SITAONAIR

5G READY

4G

The next generation mobile connectivity set to transform aviation

The world is flying more. In the next 20 years, the global fleet is expected to double to 48,000 aircraft, while annual passenger numbers are set to hit 7.2 billion.

At the same time, passenger habits are changing quicker than anticipated. Not only are most of us glued to our smartphones and consuming an ever-greater volume of rich digital content, many of us are carrying around more than just one device. Add to this an explosion of Internet of Thing devices, from smartwatches to connected baggage aboard the aircraft, and demand for 'always-on' connectivity is becoming the norm.

On the ground, mobile operators are investing significantly in addressing these changes, most recently in the 5G networks required to meet

shifting data consumption needs. This innovation is set to transform our lives on the ground in the years to come, and will soon reach the aircraft.

Here, SITAONAIR shares its vision for how mobile technology, and in particular current 4G and future 5G connections, will deliver the next big leap in mobile connectivity in the air – offering passengers the greater capacity and smoother connections they are calling for, while creating a profitable case for inflight connectivity.

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Changing passenger behaviors and expectations

Thanks to advances in connectivity on the ground, passengers are used to simple and constant connectivity – enabling them to connect with friends, family, and business on the go, wherever they are. What's more, it is easier than ever for passengers to connect to mobile networks, which has proven essential for the democratization of mobile applications and services. Indeed, most devices will connect to available mobile networks automatically, without any input required from the user – ensuring an 'always-on' experience.

Data hungry devices and the Internet of Things

Whereas ten years ago, most of us only had one device requiring access to mobile networks, in the Internet of Things age, this is no longer the case. Today, with the ubiquity of smartphones and tablet computers – and with wearables set to become an increasingly common sight – passengers are typically carrying a range of personal devices, each searching for connectivity.

Not only are there are expected to be around 29 billion connected devices in circulation by 2022, these devices are going to be more demanding than ever in terms of data comsumption. This thirst for capacity will put a major strain on existing networks. Mobile technology, including 4G and 5G, will have a key role in meeting the surge in demand from Internet of Things devices and applications in the inflight environment.

Desire for simplified and customised billing

As well as becoming accustomed to a highly personalized inflight experience – freed from fixed inflight entertainment options and able to consume the content they want, when they want – passengers are getting used to seamless payments.

On the ground, most passengers access mobile connectivity services through subscriptions with mobile network operators. Over the past five years, these mobile network operators have slowly been reducing the cost of using cellular data abroad – offering roaming deals based on a standard daily or monthly rate, or in some cases (across the EU, for example) removing charges completely.

- Unlimited data usage
- Simplified and customized billing
- Data roaming deals
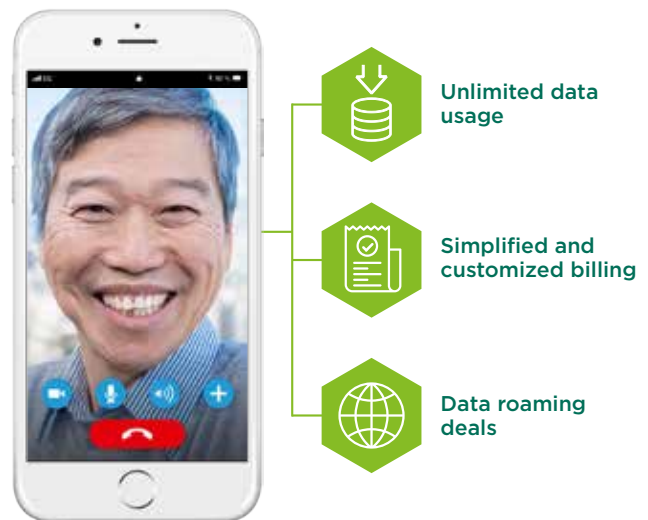
The benefits of SITAONAIR partnerships with mobile network operators

With passengers now used to simple roaming on the ground, many mobile operators are extending their roaming bundles to inflight services. For example, subscribers to mobile network operators including Etisalat, Ooredoo, Zain Group, and du, are able to use data and minutes inflight as part of their bundle, at no extra cost, when flying with an airline equipped with SITAONAIR's Mobile ONAIR.

