U.S. Department
of Transportation

**Federal Aviation
Administration**

Office of the Administrator

800 Independence Ave., S.W.
Washington, D.C. 20591

February 4, 2014

The Honorable John D. Rockefeller, IV
Chairman, Committee on Commerce,
Science, and Transportation
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

As required by the FAA Modernization and Reform Act of 2012, H.R. 658, Section 410, the Federal Aviation Administration (FAA) is pleased to provide the enclosed report.

Section 410 of the Act directed the Administrator of the FAA to conduct a study on the impact of the use of cell phones for voice communications in an aircraft during a flight in scheduled passenger air transportation. Section 410 directed the study to include a review of foreign government and air carrier policies on the use of cell phones during flight; a review of the extent to which passengers use cell phones for voice communications during flight; and a summary of any impacts of cell phone use during flight on safety, the quality of the flight experience of passengers, and flight attendants.

We have sent identical letters to Chairman Shuster, Senator Thune, and Congressman Rahall.

Sincerely,

Michael P. Huerta
Administrator

Enclosure

U.S. Department
of Transportation

**Federal Aviation
Administration**

Office of the Administrator

800 Independence Ave., S.W.
Washington, D.C. 20591

February 4, 2014

The Honorable John Thune
Committee on Commerce,
Science, and Transportation
United States Senate
Washington, DC 20510

Dear Senator Thune:

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We have sent identical letters to Chairmen Rockefeller and Shuster and Congressman Rahall.

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Michael P. Huerta
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800 Independence Ave., S.W.
Washington, D.C. 20591

February 4, 2014

The Honorable Bill Shuster
Chairman, Committee on Transportation,
and Infrastructure
House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

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**Federal Aviation
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Office of the Administrator

800 Independence Ave., S.W.
Washington, D.C. 20591

February 4, 2014

The Honorable Nick J. Rahall
House Committee on Transportation
and Infrastructure
House of Representatives
Washington, DC 20515

Dear Congressman Rahall:

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We have sent identical letters to Chairmen Rockefeller and Shuster, and Senator Thune.

Sincerely,

Michael P. Huerta
Administrator

Enclosure

Federal Aviation
Administration

USE OF CELL PHONES ON PASSENGER AIRCRAFT

FAA Modernization and Reform Act of 2012
Public Law No. 112-95. Section 410

January 2014

Section 410 of the FAA Modernization and Reform Act of 2012, Public Law No. 112-95, Feb. 14, 2012 (the Act) directed the Administrator of the Federal Aviation Administration (FAA) to conduct a study on the impact of the use of cell phones for voice communications in an aircraft during flight in scheduled passenger air transportation. Section 410 directed the study to include a review of foreign government and air carrier policies on the use of cell phones during flight; a review of the extent to which passengers use cell phones for voice communications during flight; and a summary of any impacts of cell phone use during flight on safety, the quality of the flight experience of passengers, and flight attendants. As required by the Act, the study was published in the Federal Register for public comment on September 5, 2012 (77 FR 54651). The comment period closed on November 5, 2012. The following is the FAA's report on the results of this study. A copy of the full study is also attached for review.

The FAA conducted the study to evaluate the potential safety impact of passenger use of cell phones.. This study consisted of a review of international partners' information associated with their experience with passenger use of cell phones during flight, and a review of their policies and regulations related to the subject. The technical report (attached) published in July 2012 was called *Study on the Use of Cell Phones on Passenger Aircraft*.[1]

As directed by Section 410, the FAA reviewed foreign government and air carrier policies, and the experience of the air carriers that allow airborne use of cellular telephones. The FAA identified 16 non-US civil aviation authorities that had experience with air carriers that allow airborne use of cellular telephones through approved on-board cellular telephone base station installations, often called pico-cells. The FAA sent a questionnaire to these non-US civil aviation authorities requesting information on their policies and the air carrier experience with airborne cellular telephone use, including whether air carriers reported any effects of airborne cell phone use on flight safety. The questionnaire asked the civil aviation authorities to provide information on the extent to which passengers use cell phones during flight; and a summary of any impacts of cell phone use during flight on safety, the quality of the flight experience of passengers, and flight attendants. Eleven civil aviation authorities (CAAs) responded.

This study addressed the in-service experience of air carriers that allow airborne use of cellular telephones through approved on-board pico-cells. These allowances for cell phone use were based on standards and requirements set by each governing civil aviation authority, as discussed in the attached report. Previous technical studies[2] have addressed the potential interference from cell phones to aircraft systems, and identified means to evaluate the potential

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1 D.B. Walen, R.A. Chitwood, B. DeCleene, T. Shaver, *Study on the Use of Cell Phones on Passenger Aircraft*, FAA Report DOT/FAA/AR-12/30, July 2012

2 DO-294C, Guidance on Allowing Transmitting Portable Electronic Devices (T-PEDs) on Aircraft, December 16, 2008, RTCA, Inc.

interference and provide protection against interference. Therefore this study focused specifically on in-flight safety and in-service experiences of foreign air carriers as directed by Section 410.

The non-US CAA responses indicated that non-US air carriers safely operate aircraft with installed pico-cells that facilitate passenger use of cell phones for voice communications. In the context of safety, the non-US civil aviation authorities did not identify passenger disruption or air rage as concerns related to the use of cell phones on aircraft equipped with pico-cells. They also reported no interference with aircraft systems due to cell phone use on the aircraft.

According to responses, each non-US CAA required the pico-cell installer and airline to demonstrate that the pico-cells and cell phones can be operated with no impact to aircraft systems prior to use. Similar to the US Federal Communications Commission (FCC), telecommunications authorities where the aircraft is being operated must approve the use of the pico-cells. These aviation authorities reported that use of cell phones on aircraft while airborne is restricted by telecommunications authority regulations. Operators of aircraft with on-board cellular telephone base stations must have approval from telecommunication authorities before these systems can be used by passengers with their cell phones.

