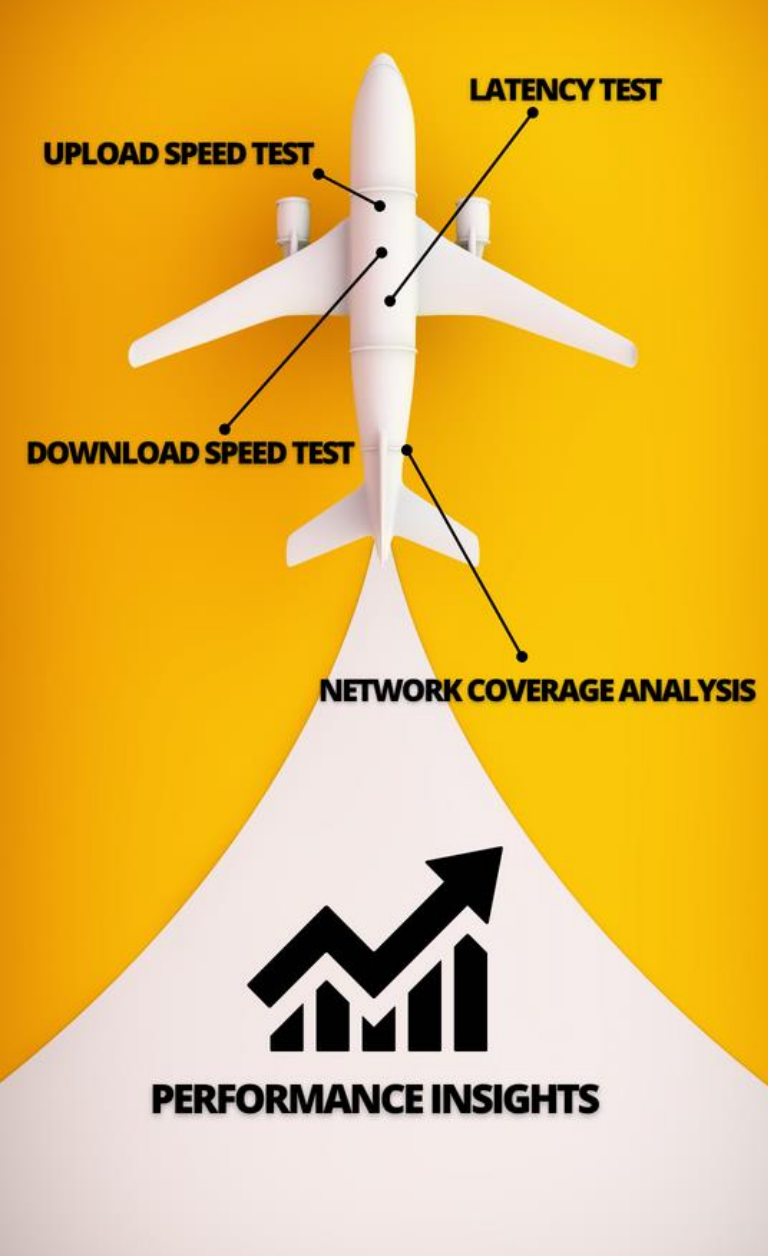# Why Network Coverage Matters on Planes?

This is case study on Wi-Fi user experience measurement at cruising altitude of commercial airplane

Wi-Fi at 40,000 feet - SkyHigh Speeds

As air travel grows, so does the need for robust, high-speed connectivity at cruising altitudes. This report consists of real user experience measurement of Delta Airline on board Wi-Fi network cruising at 40,000 ft Altitude and 1000kms/hr speed covering greater than 6000kms of ground. Read on to get know more on

1. How have we carried out various tests for to measure if network can deliver messaging, entertainment and productivity needs of Airline passenger at cruising altitude?
2. How is Satellite technology shaping the future of aviation by making connectivity accessible, reliable, and fast for passengers around the world?
3. How satellite providers , telco operators and airlines gets benefited from this new age service?

