



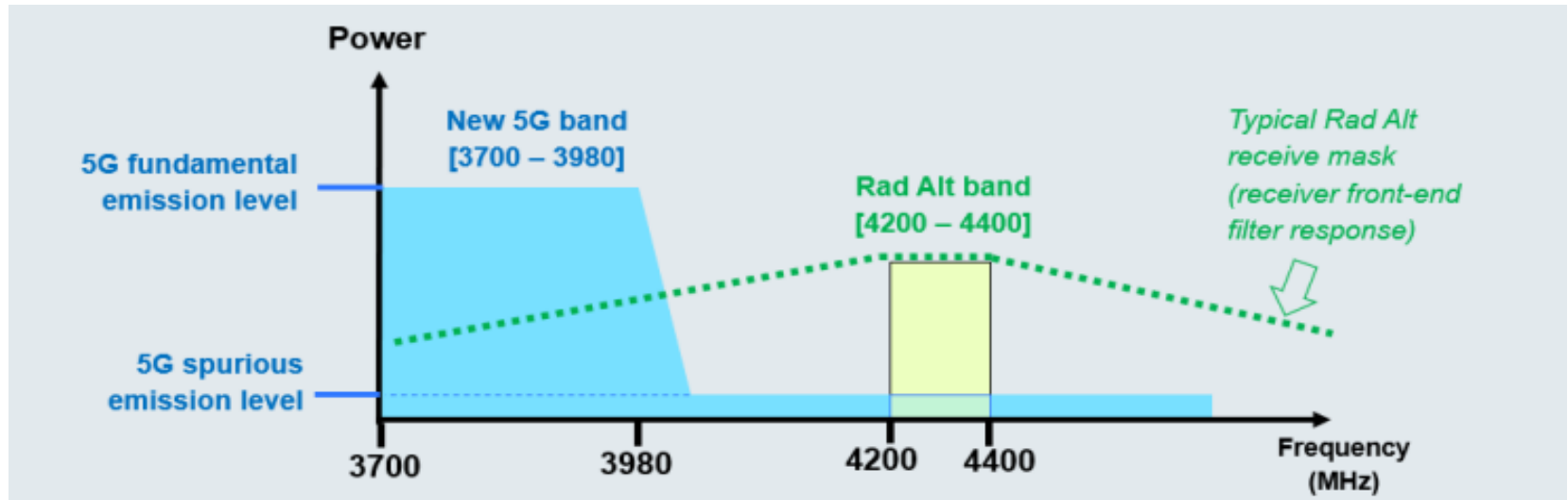
Radar Altimeter Spectrum Update

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FCC C-Band Spectrum Proceeding

