
Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of)
)
Expanding Access to Mobile Wireless Services) WT Docket No. 13-301
Onboard Aircraft)

To: The Commission

COMMENTS OF CTIA–THE WIRELESS ASSOCIATION®

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CTIA–The Wireless Association® (“CTIA”) submits the following comments in response to the *Notice* exploring the use of licensed commercial mobile spectrum bands for in-flight wireless connectivity.¹ The comments address the following:

- CTIA and its members stand ready to work with the FCC to explore the feasibility of providing the flying public with airborne access to their commercial mobile services, consistent with applicable FAA regulations and airline policies.
- The *Notice* relies on European studies to tentatively conclude that Airborne Access Systems can provide in-flight wireless connectivity using licensed commercial mobile spectrum across the United States without interference—but these studies did not analyze U.S. mobile spectrum bands or all of the air interfaces used across the U.S. In response to the *Notice*’s query, CTIA strongly believes the FCC must engage in further U.S.-specific analyses.
- Any such review must also ensure that Airborne Access Systems’ interference protection regimes account for the deployment of additional U.S. commercial mobile spectrum bands.
- Ultimately, the FCC may only authorize in-flight use of licensed commercial mobile spectrum if it concludes there is no risk of interference to ground-based networks and may only permit such airborne operations on a non-interference basis.

¹ *Expanding Access to Mobile Wireless Services Onboard Aircraft*, Notice of Proposed Rulemaking, 28 FCC Rcd 17132 (2013) (“*Notice*”).

I. CTIA AND ITS MEMBERS ARE COMMITTED TO WORKING WITH THE FCC TO EXPLORE COMMERCIAL MOBILE SERVICE ABOARD AIRBORNE AIRCRAFT

As a starting point, the *Notice* recognizes the growing use of wireless connectivity on planes, enabled in the United States by onboard Wi-Fi connectivity using unlicensed spectrum and an air-to-ground or satellite link.² CTIA has supported initiatives to improve in-flight broadband connectivity that enhance airline passengers' access to the benefits of mobile communications, most recently in the 2013 rulemaking to establish an air-ground transport service in the 14.0-14.5 GHz band.³ The current *Notice* proposes to allow in-flight access to commercial mobile services, across licensed commercial mobile spectrum bands, as a competitive alternative to today's Wi-Fi-based airborne services. CTIA stands ready to work with the Commission and other stakeholders on the proposal—with a particular focus on potential interference issues.

The FCC last considered the airborne use of cellular devices in a 2004 rulemaking.⁴ CTIA formed three working groups to explore the issues raised and to consider the potential for an industry-developed set of parameters for airborne use of commercial mobile spectrum. Significant interference concerns were raised at that time, and the Commission ultimately terminated the proceeding in 2007 due to a lack of record evidence regarding technical issues.⁵

Since then, many foreign governments have granted airborne use of commercial mobile spectrum bands. As discussed below, however, the developments abroad do not transfer

² See *id.* at 17133 ¶ 2, 17140-41 ¶¶ 16-18, 17144-45 ¶ 30.

³ See Comments of CTIA, GN Docket No. 13-114 (filed Aug. 26, 2013).

⁴ See *Amendment of the Commission's Rules to Facilitate the Use of Cellular Telephones and Other Wireless Devices Aboard Airborne Aircraft*, Notice of Proposed Rulemaking, 20 FCC Rcd 3753 (2005).

⁵ See *Amendment of the Commission's Rules to Facilitate the Use of Cellular Telephones and other Wireless Devices Aboard Airborne Aircraft*, Memorandum Opinion and Order, 22 FCC Rcd 7156 (WTB 2007).

seamlessly to the U.S. commercial mobile service environment, and the proposal requires further analysis to assess how use of commercial mobile spectrum aboard aircraft could affect licensed U.S. commercial mobile networks and other ground-based services. CTIA once again stands ready to work through the issues raised in the *Notice*, analyze additional studies that may be occurring outside those raised in the *Notice*, and assess the advancements that have occurred over the last decade.

