Doppler Weather Radar Network

Why in News?

On the Occasion of **148th Foundation Day of** India Meteorological Department (IMD), the Ministry of Earth Science has inaugurated the Doppler Weather Radar (DWR) **Systems** in Jammu & Kashmir, Uttarakhand, and Himachal Pradesh.

- The Ministry of Earth Science.is also preparing to cover the entire Country the **Doppler weather radar network** by 2025 for more accurate forecasts related to extreme weather events.

What are Doppler Weather Radars?

- Based on Doppler principle, the **radar is designed to improve precision in long-range weather forecasting** and surveillance using a parabolic dish antenna and a foam sandwich spherical radome.
- DWR has the **equipment to measure rainfall intensity, wind shear and velocity and locate a storm centre** and the direction of a tornado or gust front.

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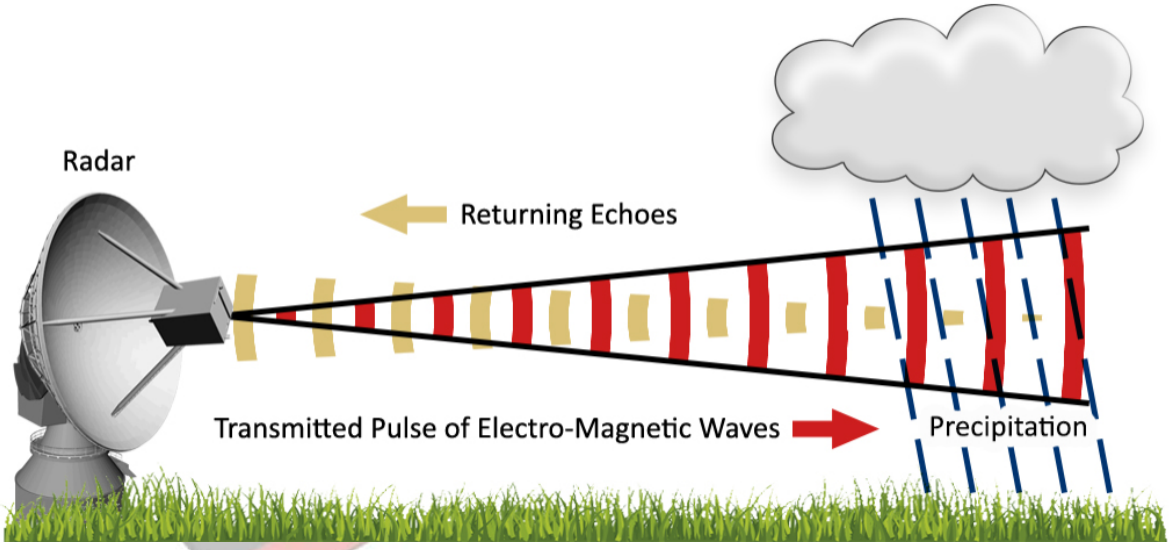
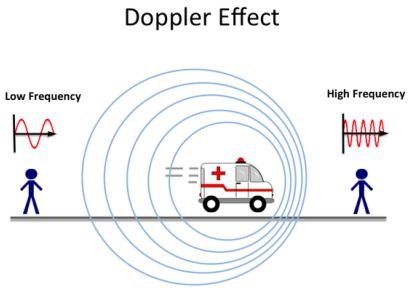


What is Radar?

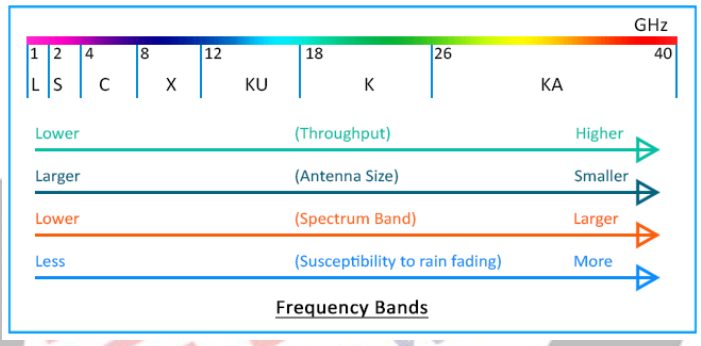
- **Radar (Radio Detection and Ranging):**
  - It is a device which **uses electromagnetic waves in the microwaves region** to detect location (range & direction), altitude, intensity and movement of moving and non-moving objects.
- **Doppler Radar:**
  - It is a specialized radar that uses the Doppler effect to produce velocity data about objects at a distance
    - **Doppler effect:** When the source and the signal are in relative motion to each

other there is a change in the frequency observed by the observer. If they are moving closer, frequency increases and vice versa.



- It does this by bouncing a microwave signal off a desired target and analyzing how the object's motion has altered the frequency of the returned signal.
- This variation gives direct and highly accurate measurements of the radial component of a target's velocity relative to the radar.

- **Types Of Doppler Radars:**
  - Doppler radar can be divided into **several different categories according to the wavelength which are L, S, C, X, K.**



- **X band radars:**
  - They operate on a wavelength of 2.5-4 cm and a frequency of 8-12 GHz. Because of the smaller wavelength, the X band radar is more sensitive and can detect smaller particles.
  - **Application:**
    - These radars are used for **studies on cloud development** because they can detect the tiny water particles and also used to detect light precipitation such as snow.
    - X-band radars also attenuate (become less effective) very easily, so they are used for only very short-range weather observation.
    - Due to the small size of the radar, it can therefore be portable like the Doppler on Wheels (DOW). **Most major airplanes are equipped with an X band radar** to pick up turbulence and other weather phenomena.
    - This band is also shared with some police speed radars and some space radars.

Source: HT