



# New Doppler Radars in Maharashtra: IMD

## Why in News

Recently, the [India Meteorological Department \(IMD\)](#) announced that it will install **seven new doppler radars in Maharashtra, including Mumbai** in 2021.

- In January 2021, the Union Minister for Earth Sciences commissioned [two of the ten indigenously built X-Band Doppler Weather Radars \(DWR\)](#) to closely monitor the weather changes over the Himalayas.

## India Meteorological Department

- It is an agency of the **Ministry of Earth Sciences, established in 1875.**
- It is the principal agency **responsible for meteorological observations, weather forecasting and seismology.**

## Key Points

### ▪ About:

- Doppler radars of varying frequencies — **S-band, C-band and X-band** — are commonly used by the IMD **to detect and track the movement of weather systems, cloud bands and gauge rainfall** over its coverage area of about **500 km.**
- Four **X-band** and one **C-band radar will be deployed over Mumbai.** In addition, **Ratnagiri will get a new C-band** and **Vengurla will get an X-band radar**, each of which will operate for multiple purposes.

### ▪ Existing Radars:

- **East Coast:** Kolkata, Paradip, Gopalpur, Visakhapatnam, Machilipatanam, Sriharikota, Karaikal and Chennai.
- **West Coast:** Thiruvananthapuram, Kochi, Goa and Mumbai.
- **Other Radars:** Srinagar, Patiala, Kufri, Delhi, Mukteshwar, Jaipur, Bhuji, Lucknow, Patna, Mohanbar, Agartala, Sohra, Bhopal, Hyderabad and Nagpur.

### ▪ Significance:

- They will **guide meteorologists, particularly in times of extreme weather events** like [cyclones](#) and associated heavy rainfall.
- As the radar **observations will be updated every 10 minutes**, forecasters will be able **to follow the development of weather systems** as well as their varying intensities, and accordingly **predict weather events and their impact.**

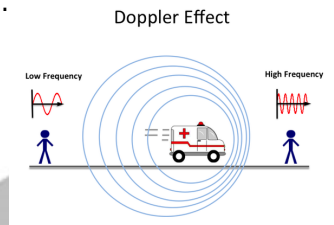
## Radars

- **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:**

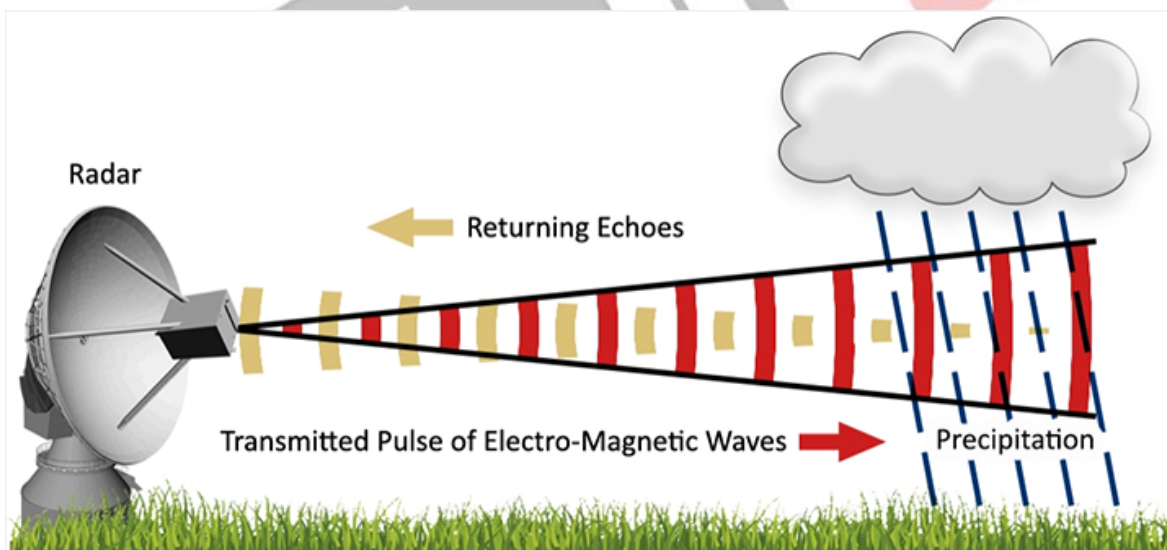
- It is a specialized radar that uses the **Doppler effect** to produce velocity data about objects at a distance.
- **Doppler effect:** When the **source and the signal are in relative motion** to each other there is a **change in the frequency observed by the observer**. If they are moving closer, frequency increases and vice versa.



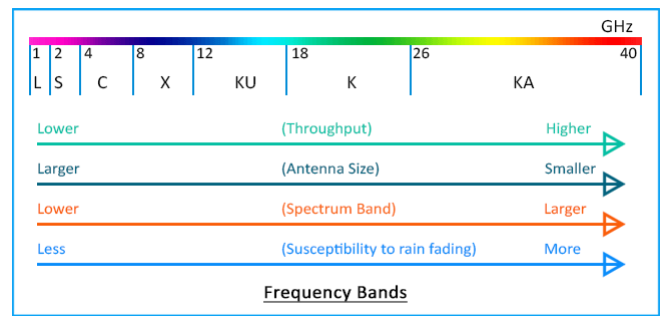
- It does this by **bouncing a microwave signal off a desired target** and analyzing how the object's motion has altered the frequency of the returned signal.
- This **variation gives direct and highly accurate measurements** of the radial component of a target's velocity relative to the radar.

- **Doppler Weather Radar (DWR):**

- 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.



- **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 radar:**

- It operates 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**.
- It is **used to detect thunderstorms** and lightning.

- **C-band radars:**

- It operates on a **wavelength of 4-8 cm** and a **frequency of 4-8 GHz**. Because of the wavelength and frequency, the dish size does not need to be very large.
- The signal is more easily attenuated, so this type of radar is **best used for short range weather observation**.
- It guides at the **time of cyclone tracking**.

- **S band radars:**

- It operates on a **wavelength of 8-15 cm** and a **frequency of 2-4 GHz**. Because of the wavelength and frequency, S band radars are not easily attenuated.
- This makes them **useful for near and far range weather observation**.

**Source: IE**

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