

# Medium Range Surface to Air Missile (MRSAM) - UPSC Notes

Surface-to-Air Missiles (SAM) are designed to be launched from the ground to destroy aircraft or other missiles. They are also known as ground-to-air missiles. The topic finds relevance in GS-3 of the [UPSC exam](#), as “defence” is a very dynamic segment of the exam.

## Surface-to-Air Missiles

The SAM is a type of anti-aircraft system, as in the modern armed forces, missiles have replaced the conventional anti-aircraft systems. Although no functional prototypes were introduced, serious efforts for the development of SAM were initiated during World War II itself.

- Further developments in the 1940s and 1950s led to the first operational systems being introduced by most major forces during the second half of the 1950s.
- The **American Nike Ajax** was the first functional guided SAM system.
- These missiles are classified on the basis of their mobility, guidance, range and altitude.
- The SAMs are categorized into three classes subsequently:
  - Fixed heavy long-range systems
  - Vehicle-mounted medium-range systems, and
  - MANPADS (short-range man-portable air-defence systems)

## Medium range SAMs

The heavier the missiles, the longer they can fly. Thus, the missiles which can fly for longer durations are less mobile. The medium-range missiles are specifically designed to be highly mobile with very fast setup time.

- The **Medium-Range Surface-to-Air Missile (MRSAM)** was developed by India's [Defence Research and Development Organisation \(DRDO\)](#) in collaboration with Israel Aerospace Industries (IAI).
- The MRSAM is based on the configuration of the **Barak-8 naval air defence system** which is a **Long-Range Surface-to-Air Missile**.

## Specifications of MRSAM

The MRSAMs are usually 4.5m long and weigh around 276kgs. The missiles have canards and fins for manoeuvrability and control.

- The MRSAM consists of four common features, that are:
  - A command and control system
  - A tracking radar
  - Radiofrequency seeker
  - Missiles
  - And a mobile launcher system
- The tracking radar is utilized to track and identify the threat. It is a part of the combat management system.

- The system is capable of calculating the distance between the target and the launcher while simultaneously determining whether the target is a friend or an enemy.
- The MRSAM utilizes a mobile launcher to transport the missiles.
- The MRSAM also consists of an active **Radio-frequency seeker**, which is located at the front section of the missile. It is used to detect the moving targets in all weather conditions.
- These missiles also consist of a **bi-directional data link**. This passes on the information regarding the target to the missile.
- The MRSAMs are equipped with an explosive warhead. This warhead has a self-destructing fuse which increases the probability of killing the target with little to no collateral damage.

## Akash Missile

In this section, you can read about the SAM Akash and its capabilities.

- **Type:** This is a Medium-range Surface-to-Air Missile.
- It was developed by the Defence Research and Development Organisation (DRDO).
- The missile has an intercept range of 30kms, at altitudes up to 18 km.
- It has a launch weight of 720 kg, a diameter of 35 cm and a length of 5.78 metres.
- It can reach a supersonic speed of around **Mach 2.5**.
- It has a multi-target engagement capability which means it can engage with multiple targets at a time. It has the capability to neutralize several types of targets also, such as aerial targets, cruise missiles and even ballistic missiles.
- The Akash battery consists of a passive electronically scanned array radar otherwise known as PESA radar.
- The missile is also equipped with a highly explosive warhead with a proximity fuse weighing 60kgs.
- The Akash system is proficient to protect a convoy of vehicles which are in constant motion.
- The design of this missile is similar to that of the SA-6, otherwise known as **2K12 "Kub" mobile surface-to-air missile system**.