II. AS A THRESHOLD MATTER, THE FCC MUST STUDY AND ADDRESS U.S.-SPECIFIC INTERFERENCE ISSUES

The *Notice* recognizes that the risk of interference to ground-based networks is real and must be addressed: “[T]he signal from an airborne handset with an unobstructed line of sight may remain sufficiently strong as the device attempts to access multiple terrestrial sites, causing harmful interference or other undesirable effects to terrestrial systems.”⁶ The *Notice*’s review of the technical studies by the EU’s European Conference of Postal and Telecommunications Administrations (“CEPT”) is a reasonable start, but more must be done. The FCC needs to examine and resolve key questions unique to the spectrum allocations in the U.S. market in order to conclude that airborne operations on licensed commercial mobile spectrum can occur on a non-interfering basis.

A. Further Examination is Required, as the European Studies Cited in the *Notice* Do Not Analyze U.S. Spectrum Bands or All of the Air Interfaces Deployed by U.S. Carriers

The *Notice* “use[d] the technical analyses and conclusions released by CEPT . . . as a baseline for [its] technical inquiries” and its tentative conclusion that Airborne Access Systems can operate without causing harmful interference to terrestrial networks.⁷ However, as the *Notice* points out, the CEPT studies on which it relies do not consider the U.S. commercial

⁶ *Notice*, 28 FCC Rcd at 17144 ¶ 29.

⁷ *Id.* at 17146 ¶ 33 (citation omitted); *id.* at 17146 ¶ 32.

mobile spectrum environment, which differs from the European environment in several important ways.⁸ These differences limit how much the Commission can extrapolate from the European experience:

- The CEPT reports cited in the *Notice* are limited to airborne device and Airborne Access System operations in only three European-licensed spectrum bands—1800, 2100, and 2600 MHz—none of which align with commercial mobile service in the United States.⁹ Moreover, as discussed below, airborne operations in Europe were limited to two bands at first, as interference concerns prevented operations in the 2600 MHz band.
- The CEPT reports relied upon in the *Notice* did not analyze interference risks from CDMA airborne operations into any terrestrial networks—but CDMA is widely deployed on multiple bands in the United States.¹⁰
- The CEPT reports invoked in the *Notice* consider interference to terrestrial networks from the Airborne Access System’s Network Control Unit (“NCU”), which raises the noise level on licensed commercial mobile bands to prevent airborne mobile interaction with ground-based networks, but CEPT only studied the possible impact to the European 450, 800 900, 1800, and 2100 MHz bands—none of which is used for commercial mobile service in the United States.¹¹
- The CEPT reports relied upon in the *Notice* are limited to in-flight transmissions using one or two airborne air interfaces in any given band—GSM and LTE at 1800 MHz and UMTS at 2100 MHz—while mobile providers in the United States

⁸ Electronic Communications Committee (“ECC”) within the European Conference of Postal and Telecommunications Administrations (“CEPT”), *Report from CEPT to the European Commission in Response to the EC Mandate on Mobile Communication Services on board aircraft (MCA)*, CEPT Report 16 (Mar. 30, 2007); ECC, *Report from CEPT to the European Commission in response to the Second Mandate to CEPT on mobile communication services on board aircraft (MCA)*, CEPT Report 48 (Mar. 8, 2013).

⁹ See CEPT Report 16 at 7 (Report 16 considered interference from operations only in the 1800 MHz band (1710-1785/1805-1880 MHz)); CEPT Report 48 at 12 (Report 48 considered interference from operations only in the 1800 MHz band, the 2100 MHz band (1920-1980/2110-2170 MHz), and the 2600 MHz band (2500-2570/2620-2690 MHz)).

¹⁰ CEPT’s only CDMA-related analysis pertained to NCU interference to terrestrial CDMA networks in the 450 MHz band, which is not used for commercial mobile CDMA operations in the United States. See CEPT Report 16 at 2-3; CEPT Report 48 at 9.

