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Heather J. Panko

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CELLULAR PHONES ON AIRPLANES — AN IDEA NOT READY FOR TAKE-OFF

HEATHER J. PANKO

I. INTRODUCTION

PICTURE THIS: it's Friday night and you have just finished a long week of intense settlement negotiations for a client. You have been burning the midnight oil for the past four nights straight. You and the opposing party have finally come to an agreement. Armed with the settlement details in your briefcase, you board your flight and settle into your seat. You are looking forward to the solitude of the three-hour flight home. You view the time in the air as a quiet three-hour getaway from the hustle and bustle of life on the ground. Work, friends, and even family cannot bother you up here; your cellular phone and Blackberry are turned off because federal regulations do not allow you to use them once the aircraft has left the ground. You settle into your chair, close your eyes, and try to relax. Then, out of nowhere comes a loud, obnoxious noise. You perk up in your seat, trying to identify the source of the disturbance. No, it is not the infant you saw boarding the plane in front of you; thankfully, she is sound asleep in her mother's arms two rows up. Then what could this dreadful noise be? It is a passenger about three rows back yelling at his girlfriend. No, she is not in the seat next to him. The girlfriend is not even on the plane. Then you realize the passenger is talking on his cellular phone, and like most cellular users, he is talking as loudly as possible. A flight attendant is alerted, and she rushes down the aisle to inform the gentleman that he is violating airline policy and federal law. She instructs the passenger to terminate his call immediately. Thankfully, the passenger does not raise a fuss and hangs up his phone and powers it off.

While this scenario is fictional, there is no doubt many individuals attempt to use their cellular phones while they are traveling through the skies. Evidence shows this unauthorized use of

cellular phones and similar devices is on the rise.¹ Today, the Federal Aviation Administration ("FAA") and the Federal Communications Commission ("FCC") regulate the use of cellular phones and other portable electronic devices on board aircraft. Most travelers are familiar with the safety announcements given by flight attendants while the plane taxis away from the terminal and readies for take-off. Travelers are used to being told to make sure their seat-backs and tray tables are in their upright positions, to secure all carry-on luggage in the overhead bins or under the seat in front of them, to fasten their seatbelts, and to turn off all portable electronic devices ("PEDs"),² such as laptop computers, PDAs, CD players, and cellular phones. Following this command is the familiar reminder that federal regulations prohibit passengers from using their cellular phones during all phases of the flight. Once the plane takes off and reaches a specified altitude, the flight attendants notify passengers that they can begin using approved electronic devices and remind passengers not to use their cellular phones. However, in the near future, these safety warnings may change, and the next time our hypothetical lawyer flies, he may have to put up with more than one passenger yelling into his cellular phone. In December 2004, the FCC "voted to examine whether to modify its rule prohibiting the use of cellular telephones on airborne aircraft."³ Passengers should not get too excited yet. While the FCC expected to begin taking comments in January 2005,⁴ the FAA also

¹ Elliot Neal Hester, *Air Rage – The Real Reason You can't use Cell Phones on Airplanes*, S.F. CHRONICLE, July 22, 2001, at T4.

² PED refers to any "transportable devices for audio, video, communication, information and entertainment, including but not limited to notebook (laptop) computers, personal digital assistants ("PDAs"), and mobile phones." CONSUMER ELECTRONICS ASS'N ("CEA"), RECOMMENDED PRACTICE: STATUS INDICATOR FOR AND CONTROL OF TRANSMITTERS IN PORTABLE ELECTRONIC DEVICES (PEDs) 9 (Version 1.0 2004), available at http://www.ce.org/publications/books_references/Recommended_Practice_for_PEDs-V_1.0_October_2004.pdf.

³ Press Release, FCC, Instructions on Submitting Public Comments in the FCC's Review of the Use of Cellular Telephones on Airborne Aircraft (Dec. 23, 2004), available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-255742A1.pdf.

⁴ At the time this article was written, the FCC has not begun to accept comments on the proposed rulemaking. The official Notice of Proposed Rulemaking was released by the Commission on February 15, 2005 and the official comment period ended 30 days after the publication the publication of the Commission's Notice in the Federal Register. See Notice of Proposed Rule Making In the Matter of Amendment of the Commission's Rules to Facilitate Use of Cellular Telephones and other Wireless Devices Aboard Airborne Aircraft, 20 F.C.C.R. 3753 (Feb. 15, 2005). However, the comment period has been extended at least twice

has a say on the issue, and passengers will not be permitted to use their phones on board an airborne aircraft until both agencies give the green light.⁵

This comment examines both the FAA and the FCC bans on the use of cellular phones on an airborne aircraft and attempts to determine whether the bans are still justified in light of current technology and research. Part II examines the FCC ban, discussing the history of the ban and the technological developments that prompted the FCC to review its regulations. Part III considers the FAA ban and attempts to determine whether the current policy is valid in light of today's technology. Following this examination, Part IV discusses the social issues surrounding the use of cellular phones in flight and passenger concerns about the lifting of the ban. Finally, Part V predicts what action the FCC and the FAA will take regarding their respective bans and concludes with an analysis of whether the predicted course of action is appropriate at this time.

II. THE FCC'S BAN ON CELLULAR PHONES IN AIRBORNE AIRCRAFT

A. THE FCC

The FCC is the regulatory agency charged with "ensur[ing] that the American people have available, at reasonable costs and without discrimination, rapid, efficient, [n]ation- and world-wide communication services; whether by radio, televisions, wire, satellite, or cable."⁶ "The FCC was established by the Communications Act of 1934,"⁷ and is divided into six bureaus, with

and as of the date this article was sent to print, it appears that the Commission is still accepting comments. See Order In the Matter of Amendment of the Commission's Rules to Facilitate the Use of Cellular Telephones and Other Wireless Devices Aboard Airborne Aircraft, 20 F.C.C.R. 7551 (Apr. 6, 2005); Order In the Matter of Amendment to the Commission's Rules to Facilitate the Use of Cellular Telephones and Other Wireless Devices Aboard Airborne Aircraft, 2005 WL 1489574 (June 23, 2005); *see also* ECFS Express, <http://svartifoss2.fcc.gov/ecfs/Upload> (last visited Dec. 19, 2005).

⁵ *Id.*; Marguerite Reardon & Ben Charny, *Feds Move on Wireless Web, Cell Phones in Flight*, TECH NEWS ON ZDNET (Dec. 15, 2004), http://news.zdnet.com/2100-1035_22-5491802.html; Associated Press, *FCC Vote may put Wireless in Jetliners* (Dec. 16, 2004), *available at* WL12/15/04 ASSOCPR 23:15:41.

⁶ The FCC History Project, para. 4, <http://www.fcc.gov/omd/history/> (last visited Jan. 15, 2005).

⁷ FEDERAL COMMUNICATIONS COMMISSION, ABOUT THE FCC: A CONSUMER GUIDE TO OUR ORGANIZATION, FUNCTIONS AND PROCEDURES 3, *available at* <http://hraunfoss.fcc.gov/edocs-public/attachmatch/DOC-229127A1.pdf> (last visited

the Wireless Telecommunications Bureau ("WTB") in charge of regulating the use of "cellular and PCS phones, pagers, and two-way radios."⁸ In addition, the WTB regulates "the use of the radio spectrum to" ensure the communication needs of various entities (businesses, state and local governments, aircraft operators, for example) are fulfilled.⁹

Every two years, the FCC is statutorily required to conduct a review of its regulations "that apply to the operations or activities of any provider of telecommunications service."¹⁰ The purpose of this review is to determine "whether any such regulation is no longer necessary *in the public interest* as the result of *meaningful economic competition* between providers of such service."¹¹ If the FCC determines that a regulation is "no longer necessary in the public interest" then the FCC must repeal or modify the regulation.¹² Included in this review is an examination of the regulation of cellular services, which is commonly referred to as the Part 22 review.¹³ The FCC's last Part 22 review initiated the proposed relaxation of the ban on the use of cellular phones aboard airborne aircraft.¹⁴

B. THE FCC BAN ON THE USE OF CELLULAR PHONES ON AIRBORNE AIRCRAFT

The current FCC ban on the use of cellular phones on an airborne aircraft is found at 47 C.F.R. § 22.925, which provides that "[c]ellular telephones installed in or carried aboard airplanes, balloons or any other type of aircraft must not be operated while such aircraft are airborne (not touching the ground). When any aircraft leaves the ground, all cellular telephones on board that aircraft must be turned off."¹⁵ The regulation also

Jan. 15, 2005) [hereinafter About FCC]; *see also* Communications Act of 1934, 47 U.S.C. § 151 (2004).

⁸ ABOUT FCC, *supra* note 7, at 3, 5.

⁹ *Id.*

¹⁰ Communications Act of 1934, 47 U.S.C. § 161 (a)(1) (2004).

¹¹ *Id.* § 161(a)(2) (emphasis added).

¹² *Id.* § 161(b).

¹³ FCC, About Cellular: Part 22 Biennial Review, <http://wireless.fcc.gov/services/cellular/about/part22.html> (last updated Oct. 23, 2002) [hereinafter About Cellular].

¹⁴ Notice of Proposed Rule Making In the Matter of Amendment of Part 22 of the Commission's Rules to Benefit the Consumers of Air-Ground Telecommunications Services Biennial Regulatory Review-Amendment of Parts 1, 22, and 90 of the Commission's Rules, 18 F.C.C.R. 8380 (Apr. 28, 2003) [hereinafter NPRM 1].

