National Aeronautics and Space Administration

SPACEX

COMMUNICATIONS SERVICES PROJECT PARTNERSHIP

NASA is commercializing satellite relay communications for science missions near-Earth. The Communications Services Project (CSP) is leading agency efforts by investing in the U.S. satellite communications industry to develop and demonstrate powerful services for missions launching as early as 2031. In 2022, CSP awarded $278.5 million to commercial industry through six Funded Space Act Agreements to demonstrate a variety of capabilities, including near-instant delivery of high-rate science data, critical support for launch operations, and reliable exchanges of telemetry, tracking, and command information.

Space Exploration Technologies (SpaceX) was awarded $69.95 million to demonstrate an optical relay network in low-Earth orbit that will provide high-rate satellite communications services to user spacecraft.

VISION

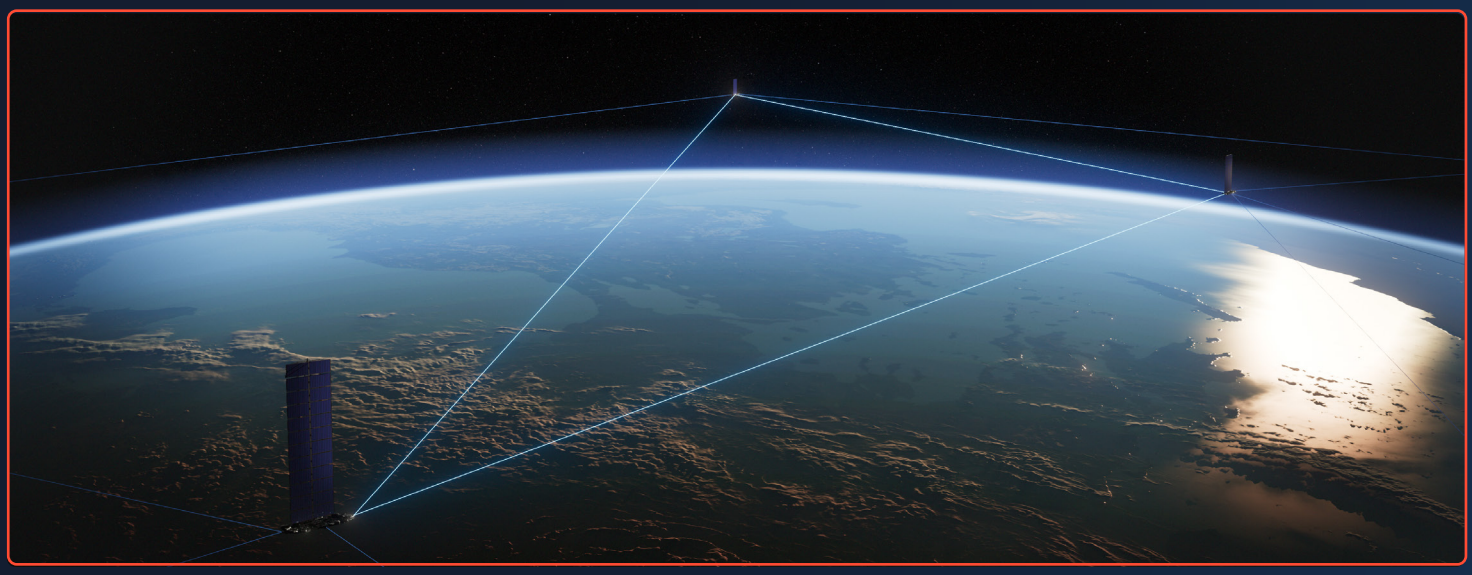
SpaceX plans to connect their established Starlink constellation and extensive ground system to user spacecraft through optical intersatellite links to enable high rate, low-latency data relay services for customers in low-Earth orbit (LEO).

The Starlink network, consisting of over 5,500 LEO satellites, will link to user spacecraft using laser based optical communication terminals created by SpaceX. Once integrated into a spacecraft, the terminals, known as Plug and Plaser, will allow users to link to the Starlink constellation to tap into a mesh network capable of providing services for a variety of missions.

A SpaceX laser terminal, coupled with an avionics bridge, make up the Plug and Plaser, which will interface with third-party spacecraft. Inter-satellite optical links will allow 3rd party satellites to directly connect to user end-points on the ground using the encrypted communications across the open Internet with autonomous scheduling, increasing bandwidth and decreasing latency by orders of magnitude as comapred to traditional direct-to-earth solutions.

All illustrations are an artistic interpretation of future space communications architecture.

NETWORK ARCHITECTURE



SpaceX will leverage the powerful mesh network of their established Starlink satellite constellation and leading-edge laser communications technology to provide data relay services for a variety of missions.

KEY FEATURES

- **Reputable Starlink LEO constellation with proven reliability**
- **Enabled through leading-edge laser communication technology**
- **Mesh communications network constructed of optical intersatellite links**
- **Always-on capability with no prioritization or de-confliction required enabled by autonomous scheduling and data routing**
- **Bidirectional communication from and to anywhere in less than 100ms**

LEARN MORE

The Communications Services Project is managed by NASA's Glenn Research Center, under the direction of the SCaN (Space Communications and Navigation) Program within NASA's Space Operations Mission Directorate. SCaN operates and manages the communications and navigation systems that are critical to every NASA missions, while facilitating a seamless transition from near-Earth government-owned communications assets to commercial alternatives.

To engage with NASA's Communications Services Project, contact **scan@nasa.gov**.