¹¹ See CEPT Report 16 at 2, 7, 9; see also CEPT Report 16 at 7 (interference from NCU considered in the 460-470 MHz, 921-960 MHz, 1805-1880 MHz, 2110-2170 MHz downlink bands); CEPT Report 48 at 13-14, 18-19 (interference from NCU considered in the 791-821 MHz and 2110-2170 MHz downlink bands).

use a wide variety of air interface technologies without governmental standardization, such that a single band is used for multiple air interfaces.¹²

- The cited CEPT reports' analyses of interference into terrestrial networks considered the impact of airborne operations on only one or two air interfaces in each terrestrial network, while mobile providers in the United States use many different air interfaces in any given commercial mobile band.¹³

Thus the CEPT studies cited in the *Notice*, standing alone, do not justify a finding that airborne operations on licensed commercial mobile bands would be non-interfering in the United States. If there are additional studies addressing spectrum bands and air interface technologies more relevant to the U.S. mobile marketplace, CTIA urges that they be introduced into the record for consideration and further study.

CTIA commends the Commission for asking important questions that consider how the European and U.S. circumstances may pose differing interference paradigms. For example, the *Notice* asks whether there are “any differences between the commercial mobile spectrum bands used in the EU and those used in the United States that would affect the relevant CEPT findings.”¹⁴ It also asks whether some air interface technologies used on airborne aircraft may present different likelihoods of causing harmful interference to terrestrial networks than others.¹⁵ Just as CEPT studied the potential interference consequences in the European context—analyzing individual European bands and the relevant air interface technologies—so too must the FCC for the U.S. commercial mobile wireless environment.

In the United States, there are more licensed commercial mobile bands (SMR spectrum, cellular, 700 MHz, PCS, AWS-1, WCS, AWS-4, BRS/EBS, as well as soon-to-be available bands including AWS-3 and the 600 MHz spectrum). Each band needs to be studied for the

¹² See CEPT Report 16 at 6-7; CEPT Report 48 at 8.

¹³ See CEPT Report 16 at 7; CEPT Report 48 at 9.

¹⁴ *Notice*, 28 FCC Rcd at 17146 ¶ 33.

¹⁵ *Id.* at 17147 ¶ 36.

impact of airborne operations on ground-based networks. Further, as policymakers explore innovative sharing regimes, some bands may have multiple uses including incumbent government operations, and interference to those systems would also need to be analyzed. Interference considerations may extend not only to co-channel operations but to adjacent band operations as well. CEPT Report 48 addressed this issue when it declined to permit immediate access to the 2600 MHz band aboard aircraft because “compatibility with adjacent band radar services could not be ensured . . . without further analysis at this present time.”¹⁶ Adjacent band operations differ in the United States, of course. The FCC also must determine whether Airborne Access Systems licensed for foreign operation would continue to operate on foreign-authorized commercial spectrum bands while over the United States and if so, what other interference analyses would be required.

Further, additional work is required to consider all of the cross air interface scenarios that would occur in the United States but were not considered by CEPT studies in the *Notice*—in each band, there should be consideration of interference *by* each air interface *into* each air interface (LTE into CDMA, LTE into CDMA, LTE into GSM, LTE into UMTS, UMTS into CDMA, *etc.*). The Commission will need to consider many granular questions, such as whether an elevated noise floor will impact CDMA, UMTS, and LTE ground-based networks operating on U.S. frequency bands, which include lower frequency bands like 700 MHz and the soon-to-be auctioned 600 MHz band. To raise just one more example, while current Airborne Access Systems’ picocells rely on GSM’s static power control mechanism to reduce mobile devices’ power levels to their lowest transmit levels, the FCC must consider how picocells can manage to

¹⁶ See CEPT Report 48 at 20; *accord id.* at 2, 22. The study found that the emissions from 2600 MHz equipment aboard an aircraft at a victim Radar type 4 (meteorological radar) receiver caused an increase in the noise floor that exceeded the required protection level for that type of radar (0.41 dB). *Id.* at 20.

similarly limit power levels on spread spectrum devices (CDMA, UMTS and LTE) that use fast adaptive power control.