Connectivity at 40,000 Feet

Growing Demand

Passengers need reliable connectivity; operators offer in-seat screens, streaming options.
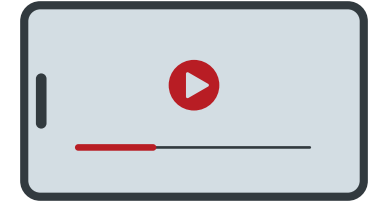
Uninterrupted Productivity

In-flight connectivity enables passengers to stay productive and connected seamlessly.

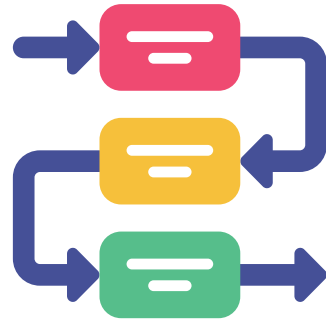## Connected, Never Alone.

Satellite advancements allow high-speed Wi-Fi, benefiting passengers and operators.

Evolving Entertainment

Streaming trends shift passenger expectations; operators reconsider traditional entertainment options.

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Test Methodology

How Did We Measure User Experience In The Air?

We used a standard commercial-grade Android phone equipped with the RantCell Pro app, typically used for measuring cellular and Wi-Fi networks on the ground.

The same software was applied onboard to replicate the real-world passenger experience as closely as possible. Our test methodology focused on assessing in-flight Wi-Fi performance under conditions similar to how passengers use the network during flights.

By utilizing RantCell Pro, we ensured accurate analysis of coverage, speed, and reliability, both on the ground and at cruising altitudes. To learn more about RantCell's capabilities, visit **RantCell's website**.
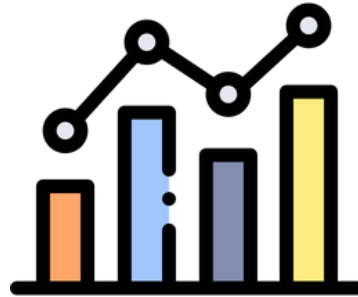
Flight Path Tested

In October 2024, we conducted in-flight connectivity tests across the following flight paths with Delta Airlines:

- Las Vegas to Seattle (Delta Airlines)
- Seattle to Detroit (Delta Airlines)

Total Distance: [2,800 miles (4,510 kilometers)]

Analysis

Latency

Latency, a crucial factor for online performance, averaged 790 ms during testing, with peaks exceeding 11 seconds. Optimal latency for smooth experiences typically ranges from 0 to 120 ms. While this level of latency supports basic tasks like browsing, shopping, and messaging, it can limit real-time activities such as gaming or HD video streaming, where low latency is critical.
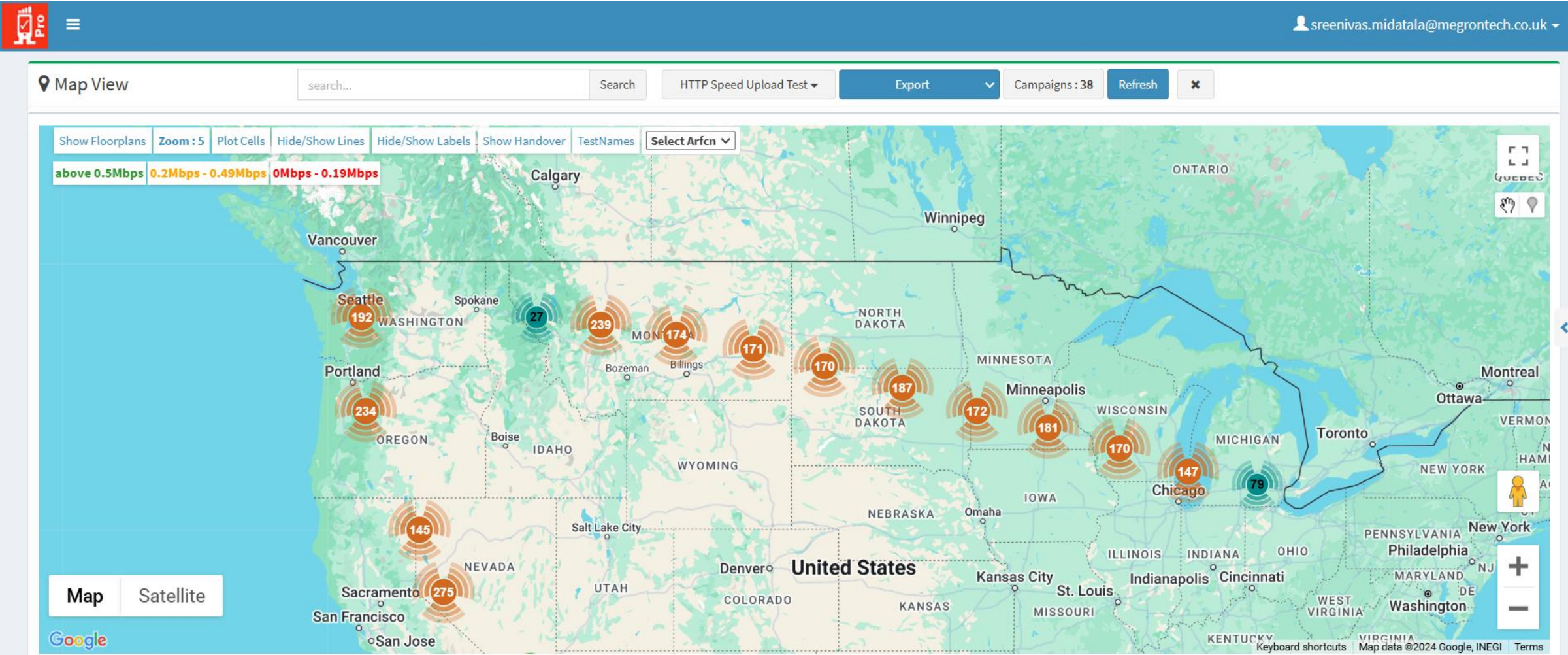
What does this means for the passengers: this means they can perform everyday tasks like checking emails, browsing websites, and shopping online without significant issues. However, applications requiring instant responsiveness may experience noticeable delays, impacting their usability.

