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Recommended Practice for Transmitter Control and Status Indication in Transmitting Portable Electronic Devices (T-PEDs)

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(Formulated under the cognizance of the CEA **R7 Home Networks Committee.**)

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Foreword

This Recommended Practice is VOLUNTARY. It is not intended, nor anticipated, that this Recommended Practice will be adopted by regulatory agencies to establish mandatory compliance requirements for T-PEDs. It is instead intended that the following Recommended Practice be made available for adoption by relevant industries or private stakeholders (e.g., airlines, healthcare facilities) to be incorporated into their policies related to sensitive environments.

This Recommended Practice was developed under the auspices of CEA, in conjunction with allied organizations in related industries. This document was prepared in liaison with RTCA Special Committee 202, the European Telecommunications Standards Institute (ETSI), and members of the air transport and consumer electronics industries.

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Recommended Practice

for Transmitter Control and Status Indication

in Transmitting Portable Electronic Devices (T-PEDs)

1 Introduction

1.1 Scope

This Recommended Practice sets forth a series of PROVISIONS that collectively constitute a FEATURE SET outlining TERMINOLOGY and INDICATORS to determine TRANSMIT and OPERATIONAL STATUS of Transmitting Portable Electronic Devices (T-PEDs) and facilitate ease of operation in controlling transmitters in T-PEDs to aid in managing their use in sensitive electronic environments. For the purposes of this Recommended Practice, T-PEDs are considered to be handheld mobile communication or computing devices for sale to the general public that intentionally transmit a radiofrequency (RF) wireless signal.

This Recommended Practice outlines inter-related PROVISIONS that together constitute a FEATURE SET, where the features are understood to be implemented collectively and in their entirety for all wireless technologies used in a product. Conformance assumes satisfaction of all PROVISIONS in the FEATURE SET collectively, and non-conformance assumes any one or more of the PROVISIONS have not been satisfied.

This Recommended Practice addresses wireless technologies that are defined in technical and/or industry standards and widely available in consumer products (e.g., CMRS / cellular network systems, WiFi, Bluetooth). Developing wireless technical standards or wireless technologies not yet common in consumer products (e.g., UWB, 802.15.4, WMTS) are not addressed in this revision, but they are mentioned and might be addressed in subsequent revisions. Wireless technologies as described in this Recommended Practice are broadly classified into categories; it is not the intention here to provide a detailed description of the RF signal or technology subtype¹. Infrared transmitters and receivers are not covered by this Recommended Practice.

¹ Different wireless technology subtypes within a given category (e.g., CMRS / cellular network systems, WiFi, Bluetooth) may have distinct signal characteristics, capacity support, dynamic power level control, and dynamic frequency selection that may directly or indirectly influence their electromagnetic interaction with neighboring sensitive electronic equipment. It is not the purpose of this Recommended Practice to provide a detailed description of wireless technologies. In addition, the complexity of defining terminology and indicators to specify each possible technology subtype would defeat the purpose of a simple, clear, and consistent set of terminology and indicators for T-PED transmit status. For instance, it is understood that operation of WiFi may involve different subtypes including 802.11a that operates in the 5.1 – 5.8 GHz band and 802.11b/g that operates in the 2.4 – 2.5 GHz band. Many laptop computers and WiFi add-on cards are enabled to operate on both frequency bands using 802.11a/b/g. It is also understood that operation of CMRS from T-PED handsets in the USA may include different frequency bands (806-824 MHz, 824 – 849 MHz, 1850 – 1910 MHz) as well as different signal types (analog, GSM, CDMA, iDEN). Additional “cellular” frequency bands exist in Europe (890 - 915 MHz, 1750 –

This Recommended Practice is intended for use by portable electronic device (PED) manufacturers, related component and software companies, the air transport industry, relevant government regulatory agencies, and other stakeholders that might require information on transmitting status of T-PEDs to facilitate policies.

This Recommended Practice is intended to be used by individual stakeholders in the formation of their policies to manage the use of T-PEDs in commercial aircraft, healthcare, and other sensitive electronic environments. The PROVISIONS of this Recommended Practice are to be implemented by producers of T-PEDs in their products.

This Recommended Practice does NOT address medical data (e.g., alarms, alerts, quality of service requirements) or make any recommendations regarding conditions under which T-PEDs that support wireless medical data streams are to be enabled or disabled. Such decisions regarding the transport of medical information are out of the scope of this document and are assumed to be in the purview of healthcare professionals.

