

NEW GENERATION AIRCRAFT COMMUNICATIONS

A unified solution for congested skies

Unified Aircraft Communications

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SITA FOR AIRCRAFT

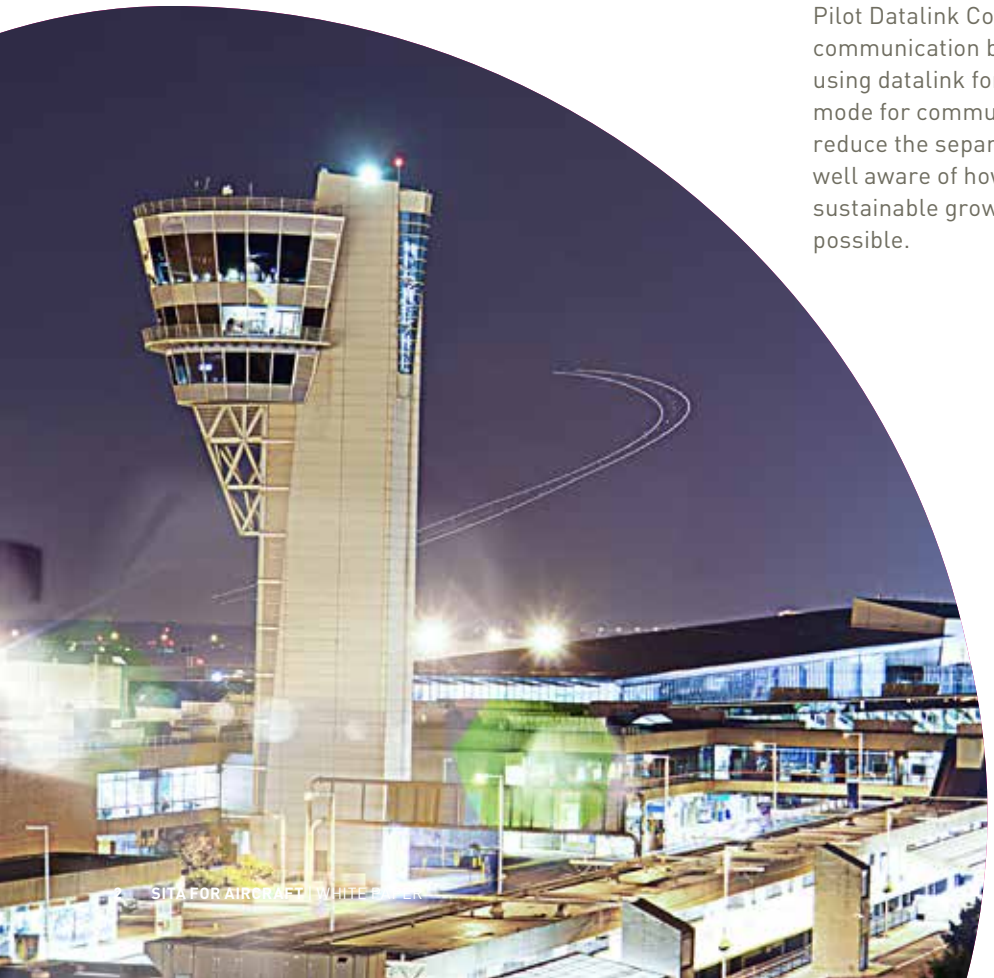
WHITE PAPER

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THE CHALLENGE

The world's airspace has never been busier. With passenger numbers expected to double to 8.2 billion by 2037, the air transport industry faces profound operational challenges across the board. This includes the critical business of aircraft communications, which enables thousands of aircraft – generating growing volumes of data – to fly every day by exchanging safety- and operationally-critical data at every flight phase.

Here, SITA FOR AIRCRAFT – the world-leader in aircraft communications and connectivity – shares its multilink, new generation datalink vision for the industry.



AN INDUSTRY UNDER PRESSURE

According to the International Air Transport Association (IATA), by 2035, more than 100,000 aircraft will take off every day. Each of these 100,000 aircraft – every new model generating increasing amounts of data – will need to access an effective, global aircraft communications ecosystem in order to communicate and transfer aircraft data effectively at every phase of flight.

