सत्यमेव जयते

GOVERNMENT OF INDIA

(भारत सरकार)

MINISTRY OF RAILWAYS

(रेल मंत्रालय)

Annexure - D

KAVACH
RFID Tag Data Format
(Amdt-7)

Issued by

SIGNAL & TELECOM DIRECTORATE
RESEARCH, DESIGNS & STANDARDS ORGANISATION
MINISTRY OF RAILWAYS
MANAK NAGAR
LUCKNOW – 226 011

अअमासं RDS रेल अग्रदूत Transforming Railways www.rdso.gov.in

Amendment History

Amdt	***Date of Issue***	***Reasons for change***
1	27.01.22	Normal Tag: • Abs. location changed from 24 bits to 23 bits. • Abs. location reset changed from 3 bits to 2 bits. • Communication in nominal and reverse direction each one bit is added. LC gate tag: • Version changed from 3 bit to 2 bit • Abs. location changed from 24 bits to 23 bits
2	20-06-22	TIN is changed from 7 bits to 8 bits. CRC changed from 32 bits to 30 bits Abs. location reset and Communication in nominal and reverse direction added in LC Gate tag.
3	14-09-22	**Normal Tag:** • **Tag Placement:** ▪ ''110'' – At Signal foot in both directions. ▪ "111" – Adjustment/Junction Tag **LC gate Tag:** • **Tag Placement:** ▪ ''110'' –At Signal foot in both directions. ▪ "111" – Adjustment/Junction Tag
4	11.01.2023	**1. Normal Tag:** Tag Placement: - • Bit Y30-Y27 - "111" Reserved. "1000" At Dead Stop in Nominal Direction "1001" At Dead Stop in Reverse Direction • "1010-1111" Reserved • Bit Y31-Y30 deleted for Absolute Location Reset • Bit Y31 modified for Tag Duplication **2. LC Tag: -** • Bit X62-X59 - "0111" Reserved. "1000" At Dead Stop in Nominal Direction "1001" At Dead Stop in Reverse Direction • "1010-1111" Reserved • Bit Y31-Y30 deleted for Absolute Location Reset • Bit Y31 modified for Tag Duplication **3. Adjacent Line Tag: -** • Bit Y31 added for Tag Duplication. • Bit Y33-Y31 modified as Bit Y33-Y32 – 2 Bit in

		place of 3 bit 4. Adjustment/Junction Tag – New Tag is added.
5	17.07.2023	Clause No.D.1 "0111" – At KAVACH territory exit in both directions. Clause No D.2 "0111" – At KAVACH territory exit in both direction.
6	29.11.2023	CL. No D.4 Modified –Reserved bit Y22–Y21, ~~3~~ – 2-Reserved for future use.
7	24.05.2024	New Template of GGD added with addition of normal Tag, LC Gate Tag , Adjacent Line tag & Adjustment/Junction Tag.

D 1. INTRODUCTION

This document describes the RFID tag data formats for all the possible RFID tags defined for KAVACH System.

D 2. Normal Tag

Field	Bit Positions	No of bits	Description
Type of Tag (1001: Normal Tag)	X3 - X0	4	This field denotes the type of Tag. The decimal value is 9
Version	X5-X4	2	0: KAVACH Spec 3.2 1: KAVACH Spec 4.0 2,3: Reserved for future use
Unique ID of RFID Tag Set	X15– X6	10	Unique ID of the RFID Tag. Value ranges from 1 to 1023
Absolute Loc in meters (1111111 11111111 11111111 : Not Applicable)	X38– X16	23	Geographical location of the RFID Tag in terms of meters as per Railway metrics or Location referred in the Signal Interlocking Plan of the respective stations. Value ranges from 0 to 83,88,607
TIN in Nominal Direction	X46 – X39	8	Track Identification number encountered while traversing in Nominal direction(Incremental direction of absolute location) Value ranges from 0 to 255 0: TIN value to be used at KAVACH territory exit in valid direction
TIN in Reverse Direction	X54– X47	8	Track Identification number encountered while traversing in Reverse direction (Decremental direction of absolute location). Value ranges from 0 to 255 0: TIN value to be used at KAVACH territory exit in valid direction
Station ID in Nominal direction	Y6-Y0 & X63-X55	16	Station ID corresponding to Tag placement, Note: 0 to be programmed if Tag is not mapped to any station
Station ID in Reverse direction	Y22– Y7	16	Station ID corresponding to Tag placement, Note: 0 to be programmed if Tag is not mapped to any station
Section type in Nominal direction	Y24 – Y23	2	Indicates whether the territory encountered by the Loco falls in Station vicinity or Block section in its direction of travel 00-Station Section 01-Absolute block

Field	Bit Positions	No of bits	Description
			10-Automatic section 11-Virtual Block (01, 10 and 11 – to be used for collision detection)
Section type in Reverse direction	Y26 – Y25	2	Indicates whether the territory encountered by the Loco falls in Station vicinity or Block section in its direction of travel 00-Station Section 01-Absolute block 10-Automatic section 11-Virtual Block (01, 10 and 11 – to be used for collision detection)
Tag placement	Y30 – Y27	4	Denotes the placement of the tag ''0000'' – In line section ''0001'' – At Signal foot in Nominal direction ''0010'' – At Signal foot in Reverse direction ''0011'' – At Turnout ''0100'' – At KAVACH territory exit in Nominal direction ''0101'' – At KAVACH territory exit in Reverse direction ''0110'' – At Signal foot in both directions "0111" – At KAVACH territory exit in both directions "1000" – At Dead Stop in Nominal Direction "1001" – At Dead Stop in Reverse Direction "1010-1111" Reserved
Tag Duplication	Y31	1	0- Main Tag 1- Duplicate Tag
Communication in Nominal Direction	Y32	1	0- Required 1-Not required
Communication in Reverse Direction	Y33	1	0- Required 1-Not required
CRC	Y63-Y34	30	Compute CRC (Cyclic Redundancy Checksum) to check the data integrity. 30 Bit CCITT CRC
Total		128	

Note: The Normal tag shall cater the requirement of the Signal foot Tag, Turn Out Tag, Exit Tag, Adjustment/Junction Tag as per the placement of the tag.

