

THE CONNECTED CABIN

How to Prepare Your Aircraft for the Digital Age

Honeywell

CONNECTED CABIN

CONTENTS

ARE YOU CONNECTED?

The average person spends a third of their waking hours on an internet-enabled device. Half the planet – more than 4 billion people – have internet access. Five billion use mobile phones.

Your watch records your heart rate and how many steps you've taken. Your car lets you know when you need an oil change. Your phone guides you to the nearest sandwich shop. Your smart TV recommends must-see shows, picked just for you. Your social media accounts reveal details of your active life.

Yes, we live in a connected world. Smart machines, software and the Internet of Things are changing just about everything on how we live, work, play and travel. Business aviation is no exception.

Today's business jets are more connected than ever before and passengers expect to be connected, productive and entertained – anywhere they fly.



Fig. 1. World's Internet Users Pass The 4 Billion Mark. Source: wearesocial.com/blog/2018/01/global-digital-report-2018.

HOW MUCH DATA ARE WE USING?

The global demand for data continues to grow, with more connected people and devices consuming an ever-increasing volume of data. According to Cisco, data demand will grow at a compounded annual rate of 26 percent through 2022, and from there, the only way is up.

Data consumption has grown exponentially over the last 30 years and, by 2022, the planet will be consuming more than 150,000 gigabytes per second.

**26%
CAGR**
2017 - 2022
Exabytes
per month

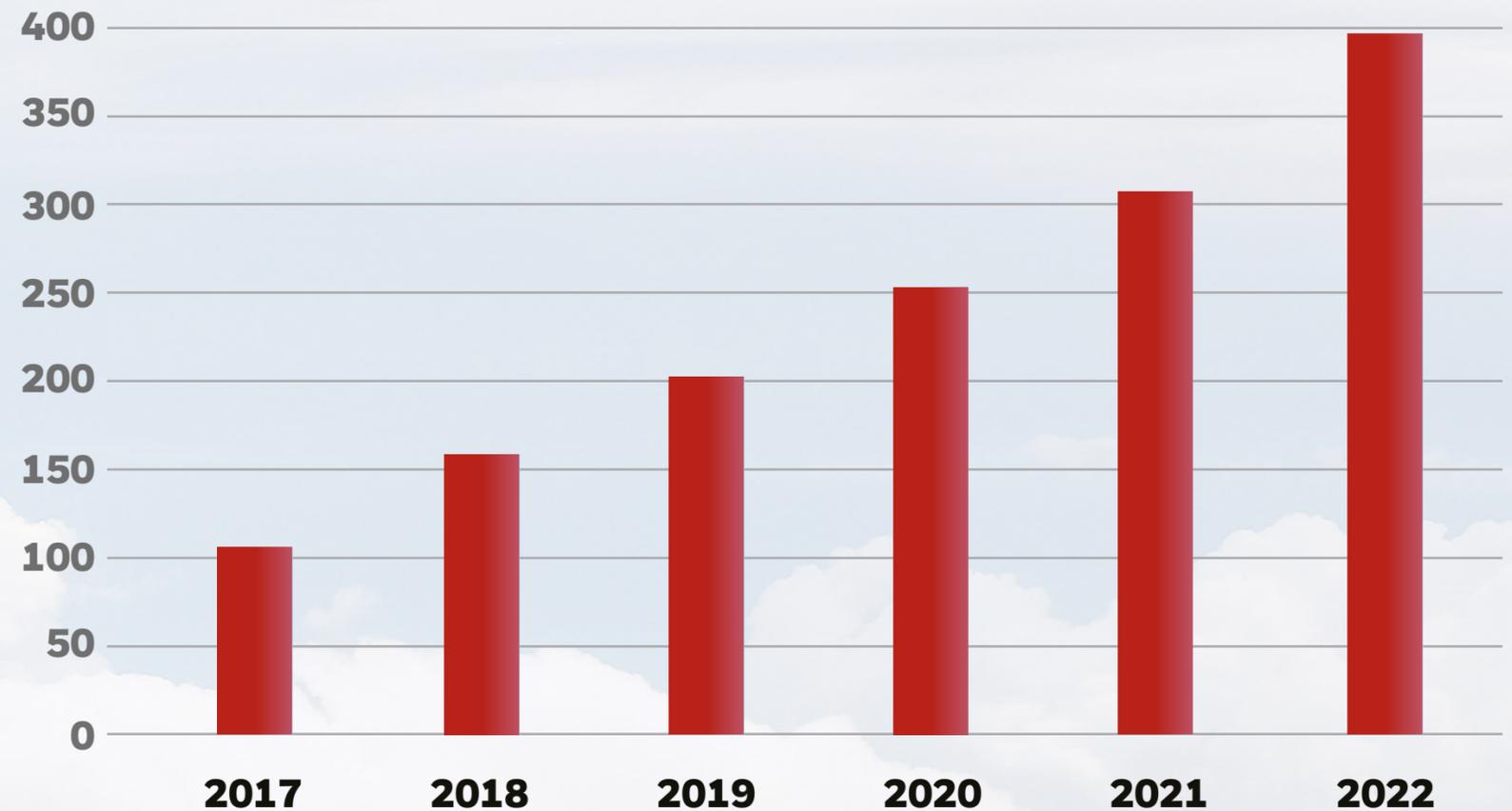


Fig. 2. VNI IP Traffic Forecast, 2017-2022. Source: Cisco VNI IP Traffic Forecast.

