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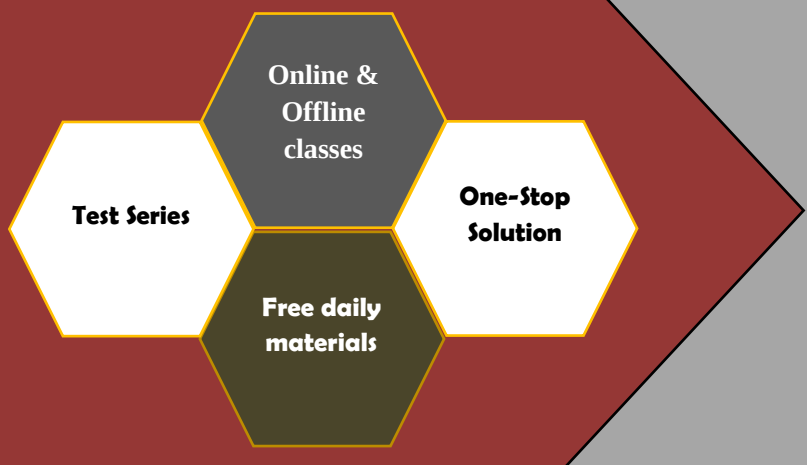
NASA's New Communications System: LCRD

Notes for civil services preparation



UPSC

General Studies

NASA's New Communications System: LCRD

Recently, **NASA (National Aeronautics and Space Administration)** has launchedits new **Laser Communications Relay Demonstration (LCRD).**

Key Points

- **About:**
  - It is the **first-ever laser communications system** that will **pave the wayfor future optical communications missions.**
    - Currently, most NASA spacecraft use radio frequency communications to send data.
  - The **LCRD payload is hosted onboard the US Department of Defense's Space Test Program Satellite 6 (STPSat-6).** It will be **in a geosynchronous orbit**, over 35,000km above Earth.
  - It will be controlled by engineers at the **LCRD mission's ground stations in California and Hawaii.**
  - The team will send test data through radio frequency signals and the LCRD will reply using optical signals.
- **Features:**
  - It has **two optical terminals**. One to receive data from a user spacecraft, and the other to transmit data to ground stations.
  - The modems will **translate the digital data into laser signals**. This will then be transmitted via encoded beams of light.
  - These capabilities make **LCRD NASA's first two-way, end-to-end optical relay.**
- **Significance:**
  - Laser uses infrared light and has a shorter wavelength than radio waves. This will **help the transmission of more data in a short time.**
    - Using infrared lasers, LCRD will send data to Earth at 1.2 gigabits-per-second (Gbps). At this speed, it will take less than a minute to download a movie.
    - It takes roughly nine weeks to transmit a completed map of Mars back to Earth with current radio frequency systems. **With lasers, we can accelerate that to about nine days.**
  - Optical communications **will help increase the bandwidth 10 to 100 times more** than radio frequency systems.
  - Optical communications systems are smaller in size, weight, and require less power compared with radio instruments.
  - A smaller size means **more room for science instruments.**
  - Less weight means a less expensive launch.

- Less power means **less drain on the spacecraft's batteries.**
- With optical communications supplementing radio, missions will have unparalleled communications capabilities.