

WRC-23 Agenda Item 1.16

Enabling Ka-band NGSO Earth Station in Motion

Presentation for the Caribbean Telecommunications Union
Spectrum Management Task Force Meeting

February 2023

The logo for GVF, consisting of the letters 'GVF' in a bold, white, sans-serif font. The 'G' is stylized with a white arrow pointing to the right, integrated into its shape. The background of the slide features a large, faint, light-red circular graphic on the right side, which appears to be a stylized satellite dish or a similar circular structure.

Satellite. Solutions. The World.

Agenda Item 1.16

Non-GSO ESIM in Ka-Band



“... to facilitate the use of the frequency bands 17.7 – 18.6 GHz and 18.8 – 19.3 GHz and 19.7 – 20.2 GHz (space-to-Earth) 27.5 – 29.1 GHz and 29.5 – 30 GHz (Earth-to-space) by non-GSO FSS ESIM, while ensuring due protection of existing services in those bands...” – Resolution 173 (WRC-19)

Technical and regulatory provisions for the operation of ESIM under this Agenda Item are limited to aeronautical and maritime ESIM

Facilitating the implementation of non-GSO ESIM in the Ka-band will:

- ✓ Support the need for ubiquitous broadband connectivity regardless of location;
- ✓ Allow connectivity even when on the move globally; and
- ✓ Provide a harmonized international framework for the use of ESIM awhile protecting existing services.



Importance of this Agenda Item for the CTU

- ④ Providing reliable internet connectivity to the aviation and maritime sectors is a key objective of the non-GSO systems that will operate in the Ka-band
- ④ Given the importance of tourism and shipping to the Caribbean, it will be beneficial to have a harmonized framework for these services.



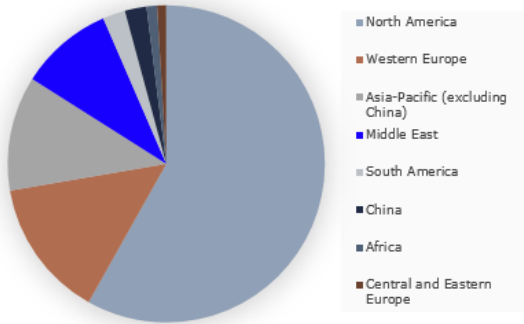
Commercial aviation connectivity market



- ▲ Inflight connectivity is a growing vertical, with airlines transitioning from paid, to semi-free, to free services for passengers in some markets
- ▲ In addition of new aircraft installs, the increase in free IFC is driving increased bandwidth

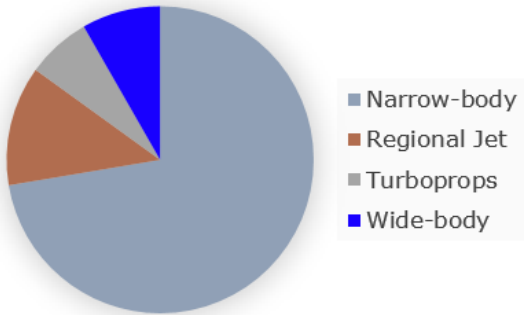
Global user base with growth opportunities

Current Connected Commercial Aviation Craft
9,924 Aircraft | 143 Airlines



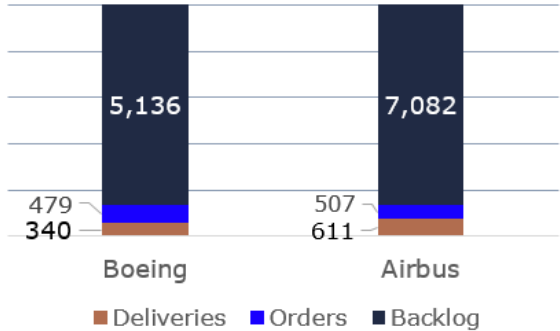
>6,000 Unconnected Aircraft
32% Connected | 68% Unconnected

Addressable Commercial Aviation Market



Airbus & Boeing line fit programs and retrofit installs

Total Aircraft Deliveries, Orders & Backlog, 2021



Commercial Aviation Demand

Importance of connectivity for passengers continues to grow



77%

of surveyed passengers find it important to be connected to Wi-Fi during a flight



79%

connected to inflight broadband over the last 12 months when it was available.