US FCC regulations currently prohibit use of certain cellular telephones for cellular communications while airborne,[3] although in December 2013 the FCC issued a proposal to expand consumer access to inflight mobile services. At the time of FAA's study, no US air carriers were operating on-board pico-cells. The FAA allows operation of portable electronic equipment for non-cellular communications on air carrier aircraft flying domestically in all phases of flight if the part 119 certificate holder has determined it will not cause interference with the navigation or communication system, but as of this time no US air carrier has made such a determination about use of cell phones while airborne.

The FAA received 148 comments on the study. No comments disagreed with the finding of the study, nor did the comments provide information to change the findings of the study. Most comments expressed opinions for and against the use of cell phones in flight. Many of the commenters raised concerns with the social issues related to cell phone use on aircraft while in flight, while others supported expanded use of cell phones in flight. The results of the study have not changed based on the public comment received.

A summary of the comments is provided below:

- Fifty nine commenters supported changes that would allow the use of cell phones on aircraft while in flight.

[3] 47 CFR § 22.925

- Seventy nine commenters did not support the use of cell phones on aircraft while in flight. The dominant concern expressed by these comments was that voice conversations by passengers using their cell phones would result in annoyance and distraction to other passengers. Even comments that supported the use of cell phones in flight expressed concern for the potential annoyance and distraction from voice conversations by other passengers.

- Twenty five commenters expressed concern for passenger safety due to conflicts resulting from voice conversations on cell phones. The following comment was typical of those with the concern for passenger safety: *"To allow cellphone use would invite incidents of air rage."*

- Fifteen commenters cited concerns related to potential cell phone interference with aircraft systems that would result in diminished aircraft safety; however, the commenters did not provide any specific data to support this concern. Several commenters noted that cell phone use is commonly observed on aircraft and no harmful interference results because many passengers inadvertently fail to completely shut down their devices. Based on these observations, the commenters asserted that using cell phones on airborne aircraft will not likely impact the safety of the aircraft operation.

- Lufthansa German Airlines commented that they are committed to providing connectivity service to their passengers through WiFi capability and cell phone capability. They commented that there are no technical barriers to providing cell phone service on board aircraft using pico-cells. They urge US regulators to allow cell phone service in US airspace. Delta Air Lines also urged the FAA to expand the use of portable electronic devices (PEDs) in flight, but suggested that cell phones be used only during ground operations.

- The Consumer Electronics Association, the Telecommunications Industry Association, and the Satellite Industry Association supported the findings of the study. They urged the FAA to facilitate the safe use of cell phones on board airplanes. AeroMobile Communications Limited and Panasonic Avionics Corporation, companies that provide pico-cell installations for onboard cell phone use, commented that the results of the study are consistent with their experience with in-flight cell phone use. They also urged the FAA to facilitate the safe use of cell phones onboard aircraft.

- The Association of Flight Attendants commented that the study did not address security issues related to cell phone use on board aircraft. They urged the FAA to conduct further review to assess the impact of passenger cell phone use and potential security hazards. They also

commented that labor unions representing flight attendants and pilots should be contacted to determine their members' experience with passenger use of cell phones on aircraft. The Air Line Pilots Association International agreed with the findings of the study, but commented that human factors and security related to in-flight cell phone use should be considered.

The results of the study have not changed based on the public comments. The results of this study indicate that the regulations and policies of foreign CAA and air carriers regarding cell phone and PED use during flight are very similar to those of the FAA and the FCC. The study found:

- Aircraft with on-board cellular telephone base stations undergo extensive analysis, functional tests, ground tests, and flight tests to demonstrate that the cell phones and base stations do not interfere with aircraft systems.
- The non-US CAAs reported no confirmed occurrences of cell phones affecting flight safety on aircraft with on-board cellular telephone base stations.
- Non-US operators of aircraft with on-board cellular telephone base stations must have approval from telecommunication authorities before these systems can be used by passengers with their cell phones.
- None of the non-US CAAs reported any cases of air rage or flight attendant interference related to passengers using cell phones on aircraft equipped with on-board cellular telephone base stations.
- Some passengers complained about the cost of the cell phone service, and about cell phone service that was inoperative or interrupted in flight.
- Some passengers, who were able to use their cell phones on aircraft properly equipped with on-board cellular telephone base stations, were not able to differentiate that some aircraft were not so equipped.

The FAA formed an Aviation Rulemaking Committee (ARC), consisting of industry experts and stakeholders, to review the FAA's regulations and policies governing the use of PEDs during flight, to determine whether expanded use of these devices could be allowed. The FAA received the ARC's recommendations September 30, 2013, and implemented guidance to accommodate greater use of PEDs.

Attachment:
D. B. Walen, R. A. Chitwood, B. DeCleene, T. Shaver, *Study on the Use of Cell Phones on Passenger Aircraft*, DOT/FAA/AR-12/30, July 2012

DOT/FAA/AR-12/30

Federal Aviation Administration
William J. Hughes Technical Center
Atlantic City International Airport, NJ
08405

Study on the Use of Cell Phones on Passenger Aircraft

D. B. Walen, R. A. Chitwood, B. DeCleene, T. Shaver

Federal Aviation Administration Aviation Safety (AVS)

July 2012

Technical Report

U.S. Department of Transportation
Federal Aviation Administration

NOTICE

This report is available through the Federal Aviation Administration William J. Hughes Technical Center Reference and Research Library Online Catalog at: http://actlibrary.tc.faa.gov.

