

1. Brief Overview of KAVACH (erstwhile Train Collision Avoidance System-TCAS)

1.1. Train Collision Avoidance System (TCAS) is an indigenous Automatic Train Protection System being developed by RDSO involving three Indian vendors. The Automatic Train Protection System alerts the Loco Pilot that he is approaching the signal aspects or PSRs and requires him to acknowledge the warning in case of over speeding. Otherwise, the system would initiate a brake application after a pre-defined short delay.

1.2. Salient features of TCAS:

- System is interfaced with existing Signaling system to provide feature of prevention of SPAD (Signal Passing At Danger) with continuous update of Movement Authority.
- Loop Line Speed Control.
- Prevention of Over speed: Section Speed & Loco Specific Speed
- Displays aspect of Signal on the route in the Locomotive.
- Manual SoS facility both from Loco and from Station.
- Prevention of side-collision, head on collision, rear end collision under certain conditions.
- LC Gate Automatic Horn Warning.
- Final system is validated to Safety Integrity Level-4.

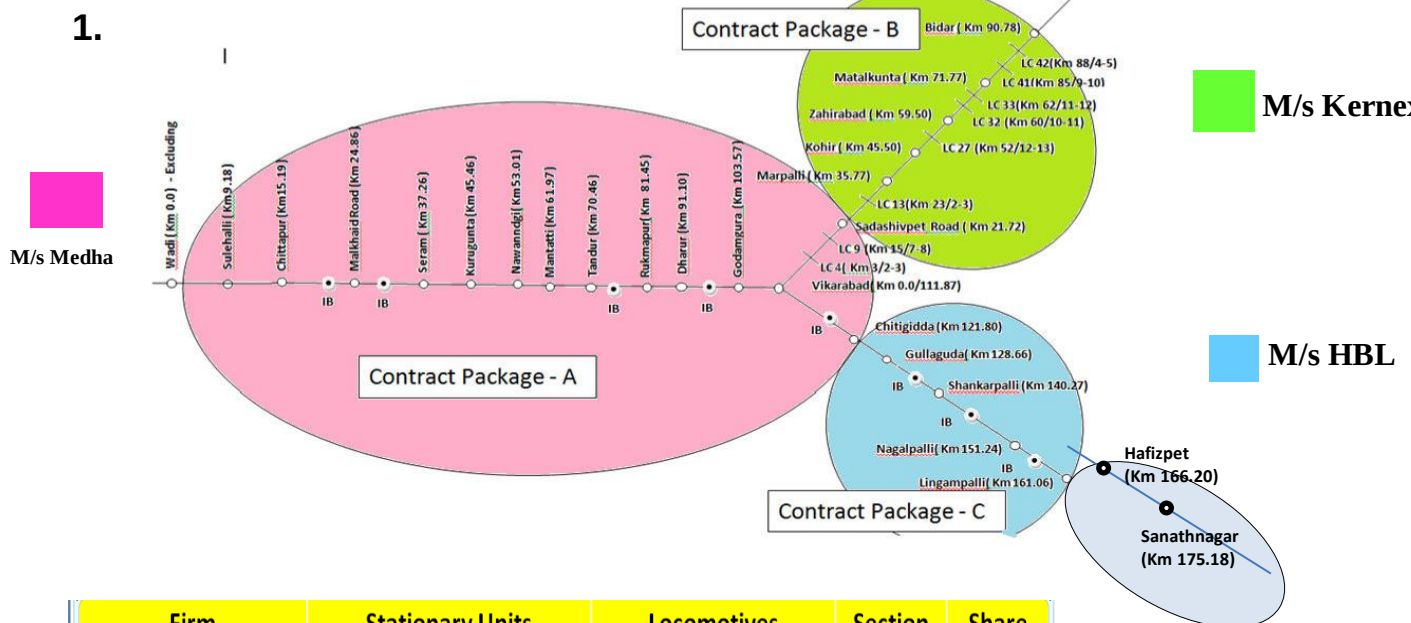
1.3. Loco Pilot will be provided with the following Information:

- Audio: Over Speeding, Transition from higher level mode to lower level Mode and Receipt of SoS Message.
- Visual: Speed, Movement Authority & Signal aspect on the route.