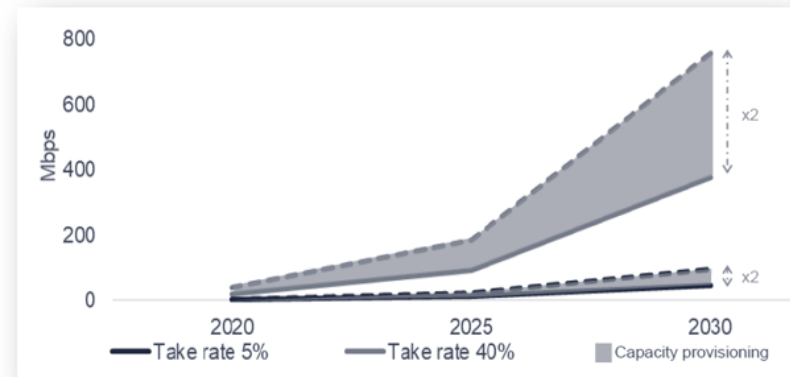
82%

would rebook with an airline if they had a positive Wi-Fi experience

Source: Inmarsat Passenger Experience Survey 2022

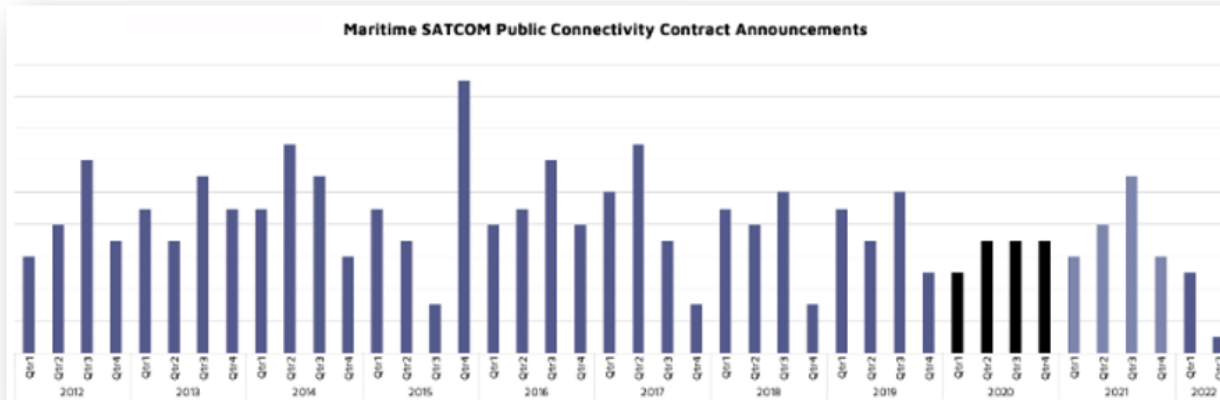
- ▲ According to Euroconsult, the number of aircraft using in-flight connectivity is expected to double to more than 21,000 within the next decade
- ▲ Valour Consultancy predicts that by 2029 81% of the North American commercial fleet will be connected, up from 71% today

- ▲ Capacity per aircraft will increase to up to 800 Mbps to meet passenger needs
- ▲ Offering free Wi-Fi to passengers will drive an increase in take-rate
 - Delta Air Lines will offer free Wi-Fi on more than 700 aircraft by the end of 2023

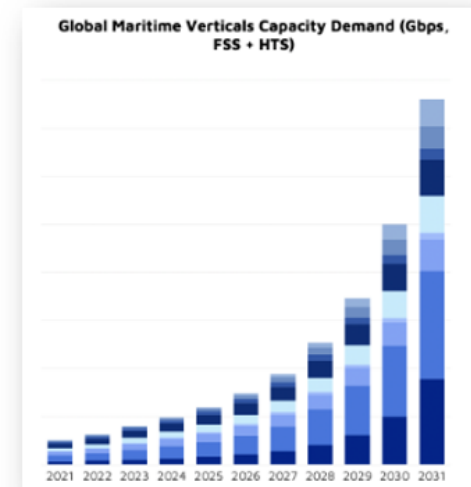


Maritime Connectivity Demand

- ▲ Demand for maritime bandwidth to support crew welfare and craft operations is expected to increase by ~12 times by 2031
- ▲ Even with only sub 100% of cruise market operating the bandwidth has exceeded pre COVID levels
- ▲ Carnival “internet connectivity across its global fleet, the latest in a series of moves that have nearly tripled ship bandwidth since 2019”



Maritime contract awards diminished in 2019-2022 (when including concessions); contract awards are now on the rise

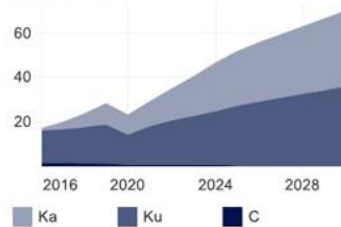


Demand is expected to increase utilization of multi orbits solutions

Maritime Connectivity Demand

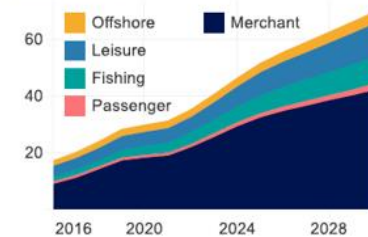
Total VSAT forecast
(by frequency band)

In thousands



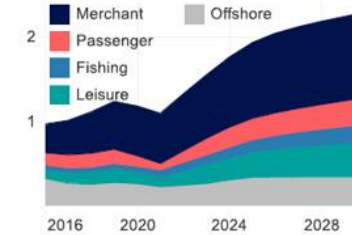
Total VSAT forecast
(by market segment)