D 3. L C Tag

Field	Bit Positions	No of bits	Description
Type of Tag (1010 : LC Tag)	X3 - X0	4	This field denotes the type of Tag. The decimal value is 10
Version	X5-X4	2	0-TCAS Spec 3.2 1-TCAS (KAVACH) Spec 4.0 2,3 – Reserved for future use
Unique ID of RFID Tag Set	X15– X6	10	Unique ID of the RFID Tag. Value ranges from 1 to 1023
Absolute Loc in meters (1111111 11111111 11111111 : Not Applicable)	X38– X16	23	Geographical location of the RFID Tag in terms of meters as per Railway metrics or Location referred in the Signal Interlocking Plan of the respective stations. Value ranges from 0 to 83,88,607
TIN in Nominal Direction	X46 – X39	8	Track Identification number encountered while traversing in Nominal direction (Incremental direction of absolute lo- cation) Value ranges from 0 to 255 0: TIN value to be used in Non-KAVACH territory or at KAVACH territory exit in valid direction
TIN in Reverse Direction	X54 – X47	8	Track Identification number encountered while traversing in Reverse direction (Decremental direction of absolute location) Value ranges from 0 to 255 0: TIN value to be used in Non-KAVACH territory or at KAVACH territory exit in valid direction
Section type in Nominal direction	X56 – X55	2	Indicates whether the territory encountered by the Loco falls in Station vicinity or Block section in its direction of travel 00-Station Section 01-Absolute block 10-Automatic section 11-Virtual Block (01, 10 and 11 – to be used for collision detection)
Section type in Reverse direction	X58 – X57	2	Indicates whether the territory encountered by the Loco falls in Station vicinity or Block section in its direction of travel 00-Station Section 01-Absolute block

Field	Bit Positions	No of bits	Description
			10-Automatic section 11-Virtual Block (01, 10 and 11 – to be used for collision detection)
Tag placement	X62 – X59	4	Denotes the placement of the tag (G-tag can to be used when approaching an LC gate instead of N-Tag) Denotes the placement of the tag Denotes the placement of the tag ''0000'' – In line section ''0001'' – At Signal foot in Nominal direction ''0010'' – At Signal foot in Reverse direction ''0011'' – At Turnout ''0100'' – At KAVACH territory exit in Nominal direction ''0101'' – At KAVACH territory exit in Reverse direction ''0110'' At Signal foot in both directions "0111" At KAVACH territory exit in both directions "1000" At Dead Stop in Nominal Direction "1001" At Dead Stop in Reverse Direction "1010-1111" Reserved
LC Gate Approach tag in direction of applicability	Y0-X63	2	Denotes whether the Tag is placed in KAVACH or Non KAVACH territory. If placed in Non KAVACH territory, parameters for nominal direction only to be used 00: KAVACH 01: NON KAVACH First 10: NON KAVACH Second 11: Spare
Applicable Direction	Y1	1	Denotes the applicable direction of the LC gate (0=Nominal, 1=Reverse)
Gate ID	Y11-Y2 ,	10	Unique ID of the LC Gate as per Railway data. Value ranges from 1 to 1023
LC Gate ID (alpha)	Y14-Y12	3	Unique ID of the LC Gate as per Railway data. Value ranges from 1 to 1023 000 : None, 001: a, 010: b, 011: c, 100: d, 101: e, 110: Out of range (display xx on DMI)

Field	Bit Positions	No of bits	Description
			111: Spare
Gate Type	Y15	1	Denotes the type of LC gate (0=manned,1=unmanned)
Distance to Gate	Y25-Y16	10	Denotes the distance from this tag to the approaching LC gate in terms of meters
Auto whistling	Y26	1	Denotes whether Auto whistling is required (0=No, 1= Yes)
Type of Auto whistling	Y27	1	Denotes type of Auto whistling required 0= Distance based Auto-whistling 1= Time based Auto Whistling
Fill Zeros	Y30-Y28	3	Zero padding to be done
Tag Duplication	Y31	1	0- Main Tag 1- Duplicate Tag
Communication in Nominal Direction	Y32	1	0- Required 1-Not required
Communication in Reverse Direction	Y33	1	0-Required 1-Not required
CRC	Y63-Y34	30	Compute CRC (Cyclic Redundancy Checksum) to check the data integrity. 30Bit CCITT CRC
Total		128	

