied high voltage test	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Environmental/ Climatic test	Yes	Yes	Yes	No	No	No	No	No	Yes
Endurance test	Yes	Yes	Yes	No	No	No	No	No	Yes
Card/ module functional tests	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
System Level Functional Tests	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LED parameter test	From the lots used in manufacturing the display boards.								

8.4.4 Following systems should be preserved after type approval.

- One number of 16 x 336 single line single/double side display board.
- Two number of coach guided display boards (One, on which environmental testing has been conducted & one additional).
- One OVD (32x48 min) & One IVD (32x48 min) on which environmental testing has been conducted.
- One PDC
- One set of complete software in CD.

8.4.5 Only one complete system shall be type tested for this purpose. The system shall successfully pass all the type tests for proving conformity with this specification. If any one of the equipment fails in any of the type tests, the inspecting authority or his nominee at his discretion, may call for other equipment/ card(s) of the same type and subject it to all tests or the test(s) in which failure occurred. No failure shall be permitted in the repeat test(s).

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

8.4.6 Total system on which type tests are to be conducted shall consist of:

- i. One rack of CDC with Two CPUs loaded with software, CDS and all other accessories.
- ii. One PDC
- iii. One RMS Server Loaded with remote monitoring software.
- iv. One Single Line single/double side Platform Display Boards
- v. One single/double side AGDB
- vi. Four Coach Guidance Display Boards
- vii. One minimum 3-Lines single sided mono colour multiline Display Board
- viii. One IVD minimum 6-lines
- ix. One OVD minimum 6-lines
- x. One Display monitor (LED TV) minimum 40" to test
- xi. Speaker to test audio announcement interface and video displays.

8.4.7 Any other test may be carried out as considered necessary by the inspecting authority.

9 TEST PROCEDURE:

The test procedure shall be based on the system design. The methodologies to be adopted for various tests shall be decided taking into account the system design/ configuration.

9.1 Visual Inspection:

Each equipment of the system shall be visually inspected to ensure compliance with the requirement of clause 3 to 6 of this specification. The visual inspection shall broadly include:

9.1.1 System Level Checking:

- i) Constructional details.
- ii) Dimensional check.
- iii) General workmanship.
- iv) Configuration.
- v) Mechanical polarization on cards.

9.1.2 Card Level Checking:

- i) General track layout.
- ii) Quality of soldering and component mounting.
- iii) Conformal Coating.
- iv) Legend printing.

9.1.3 Module Level Checking:

- i) Indications and displays.
- ii) Mounting and clamping of connectors.
- iii) Proper housing of cards.

9.2 Insulation Resistance Test: - IR test shall be carried out:

- i. Before the high voltage test
- ii. After the high voltage test

Issued by:	Director/Tele- I	Page 27 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

iii. After completion of the climatic test

The values shall not be less than 10 Mega ohms. The measurement shall be made at a potential of 500V DC.

9.3 **Applied High Voltage Test:** - The equipment shall withstand for one minute without puncture and arcing, a test voltage applied between line terminal and earth as mentioned below:

(i) AC line terminals and earth, test voltage of 1500V AC

(ii) DC line terminals and earth, test voltage of 500V AC

The test voltage shall be alternating of approximately sinusoidal waveform of any frequency between 50 Hz and 100 Hz. Printed circuit cards shall be removed during the test

9.4 **Environmental/ Climatic Tests:-**

9.4.1 The various types of display boards and controller shall be capable of working in non-air conditioned environment in the field.

9.4.2 The various types of display systems and controller shall meet the following climatic and environmental requirements:

SN	TEST		REFERENCE
1.	Change of temp test		IS 9000 Part XIV Sect. II
	Low temp	$-10^{\circ}\text{C} \pm 3^{\circ}\text{C}$	
	High temp	$+70^{\circ}\text{C} \pm 2^{\circ}\text{C}$	
	Rate of change in temperature	$1^{\circ}\text{C} / \text{min}$	
	Duration	3 hrs at each temp. -10°C & $+70^{\circ}\text{C}$	
	Cycle	3	
	Condition	Fully functional during test	
2.	Dry heat test		IEC-571; IS:9000 Part-III Sect 3
	Temp	$+70^{\circ}\text{C} \pm 2^{\circ}\text{C}$	
	Duration	16 hrs	
	Condition	Fully functional during test	
3.	Cold test		IS 9000 Part II Sect. III
	Temp	$-10^{\circ}\text{C} \pm 3^{\circ}\text{C}$	
	Duration	2 hours	
	Condition	Fully functional during test.	
4.	Damp heat test (Cyclic)		IS 9000 Part V Sect. 2 Variant 1
	Upper temp	$40^{\circ}\text{C} \pm 2^{\circ}\text{C}$	
	Humidity	95% (+1%, -5%)	
	Cycles	6	
	Condition	Fully functional during one hour period towards end of each cycle. Stabilization shall be done at $25^{\circ} \pm 3^{\circ}\text{C}$	

Issued by:	Director/Tele- I	Page 28 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

5.	Damp heat test (Steady state storage)			IS 9000 Part IV
	Temp		40° ± 2°C	
	Humidity		93% (+2%, -3%)	
	Severity		4 days	
	Condition		Fully functional during test.	
6.	Salt mist test			IS 9000 Part XI procedure 3
	Mist + Damp heat	Procedure 3 (2 hours +22 hours)		
	Temp	35° ±3°C		
	Humidity	93% (+2%, -3%)		
	Hours	22		
	Cycle	3		
	Condition	After this test, electrical parameters shall be monitored in addition to physical checks.		
7.	Dust test			IS 9000 Part XII
	Duration		1hour	
	Condition		After this test, electrical parameters shall be monitored in addition to physical checks.	
8.	Bump test			IS 9000 Part VII, Sec. 2
	PCBs/Modules/units in packed condition shall be subjected to bump test as under:			
	No of bumps	1000		
	Peak acceleration	400m/s ²		
	Pulse duration	6ms		
	No of axes	3		
	Condition	After this test, electrical parameters shall be monitored in addition to physical checks.		
9.	Vibration test			QM-333
		Up to & including 75 Kgs. weight	Over 75 Kgs.	
	Freq. Range	05-350 Hz	5-150 Hz	
	Amplitude	±6 mm constant displacement or 15m/ sec. ² constant acceleration.	±6 mm constant displacement or 15m/ sec. ² constant acceleration.	
	No. of axes	3	3	
	No of sweep cycle	20	10	
	Total duration	105 min/axis	105 min/axis	
	If resonance is observed	10 min at each resonant freq.	10 min at each resonant freq.	
	Condition	After this test, electrical parameters shall be monitored in addition to physical checks.		

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

9.4.3 Driving Rain Test:

Besides environmental/ climate tests on various types of display system, driving rain test is also to be conducted on module of **outdoor video display board only** as per following procedure.

TEST		REFERENCE
Driving Rain test		IS 9000
Water spray for 1 hour		Part XVI Test condition 'c'
Condition	After this test, electrical parameters shall be monitored in addition to physical checks.	

9.5 Performance Test:

The equipment shall comply with the requirements as specified in Clauses 3 to 7.

9.6 Endurance Test:

9.6.1 **During type test**, endurance test shall be conducted for continuous operation which shall be 168 hours at 60°C burning for LED without giving any deterioration in light output.

9.6.2 **During acceptance test**, endurance test shall be conducted on complete system for continuous operation which shall be 48 hours at room temperature burning for LED without giving any deterioration in light output.

9.7 LED Parameter Test:

9.7.1 The manufacturer shall submit the LED data sheets at the time of inspection. The parameters of LED shall be tested as per Clause No. 3.7 & procedure enclosed as **Annexure-'B'**. Samples shall be tested as follows:

- For type test, 10 nos. of single colour SMD type LEDs & 10 nos. of 3-in-one RGB SMD LEDs shall be tested from the lots used in manufacturing display boards.
- For acceptance test, 8 nos. of single colour SMD type LEDs & 8 nos. of 3-in-one RGB SMD LEDs shall be tested from the lots used in manufacturing display boards.
- For routine test, one LED from a batch of 5000 LEDs shall be tested. If it fails, then total batch of LEDs shall be tested, of which if more than 1% of LEDs fails, then entire batch of LEDs shall be rejected.

10. QUALITY ASSURANCE:

10.1 All materials & workmanship shall be of good quality.

10.2 Since the quality of the equipment bears a direct relationship to the manufacturing process and the environment under which it is manufactured, the manufacturer shall ensure Quality Assurance Program of adequate standard.

10.3 Validation and system of monitoring of QA procedure shall form a part of type approval. The necessary plants, machineries and testing equipment's required for production & quality assurance as per Scheduling of Technical Requirements (STR) shall be available with the manufacturer.

10.4 Firm to submit Bill of Material, its make & rating used in Type Test Sample.

Issued by:	Director/Tele- I	Page 30 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

11. MARKING & PACKING:

11.1 The following information shall be clearly marked at a suitable place on each equipment:

- Name and Address of the manufacturer.
- Year of the manufacturer.
- Serial number of Equipment
- Specification number
- Wiring diagram of the equipment to be shown on the side of the cover for ready reference.

11.2 The equipment and its sub-assemblies shall be packed in thermocol boxes and the empty spaces shall be filled with suitable filling material. Before keeping in the thermocol box, the equipment shall be wrapped with bubble sheet. The equipment shall be finally packed in a wooden case of sufficient strength so that it can withstand bumps and jerks encountered in a road/rail journey.

12. DOCUMENTS TO BE SUPPLIED BY THE MANUFACTURER:

12.1 The following documents in two sets should be supplied along with the system:

- Mechanical drawings of each sub system/ rack.
- Installation and maintenance manual incorporating trouble shooting exercises, printed cards patterns, software etc.
- Operating and troubleshooting manual.
- Pre-commissioning check list.

13. INFORMATION TO BE FURNISHED BY THE PURCHASER:

The purchaser should clearly indicate details of required items including hardware and software before tendering which shall mainly consist of following items as specified by him.