HOW IS OUR DATA USAGE GROWING?

The devices we use to consume all this data are changing, too, with more and more data consumers using their smart phones and fewer using tablets and computers to access the internet.

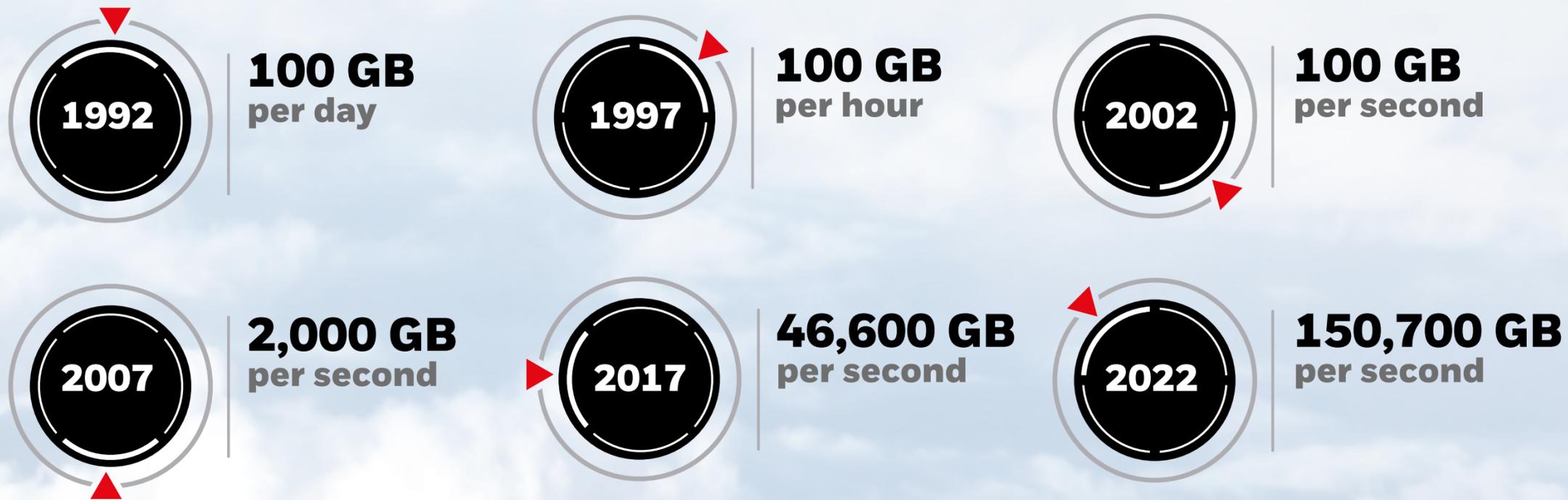


Fig. 3. Global Internet Traffic by Year. Source: Cisco VNI IP Traffic Forecast.

HOW IS TRAFFIC GROWING?

How are we using all this data? More than ever, we're watching videos on our smartphones and other devices. And, increasingly, we're watching high-definition and ultra high-definition videos.