D 4. Adjacent Line tag

Adjacent Line Tag			
Field	**BIT POSITIONS**	**No of bits**	**Description**
Type of Tag (1011: Adjacent Line Tag)	X3 – X0	4	This field denotes the type of Tag. The decimal value is 11
Version	X5 - X4	2	0: TCAS (KAVACH) Spec 3.2 1: TCAS (KAVACH) Spec 4.0 2,3: Reserved for future use
Unique ID of RFID Tag Set	X15 – X6	10	Unique ID of the RFID Tag. Value ranges from 1 to 1023
Absolute Loc in meters (1111111 11111111 11111111 : Not Applicable)	X38 – X16	23	Geographical location of the RFID Tag in terms of meters as per Railway metrics or Location referred in the Signal Interlocking Plan of the respective stations. Value ranges from 0 to 83,88,608
TIN in Nominal Direction	X46 – X39	8	Track Identification number encountered while traversing in Nominal direction(Incremental direction of absolute location) Value ranges from 0 to 255
TIN in Reverse Direction	X54 – X47	8	Track Identification number encountered while traversing in Reverse direction (Decremental direction of absolute location) Value ranges from 0 to 255
Adjacent Line-1 TIN	X62 – X55	8	TIN number of adjacent lines Value range (1-255), 0=No adjacent Line TIN
Adjacent Line-2 TIN	Y6-Y0 & X63	8	TIN number of adjacent lines Value range (1-255), 0=No adjacent Line TIN
Adjacent Line-3 TIN	Y14-Y7	8	TIN number of adjacent lines Value range (1-255), 0=No adjacent Line TIN
Adjacent Line-4 TIN	Y22-Y15	8	TIN number of adjacent lines Value range (1-255), 0=No adjacent Line TIN
Adjacent Line-5 TIN	Y30-Y23	8	TIN number of adjacent lines Value range (1-255), 0=No adjacent Line TIN
Tag Duplication	Y31	1	0- Main Tag 1- Duplicate Tag
Fill Zeros	Y33- Y32	2	Zero padding to be done
CRC	Y63-Y34	30	Compute CRC (Cyclic Redundancy Checksum) to check the data integrity. 30 Bit CCITT CRC
Total		128	

D 5. Adjustment/Junction Tag

Field	BIT POSITIONS	No of bits	Description
Type of Tag (1100: Junction Tag V2.0)	X3 - X0	4	This field denotes the type of Tag. The decimal value is 12
Version	X5-X4	2	0: TCAS Spec 3.2 1: TCAS Spec 4.0 2,3: Reserved for future use
Unique ID of RFID Tag Set	X15– X6	10	Unique ID of the RFID Tag. Value ranges from 1 to 1023
Absolute Location-1 (in meters (1111111 11111111 11111111 : Not Applicable)	X38– X16	23	Geographical location of the RFID Tag in terms of meters as per Railway metrics or Location referred in the Signal Interlocking Plan of the respective stations. Value ranges from 0 to **83,88,607**
TIN -1	X46 – X39	8	Track Identification number associated towards Absolute location -1 Value ranges from 0 to 255 0: TIN value to be used at TCAS territory exit in valid direction
TIN -2	X54 – X47	8	Track Identification number associated towards Absolute location -2 Value ranges from 0 to 255 0: TIN value to be used at TCAS territory exit in valid direction
Absolute Location-2 in meters (1111111 11111111 11111111 : Not Applicable)	Y13-Y0 & X63- X55	23	Geographical location of the RFID Tag in terms of meters as per Railway metrics or Location referred in the Signal Interlocking Plan of the respective stations. Value ranges from 0 to **83,88,607**
Direction Correction-1 (Absolute Location-1)	Y16- Y14	3	Direction Reset toward absolute location-1 000 – Reset Direction unknown. Derive direction from next tags 001 – Location Correction, Loco travel direction Nominal and Next tag is in Nominal direction 010 – Location Correction, Loco travel direction Nominal and Next tag is in Reverse direction 011 – Location Correction, Loco travel direction Reverse and Next tag is in Nominal direction 100 – Location Correction, Loco travel direction Reverse and Next tag is in Reverse direction 110 – 111: Reserved

Direction Correction-2 (Absolute Location-2)	Y19- Y17	3	Direction Reset toward absolute location-2 000 – Reset Direction unknown. Derive direction from next tags 001 – Location Correction, Loco travel direction Nominal and Next tag is in Nominal direction 010 – Location Correction, Loco travel direction Nominal and Next tag is in Reverse direction 011 – Location Correction, Loco travel direction Reverse and Next tag is in Nominal direction 100 – Location Correction, Loco travel direction Reverse and Next tag is in Reverse direction 110 – 111: Reserved
Location Correction Type	Y20	1	0 – Adjustment in Absolute Location 1 – Reset in Absolute Location
Reserved	Y22 – Y21	2	Reserved for future use
Section type-1	Y24 – Y23	2	Section type toward absolute location-1 Indicates whether the territory encountered by the Loco falls in Station vicinity or Block section in its direction of travel 00-Station Section 01-Absolute block 10-Autoblock 11-Virtual Block (01, 10 and 11 – to be used for collision detection)
Section type -2	Y26 – Y25	2	Section type toward absolute location-2 Indicates whether the territory encountered by the Loco falls in Station vicinity or Block section in its direction of travel 00-Station Section 01-Absolute block 10-Autoblock 11-Virtual Block (01, 10 and 11 – to be used for collision detection)
Reserved	Y30-Y27	4	Reserved for Future use
Tag Type	Y31	1	0 – Main Tag 1– Duplicate tag
Communication in Nominal direction	Y32	1	0 – Required 1– Not Required
Communication in Reverse direction	Y33	1	0 – Required 1– Not Required
CRC	Y63-Y34	30	Compute CRC (Cyclic Redundancy Checksum) to check the data integrity. 30 Bit CRC /CDMA

Total	**128**	

Note: RFID tag data value shall be in decimal except CRC.

