

*Preliminary GSC position for
WRC-19 on AI 1.5*

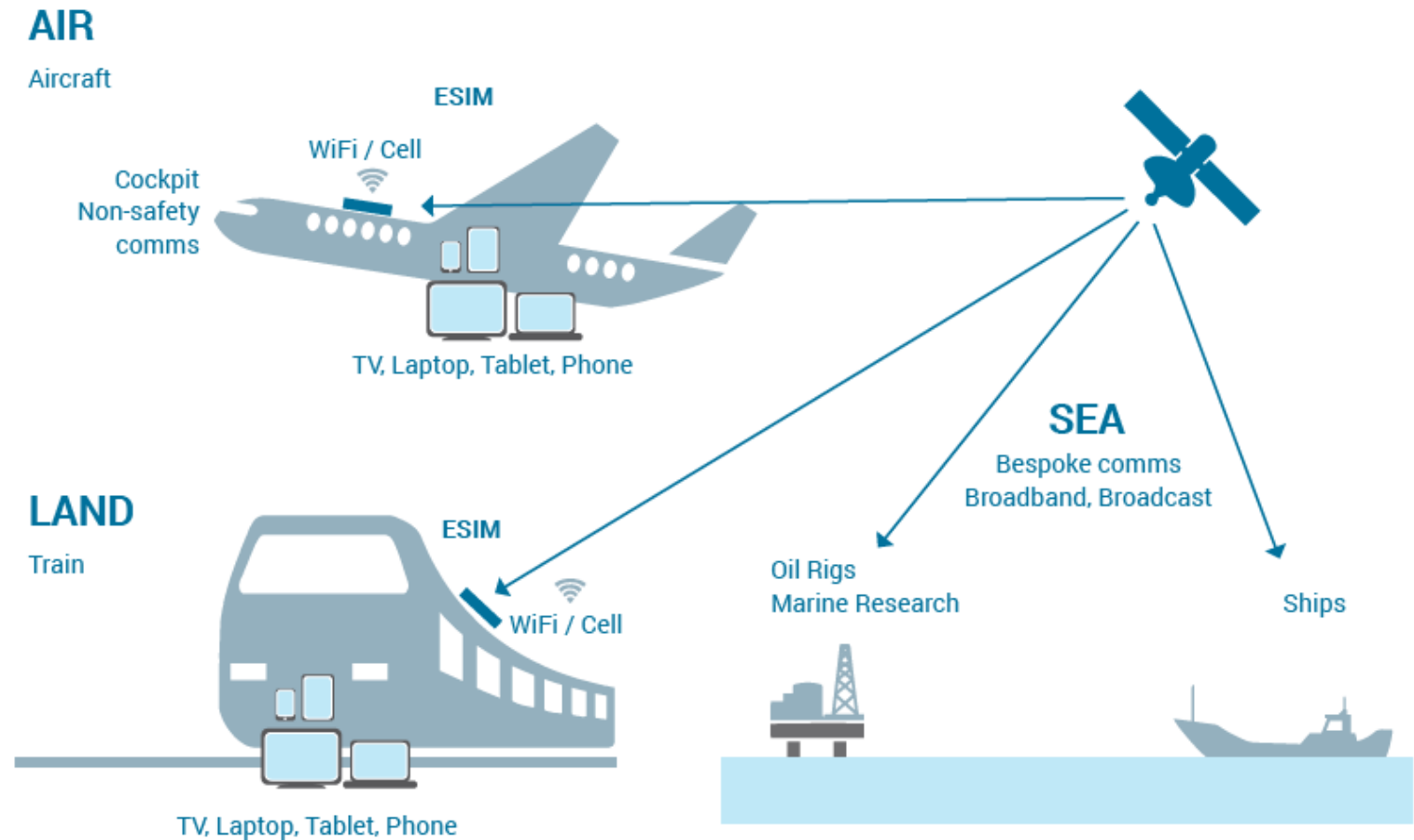
Commercial Connected Aircraft:

- 2017: 90 airlines => 7 400 aircraft
- 2027: 23 300 aircraft

Maritime Satcom Market:

- 2017: 337 300 terminals;
- 2027: 559 300 terminals.