¹⁵ 47 C.F.R. § 22.925 (2004).

requires the airline to post a notice stating: "the use of cellular telephones while this aircraft is airborne is prohibited by FCC rules, and the violation of this rule could result in suspension of service and/or a fine," next to any cellular phone installed in the aircraft.¹⁶ The ban was instituted by the FCC in 1991, in response to concerns that the use of a cellular phone while airborne would likely cause interference with the ground-cellular network "because an airborne unit [would] have a transmitting range much greater than the land-based unit for which cellular systems are engineered."¹⁷

C. DOES THE USE OF CELLULAR PHONES ABOARD AN AIRBORNE AIRCRAFT DISRUPT THE GROUND CELLULAR NETWORK?

When the FCC instituted its ban in 1991, it had reasonable concern that the use of cellular phones aboard an in-flight aircraft would disrupt the proper operation of the ground-cellular network. Cellular phones work by connecting to nearby cell towers (or base stations), which connect to the local land-based telephone network.¹⁸ The connections work on a line-of-sight basis, which limits the number of cell towers with which a person on the ground can connect to at one time.¹⁹ When a cellular phone user is moving, she may move out of the range of one cell tower and into the range of another. To keep her call from dropping, the cellular network tracks the user's movement, and the original tower will transfer the call to the next cell tower.²⁰ This transferring of calls between towers is referred to as a "hand off" and repeats as many times as necessary until the user ends her call.²¹

¹⁶ *Id.*

¹⁷ NPRM 1, *supra* note 14, at 8386; David Hunter, *Cellular Phones & Aircraft, Cellular Business*, § 12, July 1991 at S12 (quoting FCC, Public Notice, Report No. CL-142 (Oct. 11, 1984)).

¹⁸ Privateline.com, *WiW Cellular Telephone Basics: Why Can't I Use My Cellular Phone on an Airliner?* paras. 2 – 4, <http://www.privateline.com/Cellbasics/cellphonesairlines.html> (last visited Jan. 15, 2005) [hereinafter Cellular Basics 1]; *How Does a Cell Phone Work?*, para. 1, at <http://www.ieee-virtual-museum.org/collection/tech.php?id=2345893&lid=1> (last visited January 15, 2005); Tom Farley & Mark van der Hoek, *Cellular Telephone Basics: AMPS and Beyond*, <http://www.privateline.com/Cellbasics/Cellbasics.html> (last visited Jan. 14, 2005) [hereinafter Cellular Basics 2].

¹⁹ Cellular Basics 1, *supra* note 18, paras. 2-4.

²⁰ *How Does a Cell Phone Work?*, *supra* note 18, para. 5.

²¹ *Id.*

The problem with cellular calls made from an aircraft flying 30,000 feet above the ground is two-fold. First, the cellular phone is being used at a height where it can access any number of cell towers on the ground simultaneously, which can clog the network and interfere with calls from customers on the ground.²² Second, the cellular network was not designed to handle transfers between towers as rapidly as would be required by a passenger on an airplane traveling anywhere between 500- and 600-miles per hour.²³

D. RECENT DEVELOPMENTS THAT MAY SOLVE THE FCC'S CONCERNS

The cellular network and cellular phone design capabilities have come a long way since the FCC instituted its ban. Cell phones and cell towers are smaller, and coverage areas are broader than they were 14 years ago. Consumer demand has also increased drastically. Whereas ten years ago everyone assumed you were someone important if you carried a cellular phone, today almost every consumer carries a cell phone and feels lost if she leaves it at home.

Over the last few years, a number of companies have dedicated an enormous amount of time and effort to develop systems that would allow airline passengers to surf the Internet, check e-mail, send text-messages, and talk on their cellular phones while flying from one city to the next. The Internet providers won the race, and on December 15, 2004, the FCC announced it will auction off new licenses in the "4 MHz of spectrum in the 800 MHz band currently dedicated to commercial air-ground service."²⁴ This move will allow the use of high-speed wireless Internet by airline passengers.²⁵

²² Cellular Basics 1, *supra* note 18, para. 4; Rick Hampson, *Cell Phones in the Air: Convenience or Curse?*, (Dec. 16, 2004), para. 16, available at http://www.usatoday.com/travel/news/2004-12-16-cells-planes_x.htm; Keith L. Alexander, *Fliers Fear Cellular Blab, Hot-Air Planes*, WASHINGTON POST, Dec. 14, 2004, at E01.

²³ Cellular Basics 1, *supra* note 18, para. 2; Elisa Batista, *If We Can Fly, Why Can't We Talk?*, para. 43-44 (Feb. 15, 2001), available at <http://www.wired.com/news/culture/0,1284,41177,00.html>.

²⁴ Press Release, FCC, FCC Paves the Way for New Broadband Services in the Air (Dec. 15, 2004), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-255345A1.pdf [hereinafter Broadband Release].

²⁵ The move will also open up competition in this area. *Id.* Presently, Verizon Airfone is the only licensed operator in this spectrum and is the only U.S. company providing services on domestic flights. *Id.* Connexion-by-Boeing also provides Internet access to airline passengers but is currently only used by foreign

The development of cellular phones is not far behind. Several companies have developed technologies capable of controlling cellular phones and keeping the signals from in-flight phones from overloading the ground network.²⁶ Currently, two approaches are competing to become the industry standard. The first method, developed by Qualcomm (a leading wireless communications company), routes airborne cellular calls through a base station, called a pico-cell, located on the airplane to a SATCOM system also located on the aircraft.²⁷ The SATCOM system connects to the GlobalStar satellite system, and the call is routed over the satellite network to an Earth-based station that distributes the call to the land-based cellular network.²⁸ Currently, Qualcomm's system only works with CDMA-enabled phones, which means foreign phones using the Global System for Mobile Communicators ("GSM") protocol cannot connect to Qualcomm's systems.²⁹ However, both GlobalStar and Qualcomm say the system could be adapted to work with GSM phones.³⁰

Two international teams have developed similar systems for GSM-enabled phones.³¹ These systems, developed by SITA Inc. and ARINC Inc., take partial control of the cellular phone, instructing "the phone to communicate only with an onboard base station."³² This prevents the phone from trying to access too many ground stations at once.³³ In addition, these systems

airlines because the system has been too expensive for cash-strapped domestic airlines to install. Associated Press, *supra* note 5, at para. 5-6.

²⁶ James Poll, *The Future of Cell Phones on Airliners*, <http://www.privateline.com/Cellbasics/cellphoneairlinefuture.html> (last visited Jan. 15, 2005).

²⁷ Steve Lott, *AMR Tests In-Cabin Use of Cell Phones; Services Still Years Away*, AVIATION WEEK'S AVIATION DAILY (July 16, 2004), at http://www.aviationnow.com/avnow/news/channel_aviationdaily_story.jsp?id=news/cell07164.xml; David Brinn, *Israeli-Developed Airplane Cell Phone Technology Takes Flight*, ISRAEL21C (Dec. 5, 2004), <http://www.positiontoknow.com/2-11/html/cellphonespossible2003.htm>.

²⁸ Lott, *supra* note 27, para. 6.

²⁹ George Marsh, *The Race to Allow Airborne Cell Phone Use*, AVIONICS MAGAZINE (Oct. 2004), available at http://www.aviationtoday.com/cgi/av/show_mag.cgi?pub=av&mon=1004&file=racetoallow.htm. CDMA and GSM are cellular phone operating protocols. While CDMA is currently the prevalent technology in the United States, several cellular companies are introducing GSM phones into the United States market, making it necessary for any airborne system to be compatible with both standards.

³⁰ *Id.*

³¹ *Id.*

³² *Id.*

³³ *Id.*

provide airline personnel the ability to control access to the onboard network.³⁴ This control includes the ability to shut down the network while flying over countries “where airborne cellular use still is not permitted,” and the ability to “pre-empt the [SATCOM] system in the event of an aircraft operational emergency.”³⁵

In 2004, both foreign and domestic companies conducted test-flights of the pico-cell based systems. In July 2004, after receiving a waiver from the FCC and the FAA, Qualcomm teamed with American Airlines to conduct a test-flight over Texas.³⁶ The flight from Dallas to El Paso included placing calls from airborne cellular phones and receiving calls from the ground.³⁷ During the ninety-minute flight, the only complaint was that callers experienced a short delay due to the routing of the calls through the satellite network.³⁸ Airbus conducted a similar flight in September over Toulouse, France.³⁹

The second method of providing cellular phone services to airline passengers was developed by AirCell Inc. AirCell has been providing cellular-styled services in private jets for a number of years under an FCC waiver.⁴⁰ This system is similar to the Qualcomm system and its international counter-parts, but it requires the use of AirCell-manufactured and installed cordless handsets onboard the aircraft.⁴¹ Thus, it is not a true cellular service. The other key difference between AirCell’s system and the more common pico-cell system is that AirCell does not route the calls through the ground-based cellular network.⁴² Instead, AirCell’s system links with an Iridium satellite and routes the

³⁴ *Id.*

³⁵ *Id.*

³⁶ Lott, *supra* note 27, para. 4-8.

³⁷ *Id.*; David Koenig, *Qualcomm Tests Cell Phones Aboard Airliner*, CNEWS (July 16, 2004), at <http://www.eweek.com/article210,1895,1624543>, David Brinn, *supra* note 27, para. 3-4.