SN	Description of the Item	Quantity
1.	Central Data Controller consisting of two CPUs with other accessories.	One Set
2.	RMS Server with software	One
3.	Central Data Switch Note: Minimum 4 optical & 8 copper ports L3 switch specified in the specification. If requirement of the port (optical & copper) is more, port of CDS to be decided by the purchaser.	One No.
4.	Announcement recordings in digital format as per details given by Railways	One Set
5.	Software for announcement system, various types of display boards information management & Display monitor	One set with system and one set of soft copy in CD for each station.
6.	Color of LEDs: White or Amber for PFD, AGDB & MLDB (mono colour) other than CGDB. Note:	White /Amber

Issued by:	Director/Tele- I	Page 31 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

SN	Description of the Item	Quantity
	i. Unless otherwise specified by purchaser the colour should be white. ii. Colour of CGDB should be only White.	
7.	Provision of Earthing to all display board & CDC:	Each platform should have one earthing location
8.	Platform Data Controller	To be specified by purchaser
9.	Platform Display Board: (16x336) Single or double sided, unless specified default is single side.	To be specified by purchaser
10.	At A Glance Display Board: (32x192) Single or double sided, unless specified default is single side	To be specified by purchaser
11.	Multiline Display Boards (Single or Double sided and number of lines), unless specified default is single side	To be specified by purchaser
12.	Language of Fixed titles on display boards viz. train no., name, expected time, Arrival/departure, PF no.	To be specified by purchaser
13.	Indoor Video Display Board (6/12/18 Lines)	To be specified by purchaser
14.	Outdoor Video Display Board (6/12/18 Lines)	To be specified by purchaser
15.	Coach Guidance Display double sides	To be specified by purchaser
16.	Display monitor Board (LED TV)	To be specified by purchaser
17.	Data Cable (in meters) (STP CAT 6 or higher grade)	To be specified by purchaser
18.	Data Cable (in meters) (OFC)	To be specified by purchaser
19.	Power Cable and extension boards	To be specified by purchaser
20.	Any other items or features required by the purchaser	To be specified by purchaser

14. TRAINING:

Onsite training shall be provided to the Railway staff which shall include complete assembly of the system through the use of various modules, integration of hardware with software and complete operation of the system.

15. DIAGRAMS:

Detailed construction diagrams of Cabinet, Multiline Display Board (single sided & double sided), OVD, IVD, Platform Display Board (single sided & double sided), Coach Guidance Display Board etc. shall be submitted by the OEM.

- 16.** All the provisions contained in RDSO's ISO procedures laid down in Document No. QO-D-8.1-11 (Latest Version) (titled "Vendor-Changes in approved status") and subsequent versions/ amendments thereof, shall be binding and applicable on the successful vendor/vendors in the contracts floated by Railways to maintain quality of products supplied to Railways.

Issued by:	Director/Tele- I	Page 32 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

Annexure – ‘A’

A.1 Scope

This document defines networking and data communication protocol for IP based Integrated Passenger Information System as per specification no: RDSO/SPN/TC/108/2019. This system consists of train arrival/departure Information display boards and Coach Guidance display boards with PC based Central Data Controller. The entire system data transmission and networking shall be built on Ethernet only.

A.2 Acronyms:

MSB	-	Most Significant Bit
LSB	-	Least Significant Bit
CRC	-	Cyclic Redundancy Check
C0	-	ASCII Defined Control Codes for Data transmission

A.3 Overview:

Passenger information system shall consist of mainly two types of display boards, Train arrival/departure display boards placed at different places of a railway station and Coach Guidance display boards on each platform. The updated Data shall be sent to these display boards from central data controller.

The data to all the systems, both train arrival/departure information & coach composition are disseminated and routed through the network. Each PDC disseminates data to both TADDB and CGDB on the respective platform.

The architecture and system block diagram can be referred in **Annexure-‘C’** of specification.

A.4 Systems Description:

A.4.1 Communication Type & Architecture

- i. All Communication shall be on Ethernet (TCP/ IP, UDP or HTTP based protocol) using OFC / STP CAT-6 cables.
- ii. Link Check for all type of boards shall be thru standard PING Command or protocol packet format.
- iii. Spanning Tree should be implemented at network level to ensure implementation of Ring network.
- iv. Data synchronization to CGDB should be there.
- v. All devices in the network shall have unique IP address for particular stations.
- vi. Port Number to be used for TCP/IP Communication shall be 25000.
- vii. Port Number to be used for UDP Communication shall be 26000.
- viii. IP Addressing should be of type IPv4.
- ix. IP Addressing shall be as below:

Issued by:	Director/Tele- I	Page 33 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

Device	General	PF	Special PF (1A, 10A)
CDS / PDC Gateways	192.168.0. 252	192.168. PF. 252	192.168.100+PF. 252
Primary Server	192.168.0.253		
Secondary Server	192.168.0.254		
CGDB		192.168. PF.2 - 192.168.PF.39	192.168.100+PF.2 - 192.168.100+PF.39
OVD	192.168.0.40 - 192.168.0.70		
IVD	192.168.0.71 - 192.168.0.100	192.168.PF.71 - 192.168.PF.100	192.168.100+PF.71 - 192.168.100+PF.100
MLDB	192.168.0.101 – 192.168.0.130	192.168.PF.101 – 192.168.PF.130	192.168.100+PF.101 – 192.168.100+PF.130
AGDB	192.168.0.131 – 192.168.0.160	192.168.PF.131 – 192.168.PF.160	192.168.100+PF.131 – 192.168.100+PF.160
PFDB	192.168.0.161 – 192.168.0.190	192.168.PF.161 – 192.168.PF.190	192.168.100+PF.161 – 192.168.100+PF.190
TV Display	192.168.0.191 – 192.168.0.220	192.168.PF.191 – 192.168.PF.220	192.168.100+PF.191 – 192.168.100+PF.220
NW SWITCH	192.168.0.221 – 192.168.0.250	192.168.PF.221 – 192.168.PF.250	192.168.100+PF.221 – 192.168.100+PF.250

IP Schema – RMS (for interconnecting to Railnet – WAN)							
RMS Server	10. Station Code. Divisional Code. XXXXX100	Bit 7 to 3 in forth octet represent zonal code as below					
		01 NR	02 NER	03 NFR	04 ER	05 SER	06 SCR
		07 SR	08 CR	09 WR	10 SWR	11 NW	12 WCR
		13 NCR	14 SECR	15 ECor	16 ECR	17 SCoR	
Example (First Station, First Division, Northern Railway - RMS) - 10.1.1.12							

A.4.2 Central Data Controller (CDC):

CDC provides complete control and data entry for IPIS. The CDC communicates with all systems connected in the network in the defined methods and protocol.

The CDC shall fulfil the following data communication functions.

- Send Data to IVD, OVD & MLDB
- Send Data to TADDB & CGDB

Issued by:	Director/Tele- I	Page 34 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

- iii. Get Link Status of IVD, OVD, MLDB, TADDB & CGDB
- iv. Set and get the configuration of IVD, OVD, MLDB, TADDB & CGDB
- v. Soft Reset of IVD, OVD, MLDB, TADDB & CGDB

A.4.2.1 Sending Data to IVD/ OVD

- i. Data to IVD/ OVD should be over TCP/IP protocol.
- ii. Each data packet shall have serial number.
- iii. It shall identify the failure response (if any) from the various transmission stages and retransmit.
- iv. Media Files shall be transferred to IVD/OVD by TCP File transfer protocol.

A.4.2.2 Sending Data to MLDB, AGDB & TADDB

- i. Data to MLDB, AGDB & TADDB should be over TCP/IP protocol.
- ii. Each data packet shall have serial number.
- iii. It shall identify the success response from the destination system.
- iv. It shall identify the failure response (if any) from the various transmission stages and retransmit.

A.4.2.3 Sending Data to CGDB:

Coach Guidance Display Boards are required to display train number and coach number alternatively in synchronization. In order to achieve this, the following procedure is to be adopted.

- i. Initially all the boards shall be stopped with STOP command.
- ii. Data to individual Coach Guidance boards shall be send using TCP/IP.
- iii. Then START command shall be sent to all the boards.

A.4.2.4 Get Link Status of TADDB, PDC & CGDB:

- i. Ethernet link status shall be obtained by pinging any node as and when required.
- ii. CDC shall get the link status of TADDB and CGDB maintained in respective connected hubs.

A.4.2.5 Set and a Get the Configuration:

- i. CDC Shall Set and Get the configuration for All Connected nodes:
 - a. It shall set the intensity and time period for which the sent data is valid for displaying.
 - b. It shall set the colour configuration table for IVD/OVD
 - c. Get configuration shall send command to get the both set values of
 - i. Intensity
 - ii. Data validity time.
 - iii. Get Colour configuration table from IVD/OVD
- ii. Set and Get the configuration for PDC:

Issued by:	Director/Tele- I	Page 35 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

- a. CDC shall send the command to set the switch Port configuration table, which shall contain the information of CGDB identification numbers in relation to the port it is connected.
- b. Get command shall get the PDC port configuration table stored in that PDC.

A.4.2.6 Soft Reset:

CDC shall send this command to TADDB/CGDB/PDC to reset itself and clear all the data content.

A.4.3 Platform Data Controller:

The PDC is the Data hub for all TADDB and CGDB in each platform. The PDC receives all the data and command packets from CDC and directs to its destination. The device in which i.e. TADDB/CGDB is connected to PDC shall be determined from the switch configuration table. It responds to the command addressed to it. In the event of invalid packet, non-availability of port configuration table, invalid IP etc., the PDC shall report error to CDC.