Packet loss, measured at just 0.91%, indicates stable connections for basic tasks. These findings, derived from 4,632 geo-samples, highlight the in-flight Wi-Fi system's capability to provide reliable connectivity for most passengers' needs, though limitations remain for latency-sensitive activities.
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Total No. Of Test Conducted:
Highest Latency : 11587ms (EE) , 495ms (AT&T)
Average RTT : 1019.01ms (EE), 222.31ms (AT&T)

Average Latency per mobile operator

EE (23430)
Average RTTAvg 1019.01ms

AT&T (310410)
Average RTTAvg 222.31ms

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Speed (HTTP Upload Speed)

Speed (HTTP Download Speed)
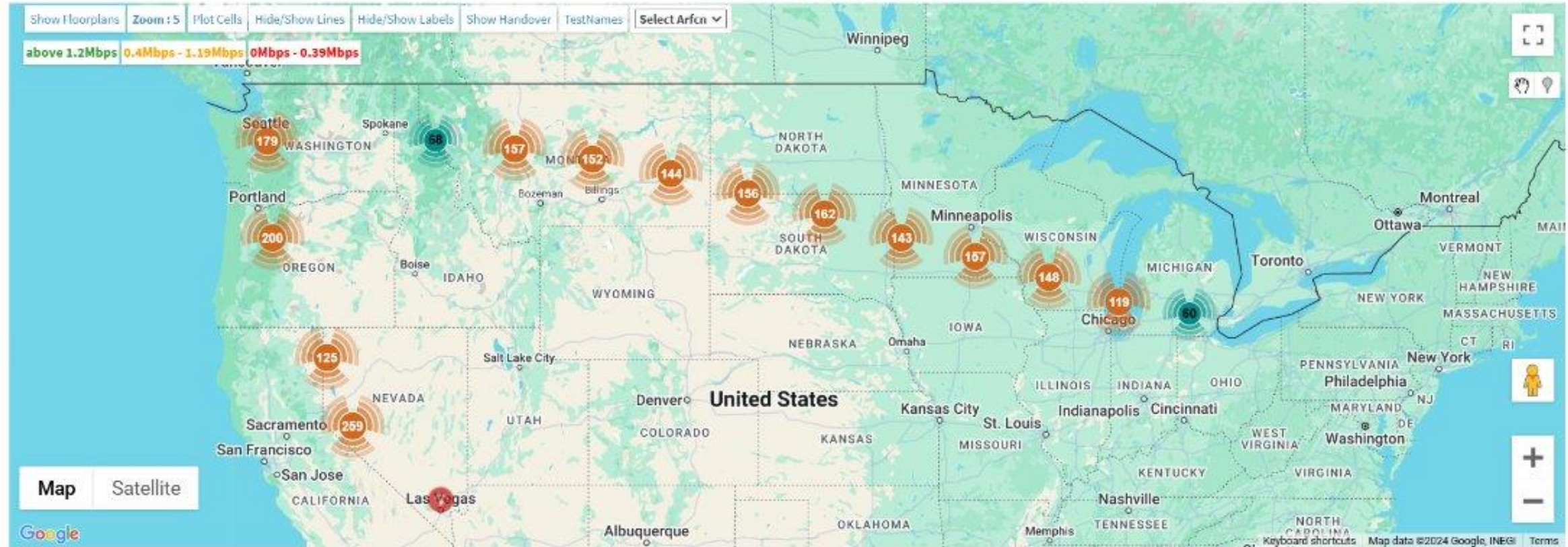
Speed Test Analysis