1.2 Overview

This Recommended Practice outlines PROVISIONS that together constitute a FEATURE SET, which include defined TERMINOLOGY and INDICATORS for TRANSMIT and OPERATIONAL STATUS of T-PED devices.

The individual PROVISIONS in this FEATURE SET are understood to be considered collectively. Conformance will assume satisfaction of all PROVISIONS in the FEATURE SET, and non-conformance will assume any one or all PROVISIONS in the FEATURE SET have not been satisfied.

The purpose of this FEATURE SET is to provide both users and persons managing sensitive electronic environments a rapid, clear, and consistent method to manage T-PED transmissions. This FEATURE SET of indicators and terminology is not intended to provide precise information on the transmitted signal (i.e., frequency, modulation), but simply identify general classes of wireless communication technology that are enabled and/or active. Indication that all transmitters are disabled is specified by a negative indicator (“Transmit Disabled”). Selective enabling of transmitters is designated by various positive indicators and will therefore depend

1780, 1900 - 1980 MHz) and other parts of the world. It is understood that a majority of currently available Bluetooth devices are class 3 and operate at milliwatts to of power, while class 1 devices operating at 1 watt may increasingly find their way into commercially available products. Any indication of these broad wireless technology categories will imply that any or all of these technology subtypes may be actively transmitted. Likewise, conformance of any wireless technology category to this Recommended Practice is to account for all associated technology subtypes to be actively transmitted.

upon user knowledge of indicator display and governing policy, as well as T-PED device manufacturer conformance. More detail on display of indicators is provided in Sections 4 and 5.

PROVISIONS regarding TRANSMITTING MODES:

1. “Transmit Enabled”: Satisfaction of (a), (b), or (c) will indicate all potential transmitters ON

- a. “Transmit Enabled” indicator: 
- b. Conventional signal strength indicators:  ,  , 
- c. Power on with no indicator

2. “Transmit Disabled”: Satisfaction of (a) or (b) will indicate all potential transmitters OFF

- a. “Transmit Disabled” indicator: 
- b. Power OFF

3. “Specific Transmitters Enabled”: Satisfaction of (a), (b), or (c) will indicate that only the specific transmitter(s) indicated are ON

- a. wLAN / wPAN Industry Standard indicators: e.g.,



- b. CMRS / cellular network indicator on mobile phones (conventional signal indicators):



- c. CMRS / cellular network indicator on laptops and other T-PEDs (proposed indicator):



- Transmit Disabled indicator indicates all transmitters are OFF
- Power on with no indicators indicates all transmitters are ON

PROVISIONS regarding OPERATIONAL MODES:

4. **“Sleep”**: NO SPECIFIC INDICATOR – **wakeup T-PED using a simple 1-step process, with transmit status indicators clearly visible upon awakening**
5. **“Voice + Data” vs. “Data ONLY”**: NO SPECIFIC INDICATOR
6. **“Power OFF”**: NO SPECIFIC INDICATOR

1.3 Background and Purpose

It is recognized that certain electronically sensitive environments (e.g., the “sterile cockpit” phase of a commercial airline flight; critical care areas of hospitals) might have policies and applicable regulations to control RF transmissions from T-PED devices. However, as radio frequency wireless technologies permeate our society, greater numbers of the general public are becoming dependent upon wireless communications and computing, and T-PED devices are increasingly operated in electronically sensitive or otherwise restricted environments. In response to this growing situation, many stakeholders have restructured policies to support managed use of T-PEDs. However, these policy adjustments are not always consistent. In the case of healthcare, ISO/TR 21730:2005 outlines a recommended practice for the deployment, use, and management of mobile phones and other T-PEDs for wireless communication and computing in hospitals. In the case of aircraft, the RTCA SC-202 DO-294A and comparable EUROCAE WG58 work product include recommendations that might serve as guidelines to the commercial airline industry for restructuring policies in support of managed T-PED use. Many airlines have already achieved certification for on-board WiFi / 802.11.a/b/g systems to support passenger mobile computing. Mobile phone picocell systems are being actively developed with the intent of supporting managed use of on-board passenger mobile phone communication during non-critical phases of flight.