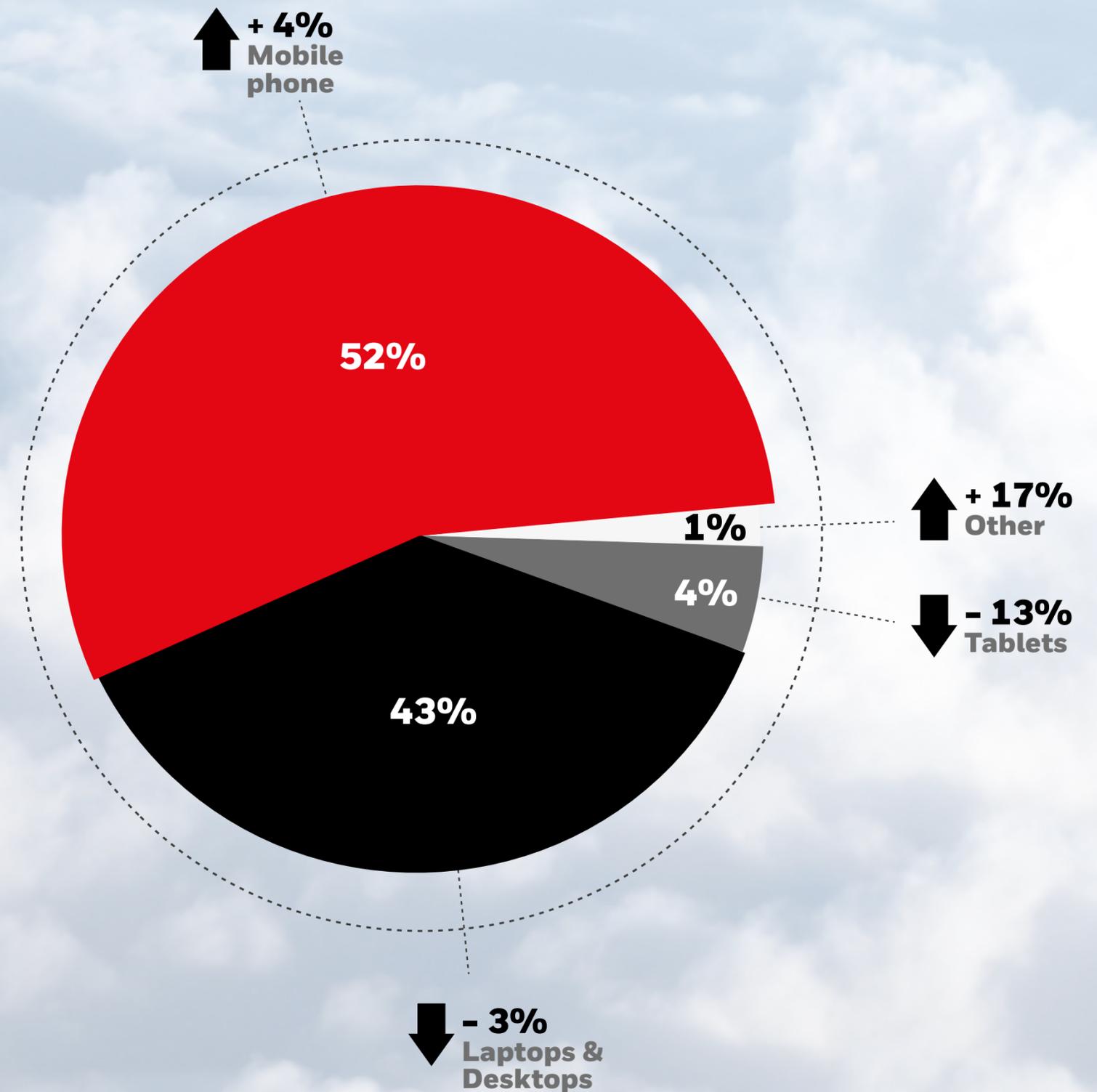


Fig. 4. Global Traffic Trends. Source: wearesocial.com/blog/2018/01/global-digital-report-2018.

HOW IS TRAFFIC GROWING?

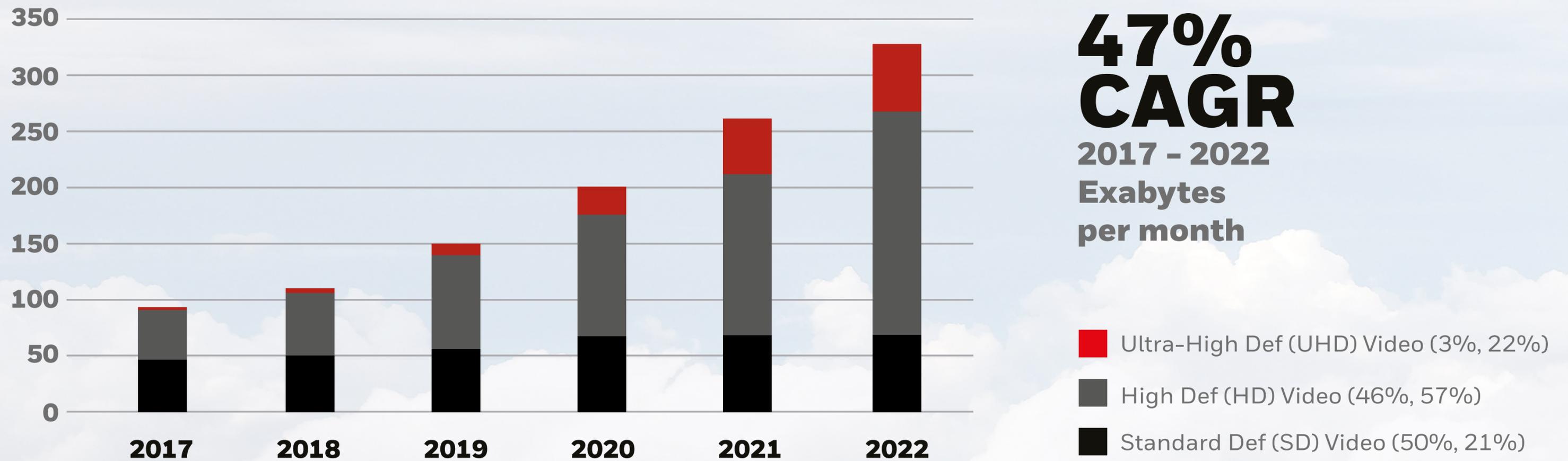


Fig. 5. Global UHD IP video traffic. Source: Cisco VNI IP Traffic Forecast, 2017-2022.