Our testing of in-flight Wi-Fi showed varying speeds, with an average of 10 Mbps and peak speeds reaching up to 25 Mbps.

These speeds are suitable for everyday online activities like browsing, shopping, and accessing emails. Applications such as One-Time Password (OTP) verification, Netflix streaming, and online shopping work well with these speeds.

However, certain activities like Zoom calls were not tested, as in-flight policies prohibit calls during the flight. While we couldn't test live video calls, other tasks such as chatting on Teams and browsing websites functioned smoothly.

What does this means for the passengers: For most passengers, this means that typical tasks like checking emails, watching videos, and using messaging apps can be done without significant delays, making the Wi-Fi adequate for general productivity and entertainment while flying.

Total No. of Download Test Conducted: 2761 (EE) and 81 (AT&T) samples reported.
Total No. of Upload Test Conducted: 3128 (EE) and 82 (AT&T) samples reported.
Upload Tests Conducted: Http Download Test: Majority average is 18.61 Mbps for EE and 7.09Mbps for AT&T.
Download Tests Conducted: Http Upload Test: Majority average is 2.17Mbps for EE and 21.21Mbps for AT&T.

Video Experience
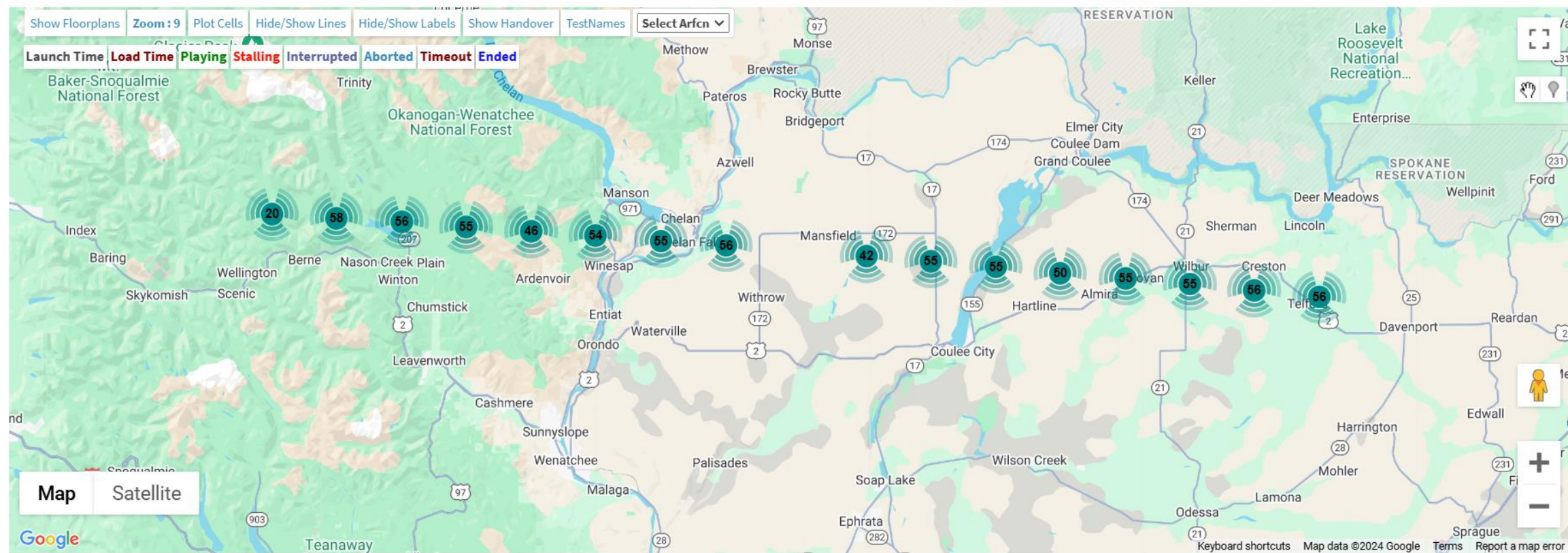
Video Test Analysis

Delta Airlines' in-flight Wi-Fi provided a mixed video streaming experience during testing. Approximately 98% of download speeds exceeded 1.2 Mbps, enabling smooth playback for standard-definition content on platforms like **Netflix and YouTube.**

However, higher-definition videos may occasionally buffer due to latency levels that often exceeded 121 milliseconds. While streaming on personal devices is feasible, interruptions might occur during peak network usage. Our tests also highlighted the importance of consistent upload speeds for tasks such as uploading media or sharing large files, though these were not specifically video-related.

What does this means for the passengers: Passengers can enjoy entertainment options as long as they manage expectations regarding quality.

Total No. of Tests Attempted: 9
Tests Passed: 9
Tests Failed: 0
Highest Load Time: 28.12s
Lowest Launch Time: 11.81s

Web Test

Web Test Analysis

