S·B·I International

Is the destiny of in-flight communications…. Soggy?

C21

Connected Future Transport Systems

(sessions 5 - 6)

Air . Sea . Surface . Rail

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In-flight passenger communications (IFC) has undergone significant growth in the last quarter-century.

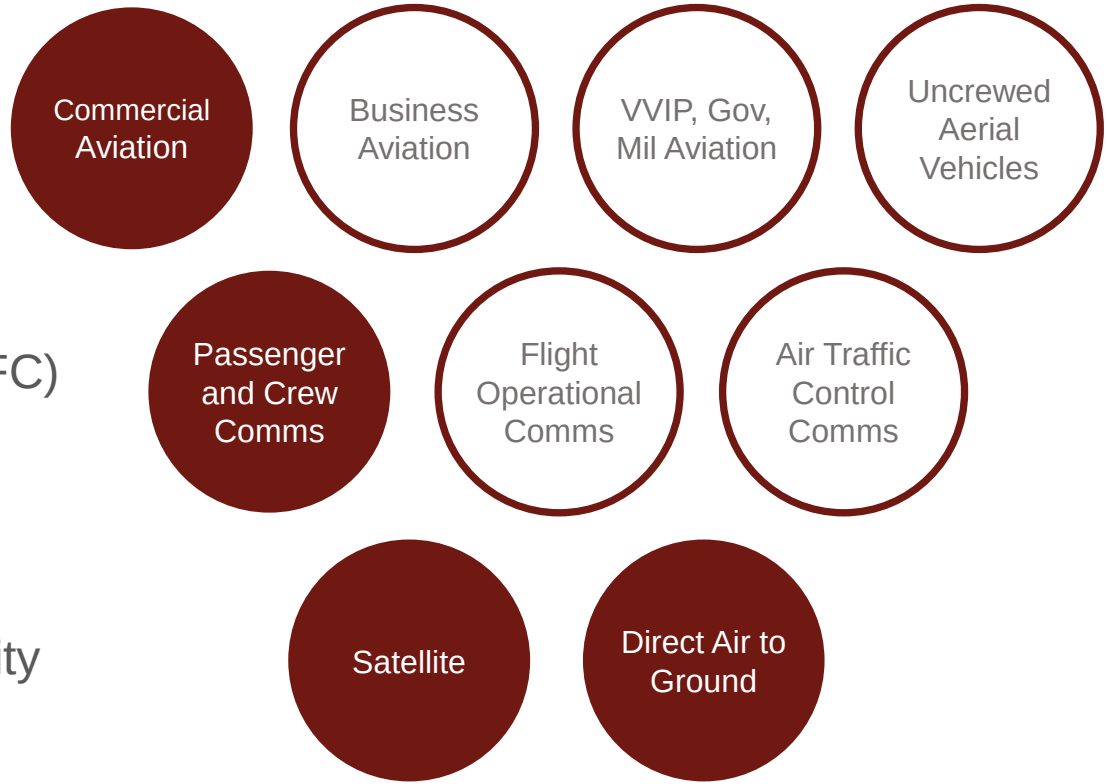
However, the market remains highly fragmented with considerable challenges faced by all stakeholders from manufacturers to end-user customers.

What are the factors that could shape IFC in the next decade and what might the situation look like then?

Scope of discussion

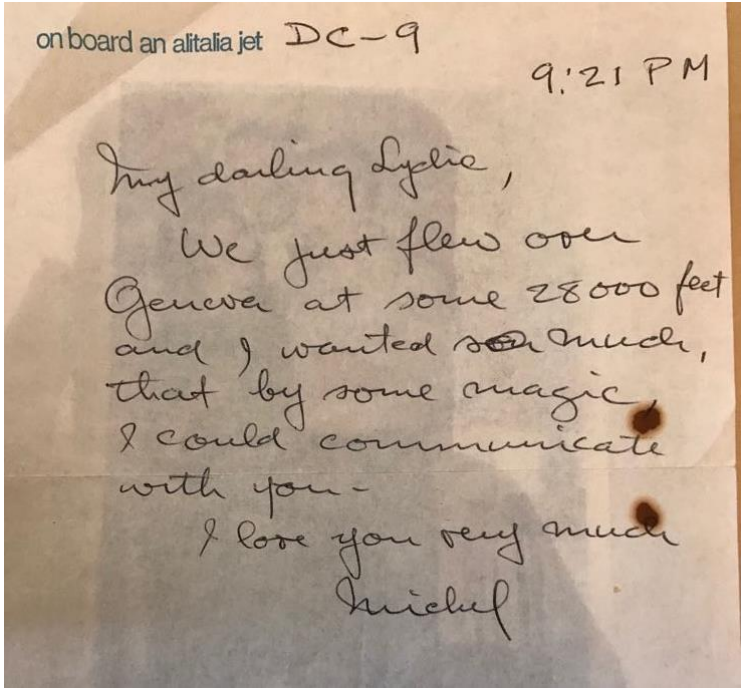
- In-flight communications is a vast territory - today our focus is on commercial aviation and passenger communications (IFC)

- IFC represents the broadest human impact and range of market opportunities and activity



The inspiration for IFC?

