



DURGA II Laser Weapon

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Why in News?

Recently, the [Defence Research and Development Organisation \(DRDO\)](#) has sought USD 100 million from the Ministry of Defence to develop a high-power laser weapon, named **Directionally Unrestricted Ray-Gun Array (DURGA II)**, a lightweight directed energy weapon (DEW).

- It is a 100-kilowatt lightweight DEW and **can be used by armed forces.**
- It aims to provide the Indian armed forces with **cutting-edge technology capable of neutralising various threats, including drones, missiles, and artillery shells.**

What are Directed-Energy Weapons (DEWs)?

▪ About:

- It is a type of weapon system that **emits highly focused energy**, typically in the form of **lasers, microwaves, or particle beams**, to incapacitate or destroy targets.
- Unlike traditional firearms or explosives which rely on **kinetic energy (physical impact)**, **DEWs use directed energy** to achieve their effects.

▪ Types:

- **Laser Weapons:** It uses a **concentrated beam of coherent light** to heat and damage the target.
 - They can be used for various purposes, including **target destruction, missile defence**, and disabling electronics.
- **Microwave Weapons:** They emit **electromagnetic radiation** in the microwave frequency range to disrupt or damage electronic systems, such as **computers, sensors, or communication devices.**
- **Particle Beam Weapons:** They accelerate **charged or neutral particles** to high velocities and direct them towards the target to cause damage through **kinetic energy transfer or ionisation effects.**

▪ Advantages:

- It has advantages including **precision targeting, rapid engagement**, reduced collateral damage, and potentially lower costs per shot.
 - DEWs are believed to be the sole **answer to virtually 'unstoppable' hypersonic missiles.**
- They have **applications in military defence, homeland security**, space exploration, and law enforcement.
- It transmits **lethal force at the speed of light.**
- These weapons are **not affected by the constraining effects of gravity** or atmospheric drag, making them **extremely precise.**

▪ Challenges:

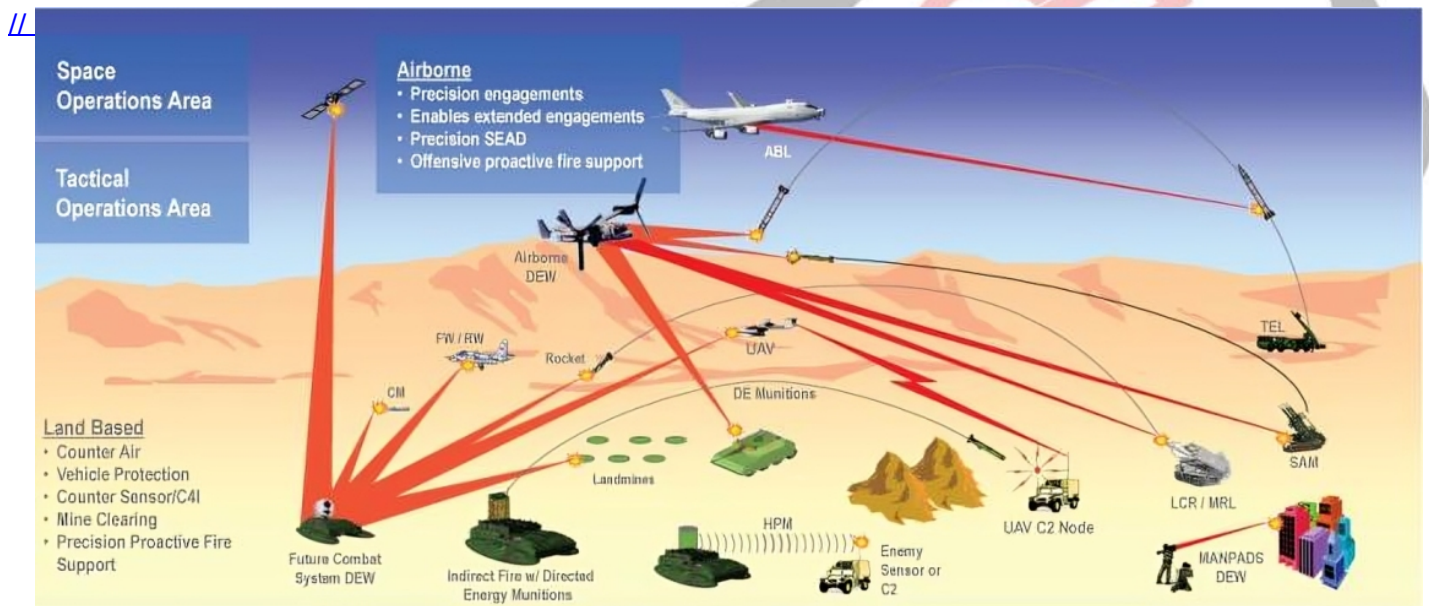
- **Limited Range:** Most DEWs have limited range, and their effectiveness **decreases with increasing distance** between the target and the weapon.
- **High Cost:** It **can be expensive** to develop and manufacture, and the cost may not be justified by their effectiveness in some situations.
- **Countermeasures:** It can be countered by using **reflective materials** which can reduce

their effectiveness.

- Its effectiveness can be influenced by factors such as **atmospheric conditions, including fog, rain, and dust.**
- **Arms Race:** The development of DEWs may lead to an arms race among nations.
 - Examples such as **the current nuclear race among nations.**
- **Significance for India:**
 - The application of this technology in the **defence industry** can transform the way wars will be fought enabling India to produce **cutting-edge platforms, weapons, sensors, and networks essential to fight and win a future war.**
 - DEWs could act as a **deterrent against hostile nations** such as China, and Pakistan by increasing India's defence capabilities.
 - **Other Countries with DEWs:**
 - **Russia, France, Germany, the United Kingdom, Israel, and China** are reportedly among the countries that have programmed to develop DEWs or Laser Directed Energy Weapons.
 - Earlier, the US also accused Cuba of carrying out sonic attacks (**Havana Syndrome**).

Note:

- The **global DEW market** was worth USD 4.1 billion in 2020 and is forecasted to reach **USD 15.5 billion by 2027**, with a CAGR of 19.63%.



UPSC Civil Service Examination, Previous Year Questions(PYQs)

Prelims:

Q1. With reference to Agni-IV Missile, which of the following statements is/are correct? (2014)

1. It is a surface-to-surface missile.
2. It is fuelled by liquid propellant only.
3. It can deliver one-tonne nuclear warheads about 7500 km away.

Select the correct answer using the code given below:

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

Ans: (a)

Q2. What is “Terminal High Altitude Area Defense (THAAD)”, sometimes seen in the news? (2018)

- (a) An Israeli radar system
- (b) India’s indigenous anti-missile programme
- (c) An American anti-missile system
- (d) A defence collaboration between Japan and South Korea.

Ans: c

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