WHAT DOES THIS MEAN FOR BUSINESS JET OPERATORS?

There was a time when buckling into an airplane seat was like entering a cone of silence. You switched your smart phone to airplane mode and accepted that even the most important emails would go unanswered for the duration of your flight. There was no expectation of streaming videos.

TODAY'S BUSINESS JET PASSENGERS EXPECT TO USE THEIR CONNECTED DEVICES – ESPECIALLY THEIR SMARTPHONES – FROM WHEN THEY GET ONBOARD UNTIL THE MOMENT THEY LAND.



CONNECTIVITY IS A KEY DIFFERENTIATOR IN BUSINESS AVIATION.

1.

THEY EXPECT TO CONNECT TO FAST, RELIABLE WI-FI THAT'S AS GOOD – OR BETTER – THAN WHAT THEY GET ON THE GROUND.

2.

THEY EXPECT TO ACCESS THE COMPANY SERVER, SURF THE NET, ACCESS HUGE FILES, TELECONFERENCE AND WATCH THE BIG GAME THROUGHOUT THEIR JOURNEY.

3.

THEY EXPECT THEIR FLIGHT DEPARTMENT, CHARTER PROVIDER OR FRACTIONAL OPERATOR TO PROVIDE A SEAMLESS CONNECTED AIRCRAFT EXPERIENCE EVERY TIME.

4.

THEY MAKE CHOICES BASED ON THE AVAILABILITY AND QUALITY OF IN-FLIGHT WI-FI.

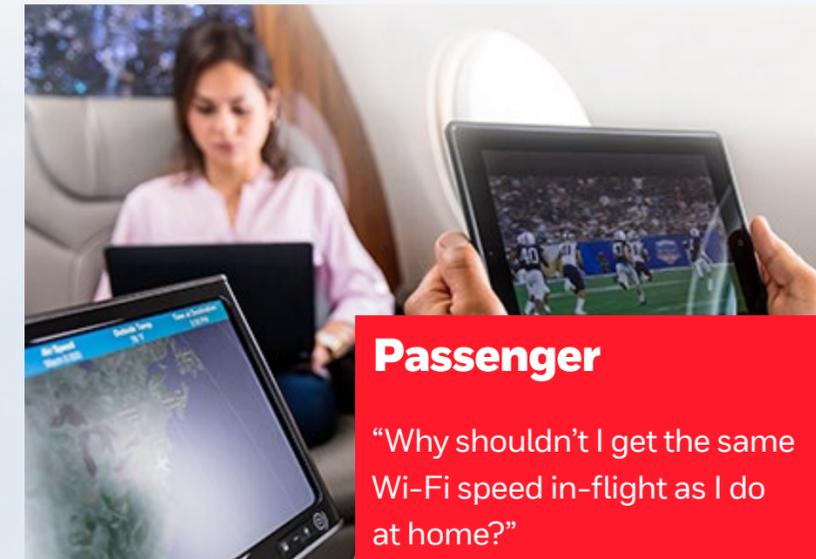
WHAT IS THE CONNECTED BUSINESS JET?

Connectivity has become a basic requirement for everyone in the business aviation community and a means for improving productivity and profitability.



Pilot

“With Flight Bag Pro, I can see real-time weather and clear air turbulence, and avoid it.”



Passenger

“Why shouldn’t I get the same Wi-Fi speed in-flight as I do at home?”



CEO/CFO

“I would like to find ways to better integrate my operations.”



Maintainer

“I want to know the status of my fleet and where I can go to quickly get help.”



Director of Aviation

“I want an integrated tool that pulls together information from all the sources and systems I use to manage my flight department.”

HOW DO I CHOOSE THE BEST SOLUTION?

Business aircraft owners and operators have a lot of options when it comes to connected aircraft technologies. A solution that might be fine for a twin-turbine that flies a few hundred miles isn't going to cut it for a heavy-iron business jet that makes frequent flights overseas with the CEO or a VIP charter passenger onboard.

Making the right choice can be a formidable challenge and even the most seasoned owner/operator needs some help picking a connectivity solution that makes the most sense.

Honeywell can help.



Our connectivity team has decades of experience in helping our customers choose the best equipment, technology and service solutions to get you connected and keep you connected. We know the right questions to ask, to help you make connectivity choices that make sense for today and

tomorrow. Once we have the answers, we'll work with you to choose the total connectivity solution that meets your needs today and for the future.

➔ **WHAT IS YOUR MISSION?**

➔ **WHAT IS THE SIZE OF YOUR OPERATION?**

➔ **WHAT TYPE OF AIRCRAFT DO YOU FLY?**

➔ **HOW DO YOU USE YOUR AIRCRAFT?**

➔ **WHAT DO YOU NEED TO DO CONNECTIVITY-WISE WHILE IN FLIGHT?**

➔ **HOW MUCH DATA DO YOU CONSUME AND WHERE IS IT TRENDING?**

➔ **WHAT IS YOUR BUDGET?**

WHAT KIND OF BUSINESS AVIATION OPERATOR ARE YOU?