Until further study and testing has been performed for these different parameters, it is not possible to make interference assessments in the U.S. market.

B. Airborne Access Systems Need to Identify a Migration Strategy to Account for New Commercial Mobile Bands as They are Introduced into the U.S. Marketplace

As the United States introduces new commercial mobile bands—and several bands are on the horizon—the FCC must consider whether Airborne Access Systems would be equipped to prevent interference scenarios involving these bands. The *Notice* points out that, for Airborne Access Systems to thwart airborne devices from seeking to communicate with ground-based networks, “the noise floor likely would have to be raised onboard aircraft *in all commercial mobile spectrum bands.*”¹⁷ That is a challenging requirement as U.S. commercial mobile spectrum is evolving—all the more so as FCC policy should encourage any airborne access regime to include a wide variety of spectrum bands to ensure that subscribers are not left behind.

Airline passengers may turn on devices that will search for preferred home networks on newly authorized spectrum bands unaccounted for (and thus not masked and controlled) by in-service Airborne Access Systems. An Airborne Access System relies on an NCU to mask the downlink portion of licensed commercial mobile bands by raising the noise level, thus preventing a mobile device from interacting with terrestrial base stations.¹⁸ As the Commission notes, the NCU would need to raise the noise floor “onboard aboard aircraft in all commercial

¹⁷ *Notice*, 28 FCC Rcd at 17145 ¶ 30 (emphasis added).

¹⁸ *See id.* at 17144-45 ¶ 30; CEPT Report 16 at 9.

mobile bands” to prevent devices from attempting to communicate with a terrestrial base station.¹⁹

If the NCU does not include a particular band, it cannot mask that band off. Thus, a future passenger might turn on a device that uses H Block or AWS-4 spectrum, for example, and if that frequency band is unaccounted for in the Airborne Access System’s NCU, the device may seek to interact with terrestrial base stations on one of those frequencies. Not only will these passengers suffer a service quality issue—the inability to access their broadband service provider reliably—but multiple terrestrial base stations may suffer interference as the Airborne Access System provides no masking and airborne devices transmit in an uncontrolled manner. A clear, effective migration strategy, therefore, is necessary to ensure that all commercial mobile spectrum bands will be captured and controlled.

Ensuring that all bands are represented in the Airborne Access Systems as soon as new bands become used presents a significant challenge. Every Airborne Access System will need to be updated within a relatively narrow time period, which will require not only speedy re-engineering, but also testing, deployment, and recertification of the aircraft in which they are deployed.

III. ANY AIRBORNE SERVICE ON COMMERCIAL MOBILE BANDS MAY ONLY OCCUR ON A NON-INTERFERENCE BASIS TO TERRESTRIAL NETWORKS

As a factual predicate, the Commission may only move forward on this proposal if it concludes, based on a full record, that the introduction of airborne service on licensed commercial mobile spectrum will not result in interference to terrestrial commercial mobile networks. Even with such findings, however, the Commission may only permit airborne operations in the licensed commercial mobile spectrum bands on a non-interference basis, with a

¹⁹ Notice, 28 FCC Rcd at 17145 ¶ 30.

speedy and reliable method for detecting, identifying, and mitigating any interference that may occur. At this juncture, the FCC should focus on the interference issues and refrain from precluding any form of future business model for now.

Finally, CTIA recognizes the sensitivity regarding voice services onboard aircraft. The *Notice* states that the “proposal is focused on data services,” and asserts that etiquette issues “would be at the discretion of individual airlines, within the context of any rules or guidelines established by the FAA or DoT.”²⁰ As such, CTIA’s comments address only the technical and operational issues raised in the *Notice*.

IV. CONCLUSION

For the foregoing reasons, the Commission should compile a full record to consider whether in-flight wireless connectivity using licensed commercial mobile bands will interfere with ground-based networks. CTIA looks forward to working with the Commission and other stakeholders.

²⁰ *Id.* at 17135 ¶ 4 (citation omitted).

Respectfully submitted,

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