Undersea Cables

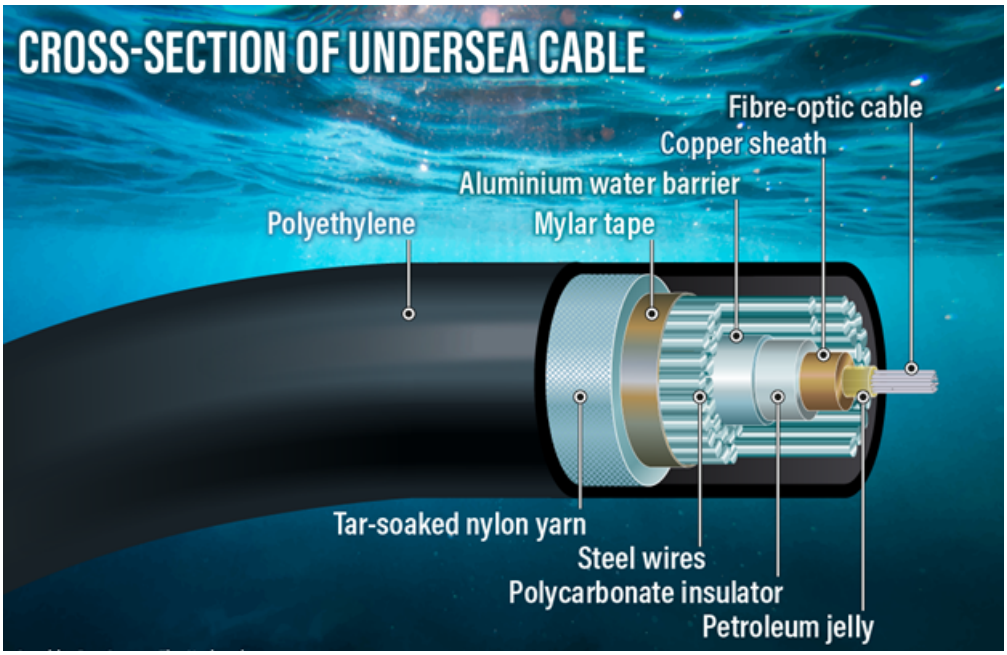
Mains Syllabus: GS III - Infrastructure: Energy, Ports, Roads, Airports, Railways etc.

Why in news?

India is expanding its subsea cable network, with the latest addition being Airtel's 2 Africa Pearls system, supported by Meta, to enhance international bandwidth.

How do they connect internet networks globally?

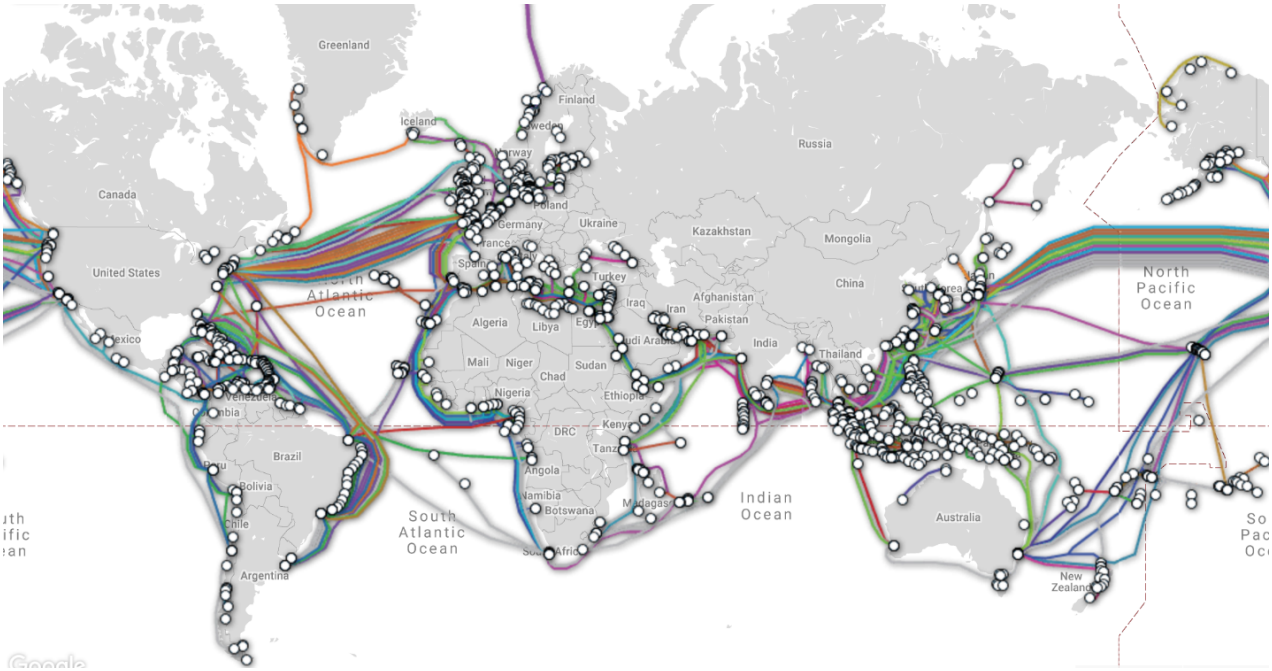
- **Undersea cables** – These are fiber optic cables laid on the ocean floor to transmit vast amounts of data.
- Typically, they are a few inches thick, reinforced to withstand deep-sea pressures and hazards.
- They connect to 'landing stations' where they integrate into terrestrial internet infrastructure.