For airspace managers, airports and airlines, the challenges of handling this dramatic growth, today and tomorrow, are all too real and wide-ranging. Aviation industry growth forecasts are fueling competition and expansion, bringing associated environmental impacts. Airline passengers continue to want more from their flying experience, without paying more, and operating margins for carriers are getting even tighter.

For air navigation service providers (ANSPs), industry growth not only puts pressure on limited airspace but increases the pressure on the world's already in-demand aircraft communications infrastructure, in every domain: communication, navigation and surveillance. As Controller-Pilot Datalink Communication (CPDLC) – the means of communication between air traffic control (ATC) and pilots using datalink for ATC messaging – becomes the primary mode for communication globally, ANSPs are looking to reduce the separation of aircraft in airspace. And they are well aware of how, without radical transformation, the sustainable growth of the airspace they manage simply isn't possible.

SERVING NEW 'FLYING DATACENTERS'

Modern aircraft are often compared to 'flying data centers', with good reason. Today's newest models – from the Airbus A350 and neos to Boeing's 787 – are capable of generating hundreds of gigabytes of data per flight. The aircraft of the future will undoubtedly generate even more.

Operators do not currently require aircraft communication networks to deliver this degree of data offload inflight, but real-world inflight data offload demands continue to rise – and constant management, planning and innovation is needed to meet the growing demand.

Aviation growth: The challenge in figures

- Passenger numbers are expected to double to 8.2 billion by 2037 (IATA).
- Modern long-haul aircraft can generate hundreds of gigabytes of data every flight – more than enough to fill the average computer hard drive.
- Every new generation aircraft generates a higher volume of data than the one before.
- The volume of aircraft data transmitted inflight by new generation aircraft is rising by a factor of four.