During testing, we evaluated the performance of high-traffic sites on in-flight Wi-Fi. A total of 20 tests were conducted, with 100% success rates for Facebook and DuckDuckGo. Google achieved a 93% success rate, while Amazon struggled at 50%, with 3 aborted tests, indicating challenges for e-commerce usability.

Load times varied significantly: Google was fastest at 5.43 seconds, while Amazon lagged at 11.97 seconds. DuckDuckGo and Facebook had moderate load times of 10.24 and 8.22 seconds, respectively. Response times were steady, with Amazon leading at 1.57 seconds, followed by Google at 1.97 seconds.

What does it means for the passengers: For passengers, this means activities like social media browsing and basic searches will perform well. However, tasks like shopping on Amazon may face delays, potentially impacting the overall in-flight browsing experience.

Total No. of Tests Conducted: Attempted for different websites (Amazon - 12, Google - 15, CNN - 14, Facebook -15)
Tests Passed: Amazon - 6, Google - 14, CNN - 14, Facebook - 15
Tests Failed: Amazon - 6, Google - 1, CNN - 12, Facebook - 0

The Abomination Behind In-Flight Connectivity—and Will It Be Motivation for Some?

Who Benefits Most from In-Flight Connectivity?

For Passengers:
In-flight connectivity ensures passengers stay productive and entertained. They can browse, stream videos, or handle work tasks like emails, reducing the isolation of air travel. Reliable internet enhances the overall flying experience, catering to both business and leisure needs.

For Airlines:
Airlines gain a competitive edge by offering seamless Wi-Fi. This boosts customer satisfaction and loyalty, enabling airlines to monetize through tiered internet plans and premium offerings. It also supports efficient operations and fosters a strong brand image.

For Telecom Providers:
Telecom companies benefit from partnerships with airlines, expanding their services to in-flight connectivity. These collaborations open new markets and revenue streams while enhancing global presence.

For Satellite Operators:
Satellite providers secure steady revenue through airline partnerships. Advanced technology like HTS boosts bandwidth, ensuring high-speed internet that satisfies modern passenger expectations, cementing their role in aviation.

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What does it means for the Passengers?

