INFLIGHT CONNECTIVITY 101

A guide to conducting business at altitude

gogo BUSINESS AVIATION

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connect

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Why we connect →

Rooted in a market need

The purpose of flying has evolved. Today, unlike earlier passengers who were amazed to be among the clouds, thousands of people fly each day with no more than a passing glance out their window. Many of these travelers are doing business on private aircraft, and their work responsibilities don't let up nor do their personal lives stop because they're 40,000 feet in the air.

Gogo Business Aviation exists because of a powerful market need: instant digital connection as a conduit for the flow of information. As a result, it's important to choose the right technology and partner, because it can drive important business outcomes as well as ensure those onboard won't miss an important life moment when it happens live such as a sports event, dance recital, or birthday.

In the pages that follow, you'll learn about technologies and market forces that have shaped aviation connectivity. After reading it, you'll be better informed about the benefits various inflight connectivity systems provide, and you will have a better understanding about your priorities and preferences when you're deciding which solution and provider is the best fit for you and your aircraft's mission.

Value proposition of connectivity

You know it already: Today's travelers need to connect in the air because their professional and personal lives won't wait. Gazing out at the horizon as clouds pass by isn't a luxury most of us have while flying. Instead, we need to stay focused on the tasks at hand and inflight connectivity enables us to complete those tasks.

There are plenty of ways to provide connectivity on your aircraft, and we'll go into more detail about the various options in subsequent chapters. But from a practical standpoint, inflight Wi-Fi must meet a few basic requirements. It must:

- Provide fast download and upload speeds to enable modern online demands.
- Allow you to use the same apps and tools you use in your home and office.
- Be durable and dependable wherever your flight path takes you – and on whatever type of aircraft you're flying.
- Deliver value by helping you improve your bottom line.
- Ensure your investment in the technology you choose pays off long term so you don't end up needing to replace the system on board when something new or better is developed.

For more than four decades, advancements in systems and usage models have met these needs with increasing effectiveness, and yet we know there is so much more to come in the future.

10,000,000
unique devices connected

10
device connections per flight

428M
miles flown while connected

2/3
of passengers said they were more productive in flight than at the office

A history lesson

In the 1980s, inflight connectivity first took root in commercial air travel and since then it's evolved to also fit the needs of business travelers. Think back to the first moving map or a simple email reply from 40,000 feet. Press fast-forward to today, where inflight connectivity can be as good as it is at the office or at home with video streaming and more, regardless of what aircraft you fly or where you fly it.

We've come a long way

Today, inflight connectivity is meeting our business needs:

MOVE AT THE SPEED OF BUSINESS

Video and audio conferencing have become critical tools as business interactions increasingly happen online and when working remotely. Executives today expect to work in the air the same way they do on the ground.

KEEP UP WITH YOUR STAFF (AND KEEP THEM UP TO DATE)

If you're a leader, your team relies on you to remain productive and to address issues as they arise.

TAP INTO THE LATEST INTELLIGENCE

As a pilot, a connected cockpit increases efficiency and safety.

INCREASE THE VALUE OF YOUR ASSETS

If you're a charter operator, your customers expect reliable Wi-Fi onboard. Gaps in service or not having internet at all can be detrimental to your business.

CONNECT WITH FAMILY AND UNWIND

We all know that connectivity isn't just for business. Sometimes you need to hear from your loved ones, keep up with your friends via social media, or simply watch a movie.

A recap of inflight connectivity milestones

1997
FCC authorizes Aircell's* first-generation analog cellular network for aviation in North America.

2001
Apple releases the iPod, a portable media player for music, eventually supporting photos, video, and more.

2002
Aircell offers Iridium satellite service, to become a multi-network global solution.

2005
Aircell Axxess, aviation's first all-digital multichannel communications system, is introduced.

2006
Aircell is granted exclusive air-to-ground broadband frequency license in a historic FCC auction.

2007
The iPhone revolutionizes smartphone capabilities and is named the invention of the year.

2008
Gogo launches Gogo Biz, the first air-to-ground connectivity network in North America. And, offers Inmarsat SwiftBroadband service for global travelers.

2013
Gogo Text & Talk service enables the use of personal smartphones in flight.

2015
Gogo Vision introduces a new era of inflight entertainment.

2017
Gogo launches Gogo Biz 4G network ushering in the era of inflight streaming capability.

2017
Gogo AVANCE introduces the first and only inflight connectivity and entertainment technology platform for business aircraft.

2020
Gogo sells Commercial Aviation division, focuses exclusively on Business Aviation.

2022
Gogo reaches a record-breaking 3,000 AVANCE systems installed.

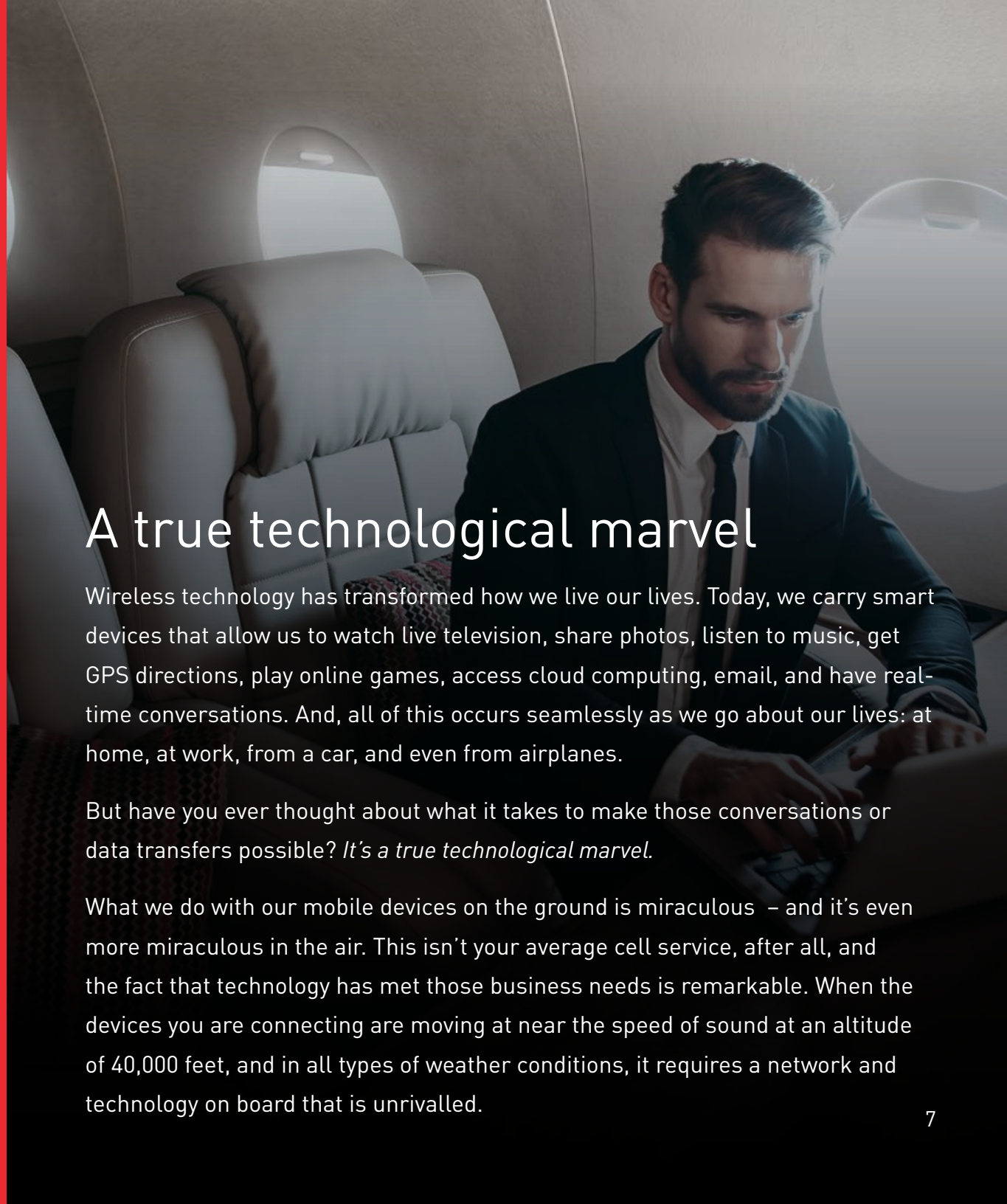
2022
Gogo completes construction of the Gogo 5G network in the contiguous U.S.

2023
OneWeb completes LEO satellite constellation that will enable Gogo Galileo. First live ground demo of Gogo Galileo conducted at EBACE.

