

Supporting
European
Aviation



EUROCONTROL NETWORK MANAGER USER FORUM 2023

5G and Radio Altimeter Compatibility

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NETWORK
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5G & RADALT Compatibility

- EUROCAE ED-310 / RTCA DO-399, Standard Guidance Document on Radar Altimeter RF Interference Rejection and Tolerance
 - Open consultation, Comment resolution ongoing, publication in 2023
 - Based on “best achievable RF tolerance” while preserving intended function
 - Consistent with AVSI Test data and EASA Data from OEM
 - Document is a first priority step towards a new RADALT MOPS (Avionics Standard)
- European Radio Regulatory Group CEPT/ECC PT-1
 - Aviation obtained extension for compatibility assessment report (end 2023 / early 2024)
 - Adjacent band power limits likely required, while Telecom insists on high broadcast power to retain implementation flexibility
 - First retrofit kits being implemented, also in response to **FAA NPRM**
 - Full aviation retrofit timeline still significant & incompatible with 5G (likely multiple retrofits required)
- Operational reports of RADALT events increased following 5G roll-out in US (NASA ASRS)
 - Including events at 50 airports with protection zones
 - FAA Investigations ongoing

ED-310 Excerpt

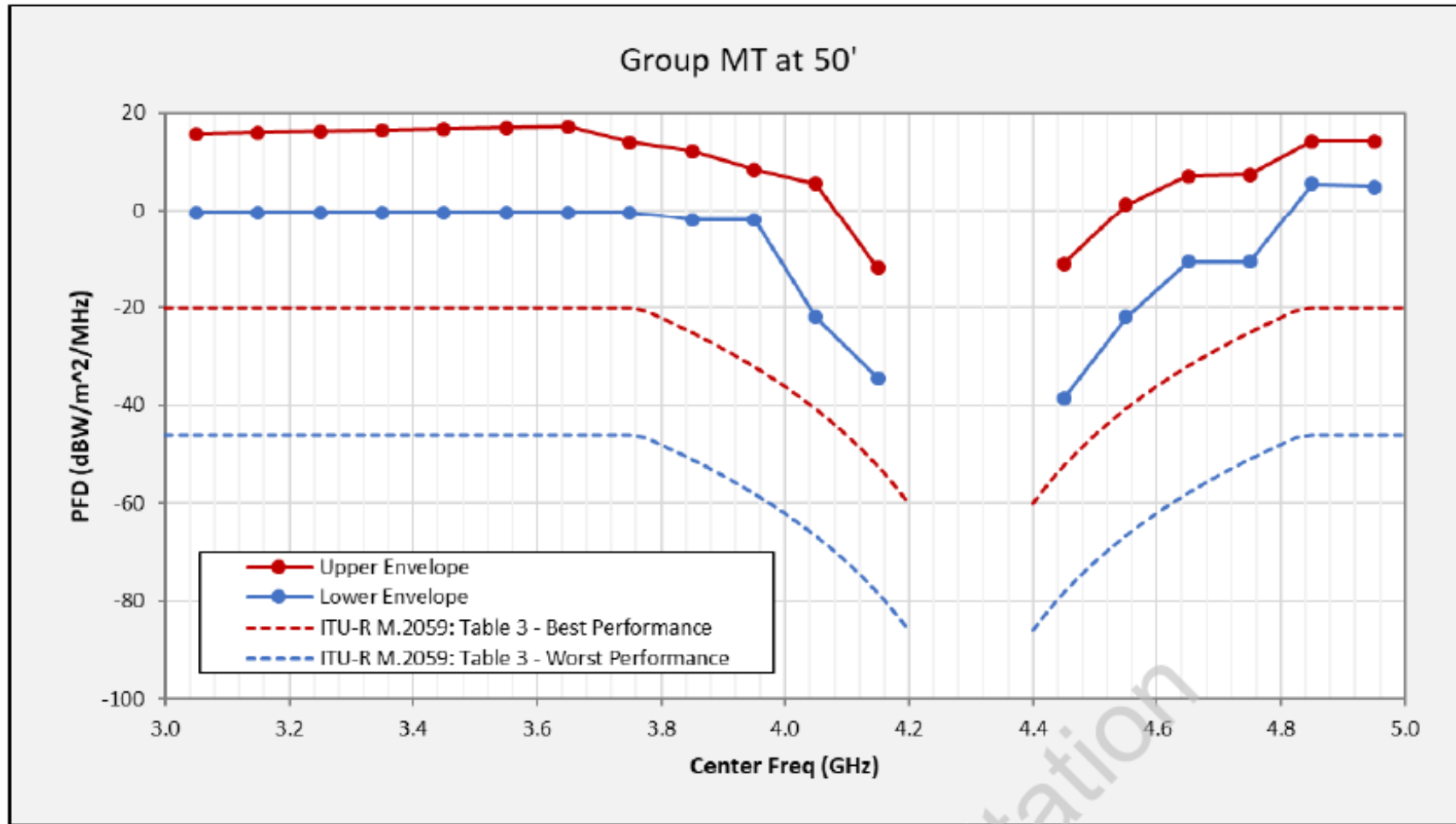


Figure 4-1: BAPFD Envelope for All Group MT Models at 50', 100', 200' AGL



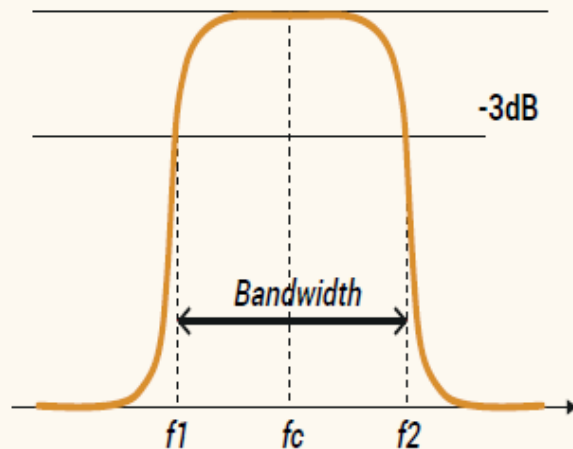
Radio spectrum: Safety-critical for aviation – but urgent action needs to be taken to avoid channel saturation & interference from other users such as 5G networks

ITU Radio Regulations (RR), Article 4.1:
States are to *“endeavour to limit the number of frequencies and the spectrum used to the minimum essential to provide in a satisfactory manner the necessary services. To that end they shall endeavour to apply the latest technical advances as soon as possible”* (our emphasis)

Proposed Measures to Improve Spectrum Efficiency

1. Maximise adjacent band filtering

Benchmark state-of-the-art capabilities and drive implementation in aviation to the greatest extent possible.