³⁸ Lott, *supra* note 27, para. 7; Koenig, *supra* note 37, para. 7.

³⁹ John Cook & Paul Nyhan, *Add Cell Phones to Trials of Flight*, SEATTLE POST-INTELLIGENCER (Sept. 21, 2004), available at http://seattlepi.nwsourc.com/business/191723_mobile21.html.

⁴⁰ James W. Ramsey, *Wireless Undeterred*, AVIONICS MAGAZINE (Feb. 2004), available at http://www.aviationtoday.com/cgi/av/show_mag.cgi?pub=av&mon=0204&file=0204wirelss.htm

⁴¹ *Id.*

⁴² *Id.*

calls back down to AirCell's own private cellular network, which covers the continental United States.⁴³

In sum, the cellular companies and airlines have banded together to develop new technologies to address the FCC's concerns regarding the disruption of the ground-based cellular network by airborne cellular calls. The industry has performed extensive work in this area, and it seems as though this concern is no longer valid. By placing a control unit aboard the aircraft and routing the phone calls through the satellite network, the cellular signals can be controlled and routed to a single base station designated by the cell carrier. This capability prevents flooding of the network and allows airline passengers to place calls using their cellular phones as if they were standing on the ground. Although it seems that recent technological developments have taken care of the FCC's concerns, the FCC ban is not the only obstacle to overcome. The FAA has safety concerns regarding the use of cellular phones and other personal electronic devices in flight, and these concerns demand consideration before passengers should be allowed to use their cellular phones in flight. The next section of this article addresses these safety concerns, including an examination of the concerns to determine whether they are fact or fiction.

III. THE FAA BAN AND SAFETY CONCERNS SURROUNDING THE USE OF CELLULAR PHONES ON AIRBORNE AIRCRAFT

A. THE FEDERAL AVIATION ADMINISTRATION

The introduction of jet airliners and a rash of midair collisions in the late 1950s prompted Congress to pass the Federal Aviation Act of 1958.⁴⁴ The Act created the Federal Aviation Agency, the FAA's predecessor, and charged the Agency with

⁴³ *Id.* Additionally, AirCell announced that in July 2003 it obtained a patent on new technology that would allow commercial airline passengers to use their personal cellular phones to link up to the AirCell network and make phone calls. *Id.* The company claims its system is much smaller and less complex than the popular pico-cell systems developed by its counterparts. Press Release, AirCell, Inc., AirCell Advances Toward Inflight Cell Phone Services (July 8, 2003), http://www.aircell.com/news/new_pr_detail.php?PR_ID=20 [hereinafter AirCell Press Release].

⁴⁴ A Brief History of the Federal Aviation Administration and Its Predecessor Agencies, para. 7, http://www.faa.gov/about/history/brief_history/ (last visited Jan. 16, 2005) [hereinafter FAA History]. Congress has amended the Federal Aviation Act of 1958 several times since its adoption. The current statute is located at 49 U.S.C. § 106 *et seq.* (2004).

regulation of air safety and the reduction of "aviation hazards."⁴⁵ The Act also made the Agency responsible for the "develop[ment] and [maintenance] of a common civil-military system of air navigation and air traffic control."⁴⁶ In 1966, Congress created the Department of Transportation (DOT) as a cabinet-level department, and the Federal Aviation Agency became part of this new organization.⁴⁷ With this elevated position, the Federal Aviation Agency was renamed the Federal Aviation Administration (FAA).⁴⁸ Over time, the FAA took on greater responsibility for safety in the skies and grew into the organization we know today.⁴⁹

Today, the FAA is responsible for numerous aspects of the "safety of civil aviation."⁵⁰ In the realm of safety regulation, "the FAA issues and enforces [safety] regulations."⁵¹ It provides minimum standards for "manufacturing, operating, and maintaining aircraft."⁵² This responsibility includes regulation of passengers by placing limitations on luggage, passenger behavior, and the use of cellular phones and other electronic devices onboard an aircraft.⁵³

The safety concerns surrounding the use of PEDs date back to the 1950s and 1960s, when several aircraft experienced interference with navigational and communications systems while a passenger operated a portable FM radio onboard the plane.⁵⁴ In response to concerns that FM radios could disrupt critical flight systems, the "FAA adopted the predecessor to its current rule in 1961"⁵⁵ Over time, the proliferation of CD-players, laptop computers, PDA's, hand-held games, and other PEDs created concern that these items would also interfere with the airplane's

⁴⁵ FAA History, *supra* note 44, para. 1.

⁴⁶ *Id.*

⁴⁷ *Id.* para. 9.

⁴⁸ *Id.*

⁴⁹ *Id.* paras. 10-17.

⁵⁰ FAA, About FAA: What We Do – Summary of Activities, <http://www.faa.gov/about/mission/activities/> (last visited Jan. 16, 2005).

⁵¹ *Id.*

⁵² *Id.*

⁵³ FAA, Safety Information, <http://www.paa.gov/passengers/fly.safe/information> (last visited Sept. 2, 2005); FAA, Prepare to Fly, http://www.faa.gov/passenger/prepare_fly/baggage/ (last visited Sept. 2, 2005).

⁵⁴ Hunter, *supra* note 17, at S12; *Portable Electronic Devices: Do They Really Pose a Safety Hazard on Aircraft?: Hearing before the House Aviation Subcommittee*, 107th Cong. (2000) (Statement of Robert H. Frenzel, Senior Vice President for Aviation Safety and Operations, Air Transport Association) [hereinafter *Testimony*].

⁵⁵ NPRM 1, *supra* note 14, at 8385.

navigational equipment.⁵⁶ Consequently, the FAA added a number of PEDs to its list of prohibited devices.⁵⁷ The current regulation prohibits “the operation of, any portable electronic device on any . . . U.S.-registered civil aircraft (1) operated by a holder of an air carrier certificate or an operating certificate; or (2) any other aircraft while it is operating under IFR [instrument flight rules].”⁵⁸ However, this prohibition “does not apply to (1) [p]ortable voice recorders; (2) [h]earing aids; (3) [h]eart pacemakers; (4) [e]lectric shavers; or (5) [a]ny other portable electronic device that the operator of the aircraft has determined will not cause interference with the navigation or communication system of the aircraft on which it is to be used.”⁵⁹ Thus, an aircraft operator cannot allow the use of a PED unless the PED falls under one of the listed exceptions, or he conducts his own study of the device and “determines that the operation of that device will not interfere with the communication or navigation system of the aircraft.”⁶⁰

As it does with many of its regulations, the FAA issued an Advisory Circular to provide airlines with guidance on how to comply with the regulations regarding PEDs.⁶¹ The Advisory Circular recommends “[p]rohibiting the operation of any PED’s during takeoff and landing phases of the flight.”⁶² Additionally, the Advisory Circular prohibits the operation of any PEDs classified as intentional transmitters during all phases of the flight.⁶³

⁵⁶ *Id.*; *Testimony*, *supra* note 54, at para. 4.

⁵⁷ NPRM 1, *supra* note 14, at 8385; FAA, U.S. Dep’t of Trans., AC 91.21-A, ADVISORY CIRCULAR, USE OF PORTABLE ELECTRONIC DEVICES ABOARD AIRCRAFT (Oct. 2000) [hereinafter ADVISORY CIRCULAR].

⁵⁸ Portable Electronic Devices, 14 C.F.R. § 91.21 (2004); *see also* 14 C.F.R. § 121.306 (2000); 14 C.F.R. § 125.204 (2000); 14 C.F.R. § 135.144 (2004).

⁵⁹ Portable Electronic Devices, 14 C.F.R. § 91.21 (2004); *see also* 14 C.F.R. § 121.306 (2000); 14 C.F.R. § 125.204 (2000); 14 C.F.R. § 135.144 (2004).

⁶⁰ ADVISORY CIRCULAR, *supra* note 57, para. 6 (a)(5).

⁶¹ *Id.* para. 1.

⁶² *Id.* para. 6 (a)(6).

⁶³ *Id.* para. 6(a)(7). The airline industry has created a distinction between devices that transmit electronic signals intentionally, and those that emit signals unintentionally. Bruce Donham, *Electromagnetic Interference from Passenger-Carried Portable Electronic Devices*, 10 AERO MAGAZINE 13, 13-19 (2000), available at http://www.boeing.com/commercial/aeromagazine/aero_10/interfere.html (last visited Jan. 14, 2005); Leaflet No. 29, GUIDANCE CONCERNING THE USE OF PORTABLE ELECTRONIC DEVICES ON BOARD AIRCRAFT (Dec. 2001), in CIVIL AVIATION AUTHORITY PAPER 2003/3, EFFECTS OF INTERFERENCE FROM CELLULAR TELEPHONES ON AIRCRAFT AVIONIC EQUIPMENT (2003) [hereinafter CAA Leaflet 29]. Non-intentionally transmitting PEDs are devices that “do not need to transmit electromagnetic signals outside the device to accomplish their functions.” Donham, *supra* note 63, at

Examples of intentionally transmitting devices ("T-PEDs") include "citizen band radios, cellular telephones, [and] remote control devices."⁶⁴ In addressing the use of cell phones, the Advisory Circular cites the FCC ban and states:

[T]he FAA supports this airborne restriction for reasons of potential interference to critical aircraft systems. Currently, the FAA does not prohibit the use of cellular telephones while on the ground if the operator has determined that they will not interfere with the navigation or communication system of the aircraft on which they are to be used.⁶⁵

The Circular goes on to add that "[a] cellular telephone will not be authorized for use while the aircraft is being taxied for departure after leaving the gate. The unit will be turned off and properly stowed"⁶⁶

While the Advisory Circular does not specifically prohibiting in-flight use of cellular phones during all phases of flight, the consensus in the industry is that the regulations and the Advisory Circular prohibit the use of cellular phones while in flight.⁶⁷ In fact, the FAA repeatedly states on its Web site that

19. Non-intentionally transmitting PEDs radiate some electromagnetic emissions but these emissions are much weaker than an intentionally transmitting PED and may or may not cause interference with aircraft systems. *Id.*; CAA Leaflet 29, *supra* note 63, at 1. Examples of non-intentionally transmitting PEDs are laptop computers with their wireless cards turned off, hand-held games, toys, and CD- or MP3 players. Donham, *supra* note 63, at 19; CAA Leaflet 29, *supra* note 63, at 1. Intentionally transmitting PEDS or T-PEDs, are devices that must emit external radio signals in order to achieve their designed functions. Bruce Donham, *supra* note 63, at 19; CAA Leaflet 29, *supra* note 63, at 1.