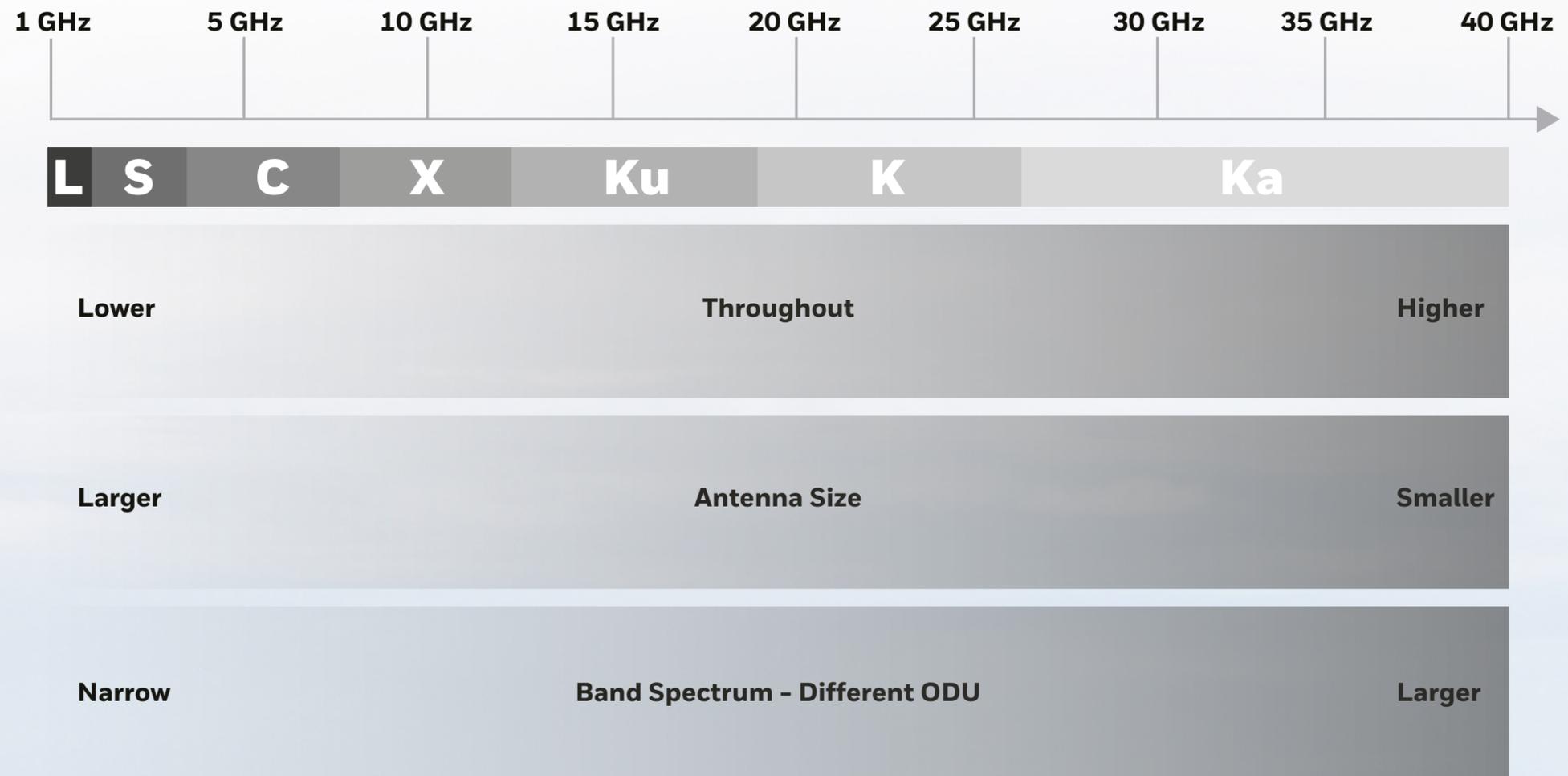
	VIP PROFILE	CHARTER PROFILE	LIGHT JETS CHARTER OR OWNERSHIP PROFILE
INTERNATIONAL FLIGHTS	Frequent	Moderate to Frequent	None/Rare
TYPICAL NUMBER OF PASSENGERS (EXCLUDING THE CREW)	1-3	3-6	1-3
INTERNET USED FOR	<p>Primary: Business productivity (email, Skype, phone calls, file transfer, videoconferencing)</p> <p>Secondary: entertainment, video streaming, live TV, gaming</p> <p>Traveling with business colleagues or family</p>	<p>Primary: Business email, Skype, file transfer, phone calls, videoconferencing</p> <p>Secondary: Entertainment, social media, streaming applications</p> <p>Streaming across multiple devices and multiple users</p>	<p>Primary: safety and basic communication (email, voice, basic browsing)</p> <p>Internet capabilities limited to areas with air-to-ground coverage</p>
INTERNET USAGE	Moderate to High	Moderate to High	Moderate (when available)
INTERNET AVAILABILITY IMPORTANCE	<p>High Being disconnected can cost a significant amount of money</p>	<p>High to moderate Depending on charter fee</p>	Moderate
COSTS SENSITIVITY	Low	Medium to High	High

WHAT COMBINATION OF SOLUTIONS AND SERVICES DO I NEED?