D 6. CRC-30/CDMA

Polynomial: $x^{30}+ x^{29}+ x^{21} + x^{20} + x^{15} + x^{13} + x^{12} + x^{11} + x^{8} + x^{7} + x^{6} + x^{2} + x + 1$

Width: 30 bits

Truncated Polynomial: 0x2030B9C7

Initial Remainder: 0x3FFFFFFF

Final Xor Value: 0x3FFFFFFF

Sample Data:

0x31, 0x32, 0x33, 0x34, 0x35, 0x36, 0x37, 0x38, 0x39

CRC-30 Value: 0x04C34ABF

GULLAGUDA (GGD)

Station ID:521 (km : 128.660)

REV. NO	REVISION HISTORY	DATE
0	Initial Version	17.04.2023
1	1. Border Tag is changed from R-528 & R-465 to R-452 & R-469 Respectively. 2. R-539 X-Tag ABS location is updated from 128.980 to 128.950. 3. R-612 ABS location is changed from 123.850 to 123.890. 4. N-71 TIN is extended upto the exit tag R-540 in the station section .	04.03.2024
2	1. R-609 ABS location is updated from 127.847 to 126.747. 2. R-611 ABS location is updated from 126.970 to 126.811. added in Up main line.	20.03.2024

LEGEND

- N NORMAL TAG
- S SIGNAL FOOT TAG
- T TIN DISCRIMINATION /TURNOUT TAG
- X EXIT TAG
- G GATE TAG
- A ADJUSTMENT/JUNCTION TAG
- L ADJACENT LINE TAG

	GGD	UP	DN	OTHER
STATION ID	521	520	522	–
RFID ALLOTMENT	505–529 & 612,660–672 , 514–528	549,609,611, 613,621,623 673	548 & 450–460	530 – 537 539 – 547
TIN ALLOTMENT	61 – 80	61 – 69	62 – 68	70 – 72
BORDER RFID TAG'S	469,611		612,452	
TOTAL NO. OF TAGS are 54				

GULLAGUDA (GGD) Secunderabad Division, SC Railway			REF. SIP: IPU.0011C Alt–5 TOC: TC.0011C
TCAS RFID TAG / TIN LAYOUT			RFID_TAG_LAYOUT_GGD_2.0.2
NOT DRAWN TO SCALE			
	Prepared By	Checked By	Checked By
SIGN.			
NAME	G ARCHANA	CH MASTANAIAH	V VARUN KUMAR

FIRM LOGO

APPROVED BY EXE/. DIRECTOR TELE–II		
SSE/PROJ/HQ/SCR	ASTE/PROJ/HQ/SCR	Dy.CSTE/P/HQ/SCR
JE/SSE/RDSO/LKO	ADE/RDSO/LKO	DIRECTOR/RDSO/LKO

संदर्भ. सिगनल आरेख. सं. REF:SIG.PLAN.NO.	सिगनल व दूर संचार SIGNAL & TELECOMMUNICATIONS			
आई.पी.यू IPU.0011C Alt–5 & TC.0011C	KAVACH गुलागुडा GULLAGUDA (GGD) KAVACH RFID TAG / TIN LAYOUT			
संशोधन REVISION				
आरेखकार DRAWN	द. म. रेलव. आरेख. सं. S.C.RLY.DRG.NO.	KAVACH: IPU.0011C Alt–5	शीट SHEET 01	कुल शीट SHEETS 01

NORMAL TAG

FIELD DESCRIPTION	Bit positions	No. of bits	612M	612D	662M	662D	664M	664D
Type of Tag (9-Normal, 10- LC, 11-Adjacent Line, 12-Adjustment/Junction)	x3 - x0	4	9	9	9	9	9	9
KAVACH Version (0-Kavach Spec 3.2, 1-KAVACH Spec 4.0, 2,3: Reserved for future Use)	X5-X4	2	1	1	1	1	1	1
Unique ID of RFID Tag Set	X15-X6	10	612	612	662	662	664	664
Absolute Location in meters	X38-X16	23	123890	123894	124955	124959	125743	125747
TIN in Nominal Direction	X46-X39	8	96	96	96	96	96	96
TIN in Reverse Direction	X54-X47	8	96	96	96	96	96	96
Station ID In Nominal Direction	Y6-Y0 & X63-X55	16	521	521	521	521	521	521
Station ID In Reverse Direction	Y22-Y7	16	520	520	521	521	521	521
Section Type in Nominal Dir. (0-Station Section, 1-Absolute block, 2-Automatic section, 3-Virtual Block)	Y24-Y23	2	1	1	1	1	1	1
Section Type in Reverse Dir. (0-Station Section, 1-Absolute block, 2-Automatic section, 3-Virtual Block)	Y26-Y25	2	1	1	1	1	1	1
Tag placement ("0" – In line section, "1" – At Signal foot in Nominal direction, "2" – At Signal foot in Reverse direction "3" – At Turnout, "4" – At KAVACH territory exit in Nominal direction, "5" – At KAVACH territory exit in Reverse direction, "6" – At Signal foot in both directions. "7" – At KAVACH territory exit in Both Directions, "8" - At Dead stop in Nominal Direction "9" - At Dead stop in Reverse Direction "10 - 15" - Reserved)	Y30-Y27	4	0	0	0	0	0	0
Tag Duplication (0 – Main Tag, 1 – Duplicate Tag)	Y31	1	0	1	0	1	0	1
Communication in Nominal Direction (0-Required, 1- Not Required)	Y32	1	0	0	0	0	0	0
Communication in Reverse Direction (0-Required, 1- Not Required)	Y33	1	1	1	0	0	0	0
CRC	Y63-Y34	30	1b953e98	2a888374	3da53393	0cb88e7f	254c6de2	11d9c5bd
PAGE-X	X63-X0	64	04b03001e3f29919	04b03001e3f69919	04b03001e81ba599	04b03001e81fa599	04b03001eb2fa619	04b03001eb33a619
PAGE-Y	Y63-Y0	64	6e54fa6202810401	aa220dd282810401	f694ce4c02810481	32e239fc82810481	9531b78802810481	476716f482810481