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16. Abstract

The FAA Modernization and Reform Act of 2012 directed the Federal Aviation Administration (FAA) to conduct a study on the impact of the use of cell phones for voice communications in an aircraft during a flight in scheduled passenger air transportation. FAA identified non-US civil aviation authorities that had experience with air carriers that allow the use of cellular telephones with on-board cellular telephone base stations. The non-US civil aviation authorities reported that their regulations and policies related to use of cell phones in flight are very similar to the US regulations and policies. The civil aviation authorities reported no documented occurrences of cell phones affecting flight safety on aircraft with on-board cellular telephone base stations. None of the civil aviation authorities reported any cases of air rage or flight attendant interference related to passengers using cell phones on aircraft equipped with on-board cellular telephone base stations.

17. Key Words Cell phone, airplane, safety, interference	18. Distribution Statement This document is available to the public through the National Technical Information Service (NTIS), Springfield, Virginia 22161

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Table of Contents

1 Summary

Section 410 in the FAA Modernization and Reform Act of 2012 (Public Law 112-95) directed the Administrator of the Federal Aviation Administration to conduct a study on the impact of the use of cell phones for voice communications in an aircraft during a flight in scheduled passenger air transportation. Section 410 directed the study to include a review of foreign government and air carrier policies on the use of cell phones during flight; a review of the extent to which passengers use cell phones for voice communications during flight; and a summary of any impacts of cell phone use during flight on safety, the quality of the flight experience of passengers, and flight attendants.

US Federal Communications Commission (FCC) regulations currently prohibit use of certain cellular telephones while airborne, and Federal Aviation Administration (FAA) has not approved installation of on-board cellular telephone base stations, often called pico-cells, on US air carrier aircraft.

Several non-US civil aviation authorities have approved the use of on-board cellular telephone base stations on airplanes for air carriers. FAA identified non-US civil aviation authorities that had experience with air carriers that allow the use of cellular telephones with on-board cellular telephone base stations. FAA sent a questionnaire to these non-US civil aviation authorities requesting information on their policies and the air carrier experience with airborne cellular telephone use.

The civil aviation authorities who have approved the installation of on-board cellular telephone base stations on aircraft reported that the aircraft with these installations undergo extensive analysis, functional tests, ground tests, and flight tests to demonstrate that the cell phones and base stations do not interfere with aircraft systems. The civil aviation authorities reported no confirmed occurrences of cell phones affecting flight safety on aircraft with on-board cellular telephone base stations.

The authorities reported that use of cell phones on aircraft while airborne is restricted by telecommunications authority regulations. Operators of aircraft with on-board cellular telephone base stations must have approval from telecommunication authorities before these systems can be used by passengers with their cell phones.

None of the civil aviation authorities reported any cases of air rage or flight attendant interference related to passengers using cell phones on aircraft equipped with on-board cellular telephone base stations. Some passengers complained about the cost of the cell phone service and when the cell phone service was inoperative or interrupted in flight.

The same authorities reported that some passengers, who were able to use their cell phones on aircraft properly equipped with on-board cellular telephone base stations, were not able to differentiate that some aircraft were not so equipped.

2 Introduction

2.1 Background

The use of cell phones and related wireless technology has become ingrained in our day-to-day lives. We use cell phones to remain connected to family, friends, and work associates through voice conversations and text messages. In addition, cell phones are being incorporated into other devices such laptop computers and electronic books to transfer data and information. The widespread use and implementation of cell phones and related wireless devices has naturally led to passengers desire to use their cell phones on board an aircraft.

FAA has recognized that portable electronic devices (PEDs), including cell phones, have the potential for causing interference with aircraft radios and other electrical and electronic systems. In 1963, the FAA published the first regulations to address this concern. During the rule making process, the FAA concluded that the air carrier/airline was best suited to make the determination of which PEDs would not cause interference with the navigation or communication system on their aircraft. This approach to control of PEDs, including cell phones, on board aircraft remains in the regulations today[1].

Federal Communications Commission (FCC) rules[2] prohibit the use of cellular phones and other wireless devices using the 800 MHz frequency on airborne aircraft. This ban was put in place because of potential interference to wireless networks on the ground. The FAA guidance to air carriers[3] recommends that transmitting PEDs, including cell phones, should be turned off in flight to satisfy the FCC rules and minimize the risk to aircraft radios and other electrical and electronic systems. Today, the policies of US air carriers prohibit the use of cell phones while airborne, based on the FCC prohibition and the FAA guidance.

The burden of enforcing an airline's policy on cell phone use typically falls on the cabin crew. Flight attendants are tasked with policing the use of cell phones throughout the flight. On occasion, enforcement of an airline's PED policy results in a conflict between a flight attendant and a passenger. Noncompliance with crewmember safety instructions on the use of PEDs has resulted in passengers being removed from an aircraft, and in some cases caused an in-flight diversion.

The FAA recognized that the industry needed assistance in determining if the cell phones and other transmitting PEDs would interfere with the aircraft communication, navigation, and other electrical and electronic systems. The FAA requested that a joint industry and government committee, led by RTCA, study the risks associated with transmitting PED. This RTCA committee recommended procedures[4,5] that can be used to demonstrate if an aircraft can safely tolerate the use of cell phones while airborne. These procedures allow

aircraft designers to build in protection to prevent interference to communication, navigation, and other electrical and electronic systems. Aircraft manufacturers and modifiers are beginning to implement this guidance on new and existing aircraft.

In the last few years, systems have been developed and installed on aircraft that allow passengers to use their personal cell phones to communicate through an on-board cellular base station. Several non-US airlines have installed these systems, with some operating the system for limited trials, and others as a permanent service to their passengers. Currently, no US airline operates these systems because of the FCC rules. The civil aviation authorities responsible for certification of these on-board cellular base stations on air carrier aircraft required extensive analysis, ground tests, and flight test to demonstrate that the base stations and the passenger cell phones could be operated safely for the specific airplane models with these installations. The recommended procedures from RTCA are the basis for approval for use of cell phones on aircraft equipped with these on-board cellular base stations.