The PDC shall fulfil the following data communication functions:

- i. Validate the received packets.
- ii. Send packets to the respective device.
- iii. Send response for packets addressed to it.
- iv. Report error to CDC in case of any failure.
- v. Maintain the communication link status of all the systems connected.
- vi. Send Link status to CDC on request.
- vii. It shall poll CGDB's & TADDB's at regular intervals for its status.
- viii. It shall identify start/stop command packet and act on all the CGDBs connected to it.
- ix. It shall receive port configuration table from CDC and store in non-volatile memory.
- x. It shall Sync all CGDB to display same information at any particular instance of time.

A4.4 Train Arrival Departure Display Board (TADDB):

The TADDB shall fulfil the following data communication functions.

- i. Validate the received packets over Ethernet
- ii. Report error in case of any failure.
- iii. Send Link status on request.
- iv. It shall receive configuration from CDC and store in non-volatile memory.

A.4.5 Coach Guidance Display Board (CGDB):

The CGDB shall fulfil the following data communication functions.

- i. Validate the received packets over Ethernet
- ii. Segregate Packet information addressed to it
- iii. Send response for packets addressed to it.
- iv. Report error in case of any failure.
- v. Send Link status on request.
- vi. It shall receive configuration from CDC and store in non-volatile memory.

Issued by:	Director/Tele- I	Page 36 of 62
------------	------------------	-----------------------------

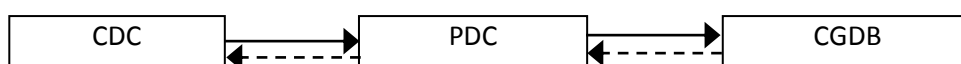
A.5 Data Transfer and Routing Overview:

All the packets will travel through CDS/PDC between CDC and IVD, OVD, MLDB, TADDB, CGDBs. Each packet travels to a minimum of 1 and maximum of 3 levels to reach its destination. The packet is validated at every level for its integrity. If any error found, it is stopped from sending further levels. Error response is sent to the sender.

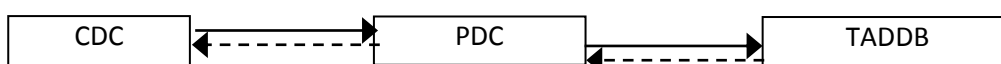
Routing of some of the data and command packets are illustrated pictorially in the following sections. The illustrations generally show the normal response and error response is not shown.

1. Sending Data:

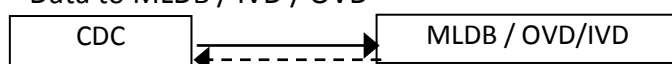
Data to CGDB Connected to PDC:



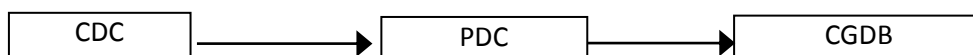
Data to TADDB Connected to PDC:



Data to MLDB / IVD / OVD

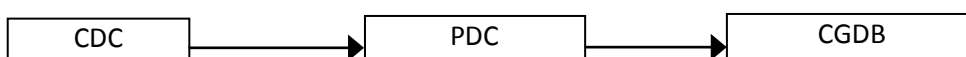


2. Stop command to CGDBs Connected to PDC:



Stop is broadcast command. PDC send this command over UDP to all CGDB's connected to it.

3. Start command to CGDB Connected to PDC:

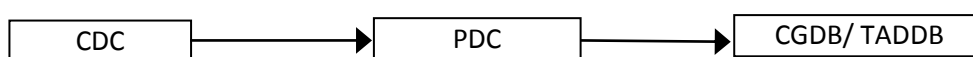


Start is broadcast command. PDC send this command over UDP to all CGDB's connected to it.

4. Link Check:

Standard TCP IP PING Command shall be used for Link Check.

5. Soft Reset Command from CDC to CGDB/TADDB:



ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

A.6 Communication Packet Format: (to be send via TCP Socket Connection)

Byte No.	Parameters	Possible Range (Hex Value)	Remarks
1	Start of Packet	0xAA	Record Starts
2		0xCC	
3	Packet Identifier	0x00	Packet for CDC
		0x01	Packet for PDC
		0x02	Packet for CGDB
		0x03	Packet for PFDB
		0x04	Packet for AGDB
		0x05	Packet for MLDB
		0x06	Packet for IVD
		0x07	Packet for OVD
4, 5	Packet Length (MSB first, LSB next)	7 + N + 3 (Data) 8 (Command)	Length of packet from Byte 6 to Byte (N + 3) excluding EOT
6	Destination Address (MSB)	0x00 – 0xFF	3rd octet of device IP Address
7	Destination Address (LSB)	0x00 – 0xFF	4th octet of device IP Address
8	Source Address (MSB)	0x00 – 0xFF	3rd octet of Active Server IP Address
9	Source Address (LSB)	0x00 – 0xFF	4th octet Active Server IP Address
10	Serial Number	0x00 – 0xFF	Packet Serial Number
11	Packet Type	0x80	Optional Link Check (Command)
		0x81	Data Transfer (Data)
		0x82	Stop (Command)
		0x83	Start (Command)
		0x84	Set Configuration (Data)
		0x85	Get Configuration (Command)
		0x86	Soft Reset (Command)
		0x87	Default Data Packet (Data)
		0x88	Message Data Packet (Data)
		0x89	Delete All Data (Command)
		0x8A – 0x8F	Reserved for Future
12	Start of Data Packet (STX)	0x02	Start of Data Packet, valid only for Data Packet
13 to N	Data Packet	0x00 – 0xFF	Actual Data Packet Refer Table A.6.1 for Data Packets & A.6.3 for Configuration

Issued by:	Director/Tele- I	Page 38 of 62
------------	------------------	-----------------------------

N + 1	End of Data Packet (ETX)	0x03	End of Data Packet valid only for Data Packet
N + 2	CRC (MSB)	0x00 – 0xFF	CRC is 16-bit value. This is calculated as CRC of all bytes starting from Length MSB to N + 1. CRC-16-CCITT (also known as CRC-CCITT) is used for data integrity. The polynomial of CRC-16 is “x ¹⁶ +x ¹² +x ⁵ +1” and its hex value is 1021.
N + 3	CRC (LSB)	0x00 – 0xFF	
N + 4	EOT	0x04	End of Transmission

A.6.1 Data Packet Formats

Byte No.	Parameters	Possible Range (Hex Value)	Remarks
1	Start of Packet	0xAA	Record Starts
2		0xCC	
3		0x02	Packet for CGDB
		0x03	Packet for PFDB
		0x04	Packet for AGDB
		0x05	Packet for MLDB
		0x06	Packet for IVD
		0x07	Packet for OVD
4,5	Packet Length	7 + N + 3 (Data) 8 (Command)	Length of packet from Byte 6 to Byte (N + 3) excluding EOT
6	Destination Address (MSB)	0x00 – 0xFF	3rd octet of device IP Address
7	Destination Address (LSB)	0x00 – 0xFF	4th octet of device IP Address
8	Source Address (MSB)	0x00 – 0xFF	3rd octet of Active Server IP Address
9	Source Address (LSB)	0x00 – 0xFF	4th octet Active Server IP Address
10	Serial Number	0x00 – 0xFF	Packet Serial Number
11	Packet Type	0x81	Data Transfer (Data)
		0x87	Default Data Packet (Data)
		0x88	Message Data Packet (Data)
12	Start of Data Packet (STX)	0x02	Start of Data Packet, valid only for Data Packet
13 to N	Data Packet	0x00 – 0xFF	Actual Data Packet Refer Table A.6.1 for Data Packets & A.6.3 for Configuration
N + 1	End of Data Packet (ETX)	0x03	End of Data Packet valid only for Data Packet

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

N + 2	CRC (MSB)	0x00 – 0xFF	CRC is 16-bit value. This is calculated as CRC of all bytes starting from Length MSB to N + 1. CRC-16-CCITT (also known as CRC-CCITT) is used for data integrity. The polynomial of CRC-16 is “x ¹⁶ +x ¹² +x ⁵ +1” and its hex value is 1021.
N + 3	CRC (LSB)	0x00 – 0xFF	
N + 4	EOT	0x04	End of Transmission

A.6.1.1 IVD, OVD, MLDB, AGDB & PFDB Data Packet Format to be send via TCP Socket Connection

Byte No.	Parameters	Possible Range (Hex Value)	Remarks
1 – 2	b15 – b0	Window Left column (2 bytes)	Varies with board size
3 – 4	b15 – b0	Window Right column (2 bytes)	Varies with board size
5 – 6	b15 – b0	Window Top Row (2 bytes)	Varies with board size
7 – 8	b15 – b0	Window Bottom Row (2 bytes)	Varies with board size
9	b7	Reverse Video	0 or 1
	b6 – b3	Not used	–
	b2 – b0	Speed	0x00 – 0x04
10	b7 – b4	Not used	
	b3 – b0	Effect code	0x00 – 0x09 (Refer section A.8 Table 1.1)
11	b7 – b6	Not used	
	b5 – b3	Letter size	0x00 – 0x05
	b2 – b0	Gap	0x00 – 0x07
12	b7 – b0	Time Delay	0x00 – 0xFF
13-14	b15 – b0	Start Address of Character string	Data Start Address location
Repeat 1 - 14 for each data page			
(N+1) – (N+2)	2 Bytes	Termination byte	0xFF, 0xFF
(N+3) – K		Character String	Train Information Data Refer A.7.1
K +1	1 Byte	Termination byte	0xFF
K +2	1 Byte	Termination byte	0xFF
Repeat (N+3) – (K+2) for each data page			