*Aircell became Gogo in 2011

02

Inflight connnectivity: the basics →



A true technological marvel

Wireless technology has transformed how we live our lives. Today, we carry smart devices that allow us to watch live television, share photos, listen to music, get GPS directions, play online games, access cloud computing, email, and have real-time conversations. And, all of this occurs seamlessly as we go about our lives: at home, at work, from a car, and even from airplanes.

But have you ever thought about what it takes to make those conversations or data transfers possible? *It's a true technological marvel.*

What we do with our mobile devices on the ground is miraculous – and it's even more miraculous in the air. This isn't your average cell service, after all, and the fact that technology has met those business needs is remarkable. When the devices you are connecting are moving at near the speed of sound at an altitude of 40,000 feet, and in all types of weather conditions, it requires a network and technology on board that is unrivalled.

Moving targets

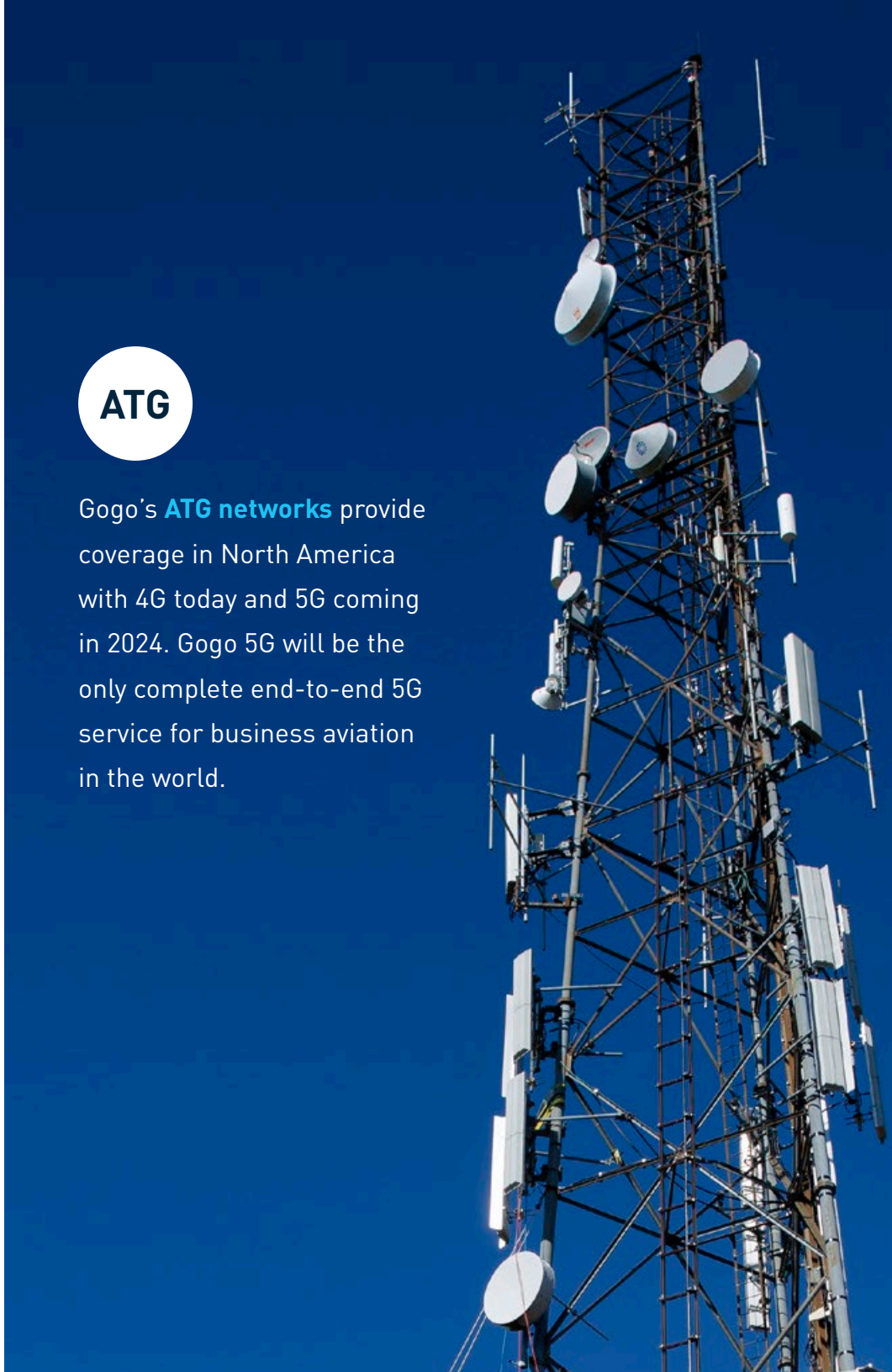
One of the most basic differences between ground and inflight connectivity is motion at high speeds. Airplanes don't stand still. Instead, they dart through airspace at hundreds of miles per hour, requiring the data link to adjust quickly in real time. At home, your coax cable doesn't have to go anywhere, and even if you're on a call or texting as a passenger in the car, the speeds and distances involved are modest compared to those in the sky.

But in the air, a signal has to connect with an aircraft thousands of times an hour and navigate rapid shifts in orientation, speed, and direction – all while ensuring an "always-on" experience for pilots and passengers.

The network you choose, and the system connecting to that network, will dictate your experience. We'll explore networks and systems in the coming pages.

Inflight connectivity options

How have Gogo and other companies succeeded at connecting business travelers in the air? They've used available resources exceptionally well. Three of the most important of these resources are the networks that make inflight connectivity possible: **air-to-ground (ATG)**, **geostationary (GEO) satellites**, and the most recent innovation **low Earth orbit (LEO) satellites**.



ATG

Gogo's **ATG networks** provide coverage in North America with 4G today and 5G coming in 2024. Gogo 5G will be the only complete end-to-end 5G service for business aviation in the world.

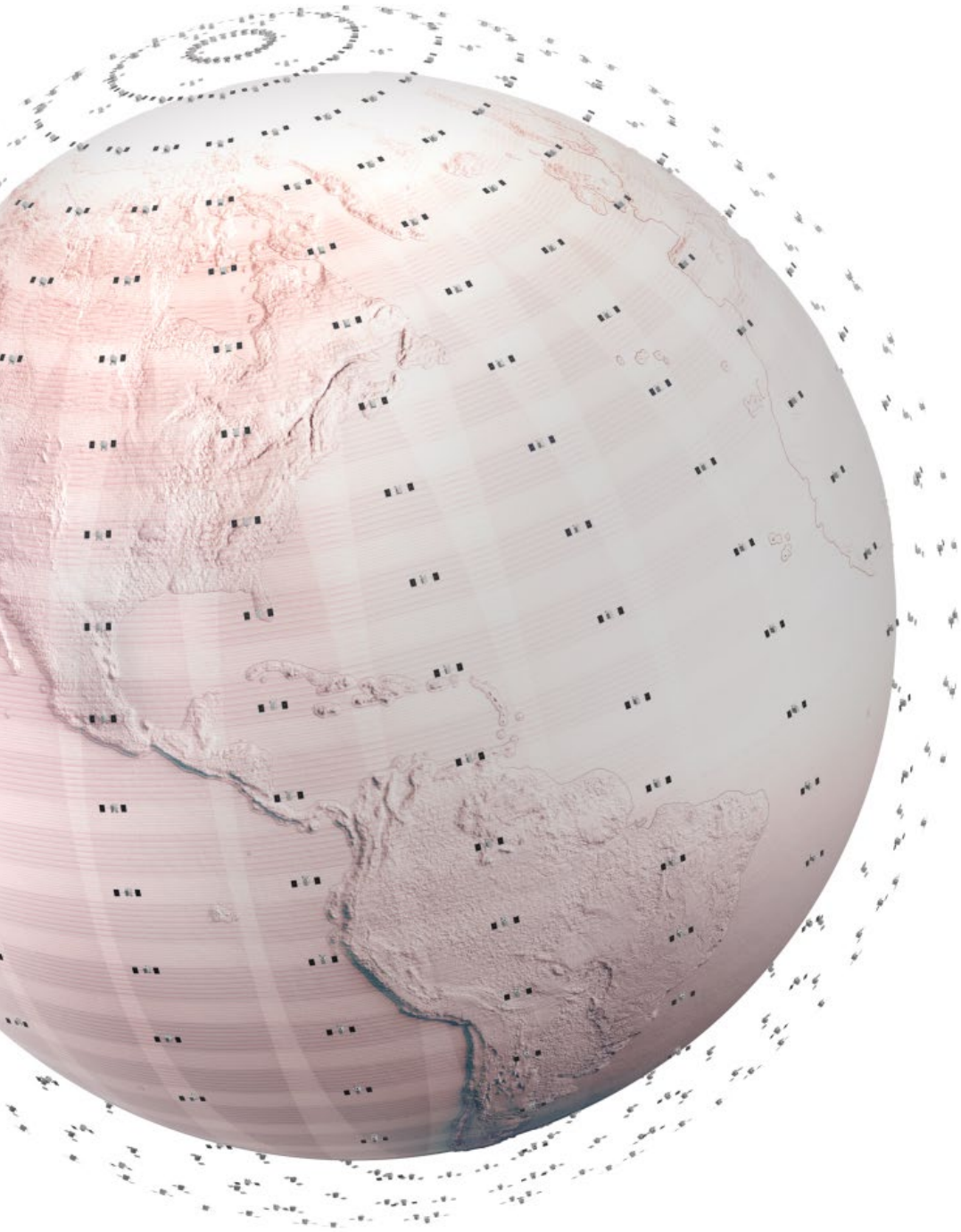
GEO

GEO networks rely on satellites parked roughly 36,000 kilometers (22,000 miles) from Earth. That's a long ways away and that distance can cause issues such as delays – known as latency – with services that require immediate responses like video conferences, cloud computing, and even phone calls.