2.2 Congressional Study Requirements

On February 14, 2012, US House Resolution (HR) 658 - FAA Modernization and Reform Act of 2012, was adopted as Public Law 112-95 (PL 112-95). Section 410 of PL 112-95 directed the Administrator of the Federal Aviation Administration to conduct a study on the impact of the use of cell phones for voice communications in an aircraft during a flight in scheduled passenger air transportation. This section directed the study to include a review of foreign government and air carrier policies on the use of cell phones during flight; a review of the extent to which passengers use cell phones for voice communications during flight; and a summary of any impacts of cell phone use during flight on safety, the quality of the flight experience of passengers, and flight attendants.

Section 410 of PL 112-95 is shown in Appendix A.

2.3 Schedule of Study

PL 112-95 Section 410 directed FAA to accomplish the study with the following deadlines:

PL 112-95 Section 410 Task	Response Due Date
Conduct study (120 days)	June 13, 2012
Publish results for comment (180 days)	August 12, 2012
Submit report to House and Senate Committees (270 days)	November 10, 2012

3 Approach to Study

US Federal Communications Commission (FCC) regulations currently prohibit use of certain cellular telephones while airborne[6], and FAA has not approved installation of on-board cellular telephone base stations, often called pico-cells, on US air carrier aircraft. Therefore, FAA does not have information on the experience of air carriers that have installed on-board cellular telephone base stations and allow the use of cellular telephones while airborne.

FAA identified non-US civil aviation authorities that had experience with air carriers that allow the use of cellular telephones with on-board cellular telephone base stations. FAA sent a questionnaire to these non-US civil aviation authorities requesting information on their policies and the air carrier experience with airborne cellular telephone use. Eleven civil aviation authorities responded to the FAA questionnaire. The questionnaire is shown in Appendix B and the list of non-US civil aviation authorities that responded are included in Appendix C.

4 Results of Study

4.1 Policies on the use of cell phones during flight

4.1.1 Foreign government aviation authority policies on the use of cell phones during flight

The non-US civil aviation authorities provided their regulations and policies related to use of cell phones during flight. In general, these regulations and policies have similar scope as the FAA regulations for portable electronic devices. These regulations and policies prohibit the use of portable electronic devices, unless the aircraft operator has determined that the use of the portable electronic devices will not adversely affect aircraft systems.

The United Kingdom Civil Aviation Authority (UK CAA), the French Directorate General for Civil Aviation (DGAC), and Portugal's Instituto Nacional de Aviação Civil (INAC) adopt the European Union aviation regulations. The specific European Union regulation for portable electronic devices[7] is EU-OPS 1.110. The United Arab Emirates General Civil Aviation Authority (UAE GCAA) aviation regulation for portable electronic devices[8] is identical to EU-OPS 1.110. EU-OPS 1.110 states:

An operator shall not permit any person to use, and take all reasonable measures to ensure that no person does use, on board an aeroplane a portable electronic device that can adversely affect the performance of the aeroplane's systems and equipment.

The New Zealand Civil Aviation Authority (NZ CAA) reported that all portable electronic devices, including cell phones, must be turned off and stowed during takeoff and landing . NZ CAA regulations specifically prohibit the use of transmitting cell phones in flight[9]. When on-board cellular telephone base stations are installed in aircraft, the NZ CAA assesses the installation and

operator procedures to determine if cell phones can be safely operated and that suitable procedures are in place. If so, the NZ CAA provides an exemption from the regulations that prohibit the use of cell phones for those aircraft.

The Malaysia Department of Civil Aviation (DCA) Regulation 70 prohibits the use of cell phones during flight[10].

Australia's Civil Aviation Safety Authority (CASA) does not have explicit regulations governing the use of cell phones in flight. The onus is placed on the pilot in command or the operator to ensure that the aircraft is operated safely. Passengers are required to obey all lawful instruction issued by the pilot in command in accordance with Civil Aviation Regulation 309A[11].

Similarly, the Saudi Arabia General Authority of Civil Aviation (GACA) does not have any explicit regulation that prohibits the use of cell phones during flight. However, GACA noted that in practice it follows the FAA regulations for portable electronic devices and the associated FAA advisory circular, and do not permit use of electrical devices, including cell phones, during takeoff and landing.

The Irish Aviation Authority (IAA) reported that all portable electronic devices, including cell phones, should be turned off and stowed during takeoff and landing, and all intentionally transmitting devices are switched off before start of flight and during flight[12]. The IAA Aeronautical Information Services bulletin notes:
This policy does not prevent any aircraft owner or operator from permitting the use of any particular intentional transmitting PEDs for which the operator has obtained approval from the relevant authority responsible for operational oversight. Such an approval would only be granted following a robust certification programme similar to that required for the aircraft systems themselves.

Jordan's Civil Aviation Regulatory Commission (CARC) reported that it allows the use of cell phones when the airplane equipped with on-board cellular telephone base stations are above 10,000 feet.

None of the aviation authorities' regulations and policies make a distinction between voice and data communications using cell phones.

The regulations pertaining to portable electronic devices are shown in Appendix D.

4.1.2 Processes used to approve the use of cell phones during flight

All the aviation authorities pointed out that operators of on-board cellular telephone base stations must be licensed by the national telecommunications authority to operate within their national boundaries. For example, in Australia, the operator of an on-board cellular telephone base station must be licensed by the Australian Communications and Media Authority. The NZ CAA pointed out that the operator for airplanes equipped with on-board cellular telephone base stations need to have authorization to operate the on-board cellular telephone base station from any nation that the airplane will overfly. In the US, the FCC

has not licensed any operator to allow use of on-board cellular telephone base stations while in US airspace.