It took a long time to get here. For more than a decade, in-flight experiences stayed the same, but advancements in connectivity have reshaped air travel. Passengers now expect fast, reliable Wi-Fi that mirrors ground-based connections, transforming flights into productive or entertainment-filled journeys. Business travelers can work uninterrupted, access real-time data, or attend virtual meetings, while casual travelers enjoy streaming and browsing. Airlines benefit too, offering tiered internet plans and premium upgrades, driving revenue and meeting customer expectations.

Partnerships with content providers create exclusive entertainment options, enhancing the travel experience. These innovations boost passenger satisfaction and loyalty, giving airlines a competitive edge. The transformation from limited in-flight options to seamless connectivity marks a significant leap forward in creating a modern, engaging air travel experience that redefines expectations for travelers worldwide.

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Retention

Partnerships

Trust

Expansion

BUILDING CONNECTIVITY LOYALTY
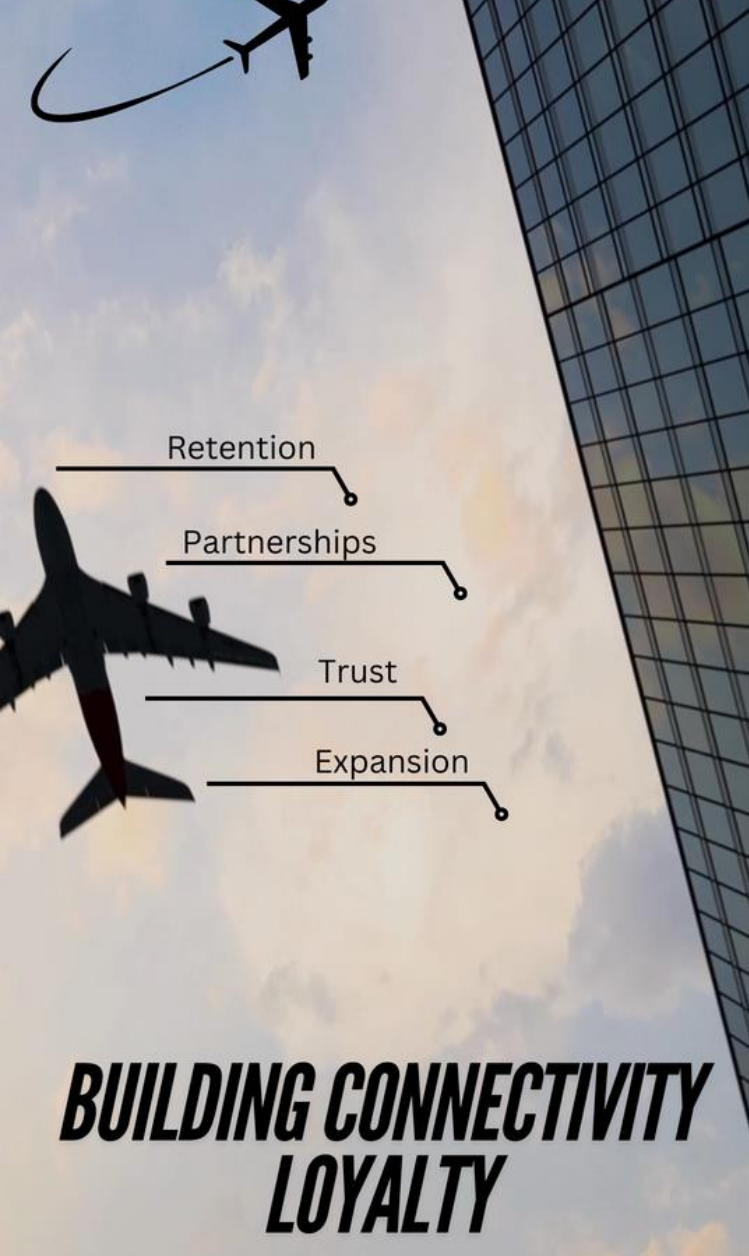
What does it means for the Airlines?

Monetization opportunities through superior inflight connectivity can significantly boost airline revenue. By offering tiered internet plans, airlines can cater to diverse passenger needs—providing free basic access while charging for premium services with faster speeds. Partnerships with satellite providers and content platforms open additional revenue streams, allowing airlines to offer exclusive entertainment or productivity options.