- Your airborne transmitter translates your conventional binary data into radio waves for transmission to the satellite.
- The satellite receives and routes the radio transmission, along with countless packets of data from other sources, back to ground stations.
- A receiving ground station converts the radio waves back into usable binary data and transmits that data back to your aircraft.

LEO

LEO network satellites orbit 1,200 kilometers (750 miles) above the Earth. That's nearly 30 times closer than GEO satellites – and that proximity is critical because it operates with low latency and enables real-time, high-bandwidth data transfer everywhere around the globe. Unlike GEO satellites, which sit in a fixed location, LEO satellites deliver a consistent experience, everywhere with no degradation – even over the poles. Gogo's LEO solution, Gogo Galileo, will be powered by 588 LEO satellites and will provide true global coverage for business aviation when it launches.



Networks determine performance

Here's what you need to know:

DISTANCE & LATENCY

When it comes to internet services onboard an aircraft, distance matters. The longer the distance data must travel, the greater the delays and buffering you'll experience. It's known as latency, and it can make or break your experience. As noted previously, LEO satellites are 30 times closer to your aircraft than GEO satellites. It's a matter of physics and no technology can overcome the difference in distance. LEO and ATG networks are so much closer to Earth that latency is virtually eliminated.

SWITCHING CONNECTIONS

With ATG and LEO networks, the aircraft is constantly switching connections from tower to tower or from satellite to satellite. ATG systems continuously switch between ground stations, doing so roughly every 10-15 minutes as the aircraft travels across the country whereas connections with LEO satellites are switching beams every 7-10 seconds. Making those switches can cause service gaps if you don't choose the right provider.

ELIMINATE SERVICE & TECHNOLOGY GAPS

In 2017, Gogo anticipated the exponential growth in data consumption for business aviation and developed the AVANCE platform. The software-centric design of AVANCE allows Gogo to deliver fast, reliable inflight Wi-Fi with extremely low latency; plus, it's built to be sustainable, able to receive updates to system software over the air, which no other inflight connectivity provider can do. Instead, AVANCE evolves as technology innovates. Case in point: AVANCE is the pathway to the two biggest developments in inflight connectivity — Gogo 5G and Gogo Galileo, Gogo's new global LEO broadband connectivity service.

KEEPING UP AS TECHNOLOGY EVOLVES

Also, it is important to note that once a GEO satellite is in orbit, it's untouchable, thus, no software or hardware updates are available. As quickly as technology evolves, a GEO satellite can become outdated in just a few years. GEO satellites are also stationary (or fixed) and don't provide a consistent experience because the signal degrades the farther you get from the equator and, as a result, they lack coverage over the polar regions. LEO satellites, on the contrary, will be updated every 3-5 years, so they'll always accommodate the latest innovations, and there are hundreds of them in orbit that are constantly moving, so they can provide true global coverage, with no degradation, including over the poles.

The good news is Gogo's networks and AVANCE platform virtually eliminate latency and technology gaps, anywhere you fly – so you can work or do any other activities online without interruption.

Speed versus capacity: a metaphor

Speed is an intuitive measure of a connection's performance – but it's not the whole story. The better measure is capacity. Consider this in plumbing terms: A small pipe and a big one can have the same throughput speed, but the larger pipe is going to transmit more material, which in the case of inflight connectivity means more data. The amount of data a pipe can transmit is called capacity (also described as "bandwidth"). High speed and low latency, combined with ample capacity is what creates an exceptional internet experience for passengers. Gogo provides all three.

EXCEPT THERE ARE TWO PIPES

With inflight connectivity, there are actually two "pipes" at work providing broadband on your aircraft – one for incoming data (from the ground to the aircraft) and one for outbound data (from the aircraft back to the ground). Inflight connectivity systems keep these data streams separate to ensure that both can function regardless of the other's load. While outbound streams are usually smaller, both pipes are important to the overall user experience – particularly for activities such as video conferencing on Zoom or Microsoft Teams, as well as cloud-based apps and services like iCloud, Google Drive, and Slack.

GOGO 5G AND GOGO GALILEO: AN ENTIRELY NEW BROADBAND ERA

Speed versus capacity will be an important factor for years to come. However, at launch, Gogo 5G will completely change the network conversation for business aviation in North America. Likewise, Gogo Galileo, will be the first truly global inflight connectivity solution for business aviation that can be installed on business aircraft of any size or mission. Regardless of what you fly or where you fly in the world, Gogo Galileo will give you the performance you need to connect with what matters most.
Harness the raw speed, huge capacity and low latency of Gogo 5G and Gogo Galileo with AVANCE.

Different activities have different data demands

Your online activities, the file sizes and types you use, and even various digital services can all have very different data demand requirements.

One way to better understand this is to visualize the minimum connection speed required to productively use a particular application or service. For example, the connection speed needed for a phone call over VoIP is less than 0.5 Mbps; while an HD video requires 4.0 Mbps.

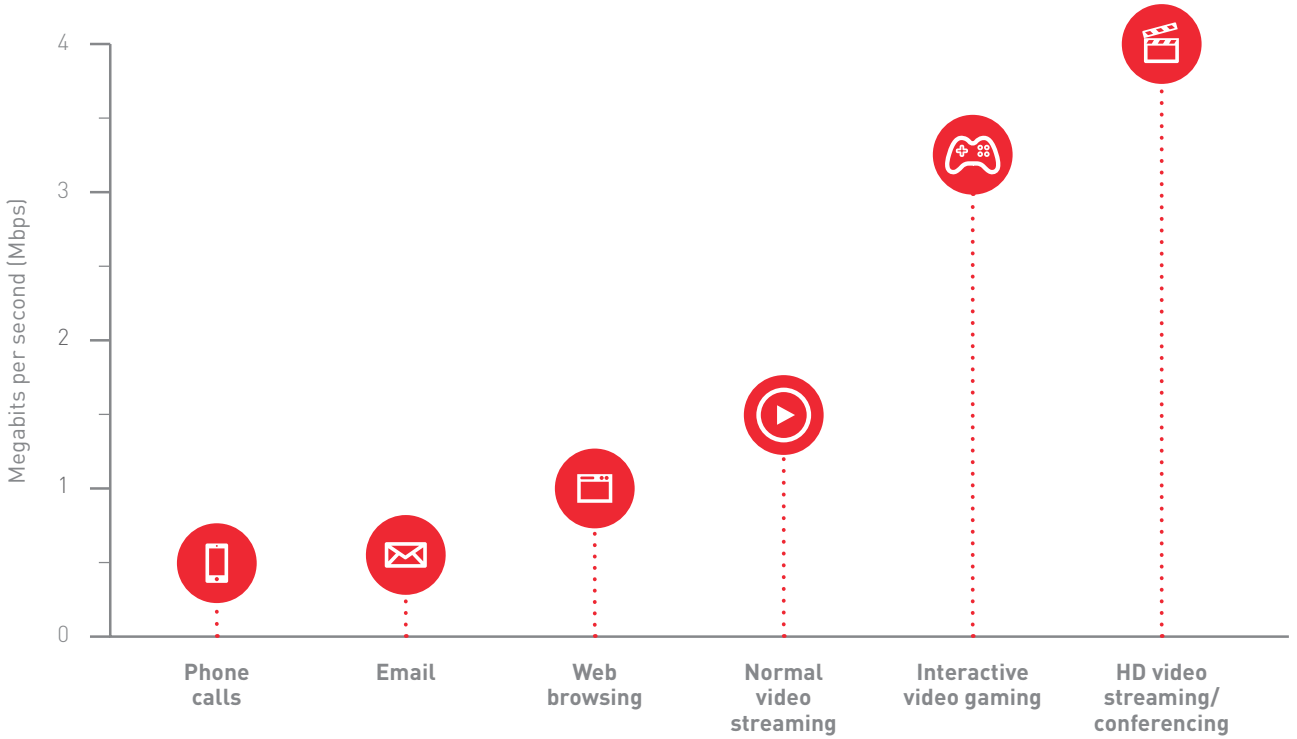
By understanding what kind of activities and data you're asking your system to most commonly handle – and the scale of its consumption (i.e. how many devices will be doing what kind of activity) – you can smartly select the network speed you need as well as the system and service plan that's right for you.