The Brazilian National Civil Aviation Agency (ANAC) commented that installation of an on-board cellular telephone base station requires compliance with applicable aircraft airworthiness requirements. In addition, ANAC applies special conditions to deal with network security, so that cell phones cannot intentionally or unintentionally corrupt aircraft data or systems critical to aircraft safety. ANAC noted that on aircraft equipped with on-board cellular telephone base stations, cell phone use is only permitted above 3000 meters (approximately 10,000 feet). The on-board cellular telephone base station must also monitor the geographic area where the aircraft is operating, and inhibit the system from operating when the aircraft flies over an area where cell phone use is not allowed. The Brazilian telecommunication authority ANATEL is responsible for approving the use of cell phones on aircraft equipped with an on-board cellular telephone base station.

The French DGAC commented that on-board cellular telephone base stations cannot be used at altitudes below 3000 meters (approximately 10,000 feet) to avoid interference with the cell phone network on the ground. The UK CAA response also noted altitude restrictions based on European telecommunications requirements[13]. The French DGAC and the NZ CAA pointed out that on-board cellular telephone base stations controlled the radio frequency power transmitted by cell phones, to avoid interference with cellular base stations on the ground.

The Malaysian DCA commented that operators of aircraft with on-board cellular telephone base stations are required to obtain approval from Malaysian Communication and Multimedia Commission (MCMC).

The aviation authorities commented that installation of the on-board cellular telephone base stations on aircraft require design and installation approval using procedures similar to those of a FAA supplemental type certification (STC). The design and installation approval involved extensive safety assessments, functional tests, and electromagnetic compatibility tests. Non-US civil aviation authorities that have approved on-board cellular telephone base stations and the use of cell phones with these base stations commented that the approval involved extensive ground tests and flight tests to demonstrate that the cell phones and base stations do not interfere with aircraft systems. The UK CAA, the French DGAC, Ireland's IAA, and Saudi Arabia's GACA approved the on-board cellular telephone base station installation based on EASA certification requirements developed specifically for on-board cellular telephone base stations. The UK CAA commented that it developed the EASA certification requirements using guidance in the RTCA document DO-294[14] and EUROCAE document ED-130[15]. Following the guidance in these documents results in a detailed analysis and specialized tests to demonstrate that the on-board cellular telephone base station and cell phones used on the airplanes do not create electromagnetic interference. The French DGAC and Jordan's CARC also commented that they adopted the PED recommendations from RTCA[16].

Air carriers that operate airplanes with the on-board cellular telephone base stations must also have operating approval from the civil aviation authority. Operating approval required crew training, crew procedures, cabin crew manuals, flight crew manuals and maintenance manuals.

The UK CAA noted *"Whilst the introduction of the onboard picocell systems has enabled cellular phones to be used in flight, their use is still restricted to the cruise phase of flight only, and to use within defined areas of the aircraft which excludes the flight deck, preventing flight crew distraction. The use in cruise only is an established process intended to minimise any residual risk posed by PED use to the phases of flight where the safety margins are greatest. This policy is defined within JAA Temporary Guidance Leaflet No.29[17] and CAA Aeronautical Information Circular 1/2004[18] but these apply to PEDs in general and do not specifically, in this aspect, address cellular phones."*

4.2 Passenger use of cell phones for voice communications during flight

The responses provided little information on the extent of passenger use of cell phones on airplanes equipped with on-board cellular telephone base stations. At this time, there is a small number of air carriers operating airplanes with on-board cellular telephone base stations. The Australia CASA, France's DGAC, Jordan's CARC, Ireland's IAA, and the UK CAA noted that limited trials of airplanes equipped with on-board cellular telephone base station were conducted, and that these are not currently operating the cell phone system. The civil aviation authorities did not gather data on the extent of passenger use of cell phones on these airplanes. The DGAC reported that during the limited trials of airplanes equipped with on-board cellular telephone base station, about two percent of the passengers used their cell phones for voice service. Ireland's IAA reported that one airline with on-board cellular telephone base stations on their airplanes had low passenger use of the system, and subsequently abandoned the system. Saudi Arabia's GACA also reported limited use of cell phones on airplanes equipped with on-board cellular telephone base stations due to the cost of the service. Jordan's CARC commented that during the limited trials on two airplanes with on-board cellular telephone base stations, approximately ten percent of the passengers used their cell phones with the system.

The UAE GCAA received reports from two air carriers that have airplanes equipped with on-board cellular telephone base stations. The two air carriers reported millions of cell phone 'turn-ons', where the on-board cellular telephone base station recognizes an appropriate cell phone being activated on board the airplane. The NZ CAA did not report the extent of use of cell phones on airplanes with on-board cellular telephone base stations due to proprietary data limitations. However, they commented that typically the operator reports that there are ten text messages for each minute of cell phone voice communication.

Brazil's ANAC reported that an average of 0.3 passengers per flight leg used cell phone voice conversation with the on-board cellular telephone base station. The average call duration was 110 seconds.

4.3 Impacts of cell phone use during flight

4.3.1 Impact on safety

For aircraft with on-board cellular telephone base stations, the civil aviation authorities had no confirmed reports of cell phones affecting flight safety. The responses from Australia, Brazil, France, Ireland, and UK point out that when on-board cellular telephone base stations are installed on aircraft, the installer demonstrates that the cell phones and base stations can operate with no interference to systems required for safe aircraft operation.

Australia's CASA noted that it has not received any report of flight safety issues due to inadvertent cell phone operation on airplanes that are not equipped with on-board cellular telephone base stations. It reported anecdotal evidence of cell phone use in flight on aircraft not equipped with on-board cellular telephone base stations, but have no reports of anomalous aircraft behavior linked to cell phone use. The UK CAA reported no substantive data on flight safety issues due to cell phone operation. It provided a list of reports from the CAA Mandatory Occurrence Reporting system. However, the CAA noted that the reports of suspected interference caused by cell phones had only circumstantial evidence. The Irish Aviation Authority noted that it has not received any recent reports of interference from mobile phones or safety hazards due to the use of mobile phones.

