

# STARLINK



DECEMBER 2023

# AVIATION PRIORITY

HIGH-SPEED CONNECTIVITY IN THE AIR



CLAY  LACY

**STARLINK AUTHORIZED DEALER & INSTALLER**

For select Gulfstream, Bombardier, and Embraer models.

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**SPEEDS**

DOWNLOAD  
**40-220+ MBPS**

UPLOAD  
**8-25+ MBPS**

LATENCY  
**LESS THAN 99 MS**

**ADDITIONAL FEATURES**

Global coverage

No long-term contracts

5-Year hardware warranty

Dedicated Starlink support

Ongoing account & technical support

**ABOUT OUR NETWORK**

Starlink is the world's first and largest satellite constellation in low Earth orbit to deliver high-speed, low-latency internet anywhere across the globe.

As of August 2023, SpaceX's Starlink constellation has 4,500+ active satellites.

As the world's leading provider of launch services, SpaceX is the only satellite operator able to launch its own satellites.

SpaceX expands network capacity with new satellite launches every week on average.

## TIMELINE OF STARLINK & STARLINK AVIATION

Mar-14: SpaceX begins work on Starlink

May-19: SpaceX launches the first 60 Starlink satellites

Oct-20: Starlink launches public beta service for consumers

Feb-21: SpaceX surpasses 1,000 active Starlink satellites launched

Sep-21: SpaceX surpasses 100,000 active Starlink users worldwide for the consumer service

### **Apr-22: SpaceX partners with several airlines to provide in-flight connectivity**

Apr-22: SpaceX launches the first Starlink satellites with laser interlinks, designed to improve data transfer between satellites and crucial for open ocean connectivity

May-22: Starlink launches portable land application

**Jun-22: Federal Communications Commission grants SpaceX approval to use Starlink in motion** – allowing us to service users in moving vehicles, vessels, and aircraft. Starlink launches Maritime application

### **Jun-22: Starlink begins developing aviation application**

Dec-22: Starlink surpasses 1,000,000 active Starlink users worldwide

### **Dec-22: Starlink installs on Embraer ERJ-145s**

Jun-23: SpaceX surpasses 4,000 active Starlink satellites

### **Aug-23: Starlink begins installations on business jets**

## FLIGHT PROVEN

- **60+ aircraft** equipped with Starlink
- **24,000+ in-flight hours** across the globe
- **12.5M+ miles** traveled
- **17K+ flights** taken

As of August 2023

## VIDEO STREAMING & VIRTUAL MEETINGS AT ANY ALTITUDE

- Starlink can deliver up to 220 Mbps to each plane, enabling **all passengers to access streaming-capable internet at the same time.**
- Enjoy **unprecedented in-flight experiences with latency below 99ms**, enabling seamless 4K video calls, online gaming, virtual private networks, and other latency-dependent activities.
- This plan includes unlimited data to customers each month. Aviation Priority customers are given a **premium level of network precedence**, meaning users will experience fast and consistent download and upload speeds.



### What makes Starlink's low Earth orbit superior to competitor geostationary satellites?

Starlink is the only service to support streaming, video calls, and other latency-dependent activities nearly anywhere in the world. Most satellite internet services come from single geostationary satellites that orbit the planet at 22,236 miles—Starlink's satellite constellation orbits at 342 miles. As a result, the time between the user and satellite (aka. latency) is high, making it nearly impossible to support latency-dependent activities.

## GLOBAL COVERAGE

- As the world's largest satellite constellation **covering land, oceans, and polar regions**. Starlink is positioned to provide in-flight connectivity to passengers and crew anywhere in the world, subject to regulatory approvals.
- Whether you're traveling over remote landscapes or soaring over vast oceans, Starlink provides **reliable speeds for all passengers on board**.
- Starlink's advanced satellites leverage optical space lasers (Optical Intersatellite Links or ISLs), which allow the spacecraft to **transmit data without local ground stations, providing ubiquitous coverage**.

Learn more about Starlink Aviation on [Starlink.com/aviation](https://starlink.com/aviation)

## SUPERIOR TECHNOLOGY – OUR HARDWARE

- Starlink's low-profile Aero Terminal features an electronically steered phased array antenna allowing us to point at a new satellite in <math><1\text{ms}</math>, which unlocks **new levels of reliability, redundancy, and performance**.
- **Existing solutions** rely on mechanically-steered motors to keep the antenna pointed at geostationary satellites and **can require a minute or more of downtime** in order to switch between satellites.
- Our Aero Terminal's low-profile mechanical design is open to the airstream resulting in **minimal performance loss and improved fuel efficiency** compared to high-profile radome antennas.