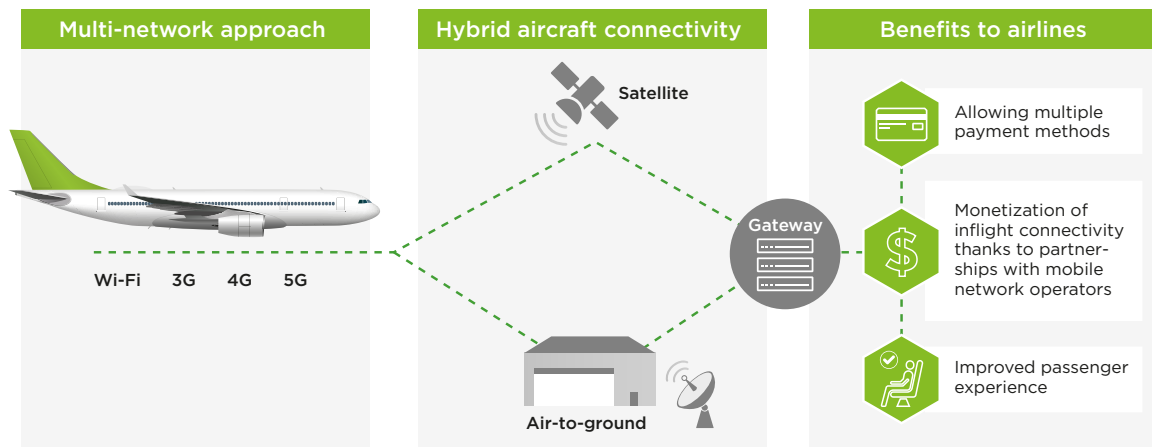### Network security at the heart of regulatory consideration

Alongside these shifting expectations, network security remains as important as ever. As part of the significant investment mobile network operators are putting into mobile technology on the ground, optimizing security protocols has been central. This focus on security will be important in ensuring the viability and worldwide regulatory approval of connectivity in the air, where robust protection of passenger data is essential.

Bringing 5G to the cabin will be crucial for airlines as they adapt to the challenges facing them – and SITAONAIR is leading innovation in this space. Our vision is to provide a superior and future-proofed inflight connectivity service to passengers by delivering a seamless and fast experience that costs less.

Ultimately, this is based on our ability to continually secure and build the partnerships with mobile network operators that are required to deliver to passengers a mobile experience comparable to what they are used to on the ground. This, in turn, will open a raft of new monetization opportunities for airlines.

SITAONAIR's vision for inflight mobile connectivity

Multi-network approach	Hybrid aircraft connectivity	Benefits to airlines

Wi-Fi 3G 4G 5G

Satellite

Gateway

Air-to-ground

Allowing multiple payment methods

Monetization of inflight connectivity thanks to partnerships with mobile network operators

Improved passenger experience

An in-cabin multi-network approach

Today, while the existing Wi-Fi networks used by many airlines are offering passengers inflight connectivity, they are also posing difficulties for airlines. Not only is it challenging for airlines to effectively monetize inflight Wi-Fi services, it is often hard to deliver a seamless user experience. What's more, given the Internet of Things future, these networks may not have the capacity to connect the sheer number of new devices set to hit the cabin. A multi-network approach, built around both Wi-Fi and mobile network technologies, is key to solving these challenges and granting passengers a choice of connections.

This approach, which involves adding 4G and then 5G on top of existing Wi-Fi connections, offers airlines and their passengers the best of both worlds. For example, inflight mobile networks will allow mobile subscribers to seamlessly and securely access the inflight service without manual authentication or the need to add manually input payment details. Meanwhile, maintaining inflight Wi-Fi provides passengers access to the airline's own portal, including options like local content and inflight shopping.

The dawn of 5G in aviation

5G is the natural evolution of 4G and Wi-Fi technology on the ground and inflight – bringing a unified and high-throughput connectivity service to passengers, Internet of Things devices, and to the aircraft.
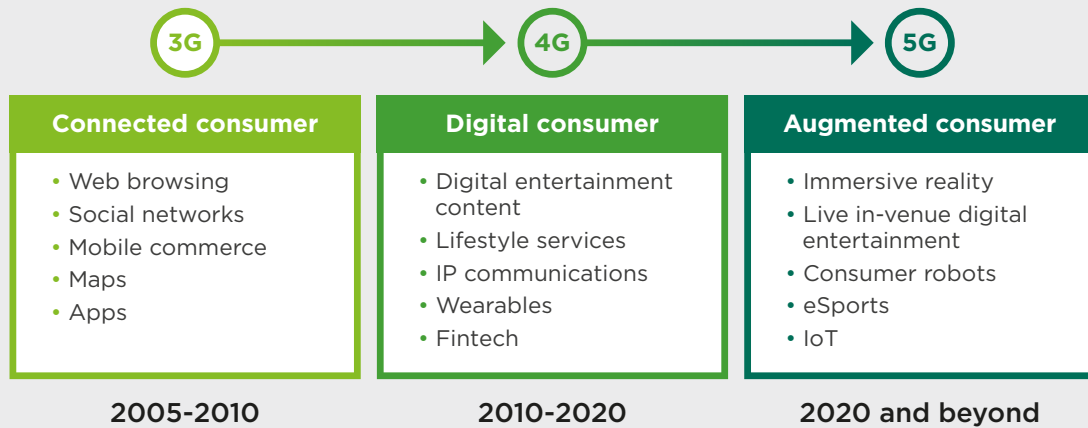
On the ground, 5G networks are already starting to be rolled out around the world. 5G phones are going on sale, and in the US, all four of the country's major network operators have set their networks live. While deployment inflight will not follow immediately, it is on the way, and set to bring a number of benefits to airlines and their passengers.