Fortunately, Gogo gives you the options and flexibility to tailor your solution to best fit your unique needs.

From the blog

Learn why low latency connectivity matters and how to optimize your inflight experience with AVANCE.

SPEED REQUIREMENTS FOR COMMON TASKS



The hardware

Hardware is an important factor for business aircraft operators. When planning for the amount of equipment needed, which differs by connectivity type, operators must consider the following: size, weight, power requirements, installation cost and availability of certifications.

LEO networks are breaking new ground because they offer true global coverage and can use smaller, lighter hardware on the aircraft. That's important because it means broadband connectivity can finally be installed on business aircraft of any size, including super-light jets and turboprops.

ATG solutions deliver a fast internet experience and only require small, lightweight equipment, and are designed for easy upgrades as technology evolves. That's why ATG Wi-Fi is found on business aircraft throughout North America of all sizes, from turboprops to VVIP.

Gogo AVANCE provides greater flexibility than traditional line replaceable units (LRUs) because it enables continuous innovation, all from one box. That's the power of the Gogo AVANCE platform: it's the brains on board that delivers a superior connectivity experience.

"We've taken the capabilities of Verizon (network), Apple (hardware and software), Xfinity (entertainment), and Amazon Web Services (predictive maintenance and analytics) and we've put them all together on the AVANCE platform so our customers have it all on their airplane."

SERGIO AGUIRRE,
PRESIDENT, GOGO BUSINESS AVIATION

- **Gogo AVANCE LX5**
- **Dimensions:** 6.34" W x 7.64" H x 13.24" D
  (162.04 mm W x 194.06 mm H x 336.29 mm D)
- **LRU weight:** 15.5 lbs (7.03kg)
- **Antennas:** *2 multi-band (MB13) antennas*
  4.52" W x 15.07" L x 7.79" H
  (114.81 mm W x 382.78 mm L x 197.87 mm H)

- **Gogo AVANCE L5**
- **Dimensions:** 6.34" W x 7.64" H x 13.24" D
  (162.04 mm W x 194.06 mm H x 336.29 mm D)
- **LRU weight:** 18 lbs (8.16kg)
- **Antennas:** *2 dual-directional antennas*
  6.2" W x 12.6" L x 7.6" H
  (157.48 mm W x 320.04 mm L x 193.04 mm H)

- **Gogo AVANCE L3**
- **Dimensions:** 3.97" W x 7.64" H x 12.57" D
  (100.84 mm W x 194.06 mm H x 319.28 mm D)
- **LRU weight:** 15 lbs (6.8 kg)
- **Antennas:** *2 omni-directional antennas*
  5.9" L x 4.2" W x 6.5" H
  (149.86 mm L x 106.68 mm W x 165.1 mm H)

- **Gogo AVANCE SCS**
- **Dimensions:** 2.40" W x 7.64" H x 12.57" D
(60.96 mm W x 194.06 mm H x 319.28 mm D)
- **LRU weight:** 6.3 lbs (2.86 kg)
- **Antennas:** *1 HDX antenna:* 24.0" L x 11.8" W x 2.0" H
  (609.6 mm L x 299.72 mm W x 50.8 mm H)
  1 FDX antenna: 24.0" L x 24" W x 2.0" H
  (609.6 mm L x 609.6 mm W x 50.8 mm H)

Gogo Galileo – leveraging the power of AVANCE for global inflight connectivity

To accommodate any aircraft, Gogo offers two ESAs (electronically steered antennas), the HDX and the FDX. Both deliver a world-class experience. Discover which is the best fit for your aircraft and mission.

Two sizes. One perfect fit.

HDX

Approximate size:	
L x W x H in inches:	**24" x 11.8" x 2"**
L x W x H in millimeters:	**609.6 x 299.72 x 50.8**
Approximate weight:	
in pounds:	**21.6 lbs**
in kilogramms:	**9.80 kg**
Installation:	**Fuselage mounted**
Power requirement:	**28 volts of DC power**
Maximum power:	**110 watts**
LRU:	**AVANCE LX5, L5, L3, or SCS**

FDX

Approximate size:	
L x W x H in inches:	**24" x 24" x 2"**
L x W x H in millimeters:	**609.6 x 609.6 x 50.8**
Approximate weight:	
in pounds:	**40-45 lbs**
in kilogramms:	**18.14-20.41 kg**
Installation:	**Fuselage mounted**
Power requirement:	**28 volts of DC power**
Maximum power:	**~330 watts**
LRU:	**AVANCE LX5, L5, L3, or SCS**

Dimensions, weight, and power are subject to change.

“It was seamless. We logged into the router and the next thing you know, we were streaming video. The speeds were just very impressive.”

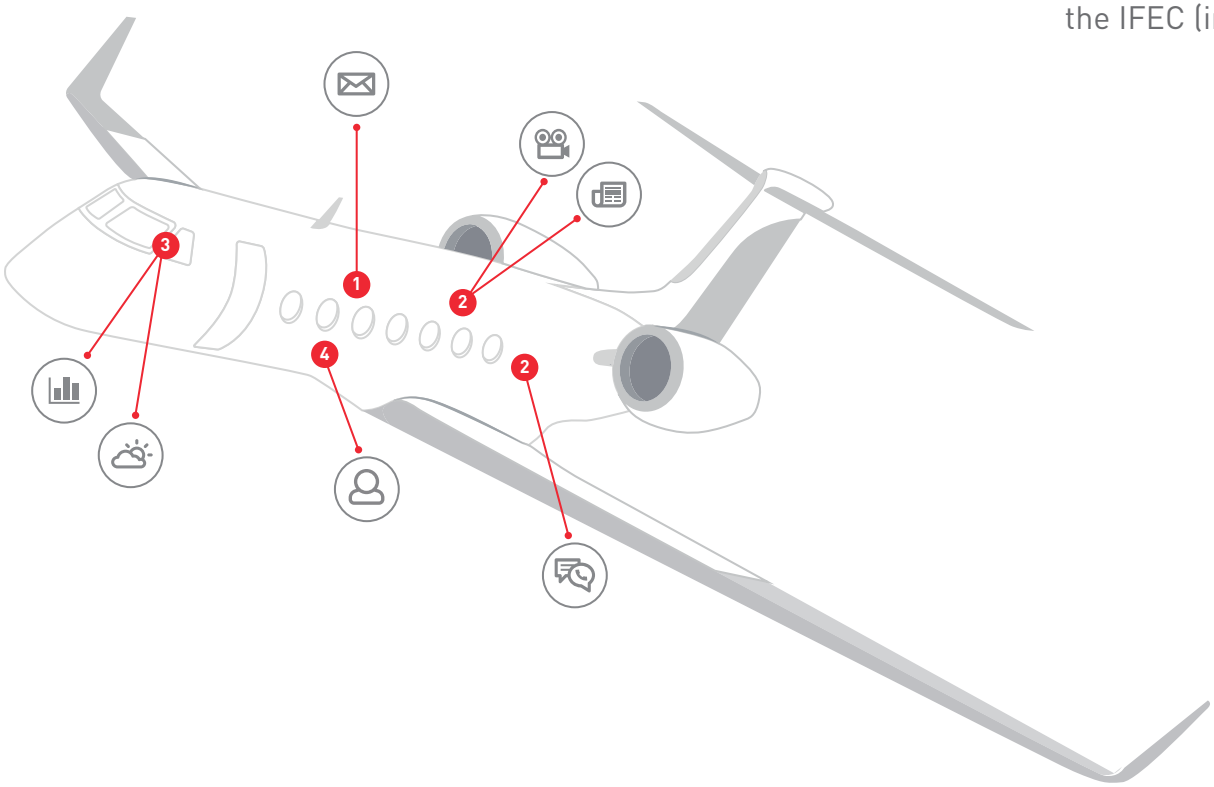
DAVID NELSON, CHIEF PILOT HIGHLANDS FOM

Connectivity that benefits everyone on board and on the ground

There's a lot to learn regarding inflight connectivity networks, hardware, service options, etc. But we advise you to keep one thing top-of-mind as you explore options: how your connectivity will benefit everyone involved in your business aviation experience.