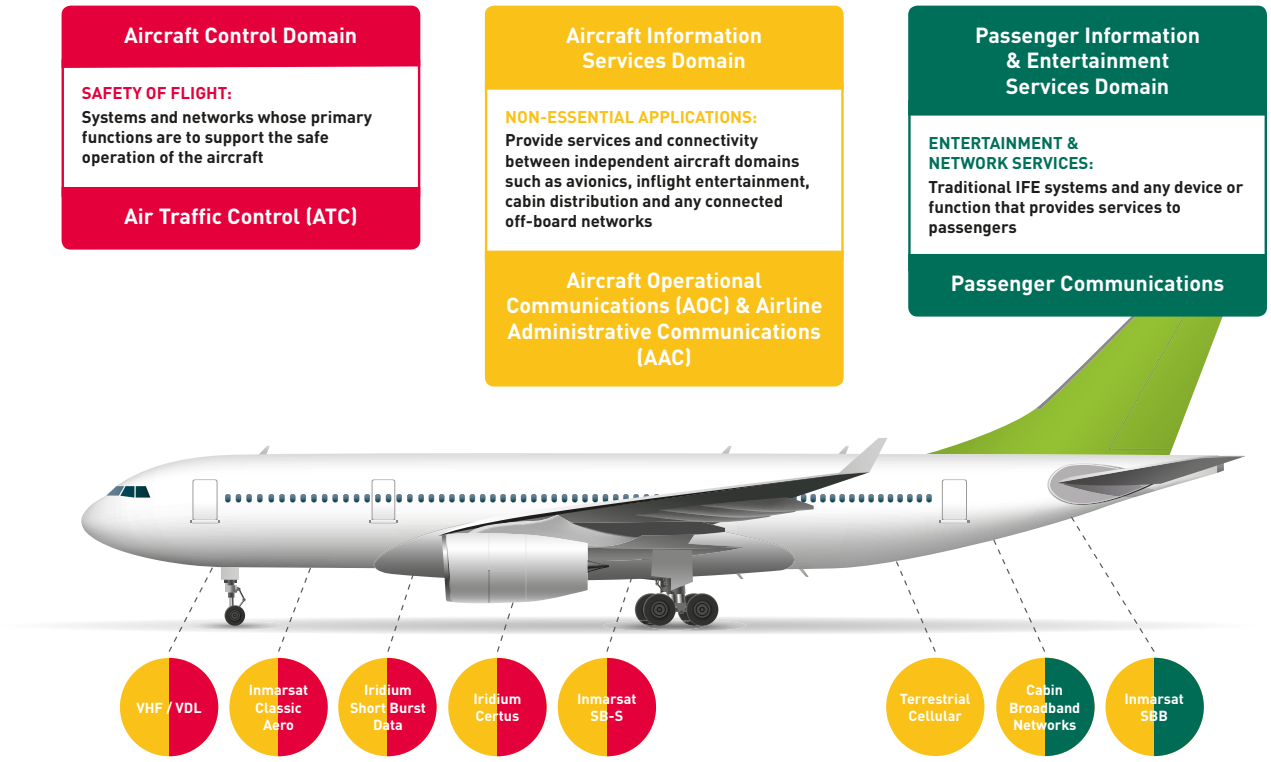
REVOLUTIONIZING COMMUNICATIONS

Fortunately, a step-change in aircraft communications is already well underway, with evolving and emerging technologies promising myriad new and expanded capabilities. In response, aircraft communication service providers are also transforming, moving to encompass new generation networks, and increase the diversity and overall bandwidth in the multilink communications ecosystem.

Inflight, these include new, dedicated IP links for the flight deck that offer secure, global and higher-throughput channels for vital air/ground and ground/air data exchanges. Cabin-focused broadband networks, now installed as standard to provide inflight connectivity to passengers and crew, can also be leveraged for non-critical aircraft communications use. Meanwhile, on the ground, widespread 3G, 4G and Long-Term Evolution (LTE) terrestrial cellular networks offer cost-effective options for expanding ground coverage, and increasing diversity and bandwidth, compared with Very High Frequency (VHF) and VHF Digital (VDL) networks used in isolation for aircraft data offload.

Onboard avionics are changing, too – working harder to bridge aircraft domains and connected aircraft communication systems to these emerging and evolving new generation networks.

Different aircraft communications domains require different link capabilities...



...and not all links are created equal

Domains as defined by the International Civil Aviation Organization (ICAO).

NO MORE LIMITS

Aircraft communications has been able to support the remarkable growth in the air transport industry, even with very narrow-band communications capability. The operational efficiency savings enabled by even today's very narrow-band communication capabilities are immeasurable. The move from analogue to IP technologies brings the promise of exponentially higher throughput for aircraft data exchanges. This move to seemingly unlimited capacity, combined with the industry's demonstrated hyper-efficiency, is key to it becoming more operationally sustainable as the number of aircraft, flights and data volume demands increase.

"WE'RE SECURING ACCESS TO THE MOST APPROPRIATE COCKPIT COMMUNICATION NETWORKS AVAILABLE, AND SEAMLESSLY INTEGRATING THEM INTO OUR INFRASTRUCTURE."

NEW GENERATION AIRCRAFT COMMUNICATIONS

But how, in real terms, can the air transport industry (ATI) deliver a truly transformative, new generation aircraft communications system – one guaranteeing to support the safety- and operations-critical communications of the more than 100,000 aircraft expected to fly every day by 2035? And what does such a system look like?

"At SITA FOR AIRCRAFT, we are completely focused on providing a highly dependable, integrated communications service, seamlessly delivered for all aircraft across all available networks. We industrialize this, because our customers rely on communications services for the safe and efficient operation of their aircraft – so we build in interoperability and fallback on the one hand, and minimized integration or cost burdens for our airline customers on the other," says Euan Mitchell, Senior Product Manager, SITA FOR AIRCRAFT.

"And, vitally, because of the nature of the information and processes it supports, we ensure this system simply works, 24 hours a day, seven days a week."