1969 – Letter from aircraft manufacturer executive to his wife, living in Geneva


onboard an alitalia jet DC-9

9:21 PM

My darling Lydie,

We just flew over Geneva at some 28000 feet and I wanted so much, that by some magic I could communicate with you -

I love you very much

Michel

onboard an alitalia jet DC-9

9:21 PM

My darling Lydie,

We just flew over Geneva at some 28000 feet and I wanted so much, that by some magic, I could communicate with you.

I love you very much

Michel

Developments in the IFC value chain

- Provider of the airframe and integrator of “line-fit” systems or provisions for same during manufacture of the aircraft
- Qualifies some IFC systems to be “line fit” as buyer or supplier furnished equipment at the time of purchase order
- Some have a demonstrated a high interest in IFC – e.g., *Connexion by Boeing*, *Airbus HBCplus* “flexible high bandwidth connectivity solution for airlines”
- Possible systems integrator role or at least as an enabler for IFC systems installation
- Could consolidation around systems architectures and technologies specified by the airframe manufacturers negatively impact innovation? Could this increase the already high cost basis?

Developments in the IFC value chain

- Designs and manufactures aircraft earth stations and related onboard networking equipment
- Often works closely to design AES with IFC Service Provider
- Challenging operating environment combining mobility factors, environmental factors, aviation regulatory/safety factors and economics
    - CAPEX including cost of terminal, installation, certification
    - OPEX driven by drag, weight
- Considerable industry focus on electronically steerable antennas with expectation to lower CAPEX and OPEX costs, but what will the trade-offs be? Performance? Reliability? Flexibility?
- How else can major CAPEX costs be driven down? Lower performance, smaller antenna systems? Greater integration with the aircraft during manufacture? Less integration?

Developments in the IFC value chain

- Operators of the radio access network between aircraft radio station and terrestrial data/switching centre
- Typically satellite based, but direct air to ground (DA2G) services such as the original Gogo network and Inmarsat's European Aviation Network also play a role
- For satellite based services, per-MHz bandwidth costs have been high, but reducing swiftly with advent of high-throughput satellites (HTS) and other industry drivers
- Promise of greater geographic coverage, greater bandwidth and reduced operating costs through NGSO satellite from traditional operators and new entrants (OneWeb, Starlink, …)
- Continued hope that DA2G can provide compelling regional solutions with high bandwidth and low capital and operating costs – Ref spectrum auction pending in Saudi Arabia and Nokia spinoff SkyFive continued commercial efforts

Developments in the IFC value chain

- Operator of the IFC service including broad systems integration role and provisioning of the service through a data centre, AAA (user authentication, access and accounting), overall network design and implementation, regulatory compliance and related matters
- May be the most challenged to capture the value created in the IFC value chain, although typically takes on considerable responsibilities and risk
- Are there opportunities to disaggregate the various service provider roles or distribute them to other participants in the value chain?
- Are there opportunities to outsource and streamline some of these functions? Are there lessons to be learned from business aviation sector or from the inflight entertainment sector?