GULLAGUDA(GGD)-521						SIGNAL & TELECOMMUNICATIONS		
REF: SIP NO: IPU.0011C Alt_5 & TOC:TC.0011C						KAVACH		
REF: KAVACH_RFID_TAG_LAYOUT_GGD_2.0.2			JE/Proj/HQ/SCR	SSTE/Proj/HQ/SCR	Dy.CSTE/Proj/HQ/SCR	GULLAGUDA(GGD)-521		
TABLE NO: KAVACH_RFID_TAG_DATA_GGD_2.0.2						KAVACH RFID TAG DATA		
	PREPARED BY	CHECKED BY	JE/SSE/RDSO/LKO	ADE/RDSO/LKO	DIRECTOR/RDSO/LKO	द. म. रेलव. आरेख. सं.	शीट	कुल शीट
SIGN						KAVACH. 0011C Alt_5	SHEET	SHEETS
NAME	S..APOORVA	P.DEVI BHARGAVI	APPROVED BY EXE/. DIRECTOR TELE-II			S.C.RLY.DRG.NO.	1	7

NORMAL TAG

FIELD DESCRIPTION	Bit positions	No. of bits	531M	531D	540M	540D	539M	539D
Type of Tag (9-Normal, 10- LC, 11-Adjacent Line, 12-Adjustment/Junction)	x3 - x0	4	9	9	9	9	9	9
KAVACH Version (0-Kavach Spec 3.2, 1-KAVACH Spec 4.0, 2,3: Reserved for future Use)	X5-X4	2	1	1	1	1	1	1
Unique ID of RFID Tag Set	X15-X6	10	531	531	540	540	539	539
Absolute Location in meters	X38-X16	23	129115	129119	128990	128986	128950	128946
TIN in Nominal Direction	X46-X39	8	61	61	71	71	0	0
TIN in Reverse Direction	X54-X47	8	67	67	0	0	0	0
Station ID In Nominal Direction	Y6-Y0 & X63-X55	16	521	521	521	521	521	521
Station ID In Reverse Direction	Y22-Y7	16	521	521	521	521	521	521
Section Type in Nominal Dir. (0-Station Section, 1-Absolute block, 2-Automatic section, 3-Virtual Block)	Y24-Y23	2	0	0	0	0	0	0
Section Type in Reverse Dir. (0-Station Section, 1-Absolute block, 2-Automatic section, 3-Virtual Block)	Y26-Y25	2	0	0	0	0	0	0
Tag placement ("0" – In line section, "1" – At Signal foot in Nominal direction, "2" – At Signal foot in Reverse direction "3" – At Turnout, "4" – At KAVACH territory exit in Nominal direction, "5" – At KAVACH territory exit in Reverse direction, "6" – At Signal foot in both directions. "7" – At KAVACH territory exit in Both Directions, "8" - At Dead stop in Nominal Direction "9" - At Dead stop in Reverse Direction "10 - 15" - Reserved)	Y30-Y27	4	1	1	5	5	7	7
Tag Duplication (0 – Main Tag, 1 – Duplicate Tag)	Y31	1	0	1	0	1	0	1
Communication in Nominal Direction (0-Required, 1- Not Required)	Y32	1	0	0	0	0	1	1
Communication in Reverse Direction (0-Required, 1- Not Required)	Y33	1	0	0	1	1	1	1
CRC	Y63-Y34	30	02365df1	332be01d	28c6bace	19db0722	31371698	2aab74
PAGE-X	X63-X0	64	04a19e81f85b84d9	04a19e81f85f84d9	04802381f7de8719	04802381f7da8719	04800001f7b686d9	04800001f7b286d9
PAGE-Y	Y63-Y0	64	08d977c408010481	ccaf807488010481	a31aeb3a28010481	676c1c8aa8010481	c4dc5a6338010481	00aaadd3b8010481

GULLAGUDA(GGD)-521						SIGNAL & TELECOMMUNICATIONS		
REF: SIP NO: IPU.0011C Alt_5 & TOC:TC.0011C						KAVACH		
REF: KAVACH_RFID_TAG_LAYOUT_GGD_2.0.2			**JE/Proj/HQ/SCR**	**SSTE/Proj/HQ/SCR**	**Dy.CSTE/Proj/HQ/SCR**	GULLAGUDA(GGD)-521		
TABLE NO: KAVACH_RFID_TAG_DATA_GGD_2.0.2						KAVACH RFID TAG DATA		
	PREPARED BY	CHECKED BY	**JE/SSE/RDSO/LKO**	**ADE/RDSO/LKO**	**DIRECTOR/RDSO/LKO**	द. म. रेलव. आरेख. सं.	शीट	कुल शीट
SIGN							**SHEET**	**SHEETS**
NAME	S..APOORVA	P.DEVI BHARGAVI	**APPROVED BY**			**S.C.RLY.DRG.NO.**	2	7
			EXE/. DIRECTOR TELE-II					