Airlines can also explore targeted advertising on connected platforms, generating income from brands eager to reach a captive audience. Enhanced connectivity fosters customer loyalty, leading to repeat bookings and long-term revenue growth.

For satellite providers, expanding partnerships with airlines in untapped markets like remote and transoceanic routes diversifies income and solidifies their position in the aviation sector. Together, these strategies enable airlines and connectivity providers to maximize revenue while delivering unmatched passenger experiences.

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Revenue

Partnerships

Customization

What does it means for Satellite Providers:

Satellite providers can thrive in the airline industry by meeting the rising demand for inflight connectivity, unlocking revenue through premium internet packages and tiered services tailored to passenger needs. Partnerships with airlines and telcos expand their market reach, enabling customized solutions and uninterrupted connectivity, even on remote or transoceanic routes.

Long-term contracts with airlines ensure steady revenue, while innovations like HTS (High Throughput Satellite) and low-Earth orbit satellites offer faster, more reliable internet. These advancements attract airlines eager to enhance passenger experiences, positioning satellite providers as leaders in inflight connectivity.

As satellite technology advances, it reshapes competition with traditional networks, setting a new standard for aviation connectivity. By aligning with airlines' needs and passengers' expectations, satellite providers secure their role as key players in delivering seamless, high-quality inflight internet.

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What does it means for Telecom Providers?

For telecom providers, inflight connectivity opens doors to untapped revenue streams and market expansion. By partnering with airlines and satellite providers, they can offer bundled plans that seamlessly extend ground-based services to the skies. This collaboration strengthens their global reach, particularly in remote or transoceanic regions where traditional networks struggle.

Telecom providers gain opportunities to diversify their offerings, introducing tiered services that cater to both budget-conscious and premium travelers. With inflight Wi-Fi becoming a standard expectation, providers can tap into this demand to enhance customer loyalty.

By integrating terrestrial and satellite networks, telecom operators ensure passengers experience uninterrupted service, boosting brand value. These partnerships position telecom providers as key players in aviation connectivity, reshaping how travelers perceive internet access at 40,000 feet while driving innovation in network capabilities.

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Integration Capabilities
Voice and Video Services
T-Mobile X Starlink

Starlink and T-Mobile: Unlocking Satellite Connectivity for All

T-Mobile is gearing up to offer satellite connections, extending coverage beyond its cellular network. Partnering with SpaceX, the service leverages Starlink's 320 new cellular-capable satellites, enabling unmodified phones to connect in remote areas with 10 Mbps bandwidth per beam. Future upgrades promise even greater capabilities.

Initially focused on text messaging, Starlink aims to expand to voice and video services later. The FCC recently approved Starlink's Supplemental Coverage from Space, boosting emergency connectivity and IoT integration using CAT-1 to CAT-4 modems.

T-Mobile may offer this as a premium perk for higher-tier plans. Beta testing and emergency alert trials are already underway. With these advancements, satellite-powered connectivity is poised to redefine mobile services, ensuring users stay connected wherever they go.

Source: https://www.lightreading.com/satellite/t-mobile-s-direct-to-cell-satellite-constellation-is-ready-to-go

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What RantCell Can Do?

- Checks Stabillity
- Monitors Network
- Provide Real Data
- Generates Reports in Seconds

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A New Dawn for Inflight Connectivity: Complementing or Competing with Cellular Networks?

The future of inflight connectivity is at a pivotal point. As satellite providers continue to improve service quality, the industry must consider whether this technology will complement or compete with traditional cellular networks. Will inflight satellite internet become the primary means of connectivity, or will cellular technology adapt to meet the demands of air travel?

If you'd like to conduct similar testing with other airlines, feel free to reach out to us.

Connect with us over the call **(+44 179 368 6197)** and email **(sales@rantcell.com)**

RantCell monitors performance, networks, and provide data-driven insights. It supports tiered plans, operational communication, and proactive issue resolution for passengers and airlines.

Ask for a Demo - *https://rantcell.com/request-for-demo.html*

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