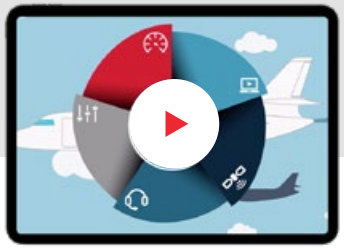
By choosing wisely:

1. Passengers can stay completely productive and feel like their plane is an office in the sky.
2. Passengers can also enjoy downtime with inflight entertainment such as movies, TV and moving maps with Gogo Vision, as well as use their smartphones for calls and texts.
3. Pilots can use Wi-Fi to access faster, more accurate flight deck information (and use Wi-Fi for communications).
4. Ground-based crew can gain valuable insight into how connectivity is being used, as well as leverage tools to control the IFEC (inflight entertainment and connectivity) experience.



Video

See exactly how AVANCE transforms an aircraft into a smartplane that benefits everyone on board.



03

Be a smart consumer →

What matters to a pilot might not matter to a charter operater, a CEO who hops on the company jet, or the granddaughter of the company owner.

By role, in this section we explore the myriad ways inflight connectivity can impact and enrich your flight, business, and operations.

PILOTS

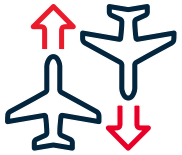
In the cockpit, connectivity isn't about pleasure or conducting business – it's about safety, which requires real-time cockpit intelligence and reliable communication channels. There are a plethora of aviation apps supported by Gogo such as Foreflight, Garmin, FlightAware, and Honeywell that provide indispensable up-to-the-minute info for navigation, logging, briefings, and flight-plan filing.

CHARTERS

In today's world, inflight connectivity for business aviation charters is almost as necessary as a pilot and propulsion. Charter operaters that don't have connectivity are faltering, and those that have previously connected their fleets are now upgrading to better services that enable video and audio streaming including 5G, and global broadband satcom.

MANAGEMENT COMPANIES AND DEALERS

As the partner to the connectivity provider and the end user, management companies and dealers are expected to be the frontline experts. It's imperative that they keep up with the latest innovations and services so they can advise customers regarding the options available so they can decide what system(s) make the most business sense for their operation.



AVIONICS AND FLIGHT DEPARTMENTS

Avionics or flight departments are responsible for providing a safe aircraft with all the services that today's corporate passengers require. Inflight Wi-Fi sits at the top of the priority list because business leaders are expected to be connected at every step of their journey. A corporate flight department can't afford to operate without inflight Wi-Fi, nor can it afford to ground an aircraft because the connectivity isn't working. There's too much at stake.

DIRECTOR OF MAINTENANCE AND OTHER GROUND CREW

Having the ability to communicate maintenance or other logistical issues while flying can accelerate the solution. Inflight connectivity offers ground crews a way to monitor the health status and performance of the onboard connectivity system, and troubleshoot with onboard crew if any logistical, maintenance, or connectivity challenges occur.

PASSENGERS

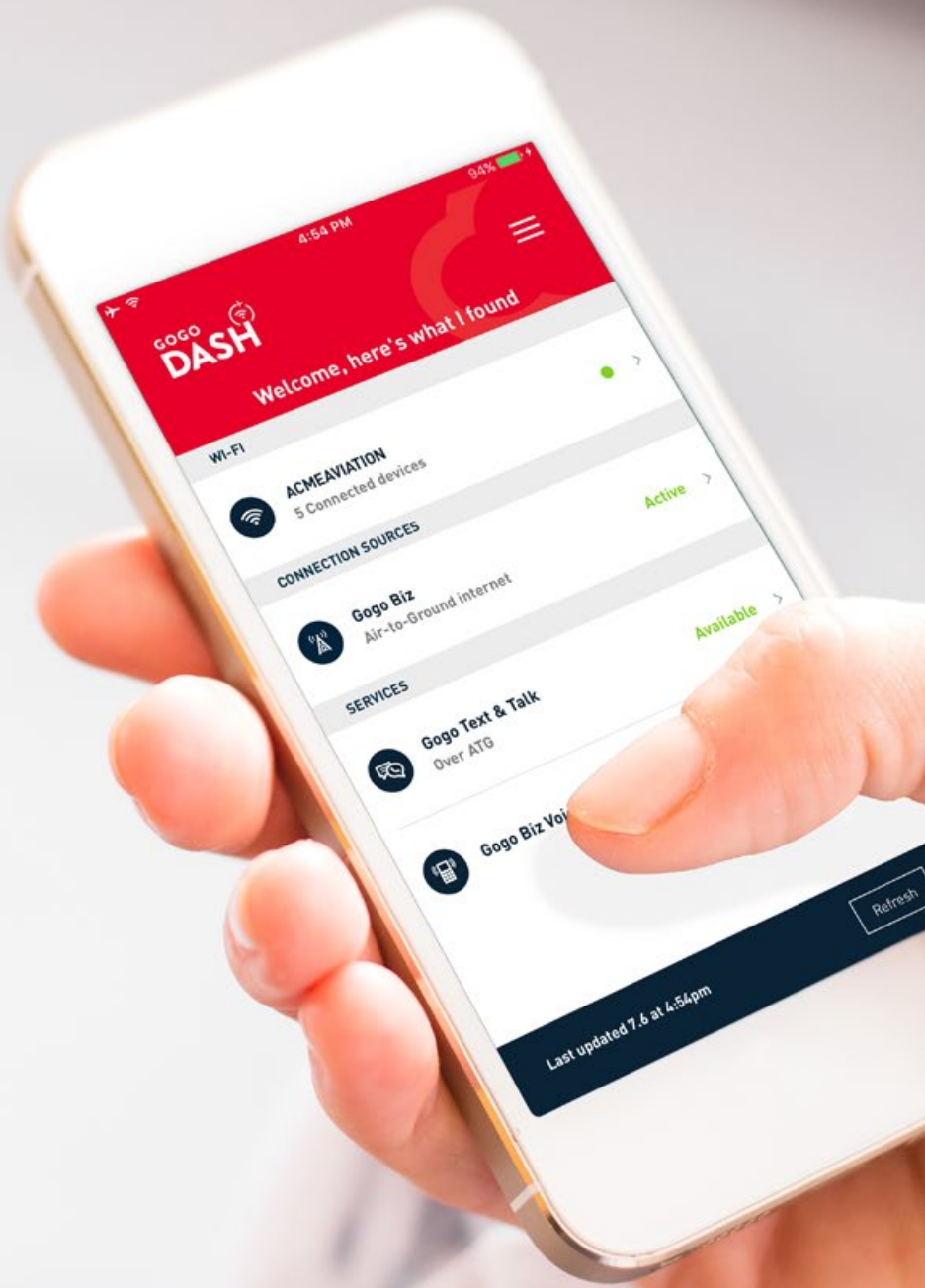
This is the most obvious user group, but also the most diverse. From business executives to family and friends, the ways in which people work, live, and play have digitally transformed – streaming services, online video conferencing, remote workforces and teams, is the new norm. Inflight Wi-Fi connects all passengers to what matters most to them right now, whether that is their office, home, or the markets.

Be a smart consumer – Maximize bandwidth

Regardless of where you fly, you can enhance the performance of your inflight connectivity system with these tried and true ways to maximize bandwidth.

- Limit the number of devices that are active at any given time. Remember that even "inactive" devices consume small amounts of bandwidth. Power them down when you can, and be sure to disable automatic updates while you're in the air.
- Suspend background app updates. Ask your IT department to show you how to change which apps run in the background on your phones and tablets.
- Be aware of what data types you're consuming. For example, watching a video will consume exponentially larger volumes of bandwidth than downloading an Excel sheet. And content within apps – like that auto-playing Facebook video – can stealthily rob you of valuable bandwidth.

With AVANCE, you can monitor usage from the palm of your hand with Gogo DASH. Learn more on page 31.



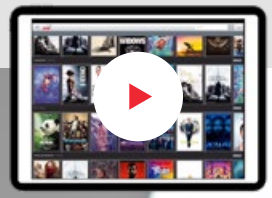
Be a smart consumer – The rise of video

The most affordable and dependable way to enjoy video in flight is to download what you want to watch while you're on the ground and store it on a server on the plane. Gogo Vision 360, Gogo's inflight entertainment and information solution, automatically updates content while you're on the ground. The system automatically connects with a Gogo Cloudport in a hangar or at a fixed-base operator (FBO) and downloads the newest content. Once you're in the air, watching the latest Hollywood release doesn't require an ATG or a satellite connection because it's stored on your AVANCE LRU.

Using Gogo Vision is practical and financially smart. Even when streaming video midair is technically feasible, you may not want to because the cost can sneak up on you, especially with GEO providers. Streaming video consumes a lot of data, so it pays to be wise and use your bandwidth for activities that matter most and leave the entertainment to Gogo Vision.