NORMAL TAG

FIELD DESCRIPTION	Bit positions	No. of bits	546M	546D	543M	543D	544M	544D
Type of Tag (9-Normal, 10- LC, 11-Adjacent Line, 12-Adjustment/Junction)	x3 - x0	4	9	9	9	9	9	9
KAVACH Version (0-KAVACH Spec 3.2, 1-KAVACH Spec 4.0, 2,3: Reserved for future Use)	X5-X4	2	1	1	1	1	1	1
Unique ID of RFID Tag Set	X15-X6	10	546	546	543	543	544	544
Absolute Location in meters	X38-X16	23	128340	128340	128230	128230	129360	129360
TIN in Nominal Direction	X46-X39	8	70	70	62	62	61	61
TIN in Reverse Direction	X54-X47	8	62	62	65	65	66	66
Station ID In Nominal Direction	Y6-Y0 & X63-X55	16	521	521	521	521	521	521
Station ID In Reverse Direction	Y22-Y7	16	521	521	521	521	521	521
Section Type in Nominal Dir. (0-Station Section, 1-Absolute block, 2-Automatic section, 3-Virtual Block)	Y24-Y23	2	0	0	0	0	0	0
Section Type in Reverse Dir. (0-Station Section, 1-Absolute block, 2-Automatic section, 3-Virtual Block)	Y26-Y25	2	0	0	0	0	0	0
Tag placement ("0" – In line section, "1" – At Signal foot in Nominal direction, "2" – At Signal foot in Reverse direction "3" – At Turnout, "4" – At KAVACH territory exit in Nominal direction, "5" – At KAVACH territory exit in Reverse direction, "6" – At Signal foot in both directions. "7" – At KAVACH territory exit in Both Directions, "8" - At Dead stop in Nominal Direction "9" - At Dead stop in Reverse Direction "10 - 15" - Reserved)	Y30-Y27	4	3	3	3	3	3	3
Tag Duplication (0 – Main Tag, 1 – Duplicate Tag)	Y31	1	0	1	0	1	0	1
Communication in Nominal Direction (0-Required, 1- Not Required)	Y32	1	0	0	0	0	0	0
Communication in Reverse Direction (0-Required, 1- Not Required)	Y33	1	0	0	0	0	0	0
CRC	Y63-Y34	30	14c27e79	147b993e	2ec0a6f2	2e7941b5	1c131115	1caaf652
PAGE-X	X63-X0	64	049f2301f5548899	049f2301f5548899	04a09f01f4e687d9	04a09f01f4e687d9	04a11e81f9508819	04a11e81f9508819
PAGE-Y	Y63-Y0	64	5309f9e418010481	51ee64f898010481	bb029bc818010481	b9e506d498010481	704c445418010481	72abd94898010481

GULLAGUDA(GGD)-521						SIGNAL & TELECOMMUNICATIONS		
REF: SIP NO: IPU.0011C Alt_5 & TOC:TC.0011C						KAVACH		
REF: KAVACH_RFID_TAG_LAYOUT_GGD_2.0.2			JE/Proj/HQ/SCR	SSTE/Proj/HQ/SCR	Dy.CSTE/Proj/HQ/SCR	GULLAGUDA(GGD)-521		
TABLE NO: KAVACH_RFID_TAG_DATA_GGD_2.0.2						KAVACH RFID TAG DATA		
	PREPARED BY	CHECKED BY	JE/SSE/RDSO/LKO	ADE/RDSO/LKO	DIRECTOR/RDSO/LKO	द. म. रेलव. आरेख. सं.	शीट	कुल शीट
SIGN						KAVACH. 0011C Alt_5	SHEET	SHEETS
NAME	S..APOORVA	P.DEVI BHARGAVI	APPROVED BY EXE/. DIRECTOR TELE-II			S.C.RLY.DRG.NO.	3	7

