30,000 "Eyes in the Sky" - SpaceX' Stargaze

On January 29th, 2026, SpaceX unveiled Stargaze, its novel space situational awareness (SSA) system.

How Does It Work?

Stargaze is enabled by SpaceX's mega-constellation of almost 10,000 Starlink satellites that are currently in orbit. This vast network equips Stargaze with nearly 30,000 star trackers (three per satellite), which have been repurposed to monitor nearby objects in low Earth orbit (LEO).

When an object is identified by a star tracker, Stargaze compiles location, velocity, and other data to create a concise Conjunction Data Message (CDM). CDMs are shared within Stargaze's system where satellite operators and other stakeholders can view the information.

CDMs provide crucial positioning and trajectory data which will be used to alert stakeholders of collision threats to satellites by other satellites or space debris. With this intelligence, stakeholders are equipped to make informed decisions and respond with an appropriate course correction if necessary.

What Does It Improve?

According to Starlink's website, SpaceX claims that their SSA system will increase space object detection by "several-orders-of-magnitude" compared to conventional ground-based systems.

Traditional ground-based sensors, including optical telescopes and radar systems, have long formed the backbone of satellite and space debris tracking of SSA systems. However, ground-based methods face significant limitations including weather disruptions, sunlight interference, atmospheric distortion, locational constraints, and reduced effectiveness for orbits further from Earth. As a result, ground-based sensors often provide position updates as infrequently as hourly or daily. This provides for less accuracy, leaving more risk for collision. In comparison to hourly or daily notices standard with ground-based systems, SpaceX claims that the system will update object position in "near-real time", according to the Stargaze website. Stargaze delivers fundamental improvements over industry standard ground-based sensors. As a space-based SSA system, Stargaze is unaffected by the observational limitations faced by existing systems. While Stargaze is focused on improving orbital safety in LEO, it has capabilities to improve other orbital regions and types.

What Does It Cost?

The most unique aspect of Stargaze is that there is no price tag attached to it. SpaceX has committed to maximizing safety for all satellites in space by making the Stargaze conjunction data open access for all operators.

Stargaze has made their data entirely accessible to stakeholders, but to gain access to the CDMs, operators are required to contribute their own data. Some of this data is known as “ephemeris”, which the company uses to calculate object trajectory.

What Are the Reactions?

The consensus across the industry is largely favorable. Brad King, CEO of Orbion Space Technology, has spoken in support of Stargaze. He urges that the system will create positive benefits for the sector and urges stakeholders to share additional information beyond what is required to increase the system's effectiveness. Mr. King argues that releasing data on a satellite’s remaining fuel, which is needed for course corrections, is “valuable” for other operators to be aware of.

Similarly, Ed Lu, co-founder and CTO of LeoLabs, was quoted as saying “We’re all in favor of what they announced.” He continued, “No measurement can tell you what somebody’s future plan of maneuvering is going to be. You know your future maneuvering plan, you know where you think you’re going to be, and that information is something that should be shared by operators across the board.

Stakeholders agree on the benefits and need for a space-based SSA system like Stargaze; however, the industry disputes who should own it. The former Director of Commercial Space Policy for the National Space Council, Diane Howard, thinks that the technology should be operated by a government. Ms. Howard was quoted as saying, “Not all data is created equally and the idea of having a neutral or governmental ability to evaluate the data and vet it from an outside perspective can help.”

Conclusion

SpaceX launched Stargaze in late January as a “closed beta” with about a dozen satellite operators. Thus, the effectiveness of the technology is yet to be known at this time.

Stargaze has already prevented an orbital collision prior to its launch as reported by SpaceX. In late 2025, the company described an instance where a third-party satellite attempted a course correction without sharing their ephemeris. This threatened a potential collision with a Starlink satellite that had to be responded to within a timeframe of five hours. Using Stargaze, the satellite was able to adjust its trajectory to avoid the collision just one hour following the third-party maneuver.

According to SpaceX “this would not have been possible by relying on legacy radar systems or high-latency conjunction screening processes”.

The threat to space assets from space debris and other satellites in orbit is a growing issue with little sign of non-technical resolution. Stargaze has yet to definitively prove its accuracy, but the need for this space-based SSA system is clear to protect the orbital environment.