Explore online

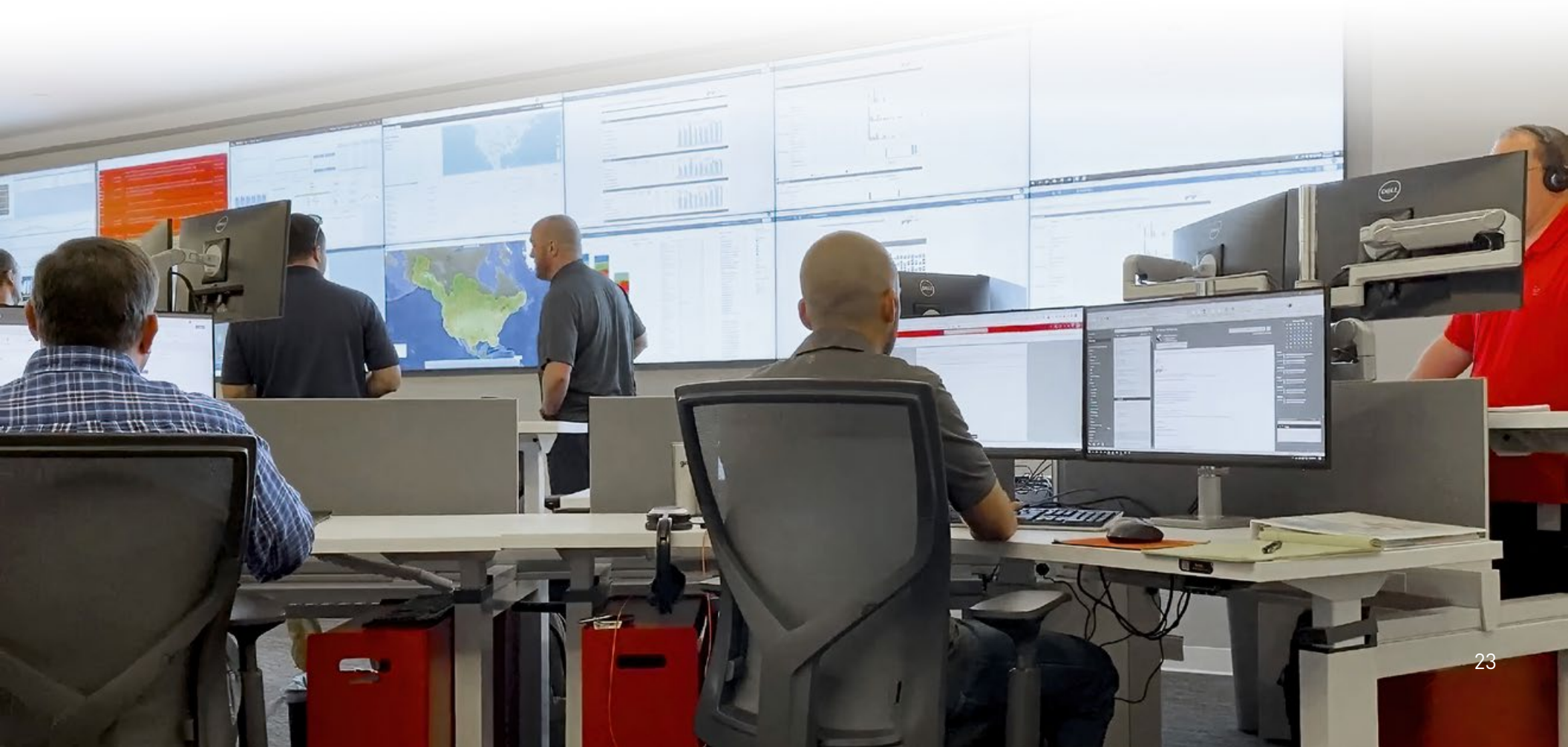
Explore Vision 360 and see what IFE (inflight entertainment) should be.



Be a smart consumer – Customer support

When choosing an inflight connectivity provider, you're adding a partner to your aviation team. Thus, you need to ask more questions. Is there help readily available if you have an issue, including nights, weekends, and holidays? Is there a real person waiting to give you a hand with your inflight connectivity when you need it?

Gogo has 30+ years of experience with network management and support services to draw from, and we've delivered award-winning customer support year after year. Our solutions are all supported by our proven systems and networks as well as our world-class customer support team. Customers routinely tell us how important personal, honest-to-goodness support is to them.

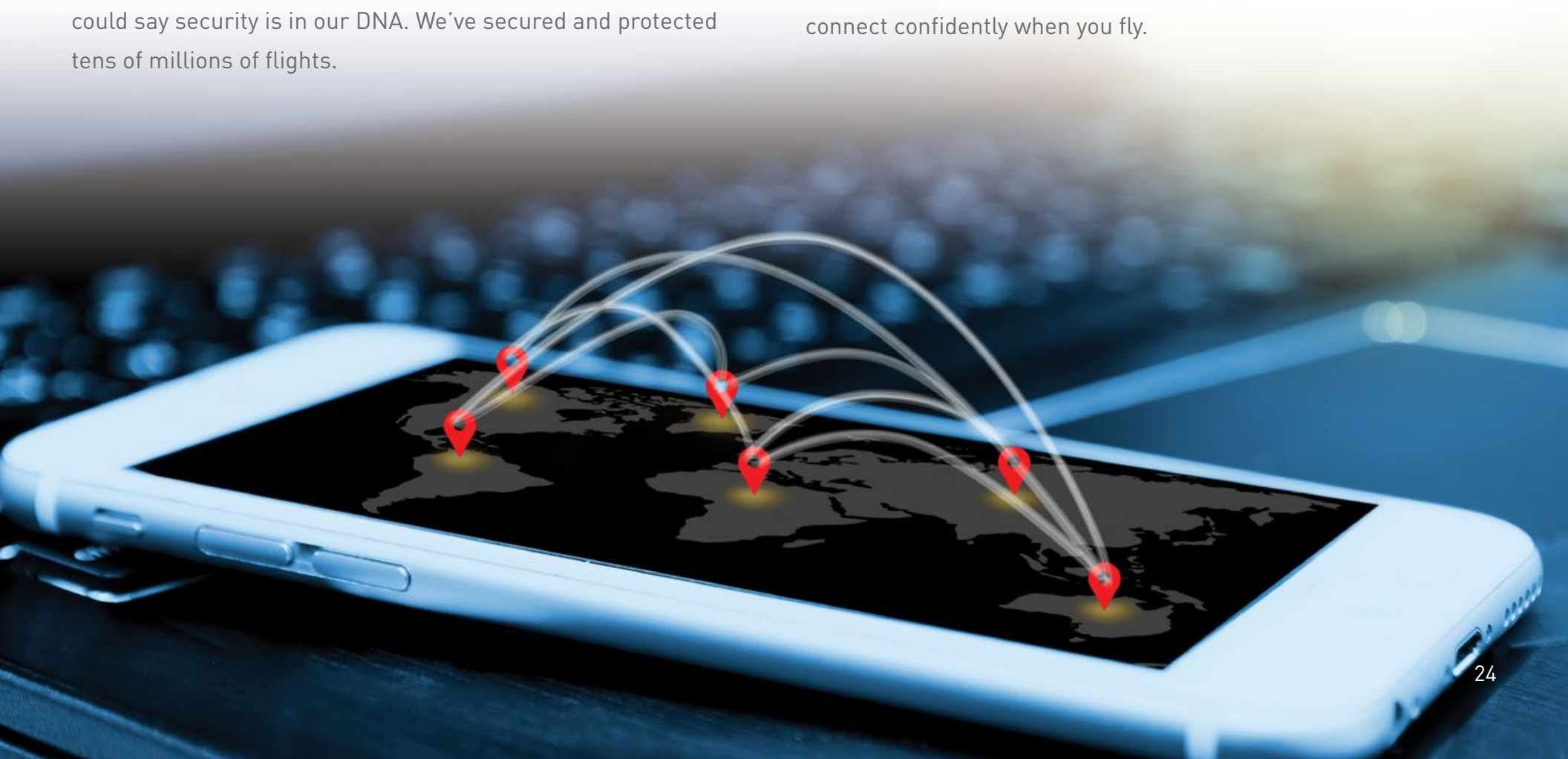


Be a smart consumer – Cybersecurity

You should take cybersecurity seriously, because inflight threats are real.

At Gogo, we realize the ever-pressing need to be vigilant in staying ahead of potential security threats. Since our start, we've built security into the design and delivery of our networks and systems. Security isn't something weve added after the fact. You could say security is in our DNA. We've secured and protected tens of millions of flights.

Gogo is the only ATG inflight connectivity provider that owns, protects, and optimizes its whole network infrastructure, and is the only provider that manufactures the equipment for its onboard systems. Because we operate and manage our systems end to end, we can more easily monitor and analyze the security of our network and onboard systems. And, through our own standards or in partnership with the FAA and other aviation stakeholders, we've been a leader in defining and implementing best practices for airborne cybersecurity. We're solving cybersecurity problems, often before they happen, so you can connect confidently when you fly.