In the aviation industry, we trust that an end-to-end inflight 5G connectivity experience could become a reality in the medium-term. This will enable an improved, unified passenger experience, with the performance and capacity necessary to handle the changing mobile data usage requirements that come with the sheer number of Internet of Things-connected devices set to reach the aircraft.

What is 5G?

5G is the next generation mobile internet, augmenting existing 3G and 4G connections and enabling far more devices to access mobile internet at the same time. 5G offers both faster upload and download speeds, substantially reduces latency and delivers wider coverage and more stable connections.

2019 has seen 5G networks go live on the ground and the first 5G smartphones released to consumers. According to a recent GSMA report, 5G is expected to account for 15% of global mobile connections by 2025 – with up to 50% market penetration in the US.

3G → **4G** → **5G**

| Connected consumer	Digital consumer	Augmented consumer
• Web browsing • Social networks • Mobile commerce • Maps • Apps	• Digital entertainment content • Lifestyle services • IP communications • Wearables • Fintech	• Immersive reality • Live in-venue digital entertainment • Consumer robots • eSports • IoT
2005-2010	**2010-2020**	**2020 and beyond**

Source: GSMA Intelligence

Airlines' monetization opportunities with mobile network operators

Monetization of inflight connectivity is not yet at the heart of airline DNA – but it can be with the establishment of roaming partnerships with mobile network operators.

Partnerships with mobile operators allow for flexible billing, giving passengers an initial taste of inflight connectivity at reduced or even no cost. SITAONAIR has long encouraged mobile network operator partners to bring mobile usage rates as close as possible to on-the-ground usage rates. However thanks to deals with mobile network operators like Etisalat, this is being taken even further.

For example, subscribers to Etisalat's business roaming packs, who fly with any airline using SITAONAIR's Mobile ONAIR network, are now able to use data and minutes inflight as part of their bundle at no extra cost. Such partnerships enable

the airline to benefit from the marketing and communication strength of the mobile operators, and their ability to promote this service directly to their customers. They can also encourage a far greater uptake of inflight connectivity, and ancillary revenue-generating opportunities that have simply not been possible up until this point.
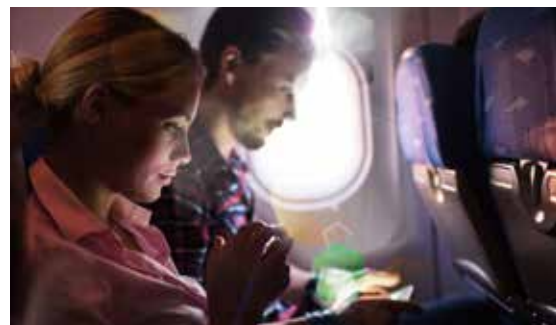
Facilitating collaboration between mobile network operators and airlines will remain at the core of SITAONAIR's approach, informing the future of inflight mobile connectivity.

Aerocel: Enabling the future of inflight mobile connectivity, today

Although timelines remain up for debate, 5G is coming to the cabin. SITAONAIR is in the process of developing Aerocel, which is set to lay the groundwork for airlines to implement the inflight mobile connectivity services of tomorrow.

Aerocel is SITAONAIR's next generation airborne solution, able to create multi-cellular networks onboard the aircraft, and which allows for the creation of a superior and flexible inflight experience based on existing 3G and 4G technology. The solution leverages software-defined architecture, allowing the rapid deployment of radio technologies (3G, 4G, 5G) by software upgrade rather than the installation of new hardware.

Aerocel has been designed to operate with any aircraft backhaul system, both Ka and Ku band satellites, and any air-to-ground network. Additionally, the system is already compatible with 5G NR technology, and therefore prepared for changing passenger requirements and the boom in Internet of Things-connected devices in the cabin.

Why SITAONAIR?

SITAONAIR has long been backed as the air transport industry's trusted connected aircraft service expert, and is well-positioned to deliver the future of inflight mobile connectivity for the cabin.

Mobile ONAIR is already used by airlines around the world to offer inflight mobile connectivity to passengers, and will form the basis of future 5G networks – enabling the rapid deployment of new technologies, without the installation of new hardware.

A neutral, open approach enabling multi-network integration

We offer e-enablement that focuses on helping airlines to take advantage of new technology, while integrating existing technology. This releases airlines from the use of prescribed solutions, freeing them to adopt a technology mix that meets their unique requirements.

A single, integrated managed service, focused on the end user

SITAONAIR is structured to offer service provision across the entirety of connected aircraft solutions, including software, hardware, connectivity and communication.

A key part of this is our 24/7 single point of contact for global support, and the ability to deliver connectivity consultancy and advice from customer application delivery specialists, focused on delivering value to the end user.

Ultimately, this enables airlines to benefit from years of SITAONAIR innovation, and the reliability and simplicity that serves to remove the complexity of dealing with multiple suppliers, internal integration projects, and their associated costs.

The next great leap in inflight mobile connectivity is coming, and SITAONAIR will be at the heart of it. We hope you will join us on the journey.