⁶⁴ ADVISORY CIRCULAR, *supra* note 57, at para. 6(a)(7). Some authorities classify cellular phones as a hybrid device, claiming that when the cellular phone is used for its non-voice related functions the phone is not transmitting signals and thus, is acting like a non-intentionally transmitting device. CAA Leaflet 29, *supra* note 63, at 2. This classification is flawed. Whenever a cellular phone is turned on, it is constantly scanning the cellular network searching for the best connection. This is an intentional transmission by the device for its primary function, placing calls. Thus, as long as a cellular phone is turned on it is always acting as a T-PED.

⁶⁵ ADVISORY CIRCULAR, *supra* note 57, at para. 6(b).

⁶⁶ *Id.* Today, many airlines allow passengers to use their cellular phones once the airplane has landed. This policy change is probably due to the wording in the Advisory Circular that says the FAA does not prohibit use of cellular phones on the ground as long as the air carrier has determined ground use will not interfere with navigation equipment. *Id.* Post-landing use is also different from using a cellular phone while the plane is preparing for take-off. The period when the plane taxis back to the gate is not considered a "critical phase" of flight.

⁶⁷ *Id.*; Associated Press, *supra* note 5, para. 15; Alexander, *supra* note 22, at para. 5-6.

the use of cellular phones aboard an airborne aircraft is prohibited by its regulations.⁶⁸ Thus, anyone wishing to use their cellular phone in flight will have to convince both the FCC and the FAA to change their regulations.

Because the FAA regulation is based on the fear that signals from cellular phones will interfere with the navigational and communication systems of the aircraft, it is necessary to develop an understanding of the science involved in the controversy and the evidence that supports or rejects the theory that PEDs interfere with aircraft systems. The rest of this section examines the science relating to interference from PED's and the evidence supporting and rejecting the claims that cellular phones are guilty of interfering with aircraft navigational systems.

B. THE SCIENCE BEHIND THE INTERFERENCE CONCERNS

All electronic devices emit radio frequency waves (RF waves). This interference is called electromagnetic interference ("EMI") and has long been a problem for electronic devices of all kinds.⁶⁹ The amount of radiation given off by a particular device depends on a number of factors, including, "the magnitude of the current involved, the size and shape of the wires conducting the current and the frequencies involved."⁷⁰ Most electronic devices have some shielding incorporated into their design to decrease the amount of unwanted RF emissions, but often it is not possible to completely contain all of the RF waves emitted by a given device.⁷¹

RF emissions from electronic devices concern the FAA and the airline industry because an airplane's navigational systems are ultra-sensitive to electromagnetic emissions.⁷² Although many of an aircraft's systems are heavily shielded to prevent interference, certain "navigation systems cannot be made totally immune to radiation."⁷³ The normal operation of these naviga-

⁶⁸ FAA, Passengers: Flying Safe, para. 2, http://www.faa.gov/passengers/flying_safe.cfm (last visited Jan. 17, 2005); Frequently Asked Questions – Is the FAA Considering Any Changes to Its Regulations on Using Cell Phones in Flight?, Dec. 16, 2004, at <http://faa.custhelp.com> [hereinafter Frequently Asked Questions].

⁶⁹ Albert Helfrick, *Avionics & Portable Electronics: Trouble in the Air?*, AVIONICS NEWS, (Sept. 1996), available at http://www.bluecoat.org/reports/Helfrick_96_PED.pdf.

⁷⁰ *Id.*

⁷¹ *Id.*

⁷² *Id.*

⁷³ *Id.*

tion systems requires them "to receive weak electromagnetic [signals] from ground-based radio" navigation systems.⁷⁴ Whereas these systems are designed to receive signals only on the frequency bands designated "for airborne navigation" systems, other electronic systems can intentionally or unintentionally emit signals on these frequencies.⁷⁵

The FCC and its foreign counterparts regulate the use of various frequency bands.⁷⁶ The FCC assigns different frequencies to different devices to ensure one device does not interfere with the operation of another device.⁷⁷ For example, an AM/FM radio operates on a frequency band distinct from the frequency band on which a cordless phone or television operate. This allows a person to listen to the radio, watch the television, and talk on a cordless phone all at once (if the person is capable of performing all these things at one time). The FCC has also set aside specific frequency bands for the operation of air navigation systems.⁷⁸

Given that the FCC has set aside specific frequency bands for air navigation systems, one may wonder how a PED may possibly interfere with the operation of systems operating on protected signals. The problem is PEDs do not adhere to the same stringent standards that airline equipment must meet.⁷⁹ PEDs are generally designed for operation on the ground and "are not manufactured or regulated with the intention of allowing operation in sensitive electromagnetic environments, such as that existing onboard an aircraft."⁸⁰ In addition, once a PED leaves the hands of the manufacturer, the device is "no longer subject to effective controls regarding [its] use or maintenance."⁸¹ Most PEDs are easily altered by the general consumer, and any altera-

⁷⁴ *Id.*

⁷⁵ *Id.*

⁷⁶ *Id.*; Carolyn Ritchie, *Potential Liability from Electromagnetic Interference with Aircraft Systems Caused by Passengers' On-Board Use of Portable Electronic Devices*, 61 J. AIR L. & COM. 683, 687 (1996) (citing Corey Sandler, *Terror at 66MHz; Is your Portable PC Actually a Deadly Airborne Weapon?*, PC COMPUTING 210 (Oct. 1993)).

⁷⁷ Ritchie, *supra* note 76, at 687.

⁷⁸ Helfrick, *supra* note 69.

⁷⁹ GUIDANCE ON ALLOWING TRANSMITTING PORTABLE ELECTRONIC DEVICES (T-PEDS) ON AIRCRAFT, RTCA DO-294, 7 (2004), available at <http://www.rtca.org> (last visited Jan. 12, 2005) [hereinafter RTCA Study].

⁸⁰ *Id.*

⁸¹ *Id.*

tion to a device can cause changes in the RF emissions from the device.⁸²

Many people argue that there is no real threat to aviation systems from the use of cellular phones and other devices. They base their skepticism on the fact that most PEDs emit RF waves on relatively low frequencies with small signal strength, while aviation equipment operates on higher frequency bands.⁸³ However, the concern is that while PEDs normally operate with relatively low RF radiation levels, under current regulations, the RF emissions from PEDs are “*allowed* to be high enough to interfere with aircraft avionics systems.”⁸⁴ Some interference may not be harmful, but a strong interfering signal can cause significant problems with a number of avionics systems.⁸⁵ For example, a strong signal from a computer has the potential to cause critical problems with the VOR system.⁸⁶ This type of interference could cause false readings, the appearance of error flags, and distortion of the audio transmissions of the navigation system.⁸⁷ In this type of situation, the flight crew would immediately recognize something was wrong and would take appropriate actions to correct the problem.⁸⁸ However, it is also possible for weaker signals to interfere with the avionics systems. Interference from weaker signals causes greater concern because this type of interference is more difficult to detect and may go unnoticed for a considerable amount of time.⁸⁹

Cellular phones pose a special problem to airlines because a cellular phone does not always transmit on the same frequency or at the same signal strength. The frequency and signal strength depends largely on the cellular network and things such as “distance of the cell phone from the nearest base station,” network traffic, and obstacles that may disrupt the line-of-site connection between the cellular phone and the base station.⁹⁰ A cellular user located on the ground is usually close to a

⁸² *Id.*

⁸³ *Id.* at 45; Sandler, *supra* note 76; Helfrick, *supra* note 69.

⁸⁴ RTCA Study, *supra* note 79, at 45.

⁸⁵ Helfrick, *supra* note 69.

⁸⁶ *Id.*; VOR stands for very high frequency omnidirectional radio, which is a ground-based navigational system relied upon by most modern airlines. Ritchie, *supra* note 76, at 687.

⁸⁷ Helfrick, *supra* note 69.