LC-GATE TAG

FIELD DESCRIPTION	Bit positions	No. of bits	672M	672D	517M	517D	534M	534D
Type of Tag (9-Normal, 10- LC, 11-Adjacent Line, 12-Adjustment/Junction)	x3 - x0	4	10	10	10	10	10	10
KAVACH Version (0-KAVACH Spec 3.2, 1-KAVACH Spec 4.0, 2,3: Reserved for future Use)	X5-X4	2	1	1	1	1	1	1
Unique ID of RFID Tag Set	X15-X6	10	672	672	517	517	534	534
Absolute Location in meters	X38-X16	23	127733	127737	129254	129250	128858	128854
TIN in Nominal Direction	X46-X39	8	96	96	61	61	71	71
TIN in Reverse Direction	X54-X47	8	96	96	61	61	71	71
Section Type in Nominal Dir. (0-Station Section, 1-Absolute block, 2-Automatic section, 3-Virtual Block)	X56-X55	2	1	1	0	0	0	0
Section Type in Reverse Dir. (0-Station Section, 1-Absolute block, 2-Automatic section, 3-Virtual Block)	X58-X57	2	1	1	0	0	0	0
Tag placement (''0'' – In line section ''1'' – At Signal foot in Nominal direction ''2'' – At Signal foot in Reverse direction ''3'' – At Turnout, ''4'' – At KAVACH territory exit in Nominal direction, ''5'' – At KAVACH territory exit in Reverse direction,''6'' – At Signal foot in both directions. ''7'' – At KAVACH territory exit in Both Directions, "8" - At Dead stop in Nominal Direction, "9" - At Dead stop in Reverse Direction, "10 - 15" - Reserved)	X62-X59	4	0	0	0	0	0	0
LC Gate Approach Tag in Direction of Applicability	Y0-X63	2	0	0	0	0	0	0
Applicable Direction	Y1	1	0	0	1	1	1	1
Gate ID	Y11-Y2	10	19	19	19	19	19	19
LC Gate ID (alpha) ("0" - None, "1"- a, "2"- b, "3"- c, "4"- d, "5"- e, "6"- Out of Range(display xx on DMI), "7"- Spare)	Y-14-Y12	3	0	0	0	0	0	0
Gate Type ("0"- Manned, "1"- Unmanned)	Y15	1	0	0	0	0	0	0
Distance to Gate	Y25-Y16	10	727	723	794	790	398	394
Auto Whistling ("0"- No, "1"-Yes)	Y26	1	1	1	1	1	1	1
Type of Auto Whistling ("0"- Distance, "1"-Time)	Y27	1	0	0	0	0	0	0
Fill Zeros	Y30-Y28	3	0	0	0	0	0	0
Tag Duplication (0 – Main Tag, 1 – Duplicate Tag)	Y131	1	0	1	0	1	0	1
Communication in Nominal Direction (0-Required, 1- Not Required)	Y32	1	0	0	0	0	0	0
Communication in Reverse Direction (0-Required, 1- Not Required)	Y33	1	0	0	0	0	0	0
CRC	Y63-Y34	30	22078afd	15ad01b8	0ffa6156	30b692f2	235774b9	14fdfffc
PAGE-X	X63-X0	64	02b03001f2f5a81a	02b03001f2f9a81a	001e9e81f8e6815a	001e9e81f8e2815a	0023a381f75a859a	0023a381f756859a
PAGE-Y	Y63-Y0	64	881e2bf406d7004c	56b406e086d3004c	3fe98558071a004e	c2da4bc88716004e	8d5dd2e4058e004e	53f7fff0858a004e

GULLAGUDA(GGD)-521						SIGNAL & TELECOMMUNICATIONS		
REF: SIP NO: IPU.0011C Alt_5 & TOC:TC.0011C						KAVACH		
REF: KAVACH_RFID_TAG_LAYOUT_GGD_2.0.2			JE/Proj/HQ/SCR	SSTE/Proj/HQ/SCR	Dy.CSTE/Proj/HQ/SCR	GULLAGUDA(GGD)-521		
TABLE NO: KAVACH_RFID_TAG_DATA_GGD_2.0.2						KAVACH RFID TAG DATA		
	PREPARED BY	CHECKED BY	JE/SSE/RDSO/LKO	ADE/RDSO/LKO	DIRECTOR/RDSO/LKO	द. म. रेलव. आरेख. सं.	शीट	कुल शीट
SIGN							SHEET	SHEETS
NAME	S..APOORVA	P.DEVI BHARGAVI	APPROVED BY EXE/. DIRECTOR TELE-II			S.C.RLY.DRG.NO. KAVACH. 0011C Alt_5	4	7

ADJUSTMENT/JUNCTION TAG

FIELD DESCRIPTION	Bit positions	No. of bits	660-M	660-D	471-M	471-D
Type of Tag (9-Normal, 10- LC, 11-Adjacent Line, 12-Adjustment/Junction)	x3 - x0	4	12	12	12	12
KAVACH Version (0-Kavach Spec 3.2, 1-KAVACH Spec 4.0, 2,3: Reserved for future Use)	X5-X4	2	1	1	1	1
Unique ID of RFID Tag Set	X15-X6	10	660	660	471	471
Absolute Location-1 in meters	X38-X16	23	124810	124810	132974	132974
TIN -1	X46-X39	8	96	96	89	89
TIN -2	X54-X47	8	96	96	89	89
Absolute Location-2 in meters	Y13-Y0 & X63-X55	23	124725	124725	132863	132863
Direction Correction ABS-1	Y16-Y14	3	1	1	4	4
Direction Correction ABS-2	Y19-Y17	3	1	1	4	4

"0"- Reset Dir. unknown. Derive Dir. from next tags, "1" - Location Correction, Loco travel Dir. Nominal and Next tag is in Nominal Dir.,"2"- Location Correction, Loco travel Dir. Nominal and Next tag is in Reverse Dir.,"3"- Location Correction, Loco travel Dir. Reverse and Next tag is in Nominal Dir.,"4"- Location Correction, Loco travel Dir. Reverse and Next tag is in Reverse Dir.,"5 " –" 7": Reserved

Location Correction Type ("0"- A-tag, "1"- J-Tag)	Y20	1	0	0	0	0
Reserved For future use	Y22-Y21	2	0	0	0	0
Section Type-1 (0-Station Section, 1-Absolute block, 2-Automatic section, 3-Virtual Block)	Y24-Y23	2	1	1	1	1
Section Type -2 (0-Station Section, 1-Absolute block, 2-Automatic section, 3-Virtual Block)	Y26-Y25	2	1	1	1	1
Reserved For future use	Y30-Y27	4	0	0	0	0
Tag Duplication (0 – Main Tag, 1 – Duplicate Tag)	Y31	1	0	1	0	1
Communication in Nominal Direction (0-Required, 1- Not Required)	Y32	1	0	0	0	0
Communication in Reverse Direction (0-Required, 1- Not Required)	Y33	1	0	0	0	0
CRC	Y63-Y34	30	137c5318	13c5b45f	174cca2	1cd2be5
PAGE-X	X63-X0	64	9ab03001e78aa51c	9ab03001e78aa51c	7facac82076e75dc	7facac82076e75dc
PAGE-Y	Y63-Y0	64	4df14c60028240f3	4df14c60028240f3	05d3328802890103	05d3328802890103