The NZ CAA had two reports of potential cell phone interference with airplanes systems on airplanes not equipped with on-board cellular telephone base stations. However, these reports were not conclusively attributed to cell phone interference.

The other civil aviation authorities reported no events related to cell phone interference with airplane systems on airplanes that are not equipped with on-board cellular telephone base stations. The French DGAC commented that during trials using airplanes equipped with on-board cellular telephone base stations, the telecommunication service provider reported that approximately ten percent of passengers forget to turn their cell phones off, even when the on-board cellular telephone base station was not operating.

4.3.2 Impact on the passengers flight experience

Most of the non-US civil aviation authorities reported no negative passenger comments or complaints related to on-board cell phone use.

Jordan's CARC noted some complaints related to loud conversations from passengers using their cell phones on airplanes equipped with on-board cellular telephone base stations. The UAE GCAA reported one airline with on-board cellular telephone base stations on its airplanes noted complaints associated with the cost of using the cell phone service.

Australia's CASA, Ireland's IAA, Saudi Arabia's GACA, and the NZ CAA reported that there was relatively low use of cell phone voice communication on airplanes equipped with on-board cellular telephone base stations.

4.3.3 Impact on flight and cabin crews

The French DGAC commented that flight crews and cabin crews expressed concerns about the health impact related to the radio frequency (RF) fields that are radiated by cell phones in the airplane, and from the on-board cellular telephone base station antennas. It noted that the operator demonstrated to its flight and cabin crews that the on-board cellular telephone base station complied with appropriate RF health standards.

No non-US civil aviation authority reported any cases of air rage or flight attendant interference related to passengers using cell phones on aircraft equipped with on-board cellular telephone base stations. The UAE GCAA reported that one operator commented that there were cases where passengers did not comply with instructions to turn off their cell phones, which required crew intervention. They also commented that the cabin crews received complaints from passengers about the cost of the cell phone service, and complained when the cell phone service was inoperative or interrupted in flight.

The UK CAA also reported that cabin crews reported that some passengers, who were able to use their cell phones on aircraft properly equipped with on-board cellular telephone base stations, are not able to differentiate that some aircraft are not so equipped. Their reports through the UK CAA Confidential Human Factors Incident Reporting Programme (CHIRP) give instances of passengers refusing to switch cell phones off, and other instances where passengers complain about other passengers using cell phones when not permitted.

5 Overall Findings

The non-US civil aviation authorities provided their regulations and policies related to use of cell phones in flight, which are very similar to the US regulations and policies.

The non-US civil aviation authorities who have approved the installation of on-board cellular telephone base stations on aircraft reported that the aircraft with these installations undergo extensive analysis, functional tests, ground tests, and flight tests to demonstrate that the cell phones and base stations do not interfere with aircraft systems. The civil aviation authorities reported no confirmed occurrences of cell phones affecting flight safety on aircraft with on-board cellular telephone base stations.

These aviation authorities reported that use of cell phones on aircraft while airborne is restricted by telecommunications authority regulations. Operators of aircraft with on-board cellular telephone base stations must have approval from telecommunication authorities before these systems can be used by passengers with their cell phones.

No non-US civil aviation authority reported any cases of air rage or flight attendant interference related to passengers using cell phones on aircraft equipped with on-board cellular telephone base stations. Passenger complained about the cost of the cell phone service and when the cell phone service was inoperative or interrupted in flight.

The same authorities reported that some passengers, who were able to use their cell phones on aircraft properly equipped with on-board cellular telephone base stations, are not able to differentiate that some aircraft are not so equipped.

Appendix A US Public Law 112-95

FAA Modernization and Reform Act of 2012

SEC. 410. USE OF CELL PHONES ON PASSENGER AIRCRAFT.
(a) CELL PHONE STUDY.—Not later than 120 days after the date of enactment of this Act, the Administrator of the Federal Aviation Administration shall conduct a study on the impact of the use of cell phones for voice communications in an aircraft during a flight in scheduled passenger air transportation where currently permitted by foreign governments in foreign air transportation.
(b) CONTENTS.—The study shall include—
(1) a review of foreign government and air carrier policies on the use of cell phones during flight;
(2) a review of the extent to which passengers use cell phones for voice communications during flight; and
(3) a summary of any impacts of cell phone use during flight on safety, the quality of the flight experience of passengers, and flight attendants.
(c) COMMENT PERIOD.—Not later than 180 days after the date of enactment of this Act, the Administrator shall publish in the Federal Register the results of the study and allow 60 days for public comment.
(d) CELL PHONE REPORT.—Not later than 270 days after the date of enactment of this Act, the Administrator shall submit to the Committee on Transportation and Infrastructure of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on the results of the study.

Appendix B Cellular Telephone Questionnaire

FAA Modernization and Reform Act of 2012
Questions on the impact of the use of cell phones on air carriers

We would like information related to the following questions.

1. What are your airworthiness and air carrier operation regulations and policies related to the use of cell phones in flight?

2. How is cell phone use permitted? Has a study been conducted to determine that no interference exists with airborne avionics, or is it based on the installation of some device such as pico cells to mitigate interference with cell phone systems?

3. Are there additional regulations and policies that govern the use of cell phones in flight, such as regulations from the telecommunications authority?

4. To what extent have passengers used cell phone for voice communications on airplanes that are equipped for cell phone communications?

5. What about aircraft not equipped for cell phone use? Have passengers attempted to use their phones anyway, and if so, what effects have been experienced?

6. Have the air carriers reported any effects of cell phone operation on flight safety? If so, what effects have been reported?

7. Have the air carriers reported passenger comments or complaints related to cell phone voice communications? If so, what comments or complaints have been reported?

8. Have the air carriers reported flight attendant or other flight crew comments or complaints related to cell phone voice communications? If so, what comments or complaints have been reported?

Appendix C Non-US Civil Aviation Authorities

Civil aviation authorities from the nations listed below responded to the FAA questionnaire related to cell phone use on board airplanes.