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

A.6.1.2 CGDB Data Packet Format to be send via TCP Socket Connection

Byte No.	Parameters	Possible Range (Hex Value)	Remarks
1	b8 – b0	Window Left column (1 bytes)	Varies with requirement
2	b8 – b0	Window Right column (1 bytes)	Varies with requirement
3	b8 – b0	Window Top Row (1 bytes)	Varies with requirement
4	B8 – b0	Window Bottom Row (1 bytes)	Varies with requirement
5	b7	0 or 1	Reverse Video
	b6 – b3	X	Not used
	b2 – b0	0x00 – 0x04	Speed (Refer Section A.8 Table 1.2)
6	b7 – b4	X	Not used
	b3 – b0	0x00 – 0x09	Effect code (Refer Section A.8 Table 1.1)
7	b7 – b6	X	Not used
	b5 – b3	0x00 – 0x05	Letter size (Refer Section A.8 Table 1.3)
	b2 – b0	0x00 – 0x07	Gap
8	b7 – b0	0x00 – 0xFF	Time Delay
9 – 18	10 Bytes	0x00, 0x30 – 0x39	5 Digit Train Number in Unicode (UTF-16)
19 – 28	10 Bytes	0x00, 0x41 – 0x5B	English Coach ID 5 Character in Unicode (UTF-16)
29,30	2 Byte	0xE700	Field Separator
31 – 46	16 Bytes	0x09, 0x00 – 0x7F	Optional Hindi Coach ID 8 Character Max (UTF-16)
47	1 Byte	0xEC	End of Coach Data

A.6.2 Command Packet Formats

A.6.2.1 Link Check Command

Byte No.	Parameters	Possible Range (Hex Value)	Remarks
1	Start of Packet	0xAA	Record Starts
2		0xCC	
3	Packet Identifier	0x00	Not Applicable
		0x01	Packet for PDC
		0x02	Packet for CGDB

Issued by:	Director/Tele- I	Page 41 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

		0x03	Packet for PFDB
		0x04	Packet for AGDB
		0x05	Packet for MLDB
		0x06	Packet for IVD
		0x07	Packet for OVD
4,5	Packet Length	8	Length of packet from Byte 6 to Byte 13 excluding EOT
6	Destination Address (MSB)	0x00 – 0xFF	3rd octet of device IP Address
7	Destination Address (LSB)	0x00 – 0xFF	4th octet of device IP Address
8	Source Address (MSB)	0x00 – 0xFF	3rd octet of Active Server IP Address
9	Source Address (LSB)	0x00 – 0xFF	4th octet Active Server IP Address
10	Serial Number	0x00 – 0xFF	Packet Serial Number
11	Packet Type	0x80	Optional Link Check (Command)
12	CRC (MSB)	0x00 – 0xFF	As explained in A.6
13	CRC (LSB)	0x00 – 0xFF	
14	EOT	0x04	End of Transmission

A.6.2.2 Link Check Response

Byte No.	Parameters	Possible Range (Hex Value)	Remarks
1	Start of Packet	0xAA	Record Starts
2		0xCC	
3	Packet Identifier	0x00	Packet for CDC
		0x01	Packet for PDC
4,5	Packet Length	8	Length of packet from Byte 6 to Byte 13 excluding EOT
6	Destination Address (MSB)	0x00 – 0xFF	3rd octet of Active Server IP Address
7	Destination Address (LSB)	0x00 – 0xFF	4th octet of Active Server IP Address
8	Source Address (MSB)	0x00 – 0xFF	3rd octet of device IP Address
9	Source Address (LSB)	0x00 – 0xFF	4th octet of device IP Address
10	Serial Number	0x00 – 0xFF	Packet Serial Number (Same as Received in Command)
11	Packet Type	0xC0	Optional Link Check (Response Command)
12	Start of Data Packet (STX)	0x02	Start of Data Packet

Issued by:	Director/Tele- I	Page 42 of 62
------------	------------------	-----------------------------

13-N	Configuration Data	0x00 – 0xFF	As per Table A.6.3.1 for Display Board, A.6.3.2 for PDC and A.6.3.3 for IVD/OVD
N+1	End of Data Packet (ETX)	0x03	End of Data Packet
N+2	CRC (MSB)	0x00 – 0xFF	As explained in A.6
N+3	CRC (LSB)	0x00 – 0xFF	
N+4	End of Transmission (EOT)	0x04	End of Transmission

A.6.2.3 STOP Command (Sent as broadcast Command)

Byte No.	Parameters	Possible Range (Hex Value)	Remarks
1	Start of Packet	0xAA	Record Starts
2		0xCC	
3	Packet Identifier	0x02	Packet for CGDB (Stop Command Valid For CGDB)
4,5	Packet Length	8	Length of packet from Byte 6 to Byte 13 excluding EOT
6	Destination Address (MSB)	0x00 – 0xFF	3rd octet of device IP Address
7	Destination Address (LSB)	0x00 – 0xFF	4th octet of device IP Address
8	Source Address (MSB)	0x00 – 0xFF	3rd octet of Active Server IP Address
9	Source Address (LSB)	0x00 – 0xFF	4th octet Active Server IP Address
10	Serial Number	0x00 – 0xFF	Packet Serial Number
11	Packet Type	0x82	STOP Command
12	CRC (MSB)	0x00 – 0xFF	As explained in A.6
13	CRC (LSB)	0x00 – 0xFF	
14	End of Transmission (EOT)	0x04	End of Transmission

A.6.2.4 START Command (Sent as broadcast Command)

Byte No.	Parameters	Possible Range (Hex Value)	Remarks
1	Start of Packet	0xAA	Record Starts
2		0xCC	
3	Packet Identifier	0x02	Packet for CGDB (Stop Command Valid For CGDB)
4,5	Packet Length	8	Length of packet from Byte 6 to Byte 13 excluding EOT

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

6	Destination Address (MSB)	0x00 – 0xFF	3 rd octet of device IP Address
7	Destination Address (LSB)	0x00 – 0xFF	4 th octet of device IP Address
8	Source Address (MSB)	0x00 – 0xFF	3 rd octet of Active Server IP Address
9	Source Address (LSB)	0x00 – 0xFF	4 th octet Active Server IP Address
10	Serial Number	0x00 – 0xFF	Packet Serial Number
11	Packet Type	0x83	START Command
12	CRC (MSB)	0x00 – 0xFF	As explained in A.6
13	CRC (LSB)	0x00 – 0xFF	
14	End of Transmission (EOT)	0x04	End of Transmission

A.6.2.5 Soft Reset Command

Byte No.	Parameters	Possible Range (Hex Value)	Remarks
1	Start of Packet	0xAA	Record Starts
2		0xCC	
3	Packet Identifier	0x00	Not Applicable
		0x01	Packet for PDC
		0x02	Packet for CGDB
		0x03	Packet for PFDB
		0x04	Packet for AGDB
		0x05	Packet for MLDB
		0x06	Packet for IVD
		0x07	Packet for OVD
4,5	Packet Length	8	Length of packet from Byte 6 to Byte 13 excluding EOT
6	Destination Address (MSB)	0x00 – 0xFF	3rd octet of device IP Address
7	Destination Address (LSB)	0x00 – 0xFF	4th octet of device IP Address
8	Source Address (MSB)	0x00 – 0xFF	3rd octet of Active Server IP Address
9	Source Address (LSB)	0x00 – 0xFF	4th octet Active Server IP Address
10	Serial Number	0x00 – 0xFF	Packet Serial Number
11	Packet Type	0x86	Soft Reset (Command)
12	CRC (MSB)	0x00 – 0xFF	As explained in A.6

Issued by:	Director/Tele- I	Page 44 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

13	CRC (LSB)	0x00 – 0xFF	
14	EOT	0x04	End of Transmission

A.6.3 Configuration Packet Formats

A.6.3.1 Configuration Data for TADDB/CGDB Display Boards

Byte No.	Parameters	Possible Range (Hex Value)	Remarks
1	Intensity Level	0x01	25%
		0x02	50%
		0x03	75%
		0x04	100%
2	Data Time Out	0x00 – 0xF0	Data Time Out Value in Minutes

A.6.3.2 Configuration Data for PDC

Byte No.	Parameters	Possible Range (Hex Value)	Remarks
1	Number of Devices Configured	0x00 – 0x50	Maximum 80 Device can connect to PDC
2	Number of Devices Connected	0x00 – 0x50	Connected devices in Response Packet
		0x00	Used for Set Configuration Packet
3	Device 1 ID	0x00 – 0xFF	Configured Device IP (Fourth Octet)
4	Device 1 Type	0x02	CGDB
		0x03	PFDB
		0x04	AGDB
5	Device 1 status	0x00	Configure (in Set Configuration)
		0x01	Link OK (valid for Response Packet)
		0x02	Link Fail (valid for Response Packet)
6	Device 2 ID	0x00 – 0xFF	Configured Device ID
7	Device 2 Type	0x02	CGDB
		0x03	PFDB
		0x04	AGDB
...	Device 2 status	0x00	Configure (in Set Configuration)
		0x01	Link OK (valid for Response Packet)
		0x02	Link Fail (valid for Response Packet)
	----		n bytes for rest all IDs

Issued by:	Director/Tele- I	Page 45 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

A.6.3.3 Configuration Data for IVD/OVD

Byte No.	Parameters	Possible Range (Hex Value)	Remarks
1	Intensity Level	0x01	25%
		0x02	50%
		0x03	75%
		0x04	100%
2	Data Time Out	0x00 – 0xF0	Data Time Out Value in Minutes, only applicable for train data.
3-5	Horizontal Line Color	0x00 – 0xFFFFFFFF	RGB Color Value
6-8	Vertical Line Color	0x00 – 0xFFFFFFFF	RGB Color Value
9-11	Background Color	0x00 - 0xFFFFFFFF	RGB Color Value
12-14	Message Line Color	0x00 – 0xFFFFFFFF	RGB Color Value
15	Status Code	0x01	Arrival, Right Time (Refer 5.3.14)
16-18	Train No Color	0x00 - 0xFFFFFFFF	RGB Color Value
19-21	Train Name Color	0x00 - 0xFFFFFFFF	RGB Color Value
22-24	Train Time Color	0x00 - 0xFFFFFFFF	RGB Color Value
25-27	Train A/D Color	0x00 - 0xFFFFFFFF	RGB Color Value
28-30	Train PF Color	0x00 - 0xFFFFFFFF	RGB Color Value
31 - N	----	0x00- 0xFF	1 Byte Status code for each status + 15 Byte Color info for rest 18 status as in 5.3.14