	VIP PROFILE	CHARTER PROFILE	LIGHT JETS CHARTER OR OWNERSHIP PROFILE
NETWORKS	<p>Ka-band (Inmarsat or ViaSat) – due to Global Coverage and high speed data.</p> <p>SwiftBroadband or Iridium Certus as a backup (for all-time system availability and safety services). Optional</p>	<p>Ka-band (Inmarsat or ViaSat) or Ku-band (for regional flights)</p> <p>SwiftBroadband or Iridium Certus as a backup (for all-time system availability and safety services). Optional</p>	<p>SwiftBroadband, Iridium and Iridium Certus, ATG</p>
HONEYWELL FORGE	<p>User Management and prioritization via Honeywell Forge Software and routing (allocate the highest bandwidth to the principal at all times)</p> <p>Honeywell Forge Network App for the crew and DoM to control and monitor system operation and ensure seamless service.</p> <p>Data Control (for optimizing streaming data and applications)</p> <p>Optimize the data pipeline for streaming applications such as Hulu, Roku, Netflix, live TV news – to ensure that the principal is receiving the highest possible quality of streaming.</p>	<p>Honeywell Forge Access (controlling data consumption costs during charter flights, eliminating overhead costs)</p> <p>Honeywell Forge Network App for the crew and DoM to control and monitor system operation and ensure seamless service.</p> <p>Filter Feature (blocking unwanted data traffic such as operating system updates – to optimize the bandwidth to multiple users)</p> <p>Data Control (Traffic Shaping).</p> <p>Optimize the data pipeline for streaming applications such as Hulu, Roku, Netflix, Live TV news – to have the most passengers benefit from the service without compromising quality.</p>	<p>Filter Feature (blocking unwanted data traffic such as operating system updates – to optimize the bandwidth to multiple users)</p> <p>Honeywell Forge Dashboard – keep an eye on your consumption and set notifications to avoid any unplanned data traffic consumption.</p>

DISCLAIMER: Above is provided for comparison purposes – contact your Honeywell Forge representative for a thorough analysis of your needs and available solutions.

WHAT OPERATING SYSTEM IS BEST FOR ME?



Operators have many options when it comes to SATCOM systems. The best option depends largely on the aircraft, its size and mission.

Fig.6. Satellite Communication Bands.

While other SATCOM options, like the L-band and SwiftBroadband, are still widely used in general aviation, the choice for high-speed in-flight Wi-Fi capabilities boils down to either a Ku-band or Ka-band solution.

Performance of Ku-band systems has improved in recent years, with typical speed now around 18 mbps, which is enough to enable standard video streaming. Ku-band systems provide regional service.

Ka-band has more available capacity and is more efficient in its use of bandwidth. The Ka-band can achieve speed of up to 33 mbps, which is more than enough to enable live streaming of HD video and exceed the speed of many ground-based Wi-Fi services. Global coverage and oceanic coverage is available, except for over the poles.

HOW DO AVAILABLE SOLUTIONS COMPARE?