Be a smart consumer – Ensure long-term value

Gogo intimately understands that our solutions need to not only deliver value now, but also continue to serve your needs far into the future. Our goal is to make sure you avoid costly replacements and downtime, meanwhile ensuring long-term value.

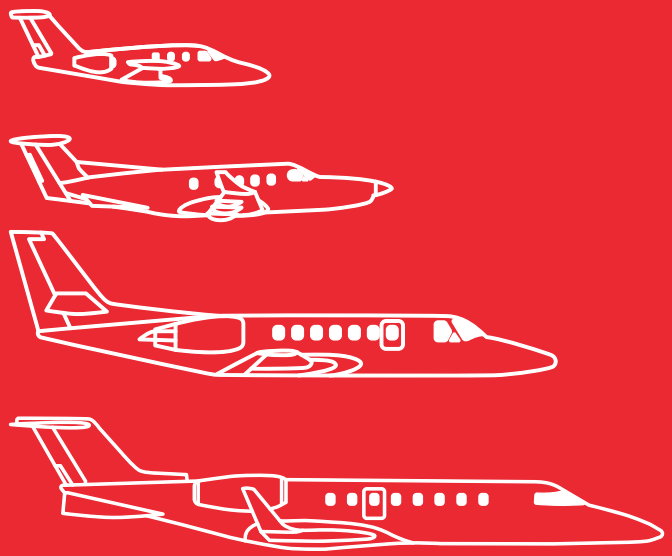
By choosing Gogo AVANCE, your aircraft's inflight connectivity will never be obsolete. So, for those planning to sell an aircraft Gogo AVANCE increases its resale value. AVANCE delivers a clear return on investment.

HERE'S HOW WE ACHIEVE THAT:

- The Gogo AVANCE platform is the only software-centric IFEC solution in business aviation. All AVANCE systems can receive over-the-air updates and remote diagnostics. This means less downtime, more connected flight time, and the best inflight connectivity experience available because the latest technological advancements are immediately available.
- Gogo AVANCE adapts to and enables new innovations. When new technologies are developed — such as Gogo 5G and global connectivity with Gogo Galileo — you can easily and quickly take advantage of them.
- The point here is no customer who upgrades to AVANCE will be left in the lurch when future technologies launch. All AVANCE systems are sustainable to evolve with emerging technological innovations.

04

Different options for different plane types →



Know your aircraft, know your budget, know your connectivity needs

Gogo can equip any business aircraft with connectivity – from a Cessna to a Boeing Business Jet – but not all solutions are ideal for all aircraft. Flying, after all, is a complicated contest of physics, where the size of the aircraft can dictate what systems can be installed, where adding equipment and antennas can impact aerodynamics. In addition to the type of aircraft you fly, where you are based and where you fly are also key considerations. And don't forget the bottom line: equipment and installation costs, and the expense of monthly plans.

All of those factors are why we offer diverse solutions. We also provide the advice and insights you need to help you make informed decisions that best meet your needs.

Here's an overview of plane types and the different systems that can provide needed connectivity. We'll use Gogo equipment as examples, but these principles apply to other connectivity options and services.

THE BIG QUESTIONS TO ANSWER

1. What type of aircraft do you fly?
2. What is the mission of your aircraft?
3. What are your Wi-Fi needs?
4. What is your budget?

Keep these in mind when you're considering your connectivity options, and you'll be more likely to find the right combination of functionality and cost effectiveness.

1. WHAT TYPE OF AIRCRAFT DO YOU FLY?

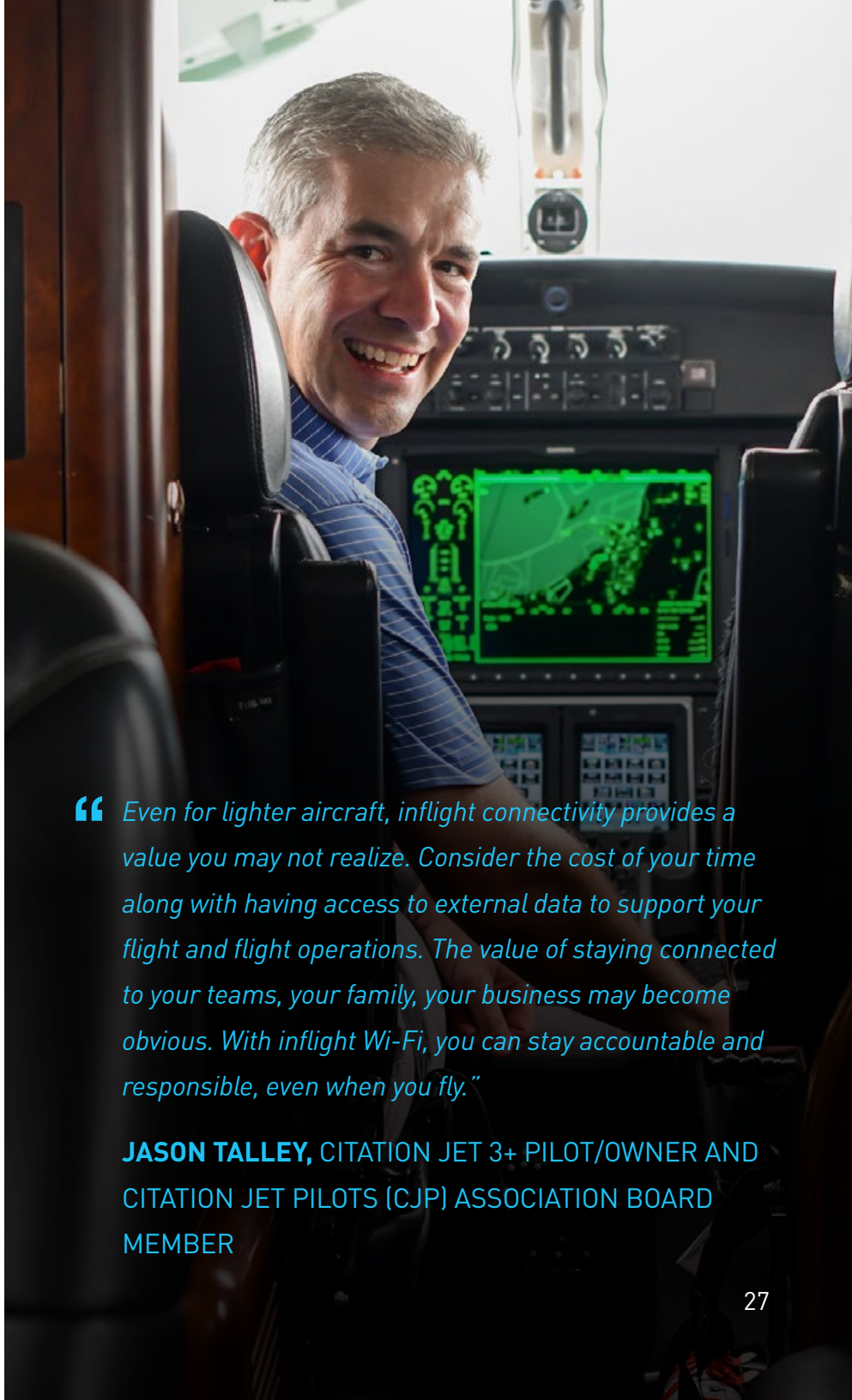
The aircraft you fly often dictates what connectivity system you can have based on size and other physical and structural considerations. Particularly among smaller aircraft, fuselage space can be at a premium, which means the connectivity solutions available will need to be smaller and lighter (i.e. a small LRU coupled to one or two externally mounted antennas). Gogo AVANCE solutions (LX5, L5, L3, and SCS), for example, deliver a great inflight experience with just a single, lightweight piece of equipment and small, elegant antennas. With AVANCE, you have a viable option for everything from a turboprop to a BBJ.

Interestingly, larger aircraft are also physically impacted by connectivity equipment, even though their mass makes them more resistant to changes in weight and balance. Some high-end satellite equipment can weigh in at 300 lbs. – equivalent to two passengers – so planning is crucial for any aircraft.

2. WHAT IS THE MISSION OF YOUR AIRCRAFT?

Where is your aircraft based around the globe and where does it fly? How long does it fly, and how far? What types of passengers are on board (corporate executives and employees, or is it family members and friends), and how many are typically on board each flight? How much do these factors vary flight to flight?