Australia - Civil Aviation Safety Authority (CASA)
Brazil - National Civil Aviation Agency (ANAC)
France - Directorate General for Civil Aviation (DGAC),
Ireland - Irish Aviation Authority (IAA)
Jordan - Civil Aviation Regulatory Commission (CARC)
Malaysia – Department of Civil Aviation (DCA)
New Zealand - Civil Aviation Authority (NZ CAA)
Portugal - Instituto Nacional de Aviação Civil (INAC)
Saudi Arabia - General Authority of Civil Aviation (GACA)
United Arab Emirates - General Civil Aviation Authority (UAE GCAA)
United Kingdom - Civil Aviation Authority (CAA)

Appendix D Policies on Use of Cell Phones

Australia
Civil Aviation Safety Regulations 1998
Part 19 Miscellaneous

309A Instructions about activities on board aircraft

(1) Subject to subregulation (2), the operator, or pilot in command, of an Australian aircraft may give an instruction, either orally or in writing, prohibiting or limiting the doing of an act on board the aircraft during flight time in the aircraft.

(2) The operator, or pilot in command, must not give an instruction unless he or she is satisfied on reasonable grounds that the instruction is necessary in the interests of the safety of air navigation.

(3) An instruction does not bind a person unless it is communicated to the person.

(4) A person who is bound by an instruction must comply with the instruction.

Penalty: 25 penalty units.

(5) An offence against subregulation (4) is an offence of strict liability.

Note For strict liability, see section 6.1 of the Criminal Code.

(6) It is a defence to a prosecution under subregulation (4) if the person had a reasonable excuse.

Note A defendant bears an evidential burden in relation to the matter in subregulation (6) (see subsection 13.3 (3) of the Criminal Code).

Civil Aviation Authority of New Zealand
Civil Aviation Rules Part 91 CAA Consolidation 10 November 2011
General Operating and Flight Rules

91.7 Portable electronic devices

(a) No person may operate, nor may any operator or pilot-in-command of an aircraft allow the operation of, any cellphone or other portable electronic device that is designed to transmit electromagnetic energy, on any aircraft while that aircraft is operating under IFR.

(b) Except as provided in paragraph (c), no person may operate, nor may any operator or pilot-in-command of an aircraft allow the operation of, any portable electronic device on any aircraft flying under IFR during an instrument approach or departure procedure or during any other critical phase of flight.

(c) Paragraph (b) does not apply to—

(1) hearing aids;
(2) heart pacemakers;
(3) portable voice recorders;
(4) electric shavers;
(5) electronic watches; or

(6) any other portable electronic device if the operator of the aircraft has determined that the portable electronic device to be operated will not cause interference with any aircraft system or equipment in the aircraft on which it is operated.
(d) In the case of—
(1) an aircraft being operated on air transport operations, the determination required by paragraph (c)(6) must be made by the operator of the aircraft on which the particular device is to be used; and
(2) any other aircraft, the determination required by paragraph (c)(6) may be made by the pilot-in-command or the operator of the aircraft on which the particular device is to be used.

European Parliament
32006R1899 Regulation (EC) No 1899/2006 of the European Parliament and of the Council of 12 December 2006 amending Council Regulation (EEC) No 3922/91 on the harmonisation of technical requirements and administrative procedures in the field of civil aviation
Annex III Common Technical Requirements and Administrative Procedures Applicable to Commercial Transportation by Aircraft
OPS 1: Commercial Air Transportation (Aeroplanes)

OPS 1.110 Portable electronic devices
An operator shall not permit any person to use, and take all reasonable measures to ensure that no person does use, on board an aeroplane a portable electronic device that can adversely affect the performance of the aeroplane's systems and equipment.

Malaysia
Federal Subsidiary Legislation
Civil Aviation Act 1969 [ACT 3]
P.U.(A) 139/96
Civil Aviation Regulations 1996
Incorporating latest amendments - P.U.(A) 322/2004P.U.(A) 139/96
Part VII – Operation of Aircraft
Chapter 5 : General Provisions
Regulation 70. Imperilling safety of aircraft.

(1) No person shall wilfully or negligently imperil the safety of an aircraft or any person on board, whether by interference with any member of the flight crew of the aircraft, or by tempering with the aircraft or its equipment or by disorderly conduct or by any other means.
(2) Subject to subregulation (3), no passenger shall use any mobile phone or other electronic equipment or gadget other than an exempt equipment during flights on any Malaysian aircraft.
(3) For the purpose of this regulations, "an exempt equipment" means any electronic equipment or gadget for use by, or the convenience of, any person carried in an aircraft.

United Arab Emirates
Civil Aviation Regulations
CAR–OPS 1.110 Portable electronic devices

An operator shall not permit any person to use, and take all reasonable measures to ensure that no person does use, on board an aeroplane, a portable electronic device that can adversely affect the performance of the aeroplane's systems and equipment.

United States
US Code of Federal Regulations Title 14 Part 91
§ 91.21 Portable electronic devices.

(a) Except as provided in paragraph (b) of this section, no person may operate, nor may any operator or pilot in command of an aircraft allow the operation of, any portable electronic device on any of the following U.S.-registered civil aircraft:
(1) Aircraft operated by a holder of an air carrier operating certificate or an operating certificate; or
(2) Any other aircraft while it is operated under IFR.
(b) Paragraph (a) of this section does not apply to—
(1) Portable voice recorders;
(2) Hearing aids;
(3) Heart pacemakers;
(4) Electric shavers; or
(5) Any 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.
(c) In the case of an aircraft operated by a holder of an air carrier operating certificate or an operating certificate, the determination required by paragraph (b)(5) of this section shall be made by that operator of the aircraft on which the particular device is to be used. In the case of other aircraft, the determination may be made by the pilot in command or other operator of the aircraft.