CONNECTIVITY OPTION	HONEYWELL JETWAVE™ KA-BAND 4.6 to 20 MBPS	VIASAT™ KA-BAND 4 - 16 MBPS	VIASAT™ KU-BAND 1.5 - 2 MBPS	GOGO™ BIZ 4G AVANCE L-5 2.5 - 7.0 MBPS	GOGO™ BIZ 3G AVANCE L-3 1 - 2 MBPS
COMPANY DESCRIPTION	Leader in connected aircraft movement with hardware, software and services that enable seamless connectivity anytime, anywhere	Communications company operations across the United States and worldwide	Communications company operations across the United States and worldwide	Provider of in-flight broadband Internet service and other connectivity services for commercial and business aircraft	Provider of in-flight broadband Internet service and other connectivity services for commercial and business aircraft.
SYSTEM DESCRIPTION	Global home and office equivalent Wi-Fi speeds from boarding to deplaning	Limited coverage area Ka-Band satellite solution	Regional Ku-Band coverage with speeds up to 4 Mbps	Domestic land mass air-to-ground solution. Above 10,000 feet only	Domestic land mass air to ground solution. Above 10,000 feet only
APPLICATIONS	Video streaming, HD video conferencing, email, phone, IPTV, VPN, Wi-Fi calling, SwiftBroadband cabin replacement	Video streaming, HD video conferencing, email, phone, IPTV, VPN, Wi-Fi calling	Limited video streaming, HD video, email, phone, IPTV, VPN, Wi-Fi calling	Email, text & talk service plan, browsing, streaming video/audio, Wi-Fi calling, VPN	Email, text, phone and basic browsing
COVERAGE AREA	Single global network in place and operable with enhancements underway	North American Ka-Band network with global network under construction until 2022	Dispersed global network in place and operable	United States, parts of Canada and Alaska above 10,000 feet altitude	United States, parts of Canada and Alaska above 10,000 feet altitude
DATA RATES	First to offer 4.6 to 20 Mbps committed information rates	First to offer 4 to 16 Mbps committed information rates set to 4/7.5 Mbps only	1.5 to 2.0 Mbps no known guarantee Ku Advanced 1.5 to 6.0 Mbps no known guarantee	2.5 to 7.0 Mbps (4G speed) no known guarantee	1.0-2.0 Mbps no known guarantee
SERVICE COST PER AIRCRAFT	\$7K - \$40K / month	\$25K - \$38K / month	\$13K - 20K / month	\$3 - 5K a month with added cost for text & voice	\$1K - \$4K a month with added cost for text & voice
SERVICE PROVIDERS	Honeywell Forge SatCom Direct ARINC Direct	Honeywell Forge SatCom Direct ARINC Direct	Honeywell Forge SatCom Direct ARINC Direct	Gogo	Gogo
IN SERVICE SINCE	2016	2019	2013	2009	2009
CUSTOMER SUPPORT	Global service and hardware customer support, including technical and field support in every region. 24/7/365	24/7/365 monitoring and support of hardware and integrated support covering services and software through Honeywell Forge	24/7/365 monitoring and support	24/7/365 monitoring and support	24/7/365 monitoring and support
HARDWARE WARRANTY	3 years plus extended warranty coverage available	12 months	12 months	24 months - limited	24 months - limited

NOTICE: The information presented in the above comparison is obtained from publicly available information such as websites and brochures on 12/10/2018. We aimed to provide accurate information at the time of documentation, but we cannot guarantee an outcome or accuracy. We recommend customers make an independent inquiry before purchase.

HOW DO I PICK THE RIGHT AIRTIME SERVICE PLAN?

Since 2016, Honeywell has grown to become the second-largest provider of in-flight airtime services. Today, we offer a wide range of flexible, affordable plans to meet your specific needs, whether you're connecting using JetWave and the Ka-Band, a Ku-Band system, Swiftbroadband or another option. Our airtime packages make sure you stay connected and control your costs wherever you fly.

In concert with partners like Inmarsat, ViaSat and Iridium, Honeywell Forge offers a wide range of airtime service plans that can be tailored to meet the needs of any operator. Choosing an airtime service plan is a lot like choosing a smartphone data plan. It's important to assess your anticipated needs in terms of the data you expect to use and choose from a wide range of available options.

Connect with your Honeywell Forge representative to accurately assess your needs and expectations in order to pick the right plan for you.



Fig. 7. Internet Data Usage. Source: att.com/esupport/data-calculator/index.jsp.

HOW CAN I MANAGE ONBOARD CONNECTIVITY?

Q:

WHY DO CONNECTIVITY SERVICE PLANS SEEM SO COSTLY?

In-flight airtime service plans may seem costly compared to plans available on the ground. While the volume of data and speed are increasing, the cost per megabyte on newer technologies such as Ka-Band is much lower than on older, slower technologies. If you calculate costs on a per-megabyte basis, high-speed connectivity of new technologies like the Ka-band cost about 50 cents/MB, compared to older services like the L-band, which costs as much as \$5-\$6/MB.

Enormous flexibility is available and plans can be adjusted to accommodate for a user's usual consumption patterns.

Q:

I WOULD LIKE TO WATCH NETFLIX OR LIVE-STREAM A FOOTBALL GAME WHILE FLYING. I DON'T WANT TO EXPERIENCE LAG-TIME OR BUFFERING. HOW CAN I BENEFIT FROM SERVICE QUALITY WITHOUT BREAKING THE BANK?

There are many ways to reduce data usage and mitigate costs without impacting the passenger's experience. For example, standard-definition video consumes significantly

less data and most viewers can't tell the difference on a small screen, like a smartphone or tablet.

Honeywell Forge offers a variety of tools that can help operators manage costs and save as much as \$100,000 annually per aircraft.

Honeywell wants to give you the connectivity you need and help you stay within your budget. We can provide you the tools that will help you to get the best experience out of any plan you've subscribed to.

Data Control, also known as traffic shaping, gives you the power to control streaming data usage on the aircraft and make sure that enough bandwidth is allocated for onboard voice and data traffic at the same time. By controlling data usage, you optimize the inflight connectivity experience, while being able to choose a less expensive data plan.

Filter Feature helps you ensure that all of the data sent and received from your aircraft cabin is used productively, not for background updates and the like. You control the kinds of applications used on the airplane to make the most of the data you're consuming and reduce delays caused by an overloaded network.

Our expert team of engineers helps you choose software configurations and data plans tailored to your specific needs through **Honeywell Forge Connectivity Consultation** – feel free to contact us today and we will be happy to provide you with a free of charge assessment of your needs and recommend solutions for you.