A.6.3.4 Media Scheme Data Packet for IVD/OVD

Byte No.	Parameters	Possible Range (Hex Value)	Remarks
1	Start of Packet	0xAA	Record Starts
2		0xCC	
3	Packet Identifier	0x06/0x07	Format Identifier for IVD/OVD
4	Packet Length	7 + 12(DATA)+N (File Name) + 1 (separator byte) + 3	Length of packet from byte 6 to Byte(N+4) excluding EOT
5			
6	Destination Address	0x00 - 0xFF	3rd octet of device IP

Issued by:	Director/Tele- I	Page 46 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

	(MSB)		Address
7	Destination Address (LSB)	0x00 - 0xFF	4th octet of device IP Address
8	Source Address (MSB)	0x00 - 0xFF	3rd octet of Active Server IP Address
9	Source Address (LSB)	0x00 - 0xFF	4th octet of Active Server IP Address
10	Serial Number	0x00 - 0xFF	Packet Serial Number
11	Packet Type	0x8B	Function Code
12	Start of Data Packet (STX)	0x02	Start of data packet
13	b3-b7	Not Used	
	b2-b0	Speed	000 - Stable 001 - Slowest 010 - Slower 011 - Medium 100 - Faster 101 - Fastest
14	b5-b7	Media Type	00 – Image 01 – Video 10 – Animation 11- Reserved
	b3-b5	Volume	000 – Mute 001 – 10% 010 – 20% 011 – 30% 100 – 50% 101 – 70% 110 – 90% 111 – 100%
	b0-b2	Media Entry Effect code	000 – Stable 001 – Top to Bottom 010 – Bottom to Top 011 – Left to Right 100 – Right to Left 101 – Flashing 110 – Zoom In 111 – Auto
15	b7	Message Line Enable	0 - Disable, 1 - Enable
	b6	Message Top/Bottom	0 - Bottom, 1 - Top
	b2-b5	Message font Size	0x00 – 0x05
	b0-b1	Message character Gap	0x00 – 0x07
16	Start Time	Start Hour	0x00 – 0x23
17		Start Minute	0x00 - 0x59
18	End Time	End Hour	0x00 – 0x23
19		End Minute	0x00 - 0x59

Issued by:	Director/Tele- I	Page 47 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

20	Time Delay	0x00-0xFF	Delay in seconds
21	Start Address of character string	MSB(0x00-0xFF)	Start address of file name
22		LSB(0x00-0xFF)	
23	FF	Termination Bytes	
24	FF	Termination Bytes	
25 to N	File Name data (xx xx .. xx)	FILE NAME Bytes	For example : pepsi.mpg
N+1	Separator	0x80	Separator byte between different media data
N+2	End of Data Packet (ETX)	0x03	End of data packet
N+3	CRC (MSB)	0x00-0xFF	16-bit CRC as per main specification
N+4	CRC (LSB)	0x00-0xFF	
N+5	EOT	0X04	End of Transmission

A.6.4 Communication Error Response

Byte No.	Parameters	Possible Range (Hex Value)	Remarks
1,2	Start of Packet	0xAA	Record Starts
		0xCC	
3	Packet Identifier	0x00	Packet for CDC
		0x01	Packet for PDC
4,5	Packet Length	8	Length of packet from Byte 6 to Byte 13 excluding EOT
6	Destination Address (MSB)	0x00 – 0xFF	3rd octet of device IP Address
7	Destination Address (LSB)	0x00 – 0xFF	4th octet of device IP Address
8	Source Address (MSB)	0x00 – 0xFF	3rd octet of Active Server IP Address
9	Source Address (LSB)	0x00 – 0xFF	4th octet Active Server IP Address
10	Serial Number	0x00 – 0xFF	Packet Serial Number in which error occur
11	Error Type	0xE0	CRC fail
		0xE1	Invalid destination address
		0xE2	Invalid from address
		0xE3	Invalid function code
		0xE4	No configuration
		0xE5	Abnormal start of data packet
		0xE6	Mismatch in serial number of data packet
		0xE7	Internal buffer overflow
		0xE8	Invalid data length
		0xE9	Invalid data

Issued by:	Director/Tele- I	Page 48 of 62
------------	------------------	-----------------------------

ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

		0xEA	Internal write error
		0xEB	Operation fail due to other conditions
		0xEC - 0xEF	Reserved
12	CRC (MSB)	0x00 – 0xFF	As explained in A.6
13	CRC (LSB)	0x00 – 0xFF	
13	End of Transmission (EOT)	0x04	End of Transmission

A.7 DISPLAY DATA STRUCTURE:

The TADDB or CGDB is an arrangement of sheet of LED dots (shown in the **Figure-‘1’**). Along with the display data, some other attributes are also need to be specified. The necessary details are described under. The position where data need to be dumped is specified as a window. The dimension of the window is defined in 4 words. The window specifies the left column, right column, top row and bottom row as its dimension to which it is bounded. The row number starts from the bottom row of the display and increases towards top row. The Column number starts from leftmost and increase towards rightmost column. Pictorial representation of window is given in **Figure-2**.

A.7.1. Character String:

Byte No	No of bytes	Parameter	Possible range	Remarks
1	1	Status Byte	0x01 -0x14	Status byte definitions are As per clause no 5.3.13 only. Status byte to be included for MLDB/AGDB/PDB/IVD/OVD boards.
2	2	Horizontal offset	Varies with board size	The row number from where the character data shall dump. \$00 – The data shall display in Horizontal Centre of window.
4	2	Vertical offset	Varies with board size	The column number from where the character data shall dump. \$00 – The data shall display in Vertical Centre of window.
...	...	Character string		Character codes shall be as per Unicode standard. Refer A.7.1.1 and A.7.1.2

For Hindi and English characters standard Unicode (UTF-16) shall be used and for other regional languages Unicode or bitmap graphics shall be used.

As per Unicode standards, Unicode from \$E000 TO \$F8FF can be used by private users.

While displaying train data information on display boards, there should be gap between one display data field and the other i.e., for example “Train No” and “Train Name” should have gap in between them. **\$E700** should be used as a gap code. The two bytes following the gap code will give the index of the columns on the board from where the next display field starts. This

Issued by:	Director/Tele- I	Page 49 of 62
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columns index value to be calculated as per the field format definition in clauses 3.5.10 and 3.5.12.

\$E800 should be used for graphics display. Four bytes following \$E800 will give the offset address of the graphic data relative to the starting address of the first display data structure. In the graphic data, first two bytes will give the width of the graphic data in terms of columns. The column data for at a glance board should be of 1 byte and for all other remaining display boards it should be of 2 bytes in which MSB first and then LSB next

Figure 1

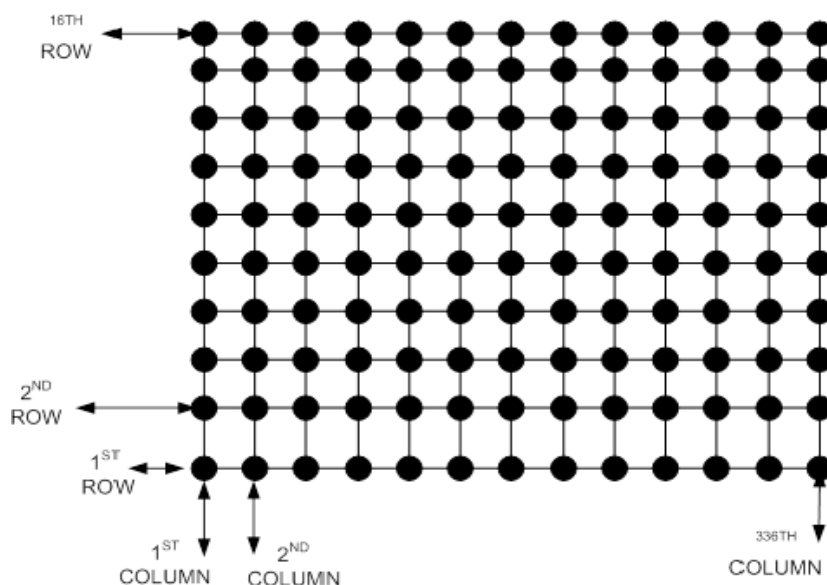
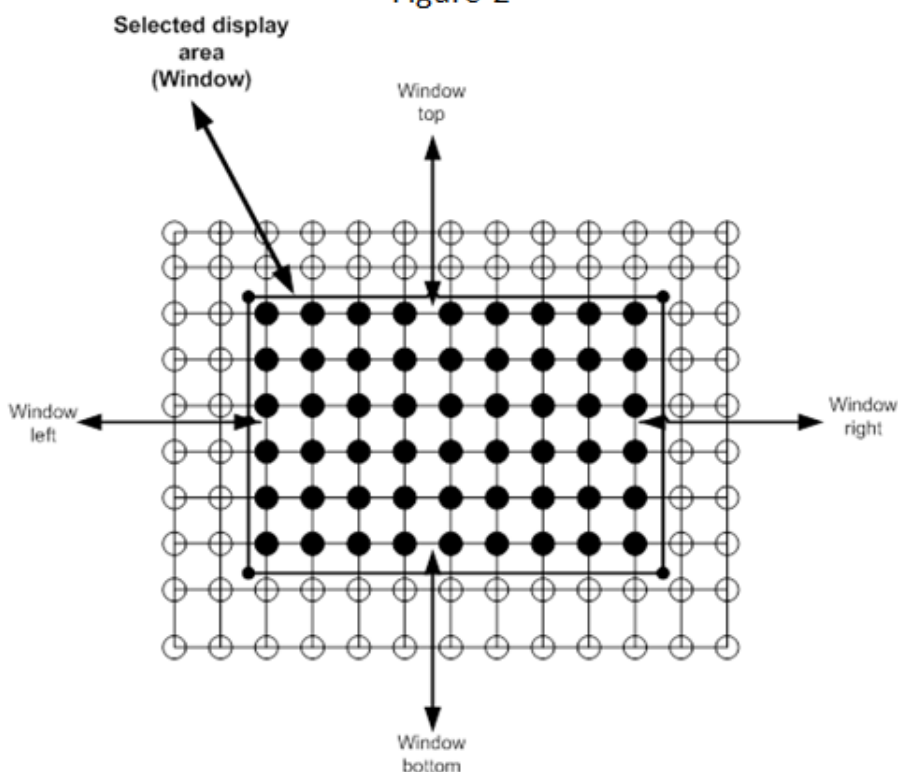