⁸⁸ *Id.*

⁸⁹ *Id.*

⁹⁰ CAA Leaflet 29, *supra* note 63, at 2.

cell tower, and, as a result, his signal strength will be strong.⁹¹ This strong connection between the cell tower and the cellular phone allows the cellular phone to operate at a lower power level, which produces lower levels of emissions.⁹² However, a cellular phone in the air is dramatically farther away from a cell tower, causing the phone to strain to maintain a good link between the phone and the network.⁹³ This strain requires the phone to operate at a much higher power level.⁹⁴ Thus, the potential for interference with the aircraft's navigation systems is greater when the cellular phone is in the air.⁹⁵ This situation is one of the reasons why the FAA's current policy allows use of cellular phones while the aircraft is at the gate, but requires passengers to turn off their cellular phones when the flight crew closes the aircraft door and the plane begins to taxi away from the gate.⁹⁶

Another cause for concern is that the cell tower determines the frequency on which the cellular phone operates, possibly assigning the phone to a different frequency with each new call.⁹⁷ This means it is impossible to predict the frequency on which a particular cellular phone will be operating at any given time, and no guarantee exists that the tower will assign an airborne call to a frequency more or less likely to interfere with the aircraft's avionics.⁹⁸ In addition, as the number of passengers talking on their cellular phone increases, the number of frequencies transmitting within the aircraft will increase, causing a more pronounced interference environment.⁹⁹ The effect of this interference is two-fold: (1) greater potential for interference with the aircraft's avionics, and (2) cellular phones within the cabin will experience greater levels of interference, causing the phones to operate at higher power levels and emit more radiation, also increasing the level of potentially threatening interference within the plane.

As it is scientifically possible for cellular phones and other PEDs to transmit RF radiation capable of interfering with an air-

⁹¹ *Id.*

⁹² *Id.*

⁹³ *Id.*

⁹⁴ *Id.*

⁹⁵ *Id.*

⁹⁶ ADVISORY CIRCULAR, *supra* note 57, para. 6(b).

⁹⁷ Cellular Basics 2, *supra* note 18.

⁹⁸ FCC, Cellular Services, <http://wireless.fcc.gov/services/cellular> (last visited Feb. 10, 2005).

⁹⁹ CAA Leaflet 29, *supra* note 63, at 2.

craft's avionics, one would wonder why there is such a large debate over the safety of the use of T-PEDs, such as cellular phones, aboard an aircraft. The problem is that the prevailing attitude has been "better safe than sorry," and the FAA has not done much to study the problem. Instead, it instituted the ban and left the matter alone. While the FAA has not conducted any substantial studies of the issue, other entities have conducted various studies. The next section of this article examines the available evidence from these studies.

C. STUDIES RELATING TO THE USE OF CELLULAR TELEPHONES ON AIRCRAFT

While all electronic devices emit RF radiation, some devices are more dangerous than others. Generally, non-intentional transmitters are less likely to cause interference than intentionally transmitting devices.¹⁰⁰ Consequently, many researchers are focusing their efforts on interference from T-PEDs. The following studies include studies on PEDs and T-PEDs, in general, in addition to a few studies focusing exclusively on cellular phones.

1. *Boeing*

Boeing conducted a study in which it tested the emissions from sixteen cellular phones representative of the cellular phones carried by passengers.¹⁰¹ The study included the testing of the phones in a laboratory and in an airplane on the ground.¹⁰² During the lab tests, the cellular phones produced emissions at their operating frequency and also produced emissions in other ranges.¹⁰³ The emissions produced at operating frequency measured "as high as 60 dB over the airplane equipment emissions limits."¹⁰⁴ This indicates a high potential for producing interference with aircraft systems.¹⁰⁵ The phones also produced emissions that registered at frequency ranges cor-

¹⁰⁰ ADVISORY CIRCULAR, *supra* note 57, paras. 6(a)(6)-(7) & 6(b) (stating that intentional transmitters are barred from operation at all stages of flight, but no mention is made about whether non-intentional transmitting devices can be used during non-critical phases of the flight.); *see also* Donham, *supra* note 63, at 17 (stating that Boeing recommends prohibiting the use of non-intentional transmitting devices only during critical stages of flight such as take-off and landing).

¹⁰¹ Donham, *supra* note 63, at 15.

¹⁰² *Id.*

¹⁰³ *Id.*

¹⁰⁴ *Id.* at 16.

¹⁰⁵ *Id.*

responding to the frequency bands for various navigation systems.¹⁰⁶ While these other emissions had low signal strengths within “airplane equipment emission limits,” Boeing is concerned that these emissions from cellular phones may interfere with the proper operation of communication and navigation systems.¹⁰⁷

After performing laboratory tests, Boeing used the same sixteen cellular phones in a test aboard an airplane on the ground.¹⁰⁸ In an effort to make the test as real as possible, researchers parked the plane on the runway and placed the aircraft in flight mode.¹⁰⁹ The researchers then monitored the reaction of the navigation systems to emissions from the cellular phones placed throughout the airplane.¹¹⁰ This test did not produce any anomalies.¹¹¹ With the information Boeing gained from these tests and the information the company has accumulated regarding emissions from PEDs, Boeing continues to recommend the prohibition of cellular phones during all phases of flight.¹¹²

2. NASA Review of Accident Reports – 2001

In 2001, the National Aeronautics and Space Administration (“NASA”) conducted a study in which it sought to determine the potential for interference from various PEDs.¹¹³ While the purpose of this report was only to prove there is a need for additional research in the area of interference from PEDs, its findings are helpful in understanding the perceived prevalence of anomalies resulting from the use of cellular phones onboard an airborne aircraft.¹¹⁴ NASA’s study involved a survey of the Aviation Safety Reporting System’s (“ASRS”) database in which it checked for reports that identified PEDs as the possible source of the experienced anomaly.¹¹⁵ The ASRS is a voluntary reporting system used by NASA and the FAA to study aviation inci-

¹⁰⁶ *Id.* at 15-16.

¹⁰⁷ *Id.*

¹⁰⁸ *Id.*

¹⁰⁹ *Id.*

¹¹⁰ *Id.*

¹¹¹ *Id.*

¹¹² *Id.* at 17.

¹¹³ ELDEN ROSS, PERSONAL ELECTRONIC DEVICES AND THEIR INTERFERENCE WITH AIRCRAFT SYSTEMS, CR-2001-210866 (2001), available at <http://techreports.larc.nasa.gov/ltrs/PDF/2001/cr/NASA-2001-cr210866.pdf>.

¹¹⁴ *Id.* at 3.

¹¹⁵ *Id.*

dents and take appropriate actions to remedy potential hazards.¹¹⁶ Because it is a voluntary reporting system, the data provided in the study is only representative of the reported incidents and not total occurrences.¹¹⁷ However, the resulting statistics are important because, at the very least, “they represent the lower measure of the true number of such events that are occurring.”¹¹⁸

The survey of ASRS reviewed incident reports for the period spanning from 1986 to 1999.¹¹⁹ During this time period, PEDs were identified as a contributing factor in 118 incidents.¹²⁰ The reports identified devices such as PDAs, CD players, electronic games, laptop computers, cellular phones, etc., as the sources of various anomalies.¹²¹ Out of the PEDs identified by the reports, cellular phones and laptop computers were the top offenders with 25 incident reports each.¹²² In addition, cellular phones were the offending devices in 15 out of 59 incidents where the flight crews reported critical anomalies.¹²³ These findings placed cellular phones at the top of NASA’s list of candidates for additional research and testing.¹²⁴

3. *NASA’s 2003 Study of the Effects of Wireless Technology on Aircraft Navigation Radios*

In this study, NASA explored the risks to aircraft navigation radios created by electromagnetic emissions from two categories of cellular phones, CDMA and GSM phones.¹²⁵ The aim of the study was to determine the potential for interference with various navigational devices.¹²⁶ The study specifically looked at the effects of cellular phone emissions on the following navigational

¹¹⁶ *Id.*

¹¹⁷ *Id.* at 4.

¹¹⁸ *Id.* at 5.

¹¹⁹ *Id.* at 7.

¹²⁰ *Id.* at 20.

¹²¹ *Id.*

¹²² *Id.*

¹²³ *Id.* at 21–22. The report defines a critical equipment problem as an “equipment problem that is vital to the safety of the flight.” *Id.* at 6.

¹²⁴ *Id.* at 20.

¹²⁵ JAY J. ELY ET. AL., WIRELESS PHONE THREAT ASSESSMENT AND NEW WIRELESS TECHNOLOGY CONCERNS FOR AIRCRAFT NAVIGATION RADIOS, TP-2003-212446 (2003), available at <http://techreports.larc.nasa.gov/ltrs/PDF/2003/tp/NASA-2003-tp212446.pdf>. GSM and CDMA are the two dominant standards for cellular telephones, CDMA being the dominant standard within the United States and GSM being the dominant standard outside of the U.S.

¹²⁶ *Id.*

aids: VOR, LOC, GS, and GPS navigation radios.¹²⁷ Researchers tested the emissions from CDMA- and GSM-enabled phones in multiple operation modes and power output levels.¹²⁸ In addition, the phones were tested while resting in a cradle and while being handled by a user.¹²⁹ The study found manipulation of the cellular phone by the user increased the emissions levels of the devices.¹³⁰ The study concluded that if a CDMA or a GSM phone operated at "its maximum FCC-allowable levels, it would result in *large NEGATIVE safety margins*."¹³¹ This indicates the emissions from the phone could pose a risk to the aircraft's navigational equipment.¹³² The report also notes that emissions in the GPS- and DME-designated bands were recorded when two phones were placed "in close proximity to one another."¹³³ These unexpected emissions were the result of the signals from the two phones interacting with one another and producing emissions on multiple frequency bands.¹³⁴ This indicates that multiple passenger phones interacting with one another could increase the range of frequencies on which emissions are produced by the cellular phones on the aircraft.¹³⁵ This should cause concern because it increases the number of potentially interfering signals on the airplane; making it more likely that one of these emissions will cause interference with the airplane's navigational systems.

