5G Technology

Why in News

Recently, the **Department of Telecommunications (DoT)** has sought inputs from telecom companies and other industry experts on the sale and use of **radio frequency spectrum** over the next 10 years, including the 5G (Fifth Generation) bands.

Key Points

- **Features of 5G Technology:**
  - **Millimeter wave spectrum:** The 5G networks will operate in the **millimeter wave spectrum** (30-300 GHz) which have the advantage of sending large amounts of data at very high speeds because the frequency is so high, it experiences little interference from surrounding signals.
  - **Upgraded LTE:** 5G is the latest upgrade in the **long-term evolution** (LTE) mobile broadband networks.
  - **Internet speed:** In the high-band spectrum of 5G, internet speeds have been tested to be as high as **20 Gbps** (gigabits per second) as compared to the maximum internet data speed in 4G recorded at 1 Gbps.

    5G network speeds should have a **peak data rate** of **20 Gb/s** for the downlink and **10 Gb/s** for the uplink.
  - **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.

- **Hurdles in Rolling Out 5G Technology:**
    - **Enabling critical infrastructures:** 5G will require a **fundamental change to the core architecture** of the communication system. The major flaw of data transfer using 5G is that it can't carry data over longer distances. Hence, even 5G technology needs to be augmented to enable infrastructure.
    - **Financial liability on consumers:** For transition from 4G to 5G technology, one has to upgrade to the latest cellular technology, thereby creating financial liability on consumers.
    - **Capital Inadequacy:** Lack of flow of cash and adequate capital with the suitable telecom companies (like Bharti Airtel and Vodafone Idea) is delaying the 5G spectrum allocation.
- **Utility of 5G Applications:** Combined with **IoT**, cloud, **big data**, **AI**, and **edge computing**, 5G could be a critical enabler of the **fourth industrial revolution**.

  For India: 5G networks could improve the accessibility of services such as **mobile banking and healthcare**, and enable exponential growth in opportunities for unemployed or underemployed people to engage in fulfilling and productive work. For this Government has rolled out enabling policies.
- **5G Enabling Policy:**

  India's National Digital Communications Policy 2018 highlights the importance of 5G when it states that the convergence of a cluster of revolutionary technologies including 5G, the cloud, Internet of Things (IoT) and data analytics, along with a growing **start-up** community, promise **to accelerate and deepen its digital engagement,** opening up a new horizon of opportunities.

  It aims to reach 100% teledensity, high-speed internet highways and delivery of citizen-centric services electronically.
- **Global Progress on 5G:**

  Global telecom companies have already started building 5G networks and rolling it out to their customers in many countries:
    - 5G had been deployed in 50 cities in the United States.
    - South Korea has rolled out 5G to 85 cities.
    - Japan and China have too started 5G mobile service on a trial basis.

Source:IE