INVESTING, INTEGRATING, EVOLVING

Since the 1970s, SITA FOR AIRCRAFT experts have provided the essential aircraft communication services needed in order to keep the air transport industry flying. Today, the company enables around 18,000 aircraft – owned by more than 250 customers – to transmit roughly 10 million daily messages. As the owner-operator of one of the largest global private networks in the world and with a network nearing 2,000 radios worldwide, SITA FOR AIRCRAFT is continually investing in this core infrastructure year-on-year, for the long term.

Euan says: "We're securing access to the most appropriate cockpit communication networks available, and seamlessly integrating them into our datalink infrastructure. In doing so, we're not just maximizing capacity, but bringing innovative, added-value services to our airline and ANSP customers."

This includes ongoing investment in SITA FOR AIRCRAFT's core VHF/VDL services. "Even as new technology becomes available in the market," Euan continues, "the thousands of aircraft in service, and those coming out of production for years to come, are fundamentally designed to speak the language of ACARS (the Aircraft Communications Addressing and Reporting System), as are airlines' core IT systems.

"Plus, with major ATC safety communication programs – including the Single European Sky ATM Research Joint Undertaking (SESARJU) initiative and North America's NextGen – reliant on ACARS-ready networks to function, it's clear conventional VHF/VDL will remain key to delivering safety communications for the foreseeable future."

Case study: Cebu Pacific

Cebu Pacific (CEB), the Philippines' leading low-cost carrier, is digitally transforming its operations for the connected aircraft age in partnership with SITA FOR AIRCRAFT.

CEB is the first customer for SITA FOR AIRCRAFT's pioneering, airline-integrated ACARS over cellular service, AoIPConnect®. The service gives CEB the flexibility of an integrated transmissions channel for vital aircraft communications, that works seamlessly with existing datalink media, complementing Very High Frequency (VHF) coverage, and enabling critical operational communications over terrestrial cellular networks while the aircraft is on the ground.

CEB has taken this innovative step to significantly increase its aircraft communications coverage across the Phillippines, enabling the carrier to maintain ACARS-facilitated, operationally-critical processes. The airline has tested the service on three aircraft and is now poised to become the first globally to roll it out across its fleet.

Francesc Torres, Director Operations Support, Cebu Pacific, says: "We are delighted to partner with SITA FOR AIRCRAFT for its pioneering ACARS over cellular service. We are now able to prioritize messages and choose delivery channels based on message tier. We have taken this bold step to significantly transform the management of data within our operations, and are proud to achieve this 'first' for Cebu Pacific and the Philippines."

DATALINK OVER CELLULAR

In parallel, SITA FOR AIRCRAFT is delivering AoIPConnect®, an industry-first integrated ACARS over terrestrial cellular service enabled by Teledyne Controls' GroundLink® Comm+ system. This flexible channel for on-ground data transmission offers increased capacity and coverage, and higher data throughput, as well as an ample on-ground alternative in VHF/VDL-sparse locations.

SITA FOR AIRCRAFT is also working with Astronics Ballard Technology and is open to working with and supporting other vendors' hardware solutions.

DEDICATED COCKPIT IP

Inmarsat and Iridium, the leading aviation satellite communications network providers, are driving forward new generation networks to bring about a step-change in how an aircraft communicates inflight. In terms of both latency and throughput these networks raise the bar, as well as challenging the industry – service and application providers, airframers and airlines alike – to revolutionize the way aircraft operate, and, ultimately, how airspace and airlines are run.

Inmarsat is leading this change through its SwiftBroadband-Safety (SB-S) network, for which SITA FOR AIRCRAFT is a key distribution partner. In May 2019, SB-S received the Federal Aviation Administration's (FAA) landmark acceptance of FANS 1/A, using the SB-S network performance as recommended by its Performance and Rulemaking Committee (PARC) group. Several commercial and business aviation aircraft already operate with SB-S and linefit deliveries are expected to be commercially available from 2020.

Iridium's-own new generation service, Certus℠, will be operated over the recently launched Iridium NEXT satellite network. Certus℠ will bring big leaps in communications capability over its predecessor, and is anticipated to be able to support both safety and operational communications.