As T-PED devices become increasingly multi-functional, they might be enabled to transmit multiple wireless signals simultaneously or independently. Different T-PED operational modes might or might not comply with policy requirements in electronically sensitive environments (depending upon which transmitters are active). For example, many mobile phones have internal software to support games, music, and other applications that can be used when the RF link to the CMRS / cellular network¹ has been disabled. In the case of laptop computers, modems can be added to support WiFi or CMRS / cellular network¹ links for internet and e-mail server access. In many T-PED devices, Bluetooth / 802.15.1 links to a headset or mouse are becoming increasingly popular.

In a recent US House of Representatives Subcommittee meeting² (to examine public safety, national security and social implications stemming from a recent FCC proposed rule change³) one of the main concerns was the potential adverse social impact of wirelessly supported voice conversations occurring within the confines of a passenger aircraft cabin during flight.

As the transmitter status of T-PEDs becomes increasingly complex, there is a need to create clear and consistent terminology and indicators to facilitate consistent policies to manage T-PED operation in electronically sensitive and/or restricted environments. The prior Recommended Practice (October 2004) specified three operating modes and their acceptable indication:

- Transmit Enabled: Power on - all transmitters on [indicator(s) or no indicator(s)]
- Transmit Disabled: Power on - all transmitters off [indicator]
- Power off - all transmitters off [no indicator]

The current Recommended Practice broadens the scope to encompass T-PEDs that are capable of transmitting multiple RF signals. These multiple RF signals might operate independently of each other, so that the complex status of transmission cannot easily be determined using a single indicator. The current Recommended Practice specifies three additional transmit and operating modes, and their acceptable indication:

- Specific Transmitters Enabled: Power on – indicated transmitters ON [indicator(s)]
- Sleep: Power on – transmitter status as above [indicator, 1-step wake-up]
- Data only: Power on - transmitter status as above [no indicator]

In addition, the current Recommended Practice broadens the scope to encompass additional T-PEDs as they become wirelessly enabled as a means of cable replacement, remote control / monitoring, and access to communication and data networks. The list of potential T-PEDs currently recognized by the present Recommended Practice might include:

- Mobile phones
- 2-way pagers
- PDAs
- Laptop computers
- MP3 players (e.g., wWAN MP3 downloads)
- Wireless headsets
- Wireless human interface devices (e.g., mouse, keyboard, keypad, graphic tablet)

² Subcommittee on Aviation Cell Phones On Aircraft: Nuisance Or Necessity? (July 14, 2005)

³ FCC Notice of Proposed Rulemaking (December 15, 2004) Docket No. 04-435; Amendment of the Commission's Rules to Facilitate the Use of Cellular Telephones and other IWireless Devices Aboard Airborne Aircraft

- Game players
- Medical devices and physiologic sensors⁴

1.4 Revision History

This Recommended Practice (CEA-CEB18) was adapted from an earlier document *Recommended Practice - Status Indicator for and Control of Transmitters in Portable Electronic Devices (PEDs)* published by CEA in 2004, which addressed only the ability to turn off all transmitters. The current CEA-CEB18 extends the previous document to consider disabling of one or more T-PED transmitters, each with the capability of transmitting multiple different RF signals, which might be present in a single device, and also addresses “wLAN / wPAN Enabled” transmitter status.

It is anticipated that this Recommended Practice will be amended as products and wireless technologies evolve. Such amendments might address changes in:

- T-PED device types
- RF wireless technologies
- Operational modes
- Industry practices / policies
- Regulatory compliance requirements
- Industry accepted terminology

⁴ As outlined in the Scope section, although the current Recommended Practice recognizes medical devices and physiologic sensors as increasingly wirelessly enabled, it will not address medical data (e.g., alarms, alerts, quality of service requirements) or make any recommendations regarding conditions under which to enable or disable T-PEDs that support wireless medical data streams. Such decisions regarding the transport of medical information are out of the scope of this document and should be made by healthcare professionals.

2 References

2.1 Informative References

The following documents are not necessary for implementation of this Recommended Practice but provide useful information related to the subject matter covered in this Recommended Practice.