Q:

HOW DO I MONITOR CONNECTIVITY COSTS WHILE ONBOARD?

There are several ways to keep an eye on costs and ensure that you do not exceed your plan limits or monthly budget. In addition to the filter feature, we've designed a service called Honeywell Forge Access that enables passengers and charter operators to use the internet only within their agreed-upon budget while flying. It is easy to use and simple to manage and does not require any additional equipment to be installed (besides connectivity such as SwiftBroadband or Ka-Band already installed).

Honeywell Forge lets you configure your onboard satellite communications system for optimum performance and automatically choose the right band and service. It also allows for more sophisticated features such as Honeywell Forge per-device charter billing.

The **Honeywell Forge** app makes it fast and easy to check the onboard Wi-Fi network status and find ways to restore connectivity when it goes down.

Our **Honeywell Forge** is a web-based integrated dashboard that provides you with the consumption status, allows you to set up notifications when you are approaching your set data consumption limit and helps you stay on top of your connectivity usage trends.

WHAT DO I NEED TO KNOW ABOUT CYBERSECURITY?



Information security is a top priority for everyone in aerospace. At Honeywell, we use the most advanced and comprehensive cybersecurity technologies, processes and practices to protect information, which ranges from flight plans to system diagnostics, to passenger emails.

With decades of cybersecurity experience, dating back to the dawn of the information age and the introduction of computers to the flight deck and cabin-cybersecurity is a priority in the design of our products, software and Honeywell Forge services and applications.

Honeywell provides standard cybersecurity to all our customers-Honeywell operates three points of presence (POP) across the globe: New York, Amsterdam and Sydney and has intrusion detection services at the Egress and Entry Points to secure our network and yours. Security is at the core of everything we do and we do not believe in charging extra for primary security of your data.

For more advanced features, specific firewalls, intrusion protection services or governmental levels of cybersecurity, contact your Honeywell Forge representative.

WHAT DOES HONEYWELL HAVE TO OFFER?

To connect it, you need to know it.
130+ years of proven aviation expertise, innovation and maintenance.



SECURE SENTIENCE™ DATA PLATFORM



10,000 INSTALLED SATCOM TERMINALS



WE PROVIDE WI-FI AND CONNECTIVITY SERVICE SUPPORT



PARTNERS



WHAT IS THE HONEYWELL DIFFERENCE?

We live in a connected world. There already are more internet-connected devices than people on the planet and there are projected to be as many as 80 billion things online by 2020. We live in connected homes, work in connected buildings, drive connected vehicles, buy snacks from connected vending machines, and the list goes on and on.

Honeywell is all about connectivity. Our unique expertise in software, data analytics and the Industrial Internet of Things enable us to deliver products, services and software solutions that help our customers achieve their core objectives in a wide range of industries, including aerospace.

Connectivity is having an enormous effect on the flying experience. In fact, experts at Honeywell Aerospace compare the Connected Aircraft evolution to the development of the first onboard computers in the late 1970s. The impact is that significant.

Honeywell has been in the satellite communications business since the very beginning and today our talented engineering teams are breaking new ground every day. Just as we pioneered the entry of flight management systems, smart auxiliary power units and other computer-enabled advancements on airplanes, we're leading the way again with nose-to-tail connected aircraft solutions that make life easier for everyone who flies.

THE HONEYWELL FORGE TEAM IS HERE TO HELP YOU:

- **FIND THE RIGHT TECHNOLOGY, TAILORED TO YOUR SPECIFIC NEEDS**
- **WORK WITH MANAGEMENT COMPANY, SERVICE CENTER AND OUR PARTNERS – INMARSAT, IRIDIUM AND VIASAT – TO FIND THE BEST CONNECTIVITY OPTIONS FOR YOU**
- **MAKE SURE YOU GET THE MOST OUT OF YOUR SATCOM SERVICE THROUGH HONEYWELL FORGE DATA CONTROL SERVICES AND TRAFFIC SHAPING**

- **SUPPORT YOUR SATCOM SYSTEM, ROUTER, SOFTWARE AND SERVICES AS YOUR ONE-STOP SHOP FOR CONNECTIVITY ANYWHERE IN THE WORLD, USING OUR VAST NETWORK OF CONNECTIVITY SUPPORT ENGINEERS**
- **INSTALL SOFTWARE UPDATES AND IMPROVEMENTS BASED ON YOUR NEEDS**
- **SAVE ON OPERATIONAL COSTS THROUGH HONEYWELL FORGE ACCESS AND FILTER FEATURE**
- **OPTIMIZE AND ORCHESTRATE EVERYTHING TO CREATE AN ON-BOARD EXPERIENCE THAT IS SEAMLESS, EFFICIENT, STABLE AND FUN**

**THE
FUTURE
IS
WHAT
WE
MAKE IT.**

To learn more

Please contact your Honeywell sales representative or call 1-888-634-3330 or email sales.honeywellforge@honeywell.com

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