Your mission type informs you and your connectivity provider about how an aircraft is used and what its typical needs will be. Fortunately, this usually isn't difficult to assess. Given the



"Even for lighter aircraft, inflight connectivity provides a value you may not realize. Consider the cost of your time along with having access to external data to support your flight and flight operations. The value of staying connected to your teams, your family, your business may become obvious. With inflight Wi-Fi, you can stay accountable and responsible, even when you fly."

JASON TALLEY, CITATION JET 3+ PILOT/OWNER AND CITATION JET PILOTS (CJP) ASSOCIATION BOARD MEMBER

availability of current infrastructure – ATG in North America or LEO/GEO satellites globally – once you've defined your mission type you can typically determine what networks and systems will best fit your needs.

3. WHAT ARE YOUR WI-FI NEEDS?

No matter what you fly, when it comes to inflight Wi-Fi, it's best to realistically assess what the passengers and crew want to do in the cabin and the cockpit. We've found that most customers keep the same general-use habits in the air that they have on the ground. Want to use Zoom and Facetime, while also being able to stream Netflix and send enormous attachments? With Gogo, you can do all of that. Crave constant phone connection? No problem. Only looking for solid internet to stay on top of basic things like email and text during flight? We can tailor to that, too.

4. WHAT IS YOUR BUDGET?

There are a few things to consider when it comes to the cost of inflight connectivity. Fortunately, there are several connectivity options to meet virtually any budget. And while there are many options available, the choice doesn't have to be daunting.

The following practices and guidelines will help you assess your total cost of ownership so you can be confident in your decision and fly away with a solution that meets your usage needs and is also useful and financially sensible. The following pages will shed light on whether your current solution is still the best fit for you.

"Connectivity from the sky is not just about technology. You also need reliability, coverage, and service and responsiveness from your provider. It's not just a question of functionality, but also dependability, support, and relationships."

TODD DUNCAN, CHAIRMAN, DUNCAN AVIATION

IT'S ABOUT BALANCE

Any purchase decision involves judgment calls – balancing affordability and functionality, thinking ahead to future business needs, and signing on to a sustainable monthly plan.

There are two main cost-generating categories to consider for inflight connectivity:

1. Hardware and installation
2. Ongoing monthly service plans

Each is critical but often complex for customers. So, let's give you some insights to help you better understand your options.

1. HARDWARE AND INITIAL SETUP

HARDWARE

On any aircraft, customers have a range of choices when it comes to hardware, which primarily consists of the onboard LRU(s) and the antennas required for a particular system. Among the systems fit for a given aircraft's weight, space, and technical profile, the most affordable are also typically smaller, and can be more limited.

INSTALLATION

When evaluating your choices for inflight connectivity, it also helps to consider installation costs and consult an experienced installation facility. With more than 100 authorized Gogo dealers worldwide, there are many facilities available in virtually any location that can perform an installation for you. The aircraft type, and the system you're installing will be the key factors that determine costs. It also matters if you're replacing a system that was previously installed or advancing an existing solution.

2. ONGOING MONTHLY PLANS

Much like a cellphone service plan, there are several service plans available for inflight connectivity that can accommodate your usage needs and provide month-to-month predictability. Each has its advantages so take the time to identify the plan that is best suited to meet your requirements.

PAY AS YOU GO

For those who don't require the most robust service, on the more affordable end of the spectrum are pay-as-you-go plans, which entail no fixed costs and appeal to customers who like to "pay for what they actually use." However, these plans can be less predictable than others, and their per-MB rates often are higher than the intermediate plans described below.

HOURLY PLANS

The next step up from a pay-as-you-go plan is an hourly plan, which lets you actively predict cost while still enjoying being connected during flights. Gogo offers hourly plans with unlimited usage.

INTERMEDIATE PLANS

These plans are desirable because they can be tailored: A user can opt for a base data allowance that matches their typical needs – say 2,500 MB – and then pay overage charges if they happen to go over the allotted data in a given month. These overage charges are cheaper than a pay-as-you-go rate, and they typically decrease as the size of the base allowance increases. Alongside these data plans are voice rates, infotainment options, and other cost categories, depending on your system's capabilities.

UNLIMITED

These plans appeal to customers who either consume masses of data each month or have the financial resources to pay higher monthly fees to ensure that their passenger and crew requirements are always met. These plans give peace of mind that there will never be unexpected additional overage fees. Note that some satellite services, by their technical nature, can't support unlimited data – so check with your connectivity partner about whether or not this type of plan makes the most sense for your usage needs.

Understand. Estimate. Monitor.

Connectivity companies will provide a dashboard or other reporting tools for you to manage and monitor your data usage – and just like your cellphone bill, they can provide alerts at certain thresholds. As you use the system, you'll learn what your typical needs are and can adjust accordingly.

Gogo DASH is our solution

Whether your crew is on the ground or in the air, Gogo DASH gives everyone in your operation the tools they need to quickly and efficiently customize the connectivity experience:

Connectivity insights

See what's happening with your Gogo systems, services and networks, including usage.

Service agreements

Select the right plans and services for your inflight experience.

Account management and billing

Quickly manage your account and monitor usage.

Activation services

Easily and remotely speed up the process of getting aircraft online.

User management

Assign access based on user roles and needs.

Gogo MIX

Customize the connectivity experience by setting up unique Wi-Fi networks and user groups.

Maintenance

Get information about over-the-air (OTA) AVANCE software updates, and accept remote loading.

05

The future of connectivity →

A platform for the future

BUSINESS NEEDS CONTINUE TO PROPEL INNOVATION

Inflight connectivity continues to evolve, expanding the realm of what's possible and expected in the air. We'll soon see inflight connectivity match the speed and ease we experience from our ground-based connections in North America with Gogo 5G and globally with Gogo Galileo. Gogo Galileo will be the first solution to provide high speed, low latency connectivity options to all size business jets anywhere in the world.

Here's a breakdown of some of the changes coming soon to hardware, software, and networks – as well as a few things that won't be changing at all.

STEP ONTO THE PLATFORM

In any rapidly changing market, adaptability and scalability are crucial. Inflight connectivity is no different and one of the vital challenges for providers is to show their ability to improve, add-to and support their technology solutions without being disruptive to consumers.

To address this need, Gogo created AVANCE, a versatile software platform where upgrades can be rapidly delivered over the air via software updates and the cloud – similar to smartphone updates that download overnight and are already installed when you turn on your phone in the morning. It's a little like your computer's operating system: When you need to make a change or an addition, you can install an update – or even a new application – without buying an entirely new operating system.

This ability to do over-the-air updates represents a paradigm shift, and is a new connectivity model that reassures consumers because it means their equipment won't become obsolete. That means they won't have to replace the equipment on board to get an upgrade. It's sensible for Gogo because it gives us a "home base" for our solutions – a familiar and secure technical ecosystem to grow and develop.

A MATTER OF DEGREE

For consumers, the most apparent changes coming to inflight connectivity will be in the scale of performance improvement, as well as some of the equipment.

Bandwidth and speeds will dramatically improve with new technologies like 5G and those enabled by the Gogo Galileo LEO satellite network. Additionally, the electronically steered antennas used for Gogo Galileo are small and light enough to fit on any size business aircraft, and they don't require a lot of power, all factors that are enabling the new service.

With the increased speed, low latency, and near-100% uptime of Gogo's connectivity solutions today, connected aircraft are becoming some of the most important business enablers available – by a degree unforeseen even five years ago.

THINGS THAT WON'T CHANGE

THE EFFECTIVENESS OF YOUR SYSTEM IS ONLY PARTLY DEPENDENT ON TECHNOLOGY

Customer support, trustworthy provider relationships, industry experts at your disposal, and dependable network infrastructure are as consequential as whiz-bang equipment and lofty promises.

YOU DESERVE A GOOD FIT

Inflight connectivity is a sea of options and the choice is yours. Do you want a company that is new to business aviation with no track record of success, or one with a history of innovation and background you can trust.

SCALABILITY AND FLEXIBILITY ARE KING

Given the rate of change in inflight technology, you want a solution that is built for the future, that is scalable and adaptable as new technologies are developed. Seek platforms, like Gogo AVANCE, that are capable of being continually upgraded, modified and added-to without needing a complete replacement, which is costly and requires downtime.

INFLIGHT CONNECTIVITY ENRICHES YOUR LIFE

The business functions are only part of it. Your connectivity solution should help you connect with what matters beyond your work, such as loved ones, and cherished pursuits.

Connected wherever you are

The most fundamental purpose of connectivity solutions is keeping you engaged with what matters most – your life on the ground – through the duration of a flight. The systems and mission profiles will vary as technology evolves, and the investment in an inflight connectivity system will have an impact for years to come, so it's important to make the right choice from the beginning.

Gogo's approach, now and in the future, is to blend dependable infrastructure, leading-edge technologies, and partnerships built on trust. Our systems will continue to evolve, of course, but our central commitment to you never will.

Happy connecting.

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