2. TCAS- RDSO Development Work:

Presently TCAS- RDSO Development Work has been successfully commissioned on 265kms section (Sanathnagar - Lingampalli-Vikarabad-Wadi & Vikarabad-Bidar) of Secunderabad division at speeds up to 110 Km/h in Absolute & Automatic Block Section with 40 IRAB type Diesel and Electric Locomotives. These trials have been done by three different indigenous firms as shown in the following figure.

**Section for Development of Train Collision Avoidance System:
Secunderabad Division (South Central Railway)**

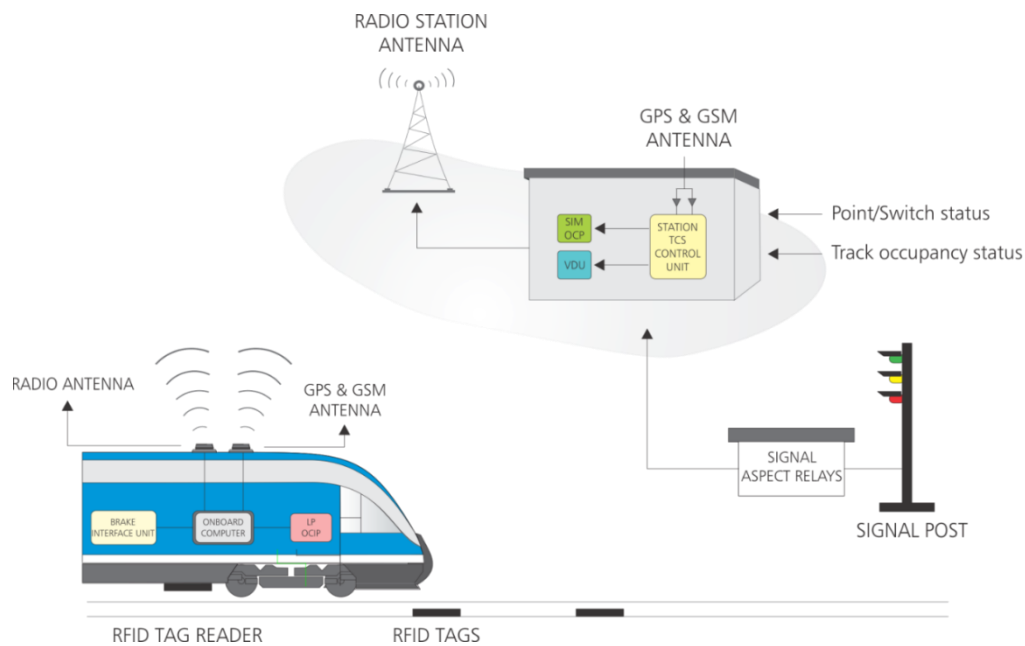


Firm (Awarded in month)	Stationary Units				Locomotives			Section Length	Share
	Stn	IB	LC	Total	Elec.	Diesel	Total		
A - Medha (June' 13)	14	5	2	21	12	8	20	140	50%
B - Kerne (June' 13)	5	0	6	11	2	10	12	70	30%
C - HBL (Nov'13)	4	3	0	7	6	2	8	40	20%

Auto Section
SNF-HFZ-LPI (14 Kms)

Trial of upgraded KAVACH Version 4.0 has been started in Sanathnagar - Lingampalli Section w.e.f Dec 2022 (TDC: Aug 2023).

CONCEPT DIAGRAM OF TCAS



3. TCAS – Amelioration:

Indian Railways have taken policy decision for extensive implementation of TCAS over IR Network and committed for expeditious roll out. Currently RDSO is working on proving interoperability of TCAS with global ATP systems like ETCS Level-1/Level-2 and up-gradation of TCAS to have additional features like working on LTE communication bearer, adhering of TSR (Temporary Speed Restrictions), working without lineside signals in automatic signalling sections, Direct interfacing with EI, CTC/TMS etc. to make the TCAS system a world class and premium export product in the field of modern Railway signalling system and to achieve the challenging organizational goal of “Zero accidents” in train operations for safe transportation of public.