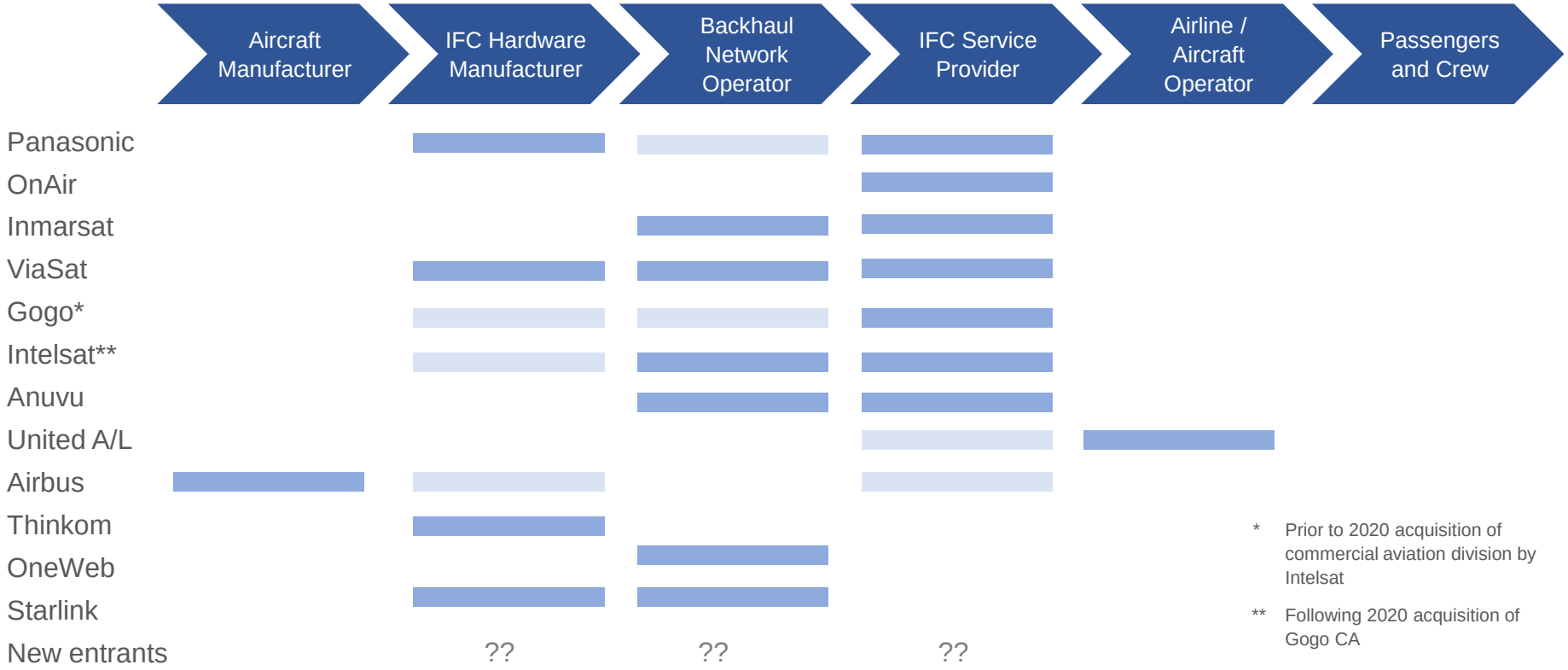
Developments in the IFC value chain

- Airline typically incurs the costs of equipment acquisition, installation and maintenance plus service operation costs may receive some “revenue share” from IFC sales to passengers
- Some airlines seek to take on the consumer facing parts IFC Service Provider role with the aim to better shape/control the passenger experience with uncertain success
- How should airlines shape retail sales, pricing and packaging of the IFC product?
- Are there merits in taking an even more active role in service delivery? Or a more passive role?
- How should IFC services to passengers be positioned – Ancillary revenue? A benefit for higher status passengers? Or persistently available to everyone with some OTT services?
- How can huge capital and operating costs be addressed? Are industry groups such as the *Seamless Air Alliance* able to have a significant impact?

Developments in the IFC value chain

- Passengers are the end users and are effectively the source of all value in the IFC value chain
- Passengers are typically reluctant to pay for IFC which often costs on the order of $20 or more per flight although the consumer demand for “connectivity” in general continues to grow
- ”Take rates” are typically on the order of 10% for paid services while free of charge IFC usage is may not top 30% typically. Does the airline passenger really value constant connection or is the flight used as “time off”?
- Will these patterns remain constant over time or evolve? Favourably?
- What type of IFC service do passengers really want? Streaming video on demand? Or just simple messaging?
- How can passenger preferences (and true value created) drive economic decisions upstream in the value chain?

Vertical integration in the IFC value chain



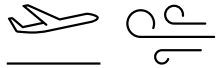
* Prior to 2020 acquisition of commercial aviation division by Intelsat

** Following 2020 acquisition of Gogo CA

There are many business models and degrees of vertical integration – Which ones generate value? How? For whom? Where are there oportunities for new entrants to create or poach value?

Summary of environmental conditions

Headwinds



- Many technology options – mostly uncertain/unproven could render investment decisions risky
- Unproven value creation and capture models discourages investment, new entrants and innovation
- Likely continued industry consolidation will take some time to stabilize

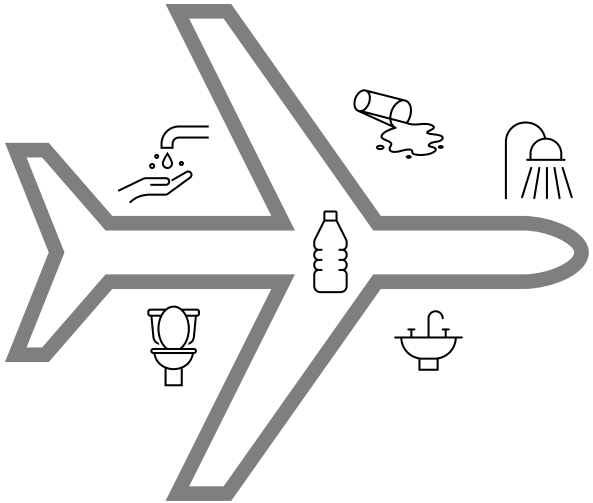
Tailwinds

- Significantly more radio access network bandwidth becoming available in multiple bands
- New radio access network technologies may address key friction points (LEO, MEO)
- Innovation in ESAs and new entrants in AES space could drive down unit costs

While the IFC sector faces many challenges going forward, advances in basic technologies can enable contnued growth and opportunities for value creation/capture.

Looking forward a decade…

IFC may continue to be a bit soggy for some…



But, IFC will be like having water on board – it will be available in many forms and for many uses, but will only be noticed by its absence

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"From ideas to execution"

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