4. *Civil Aviation Authority's Study on the Effects of Interference from Cellular Telephones on Aircraft Avionic Equipment*

In October 2002, the Civil Aviation Authority ("CAA") conducted an experiment in which it tested several avionic devices for susceptibility to interference from cellular phones.¹³⁶ The

¹²⁷ *Id.* As noted previously, VOR stands for very-high frequency omni-range radio. *Id.* at 84. LOC stands for localizer. *Id.* GS stands for glide slope and GPS stands for global positioning system. *Id.* All of these systems are critical to proper navigation of the airplane. *Id.*

¹²⁸ *Id.* at 87.

¹²⁹ *Id.* at 75-76.

¹³⁰ *Id.*

¹³¹ *Id.* at 87.

¹³² *Id.*

¹³³ *Id.*

¹³⁴ *Id.*

¹³⁵ *Id.*

¹³⁶ EFFECTS OF INTERFERENCE FROM CELLULAR TELEPHONES ON AIRCRAFT AVIONIC EQUIPMENT, CAA Paper 2003/3, v (2003), available at http://www.caa.co.uk/docs/33/CAPAP2003_03.PDF [hereinafter CAA Study]. The Central Aviation Authority is the United Kingdom's aviation regulatory agency. Among its

project tested the equipment's responses to cellular phone transmissions at the following frequencies: 412 MHz, 940 MHz (which corresponds to a GSM phone), and 1719 MHz.¹³⁷ The test also varied the strength of the transmissions to determine whether signal strength caused a difference in the level of interference.¹³⁸

The data gathered from the study revealed several anomalies, which occurred when the cellular phone operated at its maximum power levels.¹³⁹ The anomalies ranged from things such as the "[c]ompass [freezing] or [overshooting] [its] magnetic bearing" to "background noise on audio outputs."¹⁴⁰ The VOR navigation system experienced several anomalies including: bearing display errors, indicator reversals, and course deviation indicator errors.¹⁴¹ The report indicated these types of anomalies could produce consequences such as "crew distraction, confusion and loss of confidence in the equipment."¹⁴² Of greater concern is the "degraded navigation precision" experienced from these types of anomalies "could result in an inability to meet required navigation performance with potential adverse effects on aircraft separation and terrain clearance."¹⁴³ With this information, the CAA concluded cellular phones are not safe and should continue to be restricted.¹⁴⁴ The report also recommended banning the use of cellular phones until the risks of interference are fully understood and mitigated.¹⁴⁵

5. RTCA Study Commissioned by the FCC

The RTCA is a private organization that studies various issues in the aviation industry and submits reports and recommenda-

many responsibilities that are similar to that of the FAA, the CAA "regulates airlines, airports, and National Air Traffic Services economic activities and encourages a diverse and competitive industry." About the CAA: Corporate Information, <http://www.caa.co.uk/corpinfo/default.asp> (last visited Jan. 18, 2005).

¹³⁷ CAA STUDY, *supra* note 136.

¹³⁸ *Id.*

¹³⁹ *Id.*

¹⁴⁰ *Id.*

¹⁴¹ *Id.* at 3.

¹⁴² *Id.*

¹⁴³ *Id.*

¹⁴⁴ *Id.* The current UK restrictions prohibit the use of cellular phones during all stages of the flight. CAA Leaflet 29, *supra* note 63, at 5.

¹⁴⁵ CAA STUDY, *supra* note 136, at 3-4.

tions to the FAA.¹⁴⁶ The RTCA's members represent all areas of the aviation industry, including airlines, airplane manufacturers, suppliers, and government organizations.¹⁴⁷ Recently, the FAA requested the RTCA to form a special committee made up of "government, industry and academic experts to specifically address the risks associated with the use of portable wireless devices on aircraft."¹⁴⁸ This request resulted in the creation of special committee RTCA SC-202, Portable Electronic Devices.¹⁴⁹ SC-202 was charged with providing a current update on the use of PEDs "on board civil aircraft with an emphasis on intentional transmitters such as mobile phones, wireless RF network devices, and other wireless-enabled devices."¹⁵⁰ Unfortunately, at the time of the writing of this article the committee has only completed the first phase of its study.¹⁵¹ The resulting report indicates that the study of individual T-PEDs is a daunting task that should not be taken lightly.¹⁵² As a result, the committee report lays out a testing procedure for airlines and manufacturers to use when determining whether certain T-PEDs are safe to use aboard an aircraft.¹⁵³

In addition to identifying the recommended procedure for determining the safety of T-PEDs, the committee report indicates that now is not the correct time make changes to the current "policies regarding the use of T-PEDs on board aircraft."¹⁵⁴ Presently, the committee does not believe there is enough information available to support an informed policy decision on this issue.¹⁵⁵ The committee also warns against making broad policy changes in a climate where individual T-PEDs are "indistinguishable to the casual observer."¹⁵⁶ The committee is concerned that the creation of a device- or brand-specific policy would create an enforcement nightmare for flight crews and passengers alike.¹⁵⁷

¹⁴⁶ RTCA, Inc., at <http://www.rtca.org/aboutrtca.asp> (last visited Jan. 15, 2005).

¹⁴⁷ *Id.*

¹⁴⁸ *NPRM 1*, *supra* note 14, at 8386.

¹⁴⁹ RTCA Study, *supra* note 79, at 1.

¹⁵⁰ *Id.*

¹⁵¹ *Id.*

¹⁵² *Id.*

¹⁵³ *Id.*

¹⁵⁴ *Id.* at 2.

¹⁵⁵ *Id.*

¹⁵⁶ *Id.*

¹⁵⁷ *Id.*

Over the last five years, several studies have been conducted on PEDs, all with the same lofty goal of determining whether it is safe to use T-PEDs, such as cellular phones, while airborne. Most of the studies have reached the same conclusion: it is possible for cellular telephones to emit transmissions in the air navigation frequency bands, and it is possible for these emissions to interfere with critical navigational equipment.¹⁵⁸ With this possibility of interference, the majority of the studies recommend maintaining the current policies banning the use of cellular phones until more research in the area is completed.¹⁵⁹ Part of the difficulty of coming to a conclusion on the safety issue is that there are numerous types of cellular phones on the market, all with different technologies behind them. Another issue is that when flight crews report anomalies, it is often difficult to recreate the exact situation to determine the source of the anomaly.¹⁶⁰ Additionally, most studies are conducted in laboratories or aboard planes on the ground, and it is difficult to predict how the navigational equipment will react to the same emissions 30,000 feet in the air, out of the controlled environment created on the ground.

IV. A BRIEF DISCUSSION OF SOCIAL POLICY

Before predicting whether the FCC and the FAA are likely to change their positions on their respective bans, it is necessary to take a brief look at what passengers think about the possibility of using their cellular telephones in flight. While most passengers agree that being able to use their personal cellular phone would be a welcome alternative to the high-priced seat-back phones currently installed in planes, a number of passengers have their

¹⁵⁸ See previous discussion of the Various Safety Studies, *supra* Part III, Section C.

¹⁵⁹ One important issue the FAA should consider is whether the location of the cellular phone within the airplane has an effect on the strength of the potentially threatening emissions. The research conducted in preparation for this article did not uncover any studies analyzing the relationship between placement of the phone within the cabin and the level of interference experienced.

¹⁶⁰ See *supra* Part III, Section C.

reservations about the idea.¹⁶¹ Consumers are particularly concerned with two issues: (1) "cell yell" and (2) air rage.¹⁶²

Many airline passengers have expressed a desire to have greater connectivity while they are in the air, but most of these passengers stop with e-mail and Internet connectivity.¹⁶³ Consumers are afraid of losing one of the last few places where cellular phones are not allowed.¹⁶⁴ Countless articles relating to the FCC's recent announcement that it may relax its ban, express a general desire to keep the airways free of cellular noise.¹⁶⁵ One article reported that the FCC, which at the time this article was written had not begun accepting comments on its proposed rules, has been bombarded "with hundreds of e-mails opposing phones on planes."¹⁶⁶ Most of the comments received recommend limiting cellular phone use to the phone's non-voice related functions, such as games and text messaging.¹⁶⁷ Passengers complain they already overhear enough conversations, and they do not want their flights disrupted by cellular users trying to talk over each other.¹⁶⁸ Some consumers have said that if airlines want to provide in-flight cellular connectivity, the airlines need to establish a way to designate a quiet section of the plane where cellular phone use is not allowed.¹⁶⁹ How-

¹⁶¹ The seat-back phones that are installed in many planes have fallen out of favor in recent years because they are exorbitantly priced at around \$4 per call. Cook & Nyhan, *supra* note 39, para. 11; Koenig, *supra* note 37, para. 14. Most passengers look at this price and determine that their call is not so important that it cannot wait until they hit the ground. Cook & Nyhan, *supra* note 39, para. 11; Koenig, *supra* note 37, para. 14.