4. Status of Development of Train Collision Avoidance System

- After successful trials, all the three firms are approved under developmental orders on 23.03.2018 for Absolute Block section up to the speed of 110 KMPH:
 - M/s. MEDHA on 23.03.2018

- M/s. HBL on 31.12.2018
- M/s. KERNEX on 17.04.2019

5. TCAS –Auto Section Trials

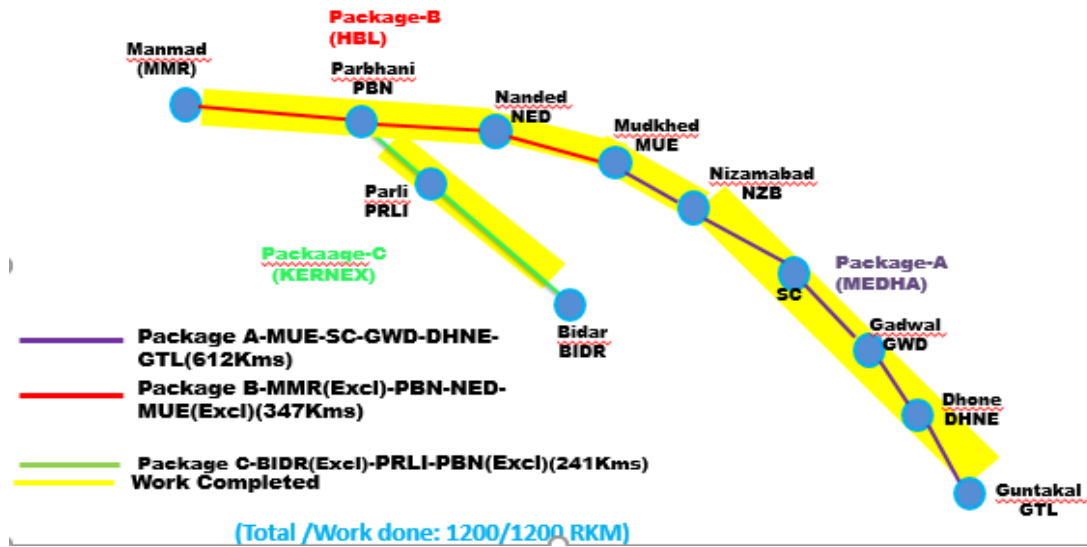
- Santhnagar-Lingampalli (14.8 Kms) Section of South Central Railway allotted in July 2018 for carrying out Auto Section Trials.
- Installation work completed by all the three firms in the allotted section.
- TCAS trials in Auto-Section started in Feb-19.
- Based on the field experiences gained, the specification for Auto section was finalized in July-19.
- Trial has been carried out on date 23 & 24 Sept 2019.
- Approval for Auto-Section from RDSO obtained for the three firms.

6. TCAS - Deployment in SCR

The following Pink Book Works are under progress over South Central Railway:

- PB 580 of 2019-20 - Bidar-Parli Vaijnath-Parbhani - (241 km) for an estimated value of Rs. 37.23 Crores.
- PB 581 of 2019-20 -Manmad- Parbhani- Nanded- Secunderabad- Gadwal-Dhone- Guntakal - (958 km) for an estimated value of Rs. 176.17 Crores.

7. Status of the 1200 RKM TCAS work over SCR:



- LOA/Counter offer issue date: 13.11.2019

1200 RKM TCAS WORK progress(As on 31.03.2023)				
Sl. No	OEM	Scope	Achievements as on 31.03.2023	Balance Targets
1	Package A – M/s Medha (50%)	Mudkhed (ex) - Guntakal 612 RKM 61 Stations 04 LC gates with tower 02 IB with tower 112 Locos	Mudkhed (ex) - Guntakal 612 RKM 61 Stations 04 LC gates with tower 02 IB with tower 89 Locos	23 Electrical Locos
2	Package B – M/s HBL (30%)	Mudkhed - Nagarsol 347 RKM 34 Stations 04 LC gates with tower 30 Locos	Mudkhed - Nagarsol 347 RKM 34 Stations 04 LC gates with tower 30 Locos	
3	Package C – M/s Kernex (20%)	Bidar (ex) - Parbhani (ex) 241 RKM 16 Stations 04 LC gates with tower 18 Locos	Bidar (ex) - Parbhani (ex) 241 RKM 16 Stations 04 LC gates with tower 18 Locos	
TOTAL		1200 RKM 111 stations 12 LC gates 02 IB with tower 160 Locos	1200 RKM 111 stations 12 LC gates 02 IB with tower 137 Locos	23 Electrical Locos

Field Trial of KAVACH systems by two new vendors (M/s GGtronics & M/s Quadrant) in Moula Ali (Excl) - Raghunathpalli section (86 Rkm) of Secunderabad division is in progress. Completion period: 15 Months (TDC: Aug 2023).