GULLAGUDA(GGD)-521						SIGNAL & TELECOMMUNICATIONS		
REF: SIP NO: IPU.0011C Alt_5 & TOC:TC.0011C						KAVACH		
REF: KAVACH_RFID_TAG_LAYOUT_GGD_2.0.2			JE/Proj/HQ/SCR	SSTE/Proj/HQ/SCR	Dy.CSTE/Proj/HQ/SCR	GULLAGUDA(GGD)-521		
TABLE NO: KAVACH_RFID_TAG_DATA_GGD_2.0.2						KAVACH RFID TAG DATA		
	PREPARED BY	CHECKED BY	JE/SSE/RDSO/LKO	ADE/RDSO/LKO	DIRECTOR/RDSO/LKO	द. म. रेलव. आरेख. सं.		शीट / कुल शीट
SIGN							KAVACH. 0011C Alt_5	SHEET / SHEETS
NAME	S..APOORVA	P.DEVI BHARGAVI	APPROVED BY EXE/. DIRECTOR TELE-II			S.C.RLY.DRG.NO.		5 / 7

ADJACENT LINE TAG

FIELD NAME	Bit positions	No. of bits	548M	548D	549M	549D
Type of Tag (9-Normal, 10- LC, 11-Adjacent Line, 12-Adjustment/Junction)	x3 - x0	4	11	11	11	11
KAVACH Version (0-Kavach Spec 3.2, 1-KAVACH Spec 4.0,	X5-X4	2	1	1	1	1
Unique ID of RFID Tag Set	X15-X6	10	548	548	549	549
Absolute Location in meters	X38-X16	23	129702	129706	127897	127893
TIN in Nominal Dir.	X46-X39	8	90	90	91	91
TIN in Reverse Dir.	X54-X47	8	90	90	91	91
Adjacent Line-1 TIN	X62-X55	8	89	89	96	96
Adjacent Line-2 TIN	Y6-Y0&X63	8	0	0	0	0
Adjacent Line-3 TIN	Y14-Y7	8	0	0	0	0
Adjacent Line-4 TIN	Y22-Y15	8	0	0	0	0
Adjacent Line-5 TIN	Y30-Y23	8	0	0	0	0
Tag Duplication (0 – Main Tag, 1 – Duplicate Tag)	Y31	1	0	1	0	1
Fill zero's	Y33-Y32	3	0	0	0	0
CRC	Y63-Y34	30	3d5ed02a	0f3b6157	050e082f	376bb952
PAGE-X	X63-X0	64	2cad2d01faa6891b	2cad2d01faaa891b	302dad81f399895b	302dad81f395895b
PAGE-Y	Y63-Y0	64	f57b40a800000000	3ced855c80000000	143820bc00000000	ddaee54880000000

GULLAGUDA(GGD)-521						SIGNAL & TELECOMMUNICATIONS		
REF: SIP NO: IPU.0011C Alt_5 & TOC:TC.0011C						KAVACH		
REF: KAVACH_RFID_TAG_LAYOUT_GGD_2.0.2			**JE/Proj/HQ/SCR**	**SSTE/Proj/HQ/SCR**	**Dy.CSTE/Proj/HQ/SCR**	GULLAGUDA(GGD)-521		
TABLE NO: KAVACH_RFID_TAG_DATA_GGD_2.0.2						KAVACH RFID TAG DATA		
	PREPARED BY	CHECKED BY	**JE/SSE/RDSO/LKO**	**ADE/RDSO/LKO**	**DIRECTOR/RDSO/LKO**	द. म. रेलव. आरेख. सं.	शीट	कुल शीट
SIGN						KAVACH. 0011C Alt_5	**SHEET**	**SHEETS**
NAME	S..APOORVA	P.DEVI BHARGAVI	**APPROVED BY** **EXE/. DIRECTOR TELE-II**			**S.C.RLY.DRG.NO.**	6	7

ADJACENT LINE TAG

REV.NO	REV. HISTORY	DATE
0	Initial Version	18.04.2023

GULLAGUDA(GGD)-521						SIGNAL & TELECOMMUNICATIONS			
REF: SIP NO: IPU.0011C Alt_5 & TOC:TC.0011C						KAVACH			
REF: KAVACH_RFID_TAG_LAYOUT_GGD_2.0.2			**JE/Proj/HQ/SCR**	**SSTE/Proj/HQ/SCR**	**Dy.CSTE/Proj/HQ/SCR**	GULLAGUDA(GGD)-521			
TABLE NO: KAVACH_RFID_TAG_DATA_GGD_2.0.2						KAVACH RFID TAG DATA			
	PREPARED BY	CHECKED BY	**JE/SSE/RDSO/LKO**	**ADE/RDSO/LKO**	**DIRECTOR/RDSO/LKO**	द. म. रेलव. आरेख. सं.	KAVACH. 0011C Alt_5	शीट	कुल शीट
SIGN								**SHEET**	**SHEETS**
NAME	S..APOORVA	P.DEVI BHARGAVI	**APPROVED BY** **EXE/. DIRECTOR TELE-II**			**S.C.RLY.DRG.NO.**		7	7