In thousands



VSAT service providers revenues
(by market segment)

In billion USD



- ▲ Ku-band is the current predominant spectrum, however Ka-band solutions are increasing and account for much of future growth
- ▲ Demand for maritime connectivity varies by sub-market, with growing needs in each:
 - Cruise: on-board Internet is key to attract tourists, growing consumer demand
 - Yacht: expectation of a "home-like experience" while at sea
 - Merchant: crew connectivity, ship monitoring and corporate applications
 - Offshore energy: Economical connectivity will create new remote operational models for offshore platforms



Updates to Draft CPM Report

- ④ Last meeting of WP4A in September reviewed contributions and reports on sharing and compatibility studies as well as draft CPM text with draft WRC-23 Resolution
- ④ Meeting endorsed the decision from the previous WP4A that the **notifying administration** of the non-GSO satellite system is the **only responsible administration** for the operation of ESIM
- ④ Draft CPM text now contains possible approaches on interference management procedures.
 - Further discussion is still on-going on how the notifying administration is identified by the administration victim of unacceptable interference
 - Network Control and Management Centre (NCCM) functionalities and ESIM operational requirements, including mechanisms to cease emission when approaching countries where ESIM operation is not authorised, are included in the draft CPM text.
- ④ Compatibility studies between non-GSO ESIM and the Earth exploration-satellite service (EESS passive) operating in the 18.6-18.8 GHz band were also discussed.
 - Draft New Resolution contains a new Annex 3 including possible options for ensuring such protection

Methodology for compliance with pfd mask for aeronautical ESIM



- ④ Need for a methodology allowing BR to check how aeronautical non-GSO ESIM would comply with the determined pfd limit on the ground
- ④ Updates to the methodology already included in the Annex 2 of the Draft Resolution to be discussed further.
- ④ However, industry believes that a lack of a fully defined methodology by the end of WRC-23 should not delay the development of a regulatory framework for non-GSO ESIM.
 - Adequate transitional measures to be developed and implemented in case WRC-23 does not finalize the methodology

Proposed sharing mechanisms in Draft CPM text

- Ⓢ NGSO ESIM operating in the frequency bands 17.7 – 18.6, 18.8 – 19.3 GHz and 19.7-20.2 GHz (RR 5.524) shall not claim protection from terrestrial services
- Ⓢ For protection of terrestrial services in the 27.5 – 29.1 GHz frequency band, the same technical conditions as applicable to GSO ESIM shall apply (pfd limit on the ground for A-ESIM; minimum distance from the coast and max EIRP spectral density towards the horizon for M-ESIM)
- Ⓢ For the protection of secondary allocation to terrestrial services in the 29.5-30 GHz (No. 5.542), the conditions for NGSO ESIM in the 27.5-29.1 GHz shall apply with respect to administrations mentioned in No. 5.542
- Ⓢ For protection of space services, NGSO ESIM characteristics shall remain within the envelope characteristics of typical earth stations associated with the NGSO system
- Ⓢ For protection of GSO FSS networks, the relevant EPFD limits in Article 22 shall apply to NGSO ESIM
- Ⓢ For the protection of Earth exploration-satellite service (EESS passive) in the 18.6-18.8 GHz band, support pfd limits of technical studies (Annex 3 of draft Resolution)

Methods in Draft CPM Text

Method A	Method B
NOC to RR and suppression of Resolution 173 (WRC-19)	Add a new footnote in RR Article 5 that refers to a new WRC Resolution with technical, operational and regulatory conditions for the operation of non-GSO maritime and aeronautical ESIMs while ensuring protection of allocated services, and consequential suppression of Resolution 173 (WRC-19)

Consistent support from all other regional groups to develop a regulatory framework for the operation of Non-GSO ESIMs in the Ka-band

Proposed Position – AI 1.16

- ④ Support **Method B**

- ④ Support the development of a methodology (Annex 2 of new Resolution) for examination by the Bureau of compliance with pfd limits on the ground for A-ESIM, and adequate transitional measures in case WRC-23 does not finalise the methodology

- ④ Support same sharing conditions with terrestrial services as for GSO ESIM - Resolution 169 (WRC-19)

- ④ Supports finalizing the CPM text and draft New Resolution on this Agenda Item relating to sharing and compatibility studies conducted thus far, including further discussion on interference management mechanisms of ESIMs in the upcoming CPM23-2

Agenda Item 1.16 in CITEI

- There is a Draft Inter-American proposal in CITEI for Agenda Item 1.16
 - The DIAP is supported by Brazil, Canada and Mexico
 - The DIAP supports method B of the CPM Report
 - [GT-CMR23-2022-40-033r2](#)

- There are only 2 more PCC II meetings before WRC-23 where the American positions for all the Agenda Items must be defined
 - Mexico May 2023
 - Canada August 2023



OAS | More rights
for more people

WRC-23 Agenda Item 1.16

THANK YOU
And see you at



GVF

Satellite. Solutions. The World.