The combination of these new generation Inmarsat and Iridium services aboard single aircraft presents an exciting prospect for airlines. The concept of dual, dissimilar satcom is part of an industry movement towards satellite-based communications that could enable airlines to remove one of two currently required, long distance High Frequency (HF) radio systems for flights through oceanic airspace.

Euan says: "When you look at the quality of voice and data communications across an HF network compared with when using high-performing satellite-based communications, there is simply no contest. As such, we are focused on supporting the adoption of satellite communications to replace HF, rather than making investments in a global HF network that is limited in integrity and capacity."



MAXIMIZING CABIN LINKS

As a leading inflight connectivity (IFC) provider and Inmarsat GX Aviation VAR, SITA FOR AIRCRAFT is also exploring how cabin links can be used for ACARS and non-ACARS IP exchanges. As with AoIPConnect®, cabin links present an alternate, higher-throughput and global channel for non-critical data transmissions, freeing up capacity for safety- and mission-critical communications.

Uses might include non-sensitive updates to flight deck applications inflight, as well as an alternative to VHF/VDL for data offload at the gate.

"AT A TIME WHEN RADIO FREQUENCY IS AT MAXIMUM CAPACITY, CULTIVATING AN INCREASINGLY RICH MULTILINK ECOSYSTEM IS THE PRIME, LOGICAL NEXT STEP."

SHIFTING TO IP-BASED DATALINK

Native IP links, such as SB-S and Certus℠, also offer up new, largely unchartered, potential for connecting applications in the cockpit. Dedicated broadband connections to the aircraft and cockpit enable airframers to maximize the capability of their onboard communications management systems and enable real-time connectivity for updates to cockpit applications, such as for a pilot's Electronic Flight Bag (EFB), graphical weather, or for fuel optimization.

"If the next generation of aircraft communication services are to be truly resilient and functional for air navigation service providers and aircraft operators globally, we believe it falls to expert aircraft communications service providers to ensure new aircraft networks are seamlessly integrated into the existing overall aircraft communications environment," says Euan. "At a time when radio frequency is at maximum capacity, cultivating an increasingly rich multilink ecosystem – offering alternative transmission routes – is the prime, logical next step.

"To ensure the overall viability of implementing new means of communication at an airline, our approach is to minimize the ground integration efforts for our customers, by delivering communications through existing interfaces and maintaining data flows to an airline's host systems and back-office applications. In short, we view managing the complexity of bringing new communications media to our customers as our responsibility, not theirs."

New connected capabilities

IP links are opening up a new territory of connected possibilities for the air transport industry. These dedicated aircraft communications and connectivity links pave the way for new and enhanced solutions, services and applications, adding even greater value.

Connected flight tracking
SITA FOR AIRCRAFT is enhancing the global effectiveness and adaptability of its AIRCOM® FlightTracker to different aircraft types by integrating Inmarsat SwiftBroadband and SwiftBroadband-Safety position reporting. This, in addition to embedding Aireon's 100% global, space-based ADS-B data – delivered by the Iridium NEXT satellite constellation – into the application, supports the International Civil Aviation Organization's Global Aeronautical Distress and Safety System recommendations, which compel airlines to report aircraft positions every 15 minutes.

AIRCOM® FlightTracker is used by airlines operating more than 400,000 flights every month.

Weather avoidance RoI
SITA FOR AIRCRAFT's popular electronic situational weather awareness solution, eWAS Pilot, is certified for use across SwiftBroadband-Safety, enabling users to receive the latest weather view, in real-time, inflight. According to a study by the London School of Economics, optimizing flight routes in real-time, through IP-enabled communications that provide better weather information to the cockpit, yields an estimated 1% fuel reduction per flight. This equates to 3.39 billion litres of fuel, 8.3 million tonnes of CO2 and $1.3 billion in fuel savings annually, based on current fuel costs – a clear return on investment.

Other areas in which a connected eWAS Pilot presents return on investment to airlines include: minimizing cabin crew and passenger injuries, supporting reduced insurance premiums and avoiding engine or aircraft damage – made possible by circumventing rapidly changing severe weather phenomena such as turbulence, lightning and high ice water content (HIWC).