¹⁶² "Cell yell" refers to the "the futile practice of yelling on a cell phone caused by a lack of understanding of the technology or in attempt to overcome a bad connection." Forum – Cell Slang, <http://www.cellmanagers.com/forum/slang/htm> (last visited Jan. 18, 2005). Air rage is a condition similar to road rage in which airline passengers become unruly and sometimes violent. *Id.*

¹⁶³ Alexander, *supra* note 22, para. 14.

¹⁶⁴ *Id.* at para. 2; Hampson, *supra* note 22, paras. 1-2.

¹⁶⁵ Alexander, *supra* note 22; Hampson, *supra* note 22.

¹⁶⁶ Hampson, *supra* note 22, para. 8.

¹⁶⁷ *Id.*

¹⁶⁸ Alexander, *supra* note 22, para. 14. While some passengers would like to allow the use of the phone's text messaging capabilities, this function poses the same threat the voice-related functions pose to the airplane's navigational equipment. *Id.*; Hampson, *supra* note 22, para. 8. Text-messaging requires the cellular phone to communicate with the cellular network in order to transmit the messages across the network. Thus, limiting cellular phone use to text-messaging only solves the passengers' concerns regarding noise, but it does not address the more serious safety concerns.

¹⁶⁹ *Id.* at 12. Many of the comments make reference to Amtrak's "quiet cars." *Id.* After being flooded with complaints of "cell yell" on its trains, Amtrak insti-

ever, this type of system would be difficult to institute. Designating a quiet section would require the installation of some sort of "phone booth" or sound proofing materials between the "cellular free" area and the "yell all you want" section of the plane. Such a system is likely to be costly and may not be worth the expense.

In addition to the general annoyance of overhearing someone else's conversations, passengers are also concerned about the safety risks cellular phones may add to the plane ride. Air rage is already a prevalent problem aboard airplanes, and some passengers fear that allowing cellular phones on airplanes could increase the problem.¹⁷⁰ In 2004 alone, the FAA reported 238 incidents of "unruly passengers."¹⁷¹ In the last six years, the numbers have been as low as 226 incidents in 1999 to as high as 299 incidents in 2001.¹⁷² Passengers become unruly for reasons ranging from long delays, to crankiness, and sometimes for no apparent reason. With air travel being as tense as it is in the post-September 11th world, many passengers question whether adding cellular phones to the list of annoyances is a good idea.

Other passengers are not worried about air rage in and of itself. They are more concerned with safety in general. Seasoned travelers have commented that too many people already ignore flight attendant instructions without the added distraction of talking on their cellular phones.¹⁷³ These travelers worry that allowing passengers to talk on their cellular phones will increase the number of passengers ignoring flight attendant instructions; creating more safety hazards and flight delays.¹⁷⁴

On the other hand, a small group of passengers would like to see both bans removed. These passengers believe that the current regulations have outlived their usefulness and only remain in place for monetary purposes.¹⁷⁵ They claim the airlines, the FAA, and the FCC are acting in concert to keep the seat-back phones in airplanes because the airlines get a share of the pro-

tuted a policy where certain cars are designated as quiet cars and cellular phone use is prohibited in these cars at all times. *Id.*

¹⁷⁰ Hampson, *supra* note 22, para. 38.

¹⁷¹ FAA Enforcement Actions Violations of 14 C.F.R. 91.11, 121.580 & 135.120 "Unruly Passengers" Calendar Years 1995-2004, <http://www.faa.gov/passengers/Unruly.cfm> (last visited Jan. 18, 2005).

¹⁷² *Id.*

¹⁷³ Hampson, *supra* note 22, paras. 36-38.

¹⁷⁴ *Id.*

¹⁷⁵ Batista, *supra* note 23; Auerbach, *Airlines Ban Cell Phones – But Why?*, http://news.zdnet.com/2100-9595_22-501431.html (last visited Jan. 14, 2005).

ceeds from the use of these phones.¹⁷⁶ Passengers who are sick of paying \$3 to \$4 per phone call want to see the ban lifted, so they can save money by using their personal cell phones.¹⁷⁷ However, these passengers fail to realize that they will be charged a fee to use their personal cellular phones to make a call from the air.¹⁷⁸ The airline must recoup the cost of installing onboard cellular systems, and the service provider will also charge a fee for the use of their system.¹⁷⁹ Thus, while the calls may ultimately cost less, making a cellular call from the air will not be free. Instead, passengers will likely pay charges similar to typical cellular roaming fees.¹⁸⁰

V. PREDICTIONS AND RECOMMENDATIONS

This section of the article relies on the previous discussion about the current state of the law, technological developments, and studies and attempts to predict what action the FCC and the FAA will take regarding the relaxation or lifting of their respective bans on the use of cellular telephones in flight. Following these predictions is an analysis of whether the predicted actions are appropriate, given the current state of technology, and a recommendation as to what the FCC and the FAA should do to address this issue.

A. PREDICTION 1: THE FCC IS LIKELY TO RELAX ITS BAN

The FCC has a statutorily mandated duty to review and revise its regulations regarding cellular phones as part of its Part 22 biennial review process.¹⁸¹ Under this process, if a regulation no longer serves the public interest, the FCC is required to either modify or repeal the regulation.¹⁸² With this responsibility in mind, it seems as though the stage is set for the FCC to relax its current ban on the use of cellular telephones in flight.

The FCC announced a proposed change to its current rules in December 2004 that would allow the use of "off-the-shelf" wireless devices, provided the device is under the control of a pico-

¹⁷⁶ Batista, *supra* note 23; Auerbach, *supra* note 175.

¹⁷⁷ Koenig, *supra* note 37.

¹⁷⁸ Mobile-Review.com, A Cell Phone Aboard an Airplane, Fantasies and the Facts, <http://www.mobile-review.com/print.php?filename=/Articles/2002/plane-en.shtml> (last visited Jan. 14, 2005) [hereinafter Mobile Review].

¹⁷⁹ Koenig, *supra* note 37.

¹⁸⁰ Mobile Review, *supra* note 178.

¹⁸¹ 47 U.S.C. § 161 (2000); About Cellular, *supra* note 13.

¹⁸² 47 U.S.C. § 161 (2000).

cell located onboard the aircraft, and the use of the device does not interfere with the operation of the ground-cellular network.¹⁸³ The ban was originally put in place to protect cellular phone users on the ground from disruption of the cellular network by calls originating in the air.¹⁸⁴ Competition in the cellular industry and constant consumer demand for new and better features has fueled the development of systems that make it possible for cellular calls originating from the air to coexist with calls originating from the ground. Several companies have already conducted product tests and proven that the pico-cell technology works.¹⁸⁵ This evidence suggests that the current ban is no longer necessary.

In addition to ensuring the protection of the ground-cellular network, the FCC also has the responsibility to encourage competition in the industry.¹⁸⁶ Sometimes it is necessary for the FCC to relax some of its regulations to allow more competitors to enter the market.¹⁸⁷ For example, at the same time the FCC announced its plans to review the cellular phone ban, the FCC restructured its regulation of the 4 MHz of the air-ground spectrum reserved for broadband services.¹⁸⁸ Before the announcement, only one service provider was allowed to provide broadband services (Internet) on airplanes.¹⁸⁹ The changes were part of an effort by the FCC to encourage competition in this area and to allow more market participants the opportunity to provide similar broadband services.¹⁹⁰ The FCC faces the same situation with the cellular ban. AirCell is currently the only company with a waiver allowing the company to provide cellular services to airline passengers.¹⁹¹ With the development of new technology that protects the ground-cellular network, it is necessary for the FCC to allow more competition into the mar-

¹⁸³ FCC Consumer Advisory, Using Your Cell Phones on Airplanes, <http://ftp.fcc.gov/cgb/consumerfacts/cellonplanes.html> (last visited Jan. 19, 2005). An "off the shelf" phone means the caller's personal cellular phone rather than a phone provided by the airline.

¹⁸⁴ *Id.*

¹⁸⁵ For a discussion of the various technologies in development *supra*, Part II Section D.

¹⁸⁶ 47 U.S.C. § 160 (2000); Broadband Release, *supra* note 24.

¹⁸⁷ Broadband Release, *supra* note 24.

¹⁸⁸ *Id.*

¹⁸⁹ *Id.*

¹⁹⁰ *Id.*

¹⁹¹ FCC. Cellular Services – Aircraft Usage, <http://wireless.fcc.gov/services/cellular/operations/aircraft.html> (last visited Jan. 15, 2005).

ket. As such, it may be in the consumer's best interest to relax the ban and allow cellular companies to compete with one another.