Source: EUROCONSULT



Google trends (2012-2019) for “[airline] wifi” searches

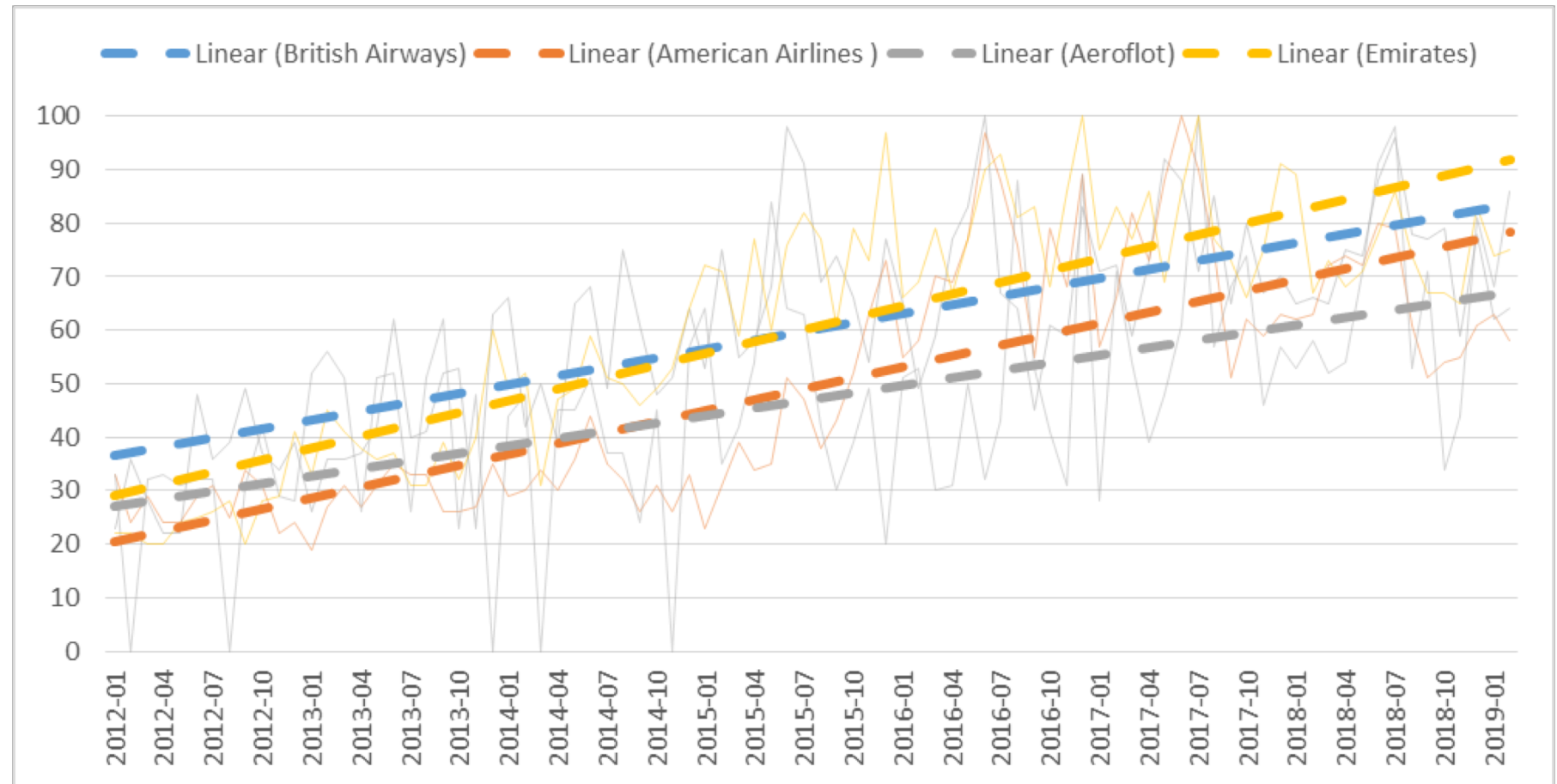
Example top related queries:

- “Wifi on American Airlines”
- “Wifi on BA”
- “Does BA have wifi”

Etc.

Market Survey:

- 67% would be more likely to rebook with an airline if inflight Wi-Fi were available;
 - 81% for passengers travelling with children;
 - 83% for business travellers;
- 54% agreed that they would not prefer to have Wi-Fi if it was poor quality.



Goal: To facilitate the operation of ESIMs in GSO FSS networks in the Ka-band

- **Genesis:** Resolution 158 (WRC-15)
- **Issue:** *to consider the use of the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) by earth stations in motion communicating with geostationary space stations in the fixed-satellite service and take appropriate action*

- **Background:** WRC-15 adopted provisions for ESIM operations within the FSS allocation in the 19.7 – 20.2 GHz and 29.5 – 30 GHz bands subject to conditions in Resolution 156. Resolution 156 recognizes the need for global broadband mobile-satellite communications, and that some of this need could be met by allowing ESIMs to communicate with space stations of the fixed-satellite service (FSS)
- AI 1.5 of WRC-19 addresses operation of ESIMs beyond these bands to meet the increasing demand for broadband satellite communications with mobility
- Today many ESIMs are operating in the air, in the sea and on the land, and airlines in particular are seeking to provide gate-to-gate passenger connectivity.