US Code of Federal Regulations Title 14 Part 121
§ 121.306 Portable electronic devices.

(a) Except as provided in paragraph (b) of this section, no person may operate, nor may any operator or pilot in command of an aircraft allow the operation of, any portable electronic device on any U.S.-registered civil aircraft operating under this part.
(b) Paragraph (a) of this section does not apply to—
(1) Portable voice recorders;
(2) Hearing aids;
(3) Heart pacemakers;
(4) Electric shavers; or

(5) Any other portable electronic device that the part 119 certificate holder has determined will not cause interference with the navigation or communication system of the aircraft on which it is to be used.
(c) The determination required by paragraph (b)(5) of this section shall be made by that part 119 certificate holder operating the particular device to be used.

US Code of Federal Regulations Title 14 Part 125

§ 125.204 Portable electronic devices.

(a) Except as provided in paragraph (b) of this section, no person may operate, nor may any operator or pilot in command of an aircraft allow the operation of, any portable electronic device on any U.S.-registered civil aircraft operating under this part.
(b) Paragraph (a) of this section does not apply to—
(1) Portable voice recorders;
(2) Hearing aids;
(3) Heart pacemakers;
(4) Electric shavers; or
(5) Any other portable electronic device that the Part 125 certificate holder has determined will not cause interference with the navigation or communication system of the aircraft on which it is to be used.
(c) The determination required by paragraph (b)(5) of this section shall be made by that Part 125 certificate holder operating the particular device to be used.

US Code of Federal Regulations Title 14 Part 135

§ 135.144 Portable electronic devices.

(a) Except as provided in paragraph (b) of this section, no person may operate, nor may any operator or pilot in command of an aircraft allow the operation of, any portable electronic device on any of the following U.S.-registered civil aircraft operating under this part.
(b) Paragraph (a) of this section does not apply to—
(1) Portable voice recorders;
(2) Hearing aids;
(3) Heart pacemakers;
(4) Electric shavers; or
(5) Any other portable electronic device that the part 119 certificate holder has determined will not cause interference with the navigation or communication system of the aircraft on which it is to be used.
(c). The determination required by paragraph (b)(5) of this section shall be made by that part 119 certificate holder operating the aircraft on which the particular device is to be used.

US Code of Federal Regulations Title 47 Part 22

§ 22.925 Prohibition on airborne operation of cellular telephones.

Cellular 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. The following notice must be posted on or near each cellular telephone installed in any aircraft:
“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. The use of cellular telephones while this aircraft is on the ground is subject to FAA regulations.”

References

1 14 CFR § 91.21, § 121.306, § 125.204, and § 135.144. Example of full regulation:

§ 121.306 Portable electronic devices.

(a) Except as provided in paragraph (b) of this section, no person may operate, nor may any operator or pilot in command of an aircraft allow the operation of, any portable electronic device on any U.S.-registered civil aircraft operating under this part.

(b) Paragraph (a) of this section does not apply to—

(1) Portable voice recorders;

(2) Hearing aids;

(3) Heart pacemakers;

(4) Electric shavers; or

(5) Any other portable electronic device that the part 119 certificate holder has determined will not cause interference with the navigation or communication system of the aircraft on which it is to be used.

(c) The determination required by paragraph (b)(5) of this section shall be made by that part 119 certificate holder operating the particular device to be used.

2 47 CFR Part § 22.925, *Prohibition on airborne operation of cellular telephones*

3 FAA Advisory Circular 91.21-1B, *Use of Portable Electronic Devices Aboard Aircraft*, August 25.2006

4 DO-307, *Aircraft Design and Certification for Portable Electronic Device (PED) Tolerance*, October 11, 2007, and Change 1, December 16, 2008, RTCA, Inc.

5 DO-294C, *Guidance on Allowing Transmitting Portable Electronic Devices (T-PEDs) on Aircraft*, December 16, 2008, RTCA, Inc.

6 47 CFR § 22.925

7 European Parliament Regulation (EC) No 1899/2006 amending Council Regulation (EEC) No 3922/91, Annex III OPS 1.110 Portable electronic devices

8 United Arab Emirates Civil Aviation Regulations, CAR–OPS 1.110 Portable electronic devices

9 Civil Aviation Authority of New Zealand, Civil Aviation Rules Part 91, General Operating and Flight Rules, 91.7 Portable electronic devices

10 Malaysia Civil Aviation Act 1969, P.U.(A) 139/96, Civil Aviation Regulations 1996, Incorporating latest amendments - P.U.(A) 322/2004, Regulation 70. Imperilling safety of aircraft.

11 Australia Civil Aviation Safety Regulations 1998, Part 19 Miscellaneous, 309A Instructions about activities on board aircraft

12 Irish Aviation Authority Aeronautical Information Services Nr 11/06, 06 Jul, Use of Portable Electronic Devices On Board Aircraft

13 European Communications Commission (ECC) for the Conférence Européenne des Administrations des Postes et des Télécommunications (CEPT), published in CEPT Report 016, March 30th 2007

14 RTCA DO-294C, *Guidance on Allowing Transmitting Portable Electronic Devices (T-PEDs) on Aircraft*, December 16, 2008, RTCA, Inc.

15 EUROCAE ED-130, *Guidance for the Use of Portable Electronic Devices (PEDs) on Board Aircraft*, December 2006

16 RTCA DO-307, *Aircraft Design and Certification for Portable Electronic Device (PED) Tolerance*, October 11, 2007, RTCA, Inc.

17 Joint Airworthiness Authorities Administrative and Guidance Material, Section Four: Operations, Part Three: Temporary Guidance, Leaflet No. 29, *Guidance Concerning the Use of Portable Electronic Devices on Board Aircraft*, October 1, 2001

18 United Kingdom Aeronautical Information Circular AIC 1/2004 (Pink 62), *Use of Portable Electronic Devices in Aircraft*, 8 January 2002