After William Cooke and Charles Wheatstone had introduced their working telegraph in 1839, the idea of a submarine line across the Atlantic Ocean began to be thought of as a possible triumph of the future.

In August 1850, John Watkins Brett's English Channel Submarine Telegraph Company laid the first line across the English Channel.

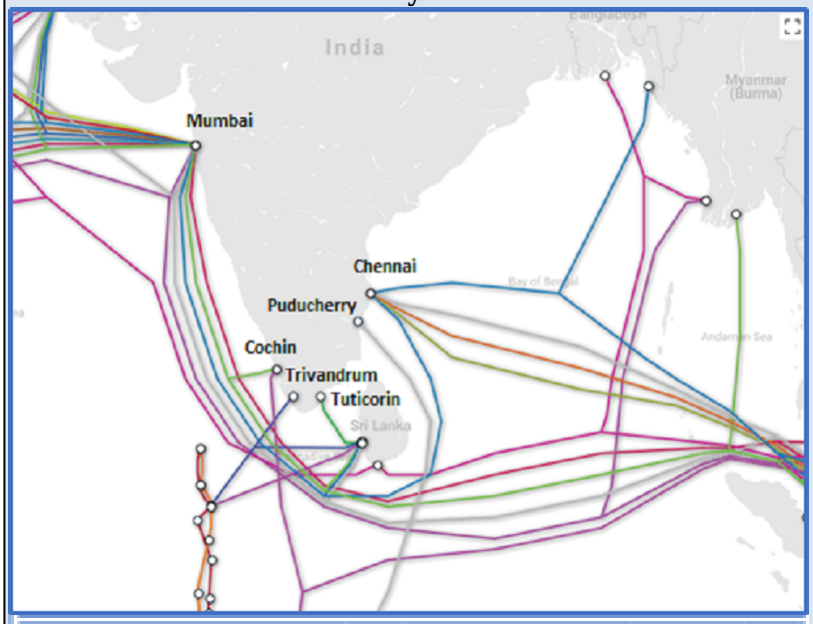
- **Global internet connectivity** - With almost 600 cables , they transmit data between continents, linking internet service providers and telecom operators worldwide facilitating global communication and internet connectivity.
- **Global Network** - This global network of undersea cables, spans the Atlantic and Pacific oceans, as well as strategic passages like the Suez Canal.



- **Transmission capacity** - Each modern cable has several hundred gigabits per second of capacity, and can support thousands of telecom users.
- **Significance** - They enable high-speed data transfer, supporting economic, security, and technological activities.
- 90% of data, 80% of world trade, and about $10 trillion of financial transactions, as well as secure government information, move through these cables.

Undersea cables of India

• With 17 undersea cables, India is connected globally through submarine cable systems, such as the Southeast Asia-Middle East-Western Europe (SEA-ME-WE) system, the Bay of Bengal Gateway (BBG) system, and the India-Middle East-Western Europe (IMEWE) system.
• In 2024, India-Asia-Express (IAX), and India-Europe-Express (IEX) were launched.
• Major landing stations are in Mumbai and Chennai, with a few in Kochi, Thiruvananthapuram and Visakhapatnam.
• 95% of subsea cables goes into a small six-kilometer patch in Versova, Mumbai.
• **Two domestic cable systems**
  - Chennai Andaman and Nicobar Islands (CANI) cable
  - Kochi Lakshadweep Islands project.
• India's share presently constitutes around 1% and 3% respectively for cable landing stations and subsea cable systems



Distribution of Cable Landing Stations and providers that own them	Mumbai	Chennai	Cochin	Trivandrum	Tuticorine	Puducherry	Digha	Visakhapatnam
Tata Communications	3	1	1					
Airtel	1	2						
Reliance Jio	1	1						1
Global Cloud Xchange	1			1				
Vodafone	1							
Sify	1							
BSNL					1		1	
IOX						1		

CLS Operational | CLS Under Construction

What are the challenges in laying undersea cables in India?

- **Limited infrastructure -** Only two major landing sites (Mumbai and Chennai) are in India and this create bottlenecks.
- A disruption in one location (e.g., Red Sea cable cuts) can significantly impact internet services.

- **Regulatory delays -** Laying cables requires approvals from multiple authorities (DoT, Home Ministry, Environment Ministry, etc.) which causes delays.
- Foreign repair vessels need permission to operate, slowing down maintenance.
- **Geopolitical risks -** Strategic locations such as the Red Sea are vulnerable to conflicts, piracy and disruptions.
- If there is a disruption at the Red Sea, it brings down almost 25% of India's Internet in our estimate.
- **High costs & maintenance issues -** Deploying and maintaining cables involves high costs.
- India lacks adequate repair and maintenance facilities, leading to longer restoration times.
- **Vulnerabilities & risks -** India's internet is highly dependent on a few landing stations, making it prone to disruptions.

What can be done to strengthen India's subsea cable network?

- India's undersea cable network is vital for its digital economy.
- Strengthening infrastructure, streamlining regulations and increasing investments will enhance connectivity, security and resilience in the face of global disruptions.
- **Expanding infrastructure -** More landing stations can be developed across coastal cities.
- **Regulatory reforms -** Approval processes can be simplified for laying cables and maintenance.
- **Enhancing security & redundancy -** Cybersecurity measures can be strengthened to prevent sabotage.
- **Public-Private Partnership & investments -** Collaborations with global tech firms and telecom companies can be enhanced to attract technology and investment in the sector.

Reference

[The Hindu | Undersea cables in India]

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