## CONTINUOUS IMPROVEMENT

With over 1.5M Starlink customers spanning 50+ markets and on every continent (August 2023), Starlink is continuously collecting and evaluating data to learn and improve your experience over time.



## SUPERIOR TECHNOLOGY – OUR SATELLITE CONSTELLATION

- Starlink is the **world's first and largest satellite constellation** with 4,500+ active satellites in low Earth orbit. This ensures you always have multiple optimally placed beams anywhere in the world.
- As the world's leading provider of launch services, SpaceX is the **only satellite operator with the ability to launch its own satellites**. With frequent launches, Starlink satellites are constantly updated with the newest technology.
- Starlink's custom built navigation sensors survey the stars to determine each satellite's location, altitude, and orientation, enabling **precise placement of broadband throughput**.
- Each Starlink satellite uses 4 powerful phased array antennas and 2 parabolic antennas to **provide increased capacity**.
- Efficient ion thrusters, powered by krypton, enable Starlink satellites to orbit raise, maneuver in space, and deorbit at the end of their useful life. Starlink is the **first krypton propelled spacecraft ever flown**.



As of August 2023, SpaceX has surpassed over 100 Starlink launches and 200 total launches. Learn more at [Starlink.com/technology](https://starlink.com/technology)



## INSTALLATION & ONGOING SUPPORT

### Guided Installation

- With its simplified design, Starlink enables installation with **minimal downtime** (10-14 days) that integrates with routine maintenance checks.
- You may choose to **utilize your current maintenance organization** or choose from a list of qualified and experienced installers provided by Starlink and the STC license holders.

### Dedicated Support

- From the time a deposit is made, **Starlink will provide dedicated support** to ensure a good customer service experience with the installation process, activation process, and operation of Starlink on your aircraft.

### Ongoing Support 24 / 7 / 365

- Following installation, Starlink provides **continuous technical, account, and engineering support**, ensuring uninterrupted connectivity to the world's largest satellite constellation.



Starlink's dedicated technical team provides **support 24 / 7 / 365**

## HOW TO RECEIVE YOUR STARLINK

1. Visit [Starlink.com/aviation](https://starlink.com/aviation) and place your refundable deposit. Deposits are fulfilled on a first come, first served basis, for customers with supported airframes.
2. A dedicated Starlink point-of-contact will reach out to answer any questions and schedule your installation.
3. Your selected maintenance organization will install the Starlink hardware, which takes an estimated 10-14 days.

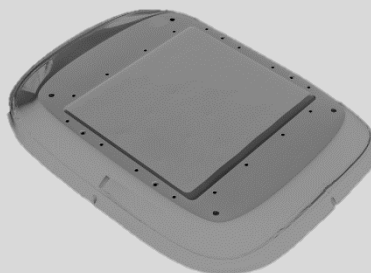
## ABOUT THE HARDWARE

- The Aero Terminal is an aerodynamic, modular fuselage mount system designed to provide high speeds and throughput in-flight, in a form factor previously not achievable with available technology. Expected throughput of **220Mbps down, 25Mbps up, and latency under 99ms**, while having a total weight under 60 lbs.
- The Aero Terminal Antenna is an **electronically-steered phased array antenna** operating in the Ku frequency band. The RX channels operate from 10.7 to 12.7 GHz and the TX channels operate from 14 to 14.5 GHz.
- Starlink provides two WiFi access points for **complete aircraft coverage**.

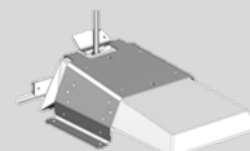
### System overview and LRU components



Power Supply Unit



Aero Terminal



WiFi Access Point  
X2

## STARLINK COMPARED TO EXISTING OPTIONS

	<b>STARLINK</b>	<b>SATELLITE COMPETITORS **</b>	<b>AIR-TO-GROUND COMPETITORS ***</b>
<b>USE CASES</b>	4K streaming, online gaming, high-quality video calls for 30+ devices	Streaming with high-latency, browsing, email for 3-4 devices	Streaming, browsing, email for 1-2 devices
<b>EXPECTED SPEEDS</b>	220↓ 25↑ Mbps	40↓ 2↑ Mbps	5↓ 1↑ Mbps
<b>EXPECTED LATENCY</b>	<99ms	Greater Than 600ms	<99ms
<b>COVERAGE</b>	Global*	Global excluding polar regions	North America

\* Subject to regulatory approvals \*\* Inmarsat JetConneX Ka JX Edge \*\*\* Gogo Biz 4G Limitless

## STARLINK'S LOW EARTH ORBIT CONSTELLATION

