



Millimetre Wave band in 5G

For Prelims: Millimetre Wave band, 5G, Low-Earth Orbit (LEO), Satellite Industry, Spectrum, International Telecommunication Union

For mains: 5G technology, mm Wave bands of 5G and concerns related to it, Satellite Communication, International Telecommunication Union.

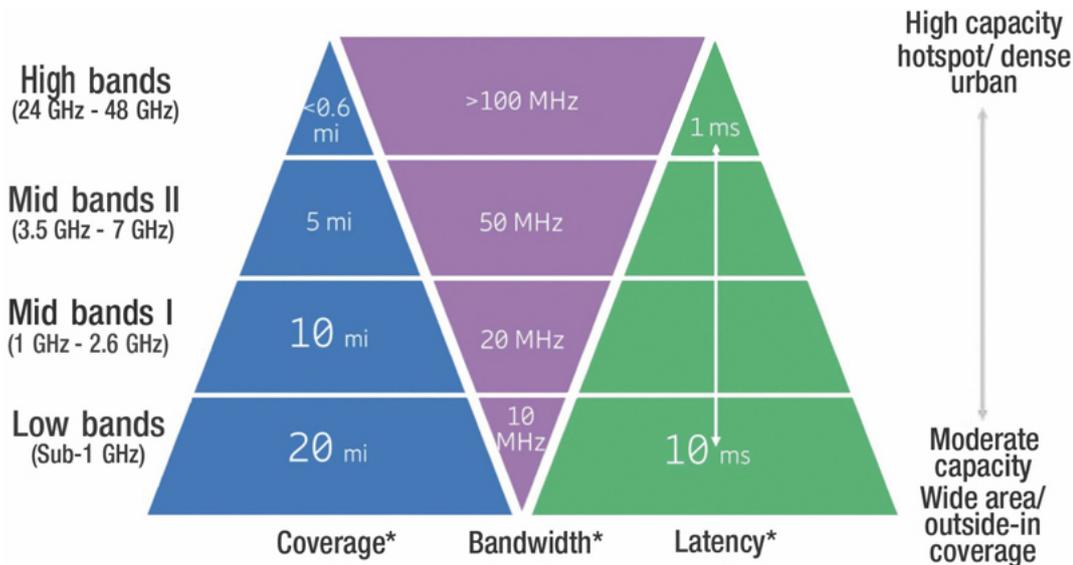
Why in News

Recently, **Satcom Industry Association-India (SIA)** has voiced concerns over the Government's plan to include the **Millimetre Wave (mm Wave) bands** in the [5G spectrum auction](#)

- SIA is an industry body that represents the interests of the communication satellite ecosystem in India.
- [Telecom Regulatory Authority of India \(TRAI\)](#) had sought industries' views on topics related to **quantum of spectrum to be auctioned off**.

Key Points

- **5G Technology:**
 - **About:**
 - 5G is the 5th generation mobile network. It is a new **global wireless standard after 1G, 2G, 3G, and 4G networks**. The 5G networks **will operate in the mm Wave spectrum**.
 - It **enables a new kind of network** that is designed to connect virtually everyone and everything together including machines, objects, and devices.
 - **Bands in 5G:** 5G mainly **work in 3 bands**, namely low, mid and high frequency spectrum — all of which have their own uses as well as limitations.
 - **Low band spectrum:** It has shown **great promise in terms of coverage and speed of internet** and data exchange however the maximum speed is limited to 100 Mbps (Megabits per second).
 - **Mid-band spectrum:** It offers **higher speeds compared to the low band**, but has limitations in terms of coverage area and penetration of signals.
 - **High-band spectrum:** It has the **highest speed of all the three bands**, but has extremely limited coverage and signal penetration strength.
 - **Internet speeds** in the high-band spectrum of 5G has been tested to be as **high as 20 Gbps (gigabits per second)**, while, in most cases, the maximum internet data speed in 4G has been recorded at 1 Gbps.



▪ Millimetre Wave-Band:

◦ About:

- It is a particular segment of the radio frequency spectrum that ranges between **24 GHz and 100 GHz**.
- This spectrum, as the name suggests, **has a short wavelength**, and is appropriate to deliver **greater speeds and lower latencies**. This in turn makes **data transfer efficient and seamless** as the current available networks work optimally only on lower frequency bandwidths.

◦ Significance:

- 5G services can be deployed using lower frequency bands. They **can cover greater distances and are proven to work efficiently** even in urban environments, which are prone to interference.
- But, when it comes to data speeds, these bands fail to hit peak potential needed for a true 5G experience. So, **mmWave is that quintessential piece in the 5G jigsaw puzzle for mobile service providers**.

◦ Effect on Satellite Industry:

- The Internet has largely been provided to users via fibre-optic based broadband connectivity or mobile network. Of late, another class of Internet vendors is showing up. These are **satellite-based communication service providers**.
- This segment uses **Low-Earth Orbit (LEO)** satellites to provide broadband to both urban and rural users. Their service could also be used for weather predictions.
- The mm- band had been the subject of controversy due to **out-of-band emissions into the passive satellite band used for weather satellites at 23.6-24 GHz**.
 - **Out-of-band emission** is emission on a frequency or frequencies immediately **outside the necessary bandwidth** which results from the modulation process.
 - The level of out-of-band emission can not be reduced without affecting the corresponding transmission of information.

▪ Concerns Raised by the Industry:

◦ Against ITU Norms:

- SIA urged the regulator **to limit the inclusion of mmWave spectrum in the 5G auction as 27.5-31 GHz and 17.7-21.2 GHz bands have been preserved for satellite-based broadband services** as per the decision taken by the **International Telecommunication Union (ITU)**.
- The industry body **pointed to Europe's "5G Roadmap"**, which is built on the ITU's decision to hold these bands for satellite-based broadband services.

◦ Denial of Benefits:

- It also noted that offering excessive spectrum resources in the upcoming 5G auction will result in **Indian citizens being denied the benefits of high-demand, advanced satellite broadband services.**
- **Loss to Economy:**
 - It will result in a **massive loss to the Indian economy** of up to USD 184.6 billion by 2030, along with the loss of [Foreign Direct Investment \(FDI\)](#) and employment generation benefits.
- **SIA's Suggestions:**
 - SIA-India has noted that the **330 MHz of spectrum in the 3.3-3.67 GHz band is enough to satisfy India's mid-band 5G needs** while ensuring a competitive auction.
 - The industry body also noted that **providing excess spectrum could pose a downside risk of the bands going unsold, or even worse,** underutilised by terrestrial players at the expense of satellite-based service providers. The **allocation of mmWave band is critical to the [satellite communication](#) industry, which needs a stronger regulatory support** to ensure that 5G operations don't interfere with their existing operations.

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