

# Design Consideration for Fully Embedded Electronically Steerable SATCOM Airborne Antenna

– EMuS 2019 -

Gonzalo EXPÓSITO\*, Juan M. ABELLÁN\*, Antonio E. JIMÉNEZ\*, Fernando MARTÍN\*,  
Josefina MENÉNDEZ\*, Fernando CANO\*, Francisco J. JIMÉNEZ\*, Avi GAL†

\* EME & Antenna systems, Structural Design, Stress Aerostruct, AIRBUS DEFENCE AND SPACE  
Pso. John Lennon, 28906 Madrid, Spain

E-mail: [Gonzalo.exposito; Juan.Abellan; Antonio.e.jimenez; fernando.m.martin; Josefina.menendez;  
Fernando.cano; Francisco.i.jimenez]@airbus.com - Web page: <https://www.e2s2a2project.eu/>

† GILAT SATELLITE NETWORKS  
21 Yegia Kapayim St., Kiryat Arye Petah Tikva 4913020 Israel  
Email: avig@gilat.com

## ABSTRACT

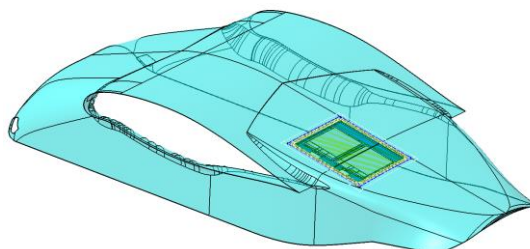
Nowadays the necessity to be connected anywhere, anytime is growing. Aircraft passenger demands large multimedia contents that the former narrow band connections do not satisfy. So far, huge and bulky parabolic dishes are necessary to establish a satellite radio link, therefore introducing additional aerodynamic drag and fuel consumption.

The purpose of this work is to embed an electronic steerable SATCOM antenna operating at Ka band in the wing to fuselage fairing without modifying the shape of the aircraft at all. Airbus DS in order to boost low profile SATCOM antennas leads a project called Embedded Electronically Steerable SATCOM Airborne Antenna (E<sup>2</sup>S<sup>2</sup>A<sup>2</sup>). The project is in line with a new green and intelligent transport such as the new European policies demand, therefore the project is partially funded by the European Commission under the Clean Sky 2 framework. The project is carried out in collaboration with GILAT, RAYSAT and FBM composite partners.

The system design is intended to be aligned with the standard described in ARINC 791 [1] in order to achieve equipment interchangeability. The environmental conditions requested are aligned with aeronautical standards and the mechanical stiffness characteristics to fulfil the operation in a turboprop aircraft. The radioelectrical operational performances fulfil the ITU-R M1643, ITU-R S2223, ITU-R S580, ECC 184 and ETSI 303978 in order to avoid interferences to satellites located in the Geostationary belt. The data throughput target of the whole system is to reach up to 50Mbps download and 10Mbps upload under an appropriate satellite beam. The Antenna performances and conceptual figure is shown in Table 1 and Figure 1 respectively.

**Table 1 Embedded KA SATCOM Antenna parameters**

	RX	TX
Dimensions	447x582x103mm	401x582x104mm
Frequency band	19,7 – 21,2 GHz	29,5 – 31 GHz
Polarization	LHCP (optional)	RHCP (optional)
FOV	Ele: 20-90° Az:360°	Ele: 20-90° Az:360°
XPD	>20 dB	>20 dB
G/T //EIRP	4,4 – 11 dBK	41,6 -49 dBW
Weight	15,9 Kg	10,5 Kg
Consumption	370 (avg)	445 (avg)



**Figure 1 Embedded Ka SATCOM antenna**

Further descriptions on the design and test campaign activities will be presented at EMuS 2019.

## REFERENCES

- [1] Aeronautical Radio INCorporation, “791-1 Mark1, Aviation Ku-band and Ka band Satellite communications system” Ago. 2014