Figure-2



ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

A.7.1.1 MLDB, SLDB, IVD, OVD Character String Description

Byte No	No of Bytes	Parameter	Possible Range	Remarks
1 - 10	10 bytes	Train number	0x00, 0x30 – 0x39	5 Digit Train Number in Unicode (UTF-16)
11-12	2 bytes	Separator	0xE7, 0x00	Gap code to separate two data fields.
13-14	2 bytes	Field Index	0x00 – 0xFF, 0x00 - 0xFF	The index of the columns on the board from where the next display field starts
15-N	N bytes	Train Name	0x00 – 0xFF, 0x00 - 0xFF	N Character Train Name in Unicode (UTF-16)
(N+1) – (N+2)	2 bytes	Separator	0xE7 , 0x00	Gap code to separate two data fields.
(N+3) – (N+4)	2 bytes	Field Index	0x00 – 0xFF, 0x00 - 0xFF	The index of the columns on the board from where the next display field starts
(N+5) - (N+14)	10 bytes	Time	0x00, 0x30 – 0x3A	5 Digit Time in Unicode (UTF-16)
(N+15) – (N+16)	2 bytes	Separator	0xE7, 0x00	Gap code to separate two data fields.
(N+17) – (N+18)	2 bytes	Field Index	0x00 – 0xFF, 0x00 - 0xFF	The index of the columns on the board from where the next display field starts
(N+19) – (N+20)	2 Bytes	Arrival/ Departure Information	0x00, 0x41/0x44	1 Character Arrival/ Departure Status in Unicode (UTF-16)
(N+21) – (N+22)	2 bytes	Separator	0xE7 , 0x00	Gap code to separate two data fields.
(N+23) – (N+24)	2 bytes	Field Index	0x00 – 0xFF, 0x00 - 0xFF	The index of the columns on the board from where the next display field starts
(N+25) – (N+30)	6 Bytes	Platform Information	0x00, 0x30 – 0xFF	3 Character Platform Number in Unicode (UTF-16)

In Case of Cancelled, Indefinite Late, Rescheduled, Terminated at, Change of Source, Diverted and Arrived the following changes will be made to the character string.

Cancelled/Indefinite Late: Bytes 1 – (N+4) remains same.

(N+5) – K	K Bytes	Train Status (Cancelled / Indefinite Late)	0x00 – 0xFF	Unicode to display Cancelled or Indefinite Late (UTF-16)
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Diverted/Terminated at/Change of Source: Bytes 1 – (N+4) remains same.

Page1:

(N+5) – K	K Bytes	Train Status (Terminated at/Diverted/ Change of Source)	0x00 – 0xFF	Unicode to display Terminated at or Diverted or Change of Source (UTF-16)
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Page2:

(N+5) – K	K Bytes	Station Name	0x00 – 0xFF	Unicode to display the Name of the Station to which the Train has been Diverted or Terminated at or Change of Source (UTF-16)
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Rescheduled: Bytes 1 – (N+4) remains same.

Page1:

(N+5) – K	K Bytes	Train Status (Rescheduled)	0x00 – 0xFF	Unicode to display rescheduled (UTF-16)
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Page2:

(N+5) - (N+14)	10 bytes	Time	0x00, 0x30 – 0x3A	5 Digit Time in Unicode (UTF-16)
(N+15) - (N+16)	2 bytes	Separator	0xE7 , 0x00	Gap code to separate two data fields.
(N+17) – (N+18)	2 bytes	Field Index	0x00 – 0xFF, 0x00 - 0xFF	The index of the columns on the board from where the next display field starts
(N+19) – (N+20)	2 Bytes	Arrival/ Departure Information	0x00, 0x41/0x44	1 Character Arrival/Departure Status in Unicode (UTF-16)
(N+21) – (N+22)	2 bytes	Separator	0xE7 , 0x00	Gap code to separate two data fields.
(N+23) – (N+24)	2 bytes	Field Index	0x00 – 0xFF, 0x00 - 0xFF	The index of the columns on the board from where the next display field starts
(N+25) – (N+30)	6 Bytes	Platform Information	0x00, 0x30 – 0xFF	3 Character Platform Number in Unicode (UTF-16)

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Specification for IP Based Integrated Passenger Information System (IPIS)			

Arrived: Bytes 1 – (N+4) remains same.

(N+5) – K	K Bytes	Train Status (Arrived)	0x00 – 0xFF	Unicode to display Cancelled or Indefinite Late (UTF-16)
(K+1) – (K+2)	2 bytes	Separator	0xE7 , 0x00	Gap code to separate two data fields.
(K+3) – (K+4)	2 bytes	Field Index	0x00 – 0xFF, 0x00 - 0xFF	The index of the columns on the board from where the next display field starts
(K+5) –(K+10)	6 Bytes	Platform Information	0x00, 0x30 – 0xFF	3 Character Platform Number in Unicode (UTF-16)

A.7.1.2 AGDB Character String Description

For AGDB Train Data Line 2:

Byte No	No of Bytes	Parameter	Possible Range	Remarks
1 - N	N bytes	Train Name	0x00 – 0xFF, 0x00 - 0xFF	N Character Train Name in Unicode (UTF-16)

For AGDB Train Data Line 1:

1 - 10	10 bytes	Train number	0x00, 0x30 – 0x39	5 Digit Train Number in Unicode (UTF-16)
11 -12	2 bytes	Separator	0xE7, 0x00	Gap code to separate two data fields.
13 -14	2 bytes	Field Index	0x00 – 0xFF, 0x00 - 0xFF	The index of the columns on the board from where the next display field starts.
15 - 24	10 bytes	Time	0x00, 0x30 – 0x3A	5 Digit Time in Unicode (UTF-16)
25 -26	2 bytes	Separator	0xE7 , 0x00	Gap code to separate two data fields.
27 -28	2 bytes	Field Index	0x00 – 0xFF, 0x00 - 0xFF	The index of the columns on the board from where the next display field starts
29 - 30	2 Bytes	Arrival/ Departure Information	0x00, 0x41/0x44	1 Character Arrival/Departure Status in Unicode (UTF-16)
31 -32	2 bytes	Separator	0xE7 , 0x00	Gap code to separate two data fields.
33 -34	2 bytes	Field Index	0x00 – 0xFF, 0x00 - 0xFF	The index of the columns on the board from where the next display field starts
35 - 40	6 Bytes	Platform Information	0x00, 0x30 – 0xFF	3 Character Platform Number in Unicode (UTF-16)

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Specification for IP Based Integrated Passenger Information System (IPIS)			

In Case of Cancelled, Indefinite Late, Rescheduled, Terminated at, Change of Source, Diverted and Arrived the following changes will be made to the data format for Line 1.

Cancelled/Indefinite Late: Bytes 1 – 14 remains same.

15 – N	N Bytes	Train Status (Cancelled/ Indefinite Late)	0x00 – 0xFF	Unicode to display Cancelled or Indefinite Late (UTF-16)
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Diverted/Terminated at /Change of Source: Bytes 1 – 14 remains same.

Page1:

15 – N	N Bytes	Train Status (Diverted/Terminated at/Change of Source)	0x00 – 0xFF	Unicode to display Terminated at or Diverted or Change of Source (UTF-16)
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Page2:

15 – N	N Bytes	Station Name	0x00 – 0xFF	Unicode to display the Name of the Station to which the Train has been Diverted or Terminated at or Change of Source (UTF-16)
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Rescheduled: Bytes 1 – 14 remains same.

Page1:

15 – N	N Bytes	Train Status (Rescheduled)	0x00 – 0xFF	Unicode to display rescheduled (UTF-16)
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Page2:

15 - 24	10 bytes	Time	0x00, 0x30 – 0x3A	5 Digit Time in Unicode (UTF-16)
25 -26	2 bytes	Separator	0xE7 , 0x00	Gap code to separate two data fields.
27 -28	2 bytes	Field Index	0x00 – 0xFF, 0x00 - 0xFF	The index of the columns on the board from where the next display field starts
29 -30	2 Bytes	Arrival/ Departure Information	0x00, 0x41/0x44	1 Character Arrival/Departure Status in Unicode (UTF-16)
31 -32	2 bytes	Separator	0xE7 , 0x00	Gap code to separate two data fields.
33 -34	2 bytes	Field Index	0x00 – 0xFF, 0x00 - 0xFF	The index of the columns on the board from where the next display field starts
35 -40	6 Bytes	Platform Information	0x00, 0x30 – 0xFF	3 Character Platform Number in Unicode (UTF-16)

Issued by:	Director/Tele- I	Page 54 of 62
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ISO 9001:2015	Effective from: 05.03.2024	RDSO/SPN/TC/108/2019	Version- 1.0
Specification for IP Based Integrated Passenger Information System (IPIS)			

Arrived: Bytes 1 – 14 remains same.

