# Open-RAN Architecture

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## Why in News

Recently, **Telecom Regulatory Authority of India (TRAI)** Chairman said that use of **Open-RAN (Radio Access Network)** and software defined telecom networks will open new opportunities for Indian entities to enter into the network equipment market.

## Key Points

- **About:**
    - **Open-RAN** is not a technology, but rather an **ongoing shift in mobile network architecture** that allows networks to be built using subcomponents from a variety of vendors.
        - O-RAN has **an open, multi-vendor architecture** for deploying mobile networks, as **opposed to the single-vendor proprietary architecture.**
        - O-RAN **uses software to make hardware manufactured by different companies work together.**
    - The key concept of Open RAN is **"opening" the protocols and interfaces between the various subcomponents** (radios, hardware and software) **in the RAN.**
        - **Radio Access Network (RAN):**
            - It is the **part of a telecommunications system** that connects individual devices to other parts of a network through radio connections.
            - A RAN resides between user equipment, such as a mobile phone, a computer or any remotely controlled machine, and **provides the connection with its core network.**
    - As a technical matter this is what the industry refers to as **a disaggregated RAN.**

- **Elements of RAN:**
  - **The Radio Unit (RU)** is where the radio frequency signals are transmitted, received, amplified and digitized. The RU is located near, or integrated into,the antenna.
  - **The Distributed Unit (DU)** is where the real-time, baseband processing functions reside. The DU can be centralized or located near the cell site.
  - **The Centralized Unit (CU)** is where the less time-sensitive packet processing functions typically reside.
- **Functioning of Open RAN:**
  - It is the interface between the **RU, DU and the CU that are the main focus of Open RAN.**
  - By **opening and standardizing these interfaces** (among others in the network), and incentivizing implementation of the same, **networks can be deployed with a more modular design** without being dependent upon a single vendor.
  - Making these changes can also allow the DU and CU to be run as virtualized software functions on **vendor-neutral hardware.**
- **Traditional RAN:**
  - In a traditional RAN system, **the radio, hardware and software are proprietary.**
    - This means that nearly **all of the equipment comes from one supplier** and that operators are unable to, for example, deploy a network using radios from one vendor with hardware and software from another vendor.
  - **Problems:**
    - Mixing and matching cell sites from different providers typically leads to a **performance reduction.**
    - The result is that most network operators, while supporting multiple RAN vendors, will deploy networks using a single vendor in a geographic region which can create vendor lock-in with high **barriers to entry for new innovators.**

- **Advantage of O-RAN:**
  - **Innovation and Options:**
    - An open environment expands the ecosystem, and with more vendors providing the building blocks, there is more innovation and more options for the Operators. They can also add new services.
  - **New Opportunities:**
    - It will open new opportunities for Indian entities to enter into the network equipment market.
  - **Cost Saving:**
    - The benefits of this approach also include increased network agility and flexibility, and cost savings.
    - It's expected to make **5G** more flexible and cost efficient.

**Source:IE**