IP – INDUSTRIALIZED AND INTEGRATED

Even with the promises of scalability and cost-efficiency offered by IP compared with established aircraft communications networks, the airline industry needs to stay vigilant in the face of an important reality – not all communication networks are created equal.

This means recognizing that different communication networks are required within a safe and sustainable service across the operational domains, to support diverse needs, such as through high-traffic continental airspace, or remote oceanic airspace.

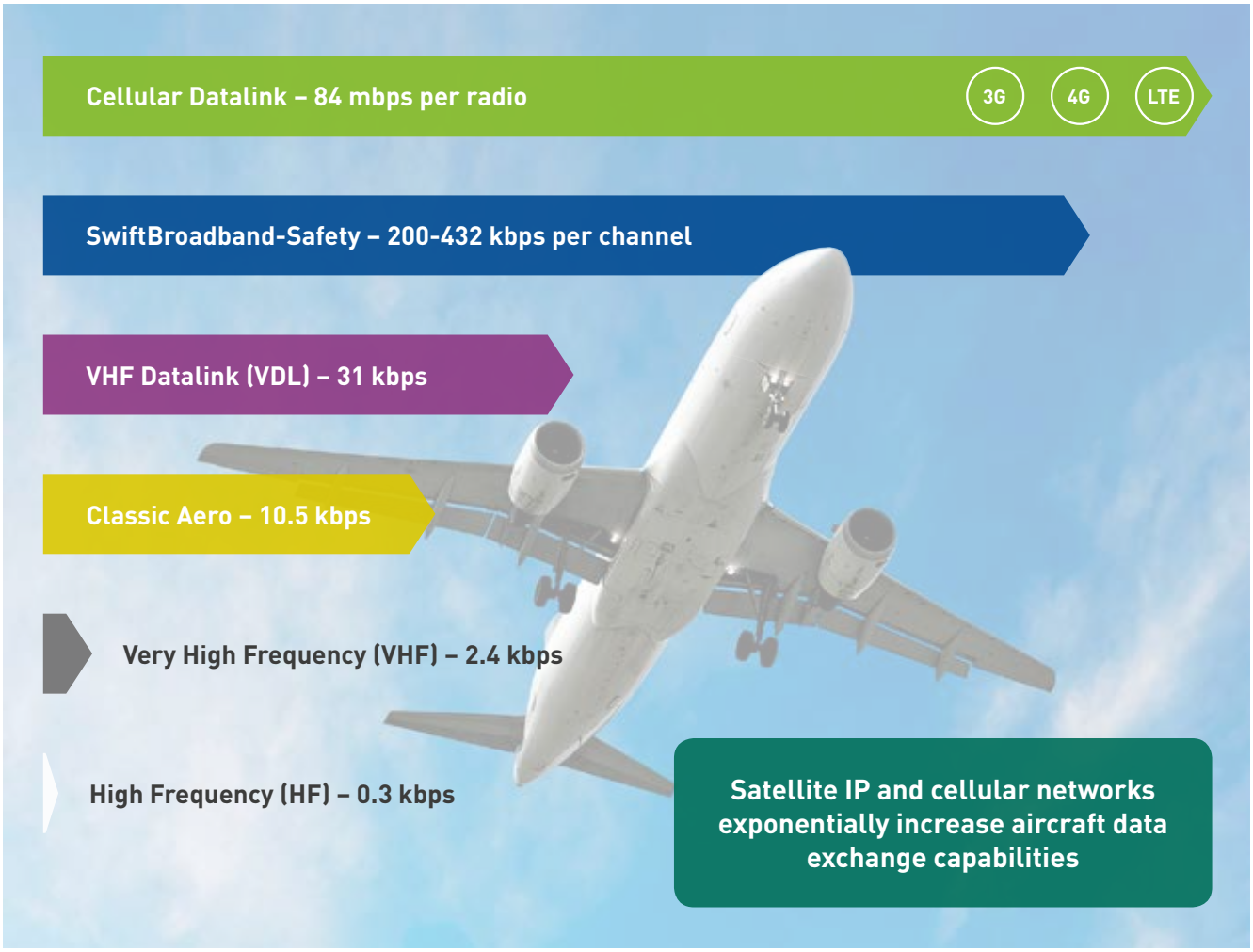
For safety-critical Air Traffic Control–flight deck communications (such as Controller Pilot Datalink Communications), performance-based communication and surveillance requirements help the industry clearly articulate what it needs from existing and new aircraft communications networks. For these essential exchanges, high availability and performance levels are a must, along with optimum resilience and redundancy delivered by a proven, multilink ecosystem.

