GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

RAJYA SABHA
UNSTARRED QUESTION NO. 3313
ANSWERED ON 20.03.2026

KAVACH 4.0 AND AI-LED SAFETY INFRASTRUCTURE

3313# SHRI RAJIB BHATTACHARJEE:
DR. PARMAR JASHVANTSINH SALAMSINH:
SHRI BRIJ LAL:
SHRI NARAYANA KORAGAPPA:
SHRI NARHARI AMIN:
SHRI ASHOKRAO SHANKARRAO CHAVAN:
DR. BHAGWAT KARAD:
SHRI DEEPAK PRAKASH:

Will the Minister of RAILWAYS be pleased to state:

(a) the current status of the Kavach 4.0 rollout and whether the target of covering 1,300 route kilometers has been achieved;

(b) the manner in which Ministry plans to utilise the ₹1.2 lakh crore safety budget for rapid installation of automatic train protection systems on high-density corridors;

(c) whether AI-enabled intrusion detection systems used in wildlife corridors are being expanded to all sensitive ecological zones across the network;

(d) if so, the details thereof; and

(e) the reasons for integrating Optical Fibre Network with the Kavach system and how does this improve real-time communication in remote areas?

ANSWER

MINISTER OF RAILWAYS, INFORMATION & BROADCASTING AND
ELECTRONICS & INFORMATION TECHNOLOGY

(SHRI ASHWINI VAISHNAW)

(a) to (e): 1. Kavach is an indigenously developed Automatic Train Protection (ATP) system. Kavach is a highly technology intensive system, which requires safety certification of highest order (SIL-4).

2. Kavach aids the Loco Pilot in running of trains within specified speed limits by automatic application of brakes in case Loco Pilot fails to do so and also helps the trains to run safely during inclement weather.

3. The first field trials on the passenger trains were started in February 2016. Based on the experience gained and Independent Safety Assessment of the system by Independent Safety Assessor (ISA), three firms were approved in 2018-19, for supply of Kavach Ver 3.2.

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4. Kavach was adopted as National ATP system in July, 2020.

5. Implementation of Kavach System involves following Key Activities:

i. Installation of Station Kavach at each and every station, block section.
ii. Installation of RFID Tags throughout the track length.
iii. Installation of telecom Towers throughout the section.
iv. Laying of Optical Fibre Cable along the track.
v. Provision of Loco Kavach on each and every Locomotive running on Indian Railways.

6. Based on deployment of Kavach version 3.2 on 1465 RKm on South Central Railway and experience gained, further improvements were made. Finally, Kavach specification version 4.0 was approved by RDSO on 16.07.2024.

7. Kavach version 4.0 covers all the major features required for the diverse railway network. This is a significant milestone in safety for Indian Railways. Within a short period, IR has developed, tested and started deploying Automatic Train Protection System.

8. Major improvement in Version 4.0 includes increased Location Accuracy, Improved Information of Signal Aspects in bigger yards, Station to Station Kavach interface on OFC and Direct Interface to existing Electronic Interlocking System. With these improvements, Kavach Ver.4.0. is planned for large scale deployment over Indian Railways.

9. After extensive and elaborate trials, Kavach Version 4.0 has been successfully commissioned on 1452 Route Kilometres, covering the high density Delhi- Mumbai and Delhi-Howrah routes as below:

SN	Section	Progress (Route Km)
(1)	**Delhi-Mumbai route:**	
i	Junction cabin – Palwal – Mathura – Nagda section	667
ii	Vadodara - Ahmedabad section	96
iii	Vadodara - Virar section	336
(2)	**Delhi – Howrah route:**	
i	Gaya Sarmatanr section	93
ii	Chota Ambana - Bardhaman – Howrah section	260

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10. Further, track side Kavach implementation work has been taken up on 24,427 RKM covering all GQ,GD,HDN and identified sections of Indian Railways. The sections mentioned above also pass through Kota division and state of Maharashtra.

11. Progress of key items of Kavach on High density routes including Delhi– Mumbai & Delhi–Howrah corridors as on 14.03.2026 are as under:

SN	Item	Progress
i	Laying of Optical Fibre Cable	8570 Km
ii	Installation of Telecom Towers	1100 nos
iii	Station Data Centre	767 Station
iv	Installation of Track side equipment	6776 RKm
v	Provision of Kavach in Loco	4211 nos

12. In addition, work for installation of Kavach in 8979 Locomotives and 1200 EMU/MEMU has been taken up.

13. Specialized training programmes on Kavach are being conducted at centralized training institutes of Indian Railways to impart training to all concerned officials. By now more than 55,000 technicians, operators and engineers have been trained on Kavach technology. This includes about 47,500 Loco Pilots & Assistant Loco Pilots. Courses have been designed in collaboration with IRISET.

14. The cost for provision of Track Side including Station equipment of Kavach is approximately Rs. 50 Lakhs/Km and cost for provision of Kavach equipment on locomotives is approximately Rs. 80 Lakh/Loco.

15. The funds utilized on Kavach works so far up to Feb'26 is Rs. 2,763.90 Crores. The allocation of funds during the year 2025-26 is Rs. 1673.19 Crores. Requisite funds are made available as per the progress of works.

Protection of wild life: One of the innovative measures taken is development of AI-enabled Intrusion Detection System (IDS) for detecting presence of elephants on Railway tracks using Distributed Acoustic Sensors (DAS).

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The system components includes Optical Fibre, hardware & pre-installed signature of elephant locomotion. The system is designed to generate alerts for loco pilots, station masters and Control Room about the movement of elephants in proximity of railway tracks, for taking timely preventive action. Presently, IDS system is working over 141 Route kms on critical and vulnerable locations identified by forest department in the Northeast Frontier railway zone.

Works of IDS have also been sanctioned for identified corridors of 1088 Route Kms across Indian railways covering NFR(403.42 Rkm), ECoR(368.70 Rkm), SR(55.85 Rkm), NR(52 Rkm), SER(55 Rkm), NER(18 Rkm), WR(115 Rkm) & ECR(20.3 Rkm).

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