2. Maintain standards in line with parts obsolescence cycles

If equipment is in service for longer than a full aircraft generation (20-30 years), ensure that standards are updated to state-of-the-art RF performance in line with parts replacement-which the industry has to do anyway. Create incentives to facilitate updating certifications to better RF performance.



3. Don't wait forever to leapfrog to newer CNS technology (let alone then fail to do even that)!

Any conservative industry will, due to safety standards and certification, lag behind the state-of-the-art. But this should not lead to blocking innovation. Accept that new system implementation takes so long that systems will not be state-of-the-art once implemented.



Sector Comparison

- ITU Representation of expert staff
- IMT about 2000 with suitable budgets for studies
- Aviation about 70 – 80
- On average, less than ½ FTE per Member State!

FIGURE 2: TELECOMS VS AVIATION SPECTRUM USAGE

	Telecoms	Aviation
Spectrum allocation		
Global spectrum allocation in 2019	2.38 GHz	2.15 GHz
Industry contribution to the economy		
Revenues 2019	€910BN	€714BN (612BN PAX + 102BN cargo)
Investment average for last 5 years	€152BN	€80BN
Contribution to GDP (absolute and % of total)	€3.6TN or 4.7%	€3.1TN or 4.1%
Direct jobs created	16M	11M
Tax revenues generated (excluding fees)	€433BN	€129BN
Estimated market size		
Users	5.2BN unique subscribers	4.5BN passengers transported
Approximate price of device	~ €200	€20-100,000
Approximate number of devices	5-10+BN	~ 1 M
Lifetime of devices	1-5 years	15-30 years
Environment		
Annual emissions (absolute and % of total)	220 MTCO ₂ or 0.4%	914 MTCO ₂ or 2.1%

Conclusions

- RADALT is one of aviation's most safety critical systems
- 200MHz required for its operation, no suitable alternative technology available
- **Maintaining future Low Visibility Operations remains at risk also in Europe**
- 5G Deployment IS POSSIBLE even around airports, as long as power levels are low enough, as demonstrated in several States
- Aviation needs to learn to work with Telecom and vice versa
- Operators will keep carrying the bill unless States step up engagement on aviation spectrum matters