- [1] RTCA SC-202 DO-294A
"Guidance on Allowing Transmitting Portable Electronic Devices (T-PEDs) on Aircraft" issued 3-14-06
- [2] ISO TC 15 - ISO/TR 21730:2005
"Health informatics — Use of mobile wireless communication and computing technology in healthcare facilities — Recommendations for the management of unintentional electromagnetic interference with medical devices"
- [3] IEEE P1621
"Standard for User Interface Elements in Power Control of Electronic Devices Employed in Office/Consumer Environments"
- [4] PCI Express
"PCI Express Specifications"
- [5] PCMCIA
"PC Card Standard"
- [6] RTCA SC-202 DO-294 guidance documents
"Phase I – Near-Term PED Technology Assessment"; "Phase II – Longer Term Technology Assessment"
- [7] USB
"Universal Serial Bus 2.0 Specification"

Documents related specifically to symbol design include:

- [8] ETSI EG 201 379-v1.1.1-1998
"Framework for the development, evaluation and selection of graphical symbols"
- [9] ETSI ETR 070
"The multiple index approach [MIA] for the evaluation of pictograms"
- [10] ETSI ETR 113
"Results of an evaluation study of pictograms for point-to-point videotelephony"

- [11] ETSI ETS 300 375-Edition 1-1994
“Pictograms for point-to-point videotelephony”
- [12] IEC 80416-1 Ed. 1.0 - 2001
“Basic principles for graphical symbols for use on equipment – Part 1: Creation of symbol originals”
- [13] TC 145/SC 1 - ISO 9186: 2001
“Graphical symbols – Test methods for judged comprehensibility and for comprehension”
- [14] ITU-T Recommendation SG 2: F.910
“Procedures for designing, evaluating and selecting symbols, pictograms and icons”

2.2 Reference Acquisition

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3 Definitions and Conventions

3.1 Abbreviations and Acronyms

The following abbreviations and acronyms are used in this Recommended Practice when referring to PEDs. For compliance to this Recommended Practice, alternative abbreviations are not used.

BT	Bluetooth
CMRS	Commercial Mobile Radio Service – refers to T-PEDs that operate on cellular, PCS, mobile radio, paging or other licensed spectrum. Also referred to the in Recommended Practice as “cellular network systems” ¹
EUROCAE	European Organization for Civil Aviation Equipment – WG 58 is the Working Group responsible for addressing passenger transmitters on commercial aircraft
PCI	Peripheral Component Interconnect
PCMCIA	Personal Computer Memory Card International Association
PDA(s)	Personal Digital Assistant(s)
PED(s)	Portable Electronic Device(s)
RF	Radio frequency
TBD	To be determined
T-PED(s)	Transmitting Portable Electronic Device(s)
USB	Universal Serial Bus
UWB	Ultra wideband
WiFi	Wireless fidelity; industry standard definition for local area networks conforming to IEEE 802.11x specifications (also Wi-Fi)
Wi-MAX	World Interoperability for Microwave Access, Inc.
wLAN	Wireless Local area Network
WMTS	Wireless Medical Telemetry System

wPAN	Wireless Personal area Network
wWAN	Wireless Wide area (mobile phone-type) Network

3.2 Terms

The following terms are used in this Recommended Practice when referring to T-PEDs. For conformance to this Recommended Practice, alternative terms are not used.

Active mode [re: Transmitter] – powered ON and in use; transmitters might either be enabled or disabled.

Auxiliary [re: Transmitter] – wireless transmitter on a CMRS enabled T-PED (e.g., mobile phone, PDA, some laptops) that is not the CMRS transmitter. As an example, a mobile phone transmitting a Bluetooth link to a wireless headset or a WiFi link to a local area network would be considered an “auxiliary” transmission.

Bluetooth [re: Transmitter] – A transmitter conforming to the industry standard developed by the Bluetooth Special Interest Group (SIG) and largely paralleling the IEEE 802.15.1 technology standard. Bluetooth links are common for short range, lower power applications such as wireless mouse and headsets.

Cellular – A wide area network communication system often associated with the operation of mobile or cellular phones and composed of multiple coordinated base stations that each have responsibility for supporting a defined coverage area or “cell”

CMRS [re: Transmitter] – Any T-PED device that normally transmits on wide area networks using cellular, PCS, mobile radio, paging or other wireless licensed services. Such T-PED devices normally include mobile phones, some PDAs, and laptops with cellular or PCS network cards. Also referred to in the Recommended Practice as “cellular network systems”.