While the FCC has stated that it is aware of the FAA's policies and is open to comments from passengers, it is not likely that the safety concerns and social problems related to cellular phones will keep the FCC from relaxing its ban.¹⁹² The FCC's duty is to determine whether the provision of cellular services is technologically possible; the FCC is not responsible for regulating social conduct or airline safety.¹⁹³ Thus, the FCC is likely to relax its ban in the near future.¹⁹⁴

B. PREDICTION 2: THE FAA IS NOT LIKELY TO RELAX ITS BAN.

On the other hand, it is not likely that the FAA will change its policies any time soon. The current regulation prohibits the use of any personal electronic device that has not been deemed safe for use on board an aircraft.¹⁹⁵ Although the industry has made a lot of progress in both cellular technology and the shielding of aircraft avionics, the technology has not come far enough. Every study reviewed in preparation of this article indicated it is scientifically possible for cellular phones to generate emissions in the air navigation frequency bands and it is possible for these emissions to interfere with the aircraft's avionics. No study indicated that cellular phone use on an aircraft is safe.¹⁹⁶

The uncertainty in this area prompted the FAA to request the RTCA to conduct a study looking at transmitting PEDs specifically, and to develop a procedure for determining the safety of various T-PEDs.¹⁹⁷ Phase I of this study was completed in December 2004 and Phase II is not expected to be completed until 2006.¹⁹⁸ Like the studies before it, the Phase I report concluded that now is not the time to change the current policies, and it

¹⁹² Alexander, *supra* note 22, para. 4; Associated Press, *supra* note 5, para. 18; Press Release, FCC, FCC to Examine Ban on Using Cellular Telephones on Airborne Aircraft, Dec. 15, 2004, *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-255246A1.pdf.

¹⁹³ Associated Press, *supra* note 5, para. 18 (quoting Commissioner Adelstein).

¹⁹⁴ The commission is expected to make a decision on the issue sometime this year. *Id.*

¹⁹⁵ 14 C.F.R. § 91.21 (2005); ADVISORY CIRCULAR, *supra* note 57, at para. 1.

¹⁹⁶ For a discussion of the various studies see *supra*, Part III Section C.

¹⁹⁷ RTCA Study, *supra* note 79, at 1.

¹⁹⁸ RTCA, SC-202 Portable Electronic Devices, <http://www.rtca.org/comm/committee.cfm?id=1> (last visited Jan. 20, 2005).

instructed the FAA to continue to ban the use of cellular phones in flight.¹⁹⁹

In light of the potential for interference and the lack of evidence to support the notion that cellular phones are safe in the air, it would be foolish to think the FAA will lift its ban on cellular phones any time in the near future. This contention is supported by the FAA's statements in response to the FCC's announcement regarding the proposed relaxation of its rules.²⁰⁰ After this report was released, the FAA placed a statement on its Web site stating that the FAA is not considering a change in its policies at this time.²⁰¹ The FAA will not change its policy until someone proves to the FAA that the use of cellular phones is safe.²⁰² Consequently, cellular phones will remain grounded for quite sometime.

C. RECOMMENDATIONS

Taking into account the current state of technology, consumer concerns, and the weaknesses in the FAA's ban on the use of cellular phones in flight, it is not a good idea for the FCC to relax its ban at this time. The FCC should work more closely with the FAA and the two agencies should make sure their policies complement each other and work together to protect both the cellular network and the safety of airline passengers.

Currently, there is some controversy surrounding the FAA's rules on cellular telephones in flight. The FAA's regulation only prohibits those electronic devices that have not been deemed safe by the airlines.²⁰³ Although no airline proclaimed cellular technology to be safe for operation during flight, it is possible under the current regulation for an individual airline to decide that it believes cellular phones are safe. After making this determination the airline could allow passengers on their flights to use their cellular phones.²⁰⁴ Once one airline makes this move, other airlines will be pressured to offer their passengers the same services to remain competitive in the market. This could create a race to provide cellular services to passengers, and it is possible that safety considerations could be ignored. This is not to say the airlines will completely disregard the safety issues, but

¹⁹⁹ RTCA Study, *supra* note 79, at 2.

²⁰⁰ Frequently Asked Questions, *supra* note 68.

²⁰¹ *Id.*

²⁰² Alexander, *supra* note 22, para. 6-7.

²⁰³ 14 C.F.R. § 91.21 (2005); *see also, supra* Part III, Section A.

²⁰⁴ 14 C.F.R. § 91.21 (2005); Advisory Circular, *supra* note 57, para. 6(a)(5).

with increasing pressures in the market, it is possible safety concerns may not receive the proper attention they deserve.

Fortunately, this controversy may not be as large of a concern as some believe. The FAA's stated position is that cellular phones are banned in flight, and most analysts agree with this position.²⁰⁵ However, the airlines are already experiencing difficulty in enforcing the ban, and there is evidence that unauthorized use of cellular technology is increasing.²⁰⁶ Currently, the FCC ban provides support for the FAA policies and threatens passengers with large fines.²⁰⁷ If the FCC removes its ban or even relaxes it, the FAA loses some of its regulatory support and the threat of enforcement is greatly reduced. Although the FCC is not responsible for the safety of the airways, it is important for the regulatory agencies to work together on this important safety issue. One agency should not make a move towards relaxation or removal of the ban until the other is prepared to do so as well. The FCC can still foster economic competition and technology development in this area through its practice of granting waivers for product testing.²⁰⁸ And even though the FCC is not charged with protection of airline passenger safety, one would argue that the protection of airline passenger safety is an important public interest served by keeping the current ban in place.²⁰⁹ Thus, the current regulation is not entirely lacking a public interest purpose, and the FCC does not necessarily have to lift its current ban just because technology has made it possible for the ground network and airborne cellular calls to coexist with one another.²¹⁰

In addition, the technology is not 100 percent ready to hit the airways at this time. Although systems have been developed to

²⁰⁵ Frequently Asked Questions, *supra* note 68; ADVISORY CIRCULAR, *supra* note 57, para. 6(b).

²⁰⁶ Hester, *supra* note 1.

²⁰⁷ *Id.*; 47 C.F.R. § 22.925 (2005).

²⁰⁸ This type of procedure was used to allow American Airlines and Qualcomm to test Qualcomm's pico-cell technology on a flight from Dallas, Texas to El Paso, Texas in June 2004. Koenig, *supra* note 37; Lott, *supra* note 27, para. 6. In fact, the FAA and the FCC both gave the companies one-time waivers for the test flight and there is no reason to expect that this same procedure will not work in the future. Koenig, *supra* note 37; Lott, *supra* note 27, para. 6.

²⁰⁹ Comments of Cingular Wireless LLC., In the Matter of Amendment of Part 22 of the Commission's Rules to Benefit the Consumers of Air Ground Telecommunications Services Biennial Review – Amendment of Parts 1, 22, and 90 of the Commission's Rules 10 (Sept. 23, 2003), available at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=651508362.

²¹⁰ *Id.*

control airborne calls and route them through satellite networks so they do not interfere with the ground networks, the safety concerns remain unresolved.²¹¹ Numerous studies have been conducted on the electromagnetic interference emitted by cellular phones, and none of those studies has declared that cellular phones do not pose a threat to the aircraft's navigation equipment. If the FAA and the FCC want to allow cellular phone operation, they need to heighten the manufacturing standards for cellular phones and ensure that the EMI from cellular phones does not spillover into the air navigation frequency bands, or at least prove that any spillover will not cause interference to critical avionic systems.

By the same token, there is the argument that the FAA has the sole responsibility for air safety, and the FCC should not concern itself with safety matters. The FCC is only required to regulate the communications market to ensure consumers are provided with adequate communication capabilities by promoting market competition and protecting the public from fraud and unsafe devices.²¹² As Commissioner Adlestien has stated, the FCC's "job is to see if this is possible and then let the consumers work out the" rest.²¹³ The FAA, on the other hand, is responsible for safety and should be the sole regulator of the use of cellular phones on board aircraft. The problem with this theory is that it assumes the two agencies operate in mutually exclusive spheres when, in actuality, their jurisdiction over cellular phones (and other devices for that matter) intersects.²¹⁴ The FAA has the authority to ban the use of cellular phones and other devices on airplanes. However, if the FAA decides it wants to allow passengers to use their cellular phones, the FAA lacks the authority to regulate important issues such as shielding requirements, frequency bands, and power output levels. These types of regulations are outside the scope of the FAA's authority and are the FCC's responsibility. The FCC is in charge of making sure that devices do not interfere with each other, and it accomplishes this task by placing manufacturing requirements on these devices. If the FAA is the sole judge on the cellular phone issue, it is possible to end up with two conflicting regulatory schemes for cellular phones, one for the air and one for the

²¹¹ For a discussion relating to the safety of cellular phones on airplanes see *supra*, Part III Section C.

²¹² About FCC, *supra* note 7.

²¹³ Associated Press, *supra* note 5.

²¹⁴ NPRM 1, *supra* note 14, at 8386.

ground. This would create a nightmare for manufacturers and passengers alike. Manufacturers would have to expand their product lines and keep track of two different sets of regulations. Similarly, passengers would need one phone for everyday ground use and one phone for use in the air. Rather than disrupting the current regulatory system, logic demands that the FAA and the FCC work together to solve the cellular phone issue and create regulations that provide protection for both the air navigation systems and the ground-cellular network.

Similarly, the FAA needs to consider the passenger concerns about the use of cellular phones in flight.²¹⁵ Many passengers do not like the idea of listening to 250 people talk on their phones for the duration of a two-hour flight. Thus, the FAA needs to work with the individual air carriers, the pilot's associations, and the public to study the issues and develop policies for the proper use of cellular phones in flight. Whether the FAA develops quiet zones, similar to Amtrak quiet-cars, limits the use of phones to their non-voice related operations, or uses some other mechanism to control the noise from passenger conversations, it should not allow the use of cellular phones until these important social issues are addressed.

More than likely the day will come when passengers can use their cellular phones in flight, but now is not the time to do it. Too many technical and safety issues remain unsolved, and the consuming public is not ready for cell phones to grow wings.

²¹⁵ For a discussion regarding passenger concerns see *supra*, Part IV.

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