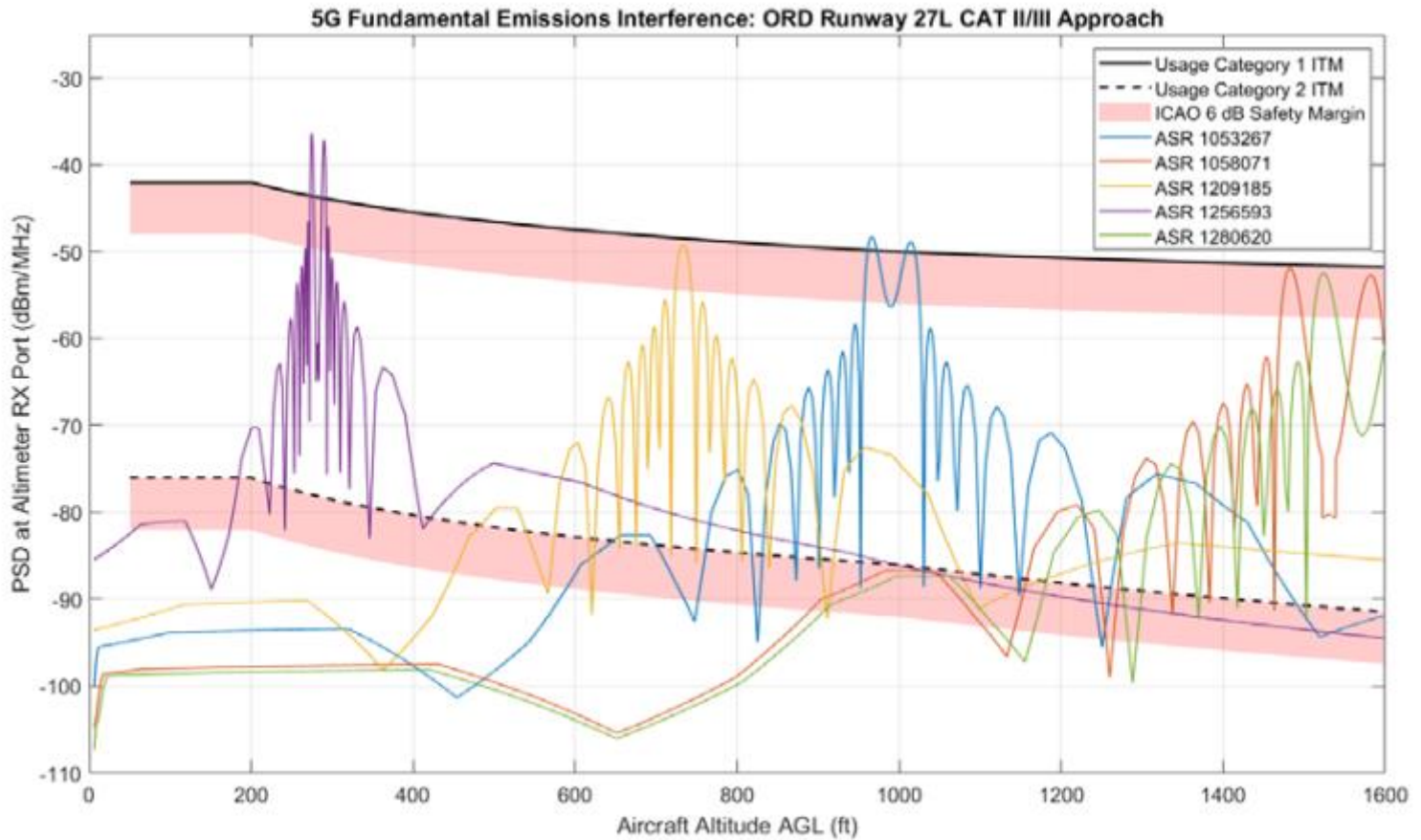
- 'C-band' in this context covers 3.7-4.2 GHz
 - Historically 500 MHz of fixed SATCOM
- US FCC has been considering C-band 5G since 2017
 - Part of national approach to releasing spectrum for commercial wireless
 - Significant sums of money at stake
- Radar altimeters operate in the adjacent 4.2 – 4.4 GHz band
 - Full altimeter performance data was not available, but indications that the systems were susceptible to high power adjacent band signals
 - ICAO initiated work in 2016 to investigate current altimeter performance
- Several other administrations also pushing for similar 5G proposals