To serve these critical needs, new IP-based technologies must be highly integrated and industrialized into a single, seamless delivery model, to be market-ready, and bring significant advantages for airline and airspace management service users.

Euan explains: "As one of the longest-serving, and only independent, aircraft communications providers, SITA FOR AIRCRAFT has extensive first-hand experience of what airline customers need, want and value. Airlines should be mindful of providers who advocate modifying aircraft to bring IP technologies onboard, but don't address the ongoing management of those capabilities. If it's not part of their DNA, the practicalities of service management – which are fundamental – become an afterthought, left to the airline to solve.

"This reality can quickly become a nightmare for the vast majority of airlines. But as a dedicated aircraft communications service provider who keeps airlines' best interests at the heart of our approach, it's our reason for being."

The Evolution of Bandwidth



SITA FOR AIRCRAFT: The ATI's aircraft communications partner

The next great leap in aircraft communications is here. To empower the air transport industry to unlock the full potential of this connected ecosystem, SITA FOR AIRCRAFT delivers:

Simplicity
We remove the complexity of dealing with multiple suppliers, internal integration IT projects and associated costs.

Innovation
We bring access to new, disruptive technologies, which are combined and connected to deliver innovative, end user-focused solutions.

Reliability
We deliver peace of mind that aircraft communications will 'just work', with services that are industrialized, highly resilient and available by design.

NEW GENERATION AIRCRAFT COMMUNICATIONS

SITA FOR AIRCRAFT's fully industrialized aircraft communications ecosystem is characterized by its resilience-by-design, achieved through expert integration of multiple aircraft communication networks. The only communications service provider offering truly global business continuity by employing a geographically diverse architecture, SITA FOR AIRCRAFT provides 24/7 proactive monitoring and management – ensuring airlines' and airspace managers' needs, and exacting industry standards, are met.

The constant flow of safety and operational data through SITA FOR AIRCRAFT's communications infrastructure also ensures there is constant visibility over aircraft tracking and routing of safety and mission critical communications exchanges with aircraft around the world. This means that if SITA FOR AIRCRAFT's operatives receive an ANSP request to uplink a message to a specific aircraft, they are able to do so, quickly and effectively.

Andy Hubbard, Head of SITA FOR AIRCRAFT's Unified Aircraft Communications portfolio, says: "At its core, our approach to aircraft communications is as authoritative, agile and analytical as it gets. This is key, as the nature of the services we provide, and the use of them by our customers, is operationally- or safety-critical. To provide anything less, while ensuring the ongoing safety and efficiency of the air transport industry, is simply not an option."

Discover Unified Aircraft Communications
SITA FOR AIRCRAFT's Unified Aircraft Communications (UAC) solutions provide aircraft connectivity as-a-service.

Our global, end-to-end managed, fault-resilient connectivity services support multiple technology and connectivity options. They also give airlines and air traffic managers the flexibility to choose the solution that best fits their needs and those of their stakeholders.

Whether your focus is unlocking significant cost savings and efficiencies with both data and voice services, enhancing air traffic control (ATC) procedures with complete integration from ATC to cockpit, or facilitating secure, real-time aircraft data exchange, our UAC solutions offer the complete package, straight from the industry's experts in the field.

The world's state-of-the-art aircraft and ATC communications ecosystem. Reliability, flexibility and innovation, simply delivered. Unlock possibilities today.