Disabled [re: Transmitter] – powered on, but **not capable** of transmitting; this transmitting mode may assume internal local oscillator and clocks are operating and creating spurious emissions, but the fundamental transmitters are disabled

Enabled [re: Transmitter] – powered on and **capable** of transmitting

Feature Set – the collective representation of all the individual provisions as outlined in this document that together define terminology and indicators for management of T-PED transmit status

Laptop – battery and/or line voltage powered portable computer of a dimension suitable for operation on one’s lap, a desktop, or an airline tray table (also sometimes referred to as Notebook)

Off [re: Transmitter] – not powered (i.e., no power to RF circuit board or antenna); this state might assume internal clocks running at minimal power, but a device in the OFF state will not transmit

On [re: Transmitter] – powered on and in use

Provision – the individual elements describing transmitter control, terminology used, and/or indicators displayed, as outlined in this document, which collectively make up the FEATURE SET. The FEATURE SET as a whole defines the control, terminology, and indicators for management of T-PED transmit status

Receiver [re: Transmitter] – radio receiver or wireless receiver

Sleep [re: Transmitter] – Power ON but in some state of minimal power consumption (e.g., backlighting off, screen off) with settings and prior-state information retained and capable of quickly resuming active status following minor user action. Importantly, some T-PEDs (e.g., CMRS / cellular network systems) might continue to transmit burst RF signals during sleep mode to maintain the network link even though other activities have been temporarily discontinued. This mode may also be referred to as “inactive mode” or “power save mode”.

Transmitting Portable Electronic Device (T-PED) [re: Transmitter] – handheld and portable devices for mobile communication and computing that contain a transmitter to allow a wireless link to other devices or a network; includes such devices as notebook (laptop) computers, personal digital assistants (PDAs), and mobile phones

Transmitter – radio transmitter or wireless transmitter, also known as an “intentional radiator”; a component of a device that is capable of generating radio waves for the specific purpose of communicating with other devices

Wi-Fi [re: Transmitter] – A transmitter conforming to the industry standard developed by the Wi-Fi Alliance and largely paralleling the IEEE 802.11 technology standard (also Wi-Fi).

Wi-MAX [re: Transmitter] – A transmitter conforming to the industry standard developed by the Wi-Fi Alliance and largely paralleling the IEEE 802.16 technology standard.

3.3 Conventions

The PROVISIONS of this Recommended Practice represent an intact FEATURE SET for conformity assessment purposes.

4 Disabling and Enabling Transmitters

Section 4 details recommended procedures to disable and enable transmitters, or otherwise indicate T-PED transmit status. T-PED manufacturers are encouraged to develop and incorporate simple and obvious point-and-click and keystroke commands to disable and enable individual transmitters.

4.1 Accepted Procedures

Satisfaction of the PROVISION describing “Transmit Disabled” mode involves the ability to immediately place any T-PED into a “Transmit Disabled” mode with minimal user effort (e.g., single key stroke, single button push, slide switch or battery removal), as opposed to a series of keystrokes or menu options. Such a simple and rapid method is necessary to address situations where an actively transmitting T-PED is causing, or representing an imminent risk of, potentially harmful interference. This should be possible from either an active or inactive state of the T-PED, and should remove all power from all intentionally transmitting RF circuit(s) and transmitting antenna(s) [although in certain cases non-intentionally transmitting components (e.g., local digital oscillators) might remain powered].

If a complete Power OFF is the only way to bring the T-PED to Transmit Disabled status (i.e., there is no operational mode allowing Transmit Disabled status while the T-PED is in an active state), then it is recommended the device not be operated in electronically sensitive environments or where existing policies do not allow the use of RF transmitters. If a T-PED cannot be powered ON in a Transmit Disabled mode, it is recommended the device not be operated in an electronically sensitive environment unless a) it is already in a Transmit Disabled mode upon entering that environment, or b) it is taken outside the sensitive environment, switched to Transmit Disabled mode, and then brought back in.

In addition to powering OFF the T-PED as described above, alternative methods might be available to place the T-PED into Transmit Disabled mode. Such alternative methods might allow the T-PED to maintain an active status and support “on-board” functionality (e.g., various computer processing programs, games, music). This might involve manual selection of Transmit Disabled mode through a multi-step user interface. Such user initiated operations would not need to be single-step procedures so long as they were used to disable transmitters PRIOR to entering an electronically sensitive or restricted environment (e.g., the ICU of a healthcare facility; upon announcement of acceptable use of T-PEDs in a commercial aircraft at cruise altitude). Such methods of achieving Transmit Disabled status in active mode, if available, should be clearly outlined in the user manual and be accompanied by appropriate indicators on the T-PED (described in section 5) to clearly indicate the Transmit status.

It is foreseeable that the use of certain wireless technologies might be permitted at certain times or in certain locations within electronically sensitive or restricted environments while other wireless technologies might not. The Specific Transmitters Enabled mode is