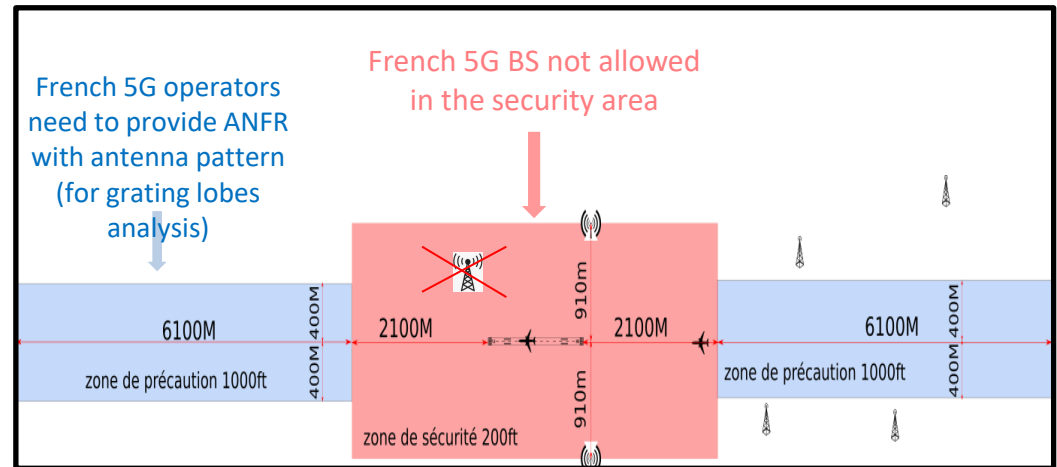
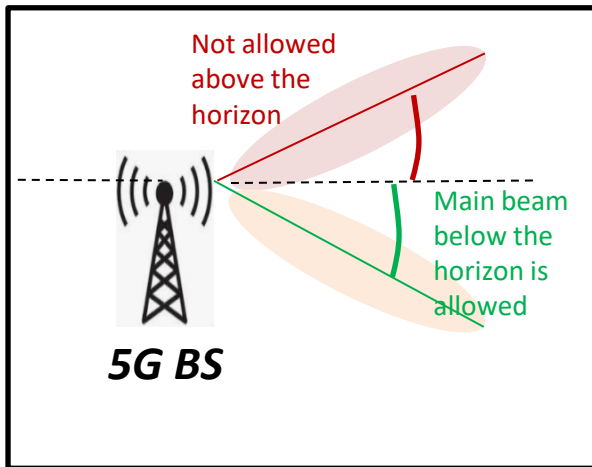
C-Band History (Short Version)

- FCC approved a final Report and Order late Feb/Early March for 280 MHz of 5G in C-band
 - Report did not ignore aviation/aerospace concerns, but concluded the evidence available at that time did not sufficiently identify a risk of harmful interference requiring special conditions for protection of aviation safety
 - Aiming for roll out of new 5G from 2022 onwards
- FCC did leave a crack in the door that an industry Multi-Stakeholder Group (MSG) can assess “the complex coexistence issues in the band and provide a forum for the industry to work cooperatively towards efficient technical solutions to these issues.”
 - Aviation/aerospace interests filed petition for reconsideration and advocated that MSG output should be basis for whether and what protections are necessary
- RTCA formed a multi-stakeholder group to fully assess impact to a range of tested radar altimeters from 5G in the C-band
 - Found potential fundamental and spurious interference from both cell towers and handsets across commercial fixed wing, regional/private aircraft and helicopters

Radar Altimeter Interference – ORD Scenario



- Aviation/aerospace has suggested several 5G mitigations that would provide some protection.
 - Protection area around runways and limitation of base station tower antenna power above the horizon



- Aviation/aerospace unable to take rapid technical mitigations to protect itself from high power 5G
 - RTCA has begun work on a new radar altimeter standard to update old MOPS, but will not be ready for several years
 - Filter options being investigated, but uncertain if feasible

- Mitigation proposals by aviation/aerospace facing significant opposition
 - Many national priorities wrapped up in the band
- Continuing to push on issue with relevant decision makers
 - Aviation/aerospace petition for reconsideration still before FCC
 - Continuing to educate FCC and other parts of USG on aviation/aerospace concerns
- Aviation regulators also assessing issue
 - FAA is assessing the RTCA report
 - EASA now looking at the issue with manufacturers

- Aviation on the backfoot with several spectrum issues affecting its systems
 - C-band and Ligado issues still ongoing post FCC decisions
 - Has a potential for lasting impact on aviation, both in current and future system development/implementation
- Increasing competition for spectrum from other industries will only increase number and magnitude of similar issues
 - Many regulators do not agree with aviation's approach to protect aviation systems
 - Many industries have significant resources to pursue spectrum acquisition and advocate for reduced protection
- Need for internal aviation debate about what level of system design/development must be invested to protect against future spectrum changes
 - Participation of aviation operators, manufacturers and regulators critical to keeping an informed process



Questions?