GSC General Position: Establish provisions for aeronautical, maritime, and land ESIM operations within GSO FSS networks in the Bands 17.7-19.7GHz and 27.5-29.5GHz, subject to technical and regulatory protection mechanisms for existing FSS *operations* & other allocated services.

Background - Current status:

- **Resolution 158 of WRC-15 resolves to invite the ITU-R to:**

1. To study the technical and operational characteristics and user requirements of ESIM and the requirement for flexible use of spectrum to provide ESIM services;

Further information in: Sections 2 & 3 of WP4A preliminary draft new Report ITU-R S.[AGENDA ITEM 1.5] & Reports ITU-R S.2223 & S.2357-0

2. To study sharing and compatibility between ESIM and current and planned stations of existing services allocated in the bands;

Further information in: Section 4 of WP4A preliminary draft new Report ITU-R S.[AGENDA ITEM 1.5] as well as PDNRs S./M.[ESIM-MS], S./F.[ESIM-FS] and S.[ESIM]

3. To develop technical conditions and regulatory provisions for the three types of ESIMs operation (Land, Maritime, Aero)

WP 4A has developed an example draft Resolution for WRC-19 as part of CPM text for AI 1.5, which includes the regulatory framework for ESIM operation as well as measures to ensure protection of other services. Most of the Resolution has been agreed in WP 4A, but there are some provisions for which the views of different administrations are indicated as options.

GSC Position – conditions on ESIM operations

- Support Method B to adopt a footnote in Article 5 and an associated Resolution that would define conditions for ESIM operations, including:
 - that ESIMs communicate with FSS satellites and operate within the envelope of the FSS network
 - that Maritime ESIMs that operate within 60-70 km distance of low water mark of a country are subject to the prior agreement of the concerned coastal State
 - that Aero ESIM that does not meet the following PFD mask at the surface of the Earth are subject to the prior agreement of the concerned State.
 - $\text{PFD}(\delta) = -124.7 \text{ (dBW/m}^2\text{/14 MHz)}$ for $0^\circ \leq \delta \leq 0.01^\circ$
 - $\text{PFD}(\delta) = -120.9 + 1.9 \cdot \log_{10}(\delta) \text{ (dBW/m}^2\text{/14 MHz)}$ for $0.01^\circ \leq \delta \leq 0.3^\circ$
 - $\text{PFD}(\delta) = -116.2 + 11 \cdot \log_{10}(\delta) \text{ (dBW/m}^2\text{/14 MHz)}$ for $0.3^\circ < \delta \leq 1^\circ$
 - $\text{PFD}(\delta) = -116.2 + 18 \cdot \log_{10}(\delta) \text{ (dBW/m}^2\text{/14 MHz)}$ for $1^\circ < \delta \leq 2^\circ$
 - $\text{PFD}(\delta) = -117.9 + 23.7 \cdot \log_{10}(\delta) \text{ (dBW/m}^2\text{/14 MHz)}$ for $2^\circ < \delta \leq 8^\circ$
 - $\text{PFD}(\delta) = -96.5 \text{ (dBW/m}^2\text{/14 MHz)}$ for $8^\circ < \delta \leq 90.0^\circ$
 - that ESIMs operating in 27.5-28.6 GHz band meet an off-axis EIRP mask outside 3 degrees of the GSO or a maximum ESIM transmit EIRP to protect NGSO FSS systems. If the ESIM cannot meet this off-axis EIRP mask, the maximum on-axis EIRP of 55 dBW for bandwidths up to 100 MHz should not be exceeded. For larger bandwidths, the on-axis EIRP may be increased proportionately

GSC Position – responsibility for ESIM operations

- The administration under whose satellite network the ESIM is operating should ensure that the ESIM operator has the capabilities to respect the technical conditions as defined for ESIM operations.
- For Aero or Maritime ESIMs operating in international territories, and in the case of suspected or reported interference, the ‘flagship’ administration should investigate the interference and identify the ESIM operator.
- The flagship administration should then work together with the administration under whose satellite network the ESIM is operating to take the actions required to remove the interference.

Note: flagship means the country responsible for registering this aircraft or ship.

Note: Iridium does not support the GSC position on ESIM use of 19.4-19.6 GHz and 29.1-29.3 GHz.