15 - N	N Bytes	Train Status (Arrived)	0x00 – 0xFF	Unicode to display Cancelled or Indefinite Late (UTF-16)
(N+1) – (N+2)	2 bytes	Separator	0xE7 , 0x00	Gap code to separate two data fields.
(N+3) – (N+4)	2 bytes	Field Index	0x00 – 0xFF, 0x00 - 0xFF	The index of the columns on the board from where the next display field starts
(N+5) – (N+10)	6 Bytes	Platform Information	0x00, 0x30 – 0xFF	3 Character Platform Number in Unicode (UTF-16)

For AGDB Coach Data Line 2:

Byte No	No of Bytes	Parameter	Possible Range	Remarks
1 - 6	6 bytes	Coach Data	0x00, 0x30 – 0x3A	3 Character Coach Data in Unicode (UTF-16)
7 -8	2 bytes	Separator	0xE7 , 0x00	Gap code to separate two data fields.
9 - 110	Repeat coach data and Separator for 14 coaches, if coach not present fill it with 0x00,0x20, no Separator after last coach.			

For AGDB Coach Data Line 1:

1 - 10	10 bytes	Train number	0x00, 0x30 – 0x39	5 Digit Train Number in Unicode (UTF-16)
11 -12	2 bytes	Separator	0xE7, 0x00	Gap code to separate two data fields.
13 -14	2 bytes	Field Index	0x00 – 0xFF, 0x00 - 0xFF	The index of the columns on the board from where the next display field starts
15 - 20	6 bytes	Coach Data	0x00, 0x30 – 0x3A	3 Character Coach Data in Unicode (UTF-16)
21 -22	2 bytes	Separator	0xE7 , 0x00	Gap code to separate two data fields.
23 - 124	Repeat coach data and Separator for 14 coaches, if coach not present fill it with 0x00,0x20, no Separator after last coach.			

A.8 Display Mode Tables:

TABLE 1.1 - Available Display Effects

Effect Value	Effect Name
0x00	Reserved
0x01	Curtain Left to Right
0x02	Curtain Top to Bottom
0x03	Curtain Bottom to Top
0x04	Typing Left to Right
0x05	Running Right to Left
0x06	Running Top to Bottom
0x07	Running Bottom to Top
0x08	Flashing
0x09	Stable / Static

TABLE 1.2 Available Effect Speed

Speed Value	Relevant Speed
0x00	Lowest
0x01	Low
0x02	Medium
0x03	High
0x04	Highest

TABLE 1.3 - Available letter sizes for English language

Size Value	Display Font Size
0x00	7
0x01	8
0x02	10
0x03	12
0x04	14
0x05	16

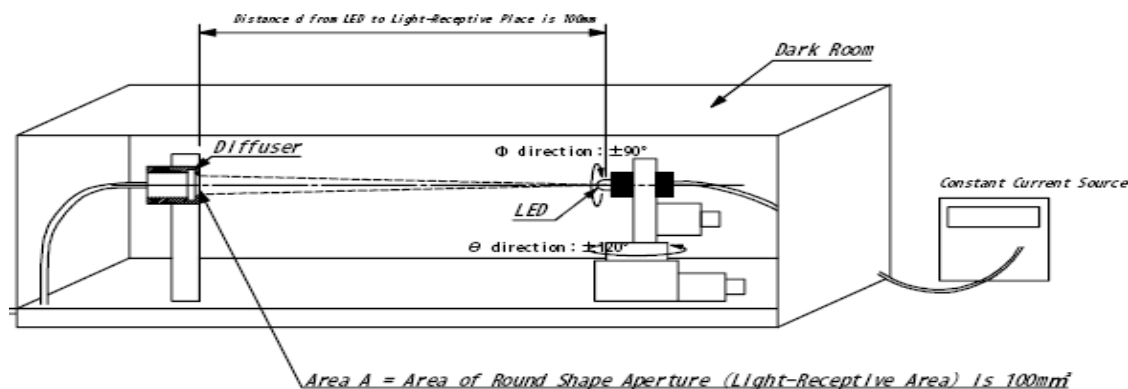
Note: Only 16 size fonts are available for Hindi & other regional languages.

Annexure-‘B’

B- Procedure for LED Parameter measurement:

B.1 Measurement of Viewing Angle of LED:

Typical setup diagram is show below:



- B.1.1 Connect the LED under test as shown in the above set up in a dark room.
- B.1.2 Bias the LED such that the rated current flows in the LED under test.
- B.1.3 Adjust the distance between the tip of the LED and Chromo meter or Spectrometer diffuser to 10 cm exactly.
- B.1.4 Place the Chromo meter or Spectrometer to measure the intensity in Lux in the position indicated in the setup. Rotate the LED so that the chromo meter or Spectrometer records maximum Lux. Record this value and position of LED in degrees.
- B.1.5 Rotate the LED in Horizontal (X-direction) to a point, at which the Lux reading is half of the value that was observed in the clause B.1.4. Record the position of LED in degrees. Calculate the degrees the LED was rotated from the maximum intensity value to half intensity value. Record this value is as θ_a (Theta). Similarly rotate the LED in opposite direction from the maximum intensity value and mark the point where the Lux value observed is half the value to the one observed in the center. Calculate the rotation in degrees from maximum Lux value and record this value as θ_b .

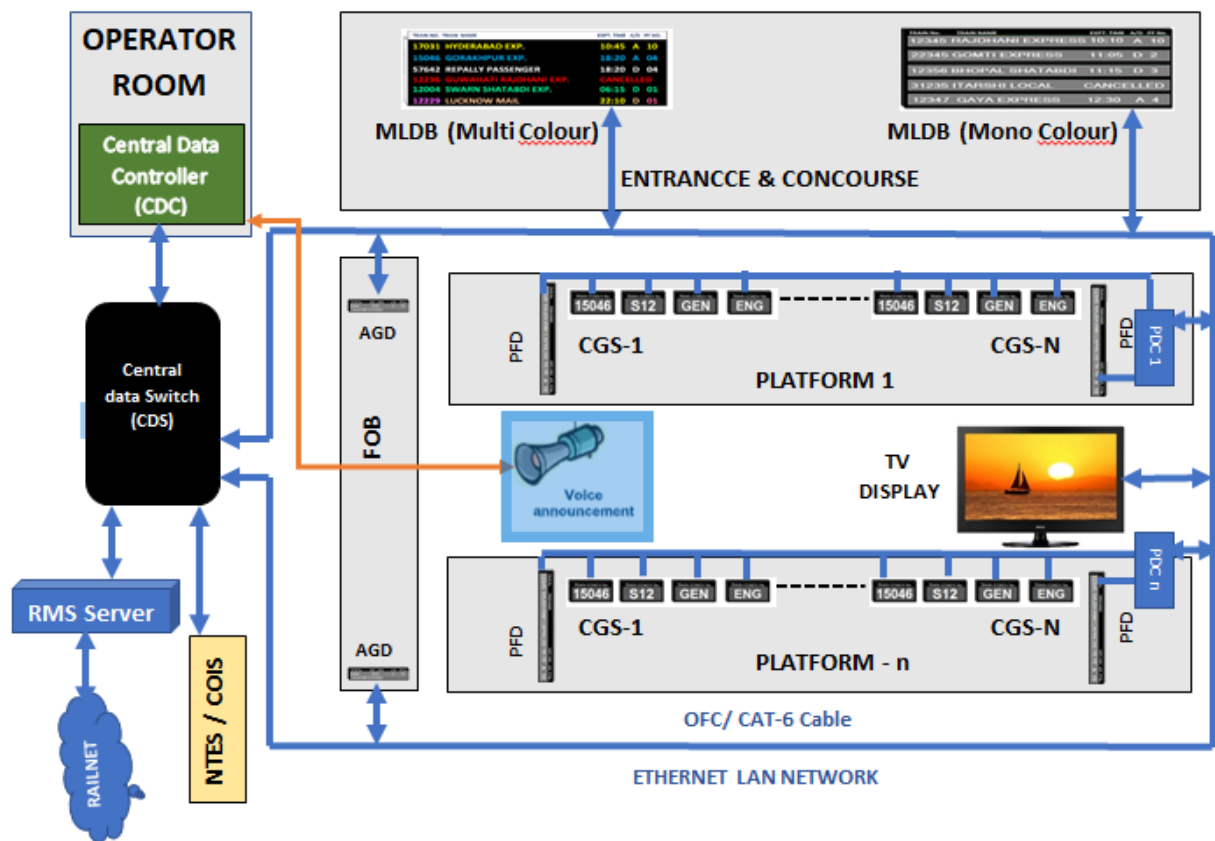
B.1.6 Calculation of dispersion Angle:

$$\text{Dispersion Angle} = \theta_a + \theta_b$$

B.2 Intensity Measurement of LED:

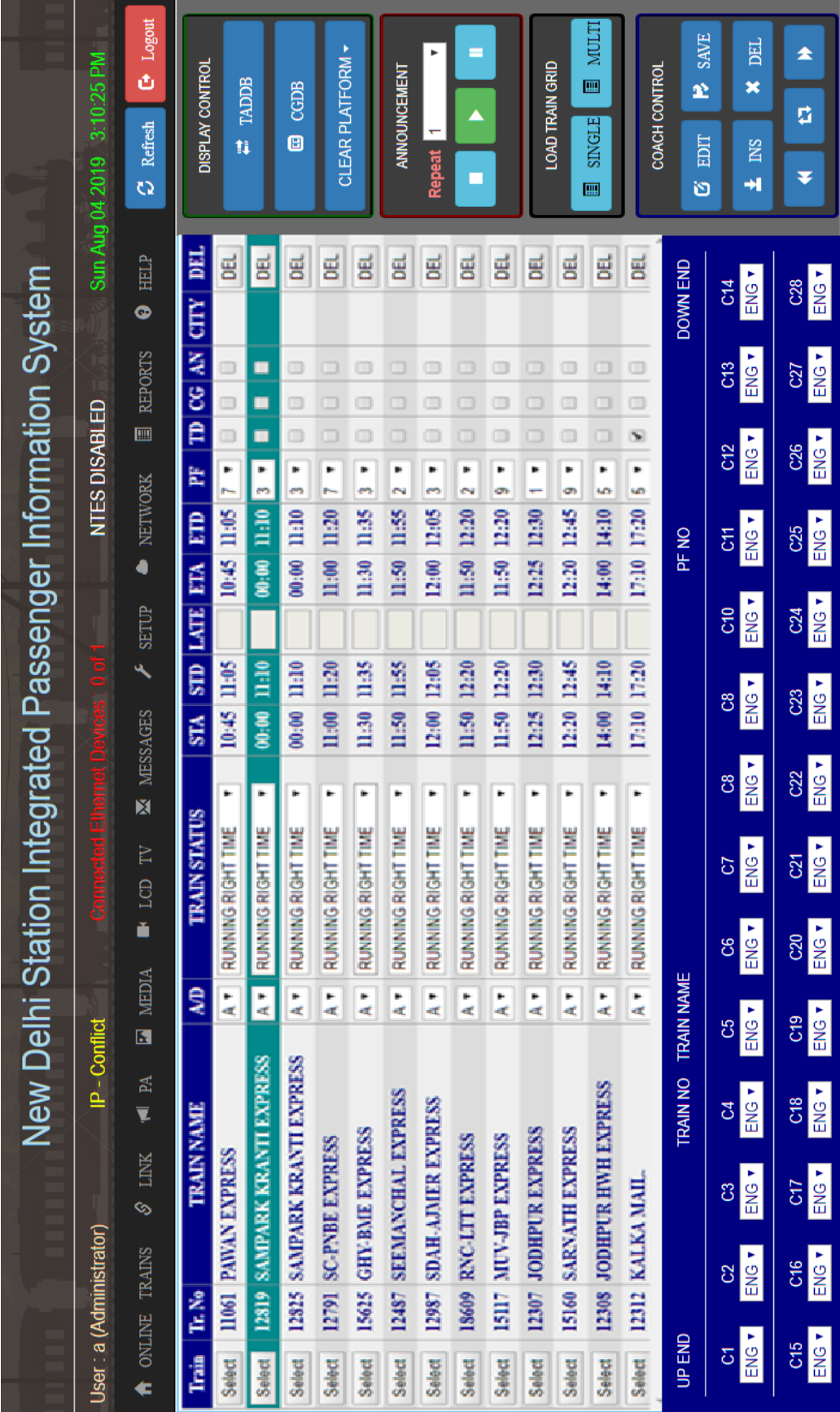
- B.2.1 Connect the LED under test as shown in the above set up in a dark room.
- B.2.2 Bias the LED such that the rated current flows in the LED under test.
- B.2.3 Adjust the distance between the tip of the LED and white board to 30 cm exactly.
- B.2.4 Use the Chromo meter or Spectrometer to measure the intensity in Lux at the center of the pattern formed on the white board due the illumination of the LED. The Value of the Lux observed at the center of the Pattern on the white board is the intensity of the LED in Lux.

B.2.5 Intensity of LED (mcd) = 92.9*Lux value observed.



SYSTEM ARCHITECTURE

Annexure-C



Reference for Main Software Home Screen

Diagram-1

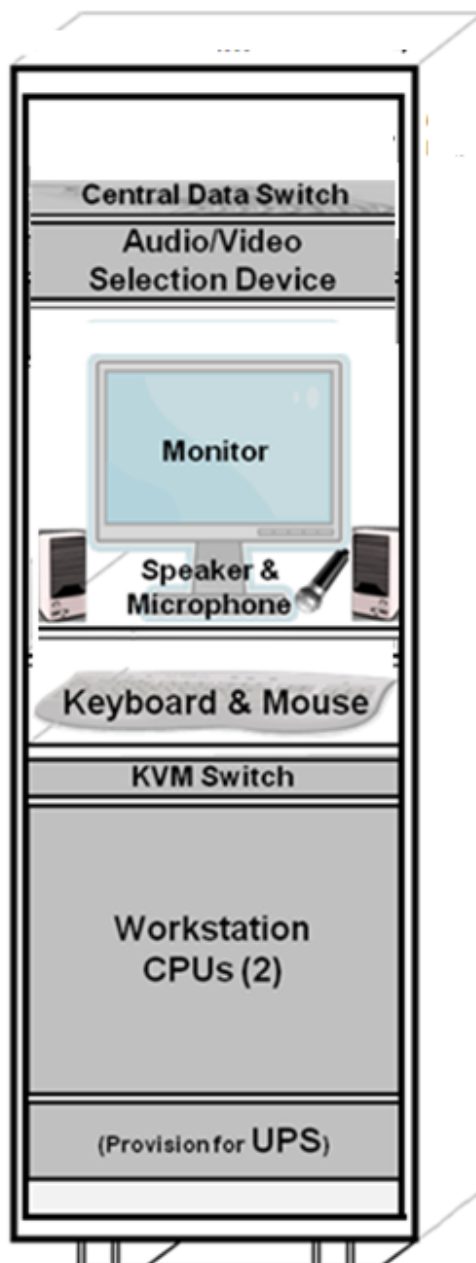


Diagram-2

Note: Equipment mentioned in CDC rack, Location is indicative only.

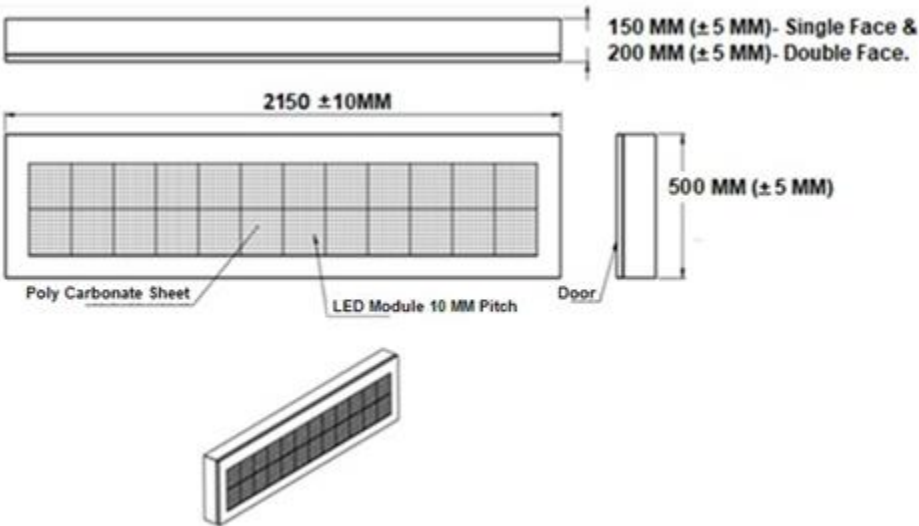


Diagram – 3

Line Diagram AGDB

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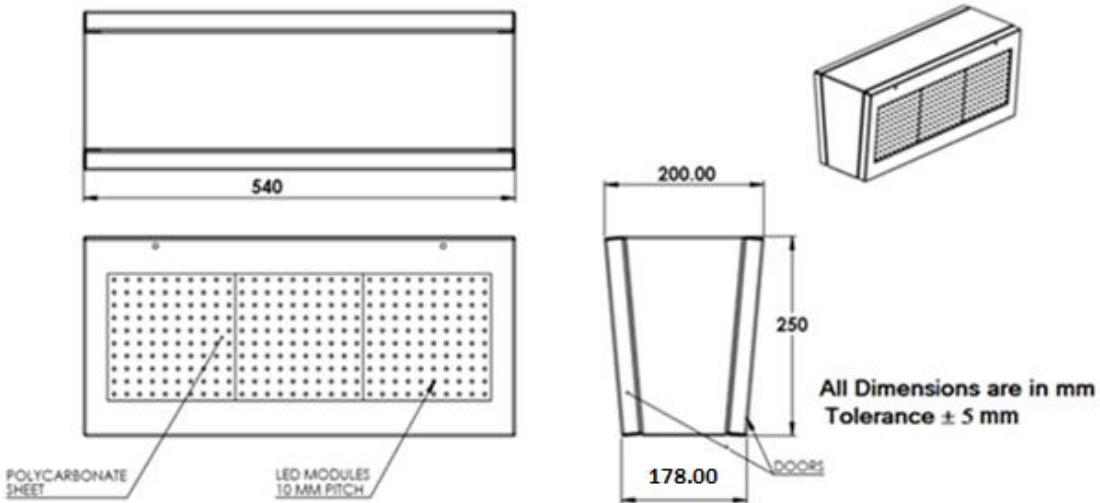


Diagram - 4

Line Diagram CGDB

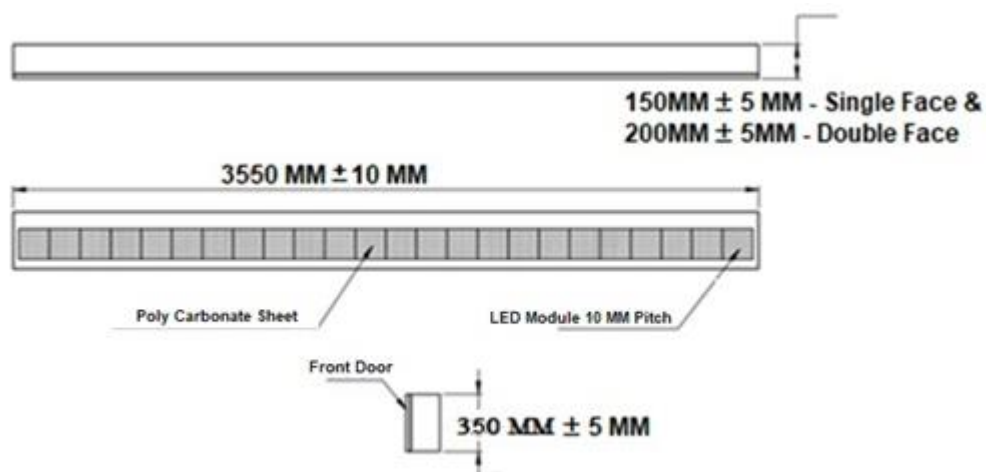


Diagram – 5

Line Diagram PFD