



Kavach System

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Why in News?

The recent collision between two passenger trains in **Andhra Pradesh's Vizianagaram district** drew attention to the absence of the [Traffic Collision Avoidance Systems \(TCAS\)](#), specifically the indigenously developed system called '[Kavach](#),' which, if installed, could have averted the tragic incident.

What is Kavach?

▪ About:

- Kavach is a **cab signaling train control system with anti-collision features** developed by the [Research Design and Standards Organisation \(RDSO\)](#) in association with **three Indian vendors**.
 - It has been adopted as our **National Automatic Train Protection (ATP) System**.
- It adheres to **Safety Integrity Level-4 (SIL-4)** standards and acts as a vigilant watchdog over the existing signaling system, **alerting the loco pilot when approaching a 'red signal'** and applying automatic brakes if necessary to prevent overshooting the signal.
 - The system also relays **SoS messages** during emergency situations.
- It features centralized live monitoring of train movements through the **Network Monitor System**.
 - The **Indian Railways Institute of Signal Engineering & Telecommunications (IRISET) in Secunderabad, Telangana** hosts the 'Centre of Excellence' for Kavach.

▪ Components of Kavach:

- Within the **Kavach setup**, designated railway stations along the intended route for deployment **consist of three essential components**.
 - **First Component:** The first component involves the **incorporation of [Radio Frequency Identification \(RFID\) technology](#)** into the tracks.
 - RFID employs **radio waves to identify objects or individuals and utilizes electromagnetic fields** to automatically read wireless device information from a distance without physical contact or line of sight.

▪ **Second Component:** The **locomotive**, serving as the driver's cabin, **is equipped with RFID readers**, a computer, and brake interface equipment, comprising the second component.

▪ **Third Component:** It encompasses radio infrastructure, **such as towers and modems**, strategically installed at railway stations to support the system's functionality.

▪ Challenges in Deployment:

- Its deployment cost is **₹50 lakh per kilometer**, with limited coverage of approximately 1,500 km currently, posing a challenge in comprehensive implementation across the **68,000 km rail network**.

Note: Presently, the [Indian Railways](#) has designated **₹4,000 crore within the Signalling and Telecom budget section**, encompassing **₹2,000 crore** allocated under the [Rashtriya Rail Sanraksha Kosh \(RRSK\)](#) specifically for implementing **Kavach**.

UPSC Civil Services Examination, Previous Year Question:

Q. Consider the following communication technologies: (2022)

1. Closed-circuit Television
2. Radio Frequency Identification
3. Wireless Local Area Network

Which of the above are considered Short-Range devices/technologies?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Ans: (d)

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