TACTILITY, VOICE RECOGNITION AND SPEECH COMMAND

1. Scope

This draft Code-of-Practice (CoP) is intended to establish practical, achievable and viable minimum standards for accessibility to information, products and services provided via Information and Communication Technology (ICT) [kiosks].

The objective is to ensure access to information, products and services for those with disabilities including sensory impairment(s), limited dexterity, restricted mobility or some cognitive impairment (permitting higher levels of functionality). These codes of practice are proposed for ICT Kiosks deployed in public spaces, public amenities and in places of public accommodation or service. For the purposes of this CoP, public spaces and places of public accommodation are considered to include (but are not limited to) public infrastructure and facilities such as passenger transport terminals, places of education, healthcare facilities, government or civic facilities, publicly accessible amenities , places of entertainment or hospitality and commercial premises providing public access to information, products, facilities or services.

This CoP recognizes that the emergence of new technology and techniques may provide additional or improved accessibility beyond the minimum standards described in this document. This CoP does not prevent, preclude or discourage adoption of such innovation or improvements.

This CoP will also address the required density of available accessible kiosks in any given kiosk deployment or population.

IMPORTANT NOTICE:

Adoption of, or compliance with this Code of Practice does not indicate or warrant compliance with any law or other legally mandated requirement. Compliance with this Code of Practice does not absolve or release any person, organization or agency from their obligations and responsibilities under law, or legally enforceable mandates, in either domestic or foreign jurisdictions.

2. Density and Population of Accessible ICT

Commentary: The stated KMA objective and recommendation is that all ICT/Kiosks should be as inclusive and as accessible as possible. However, it is recognized that this

objective may not be viably delivered in all locations or applications. It is therefore proposed that the KMA adopt a 'minimum density of accessible kiosks' policy.

Current Standards, and precedent relating to the population of Accessible Kiosks.

DOT Air Carrier Access Act

Commentary: The Air Carrier Access Act, issued by the US Department of Transport, relates to public ICT deployed in the Air Passenger Transportation Sector. It would be advisable and good practice for kiosk deployers in all sectors to follow this established legal precedent.

Best Practice:

Commentary: As a minimum requirement, the density of available accessible kiosks, when located together with other kiosks, for a common purpose, in a group, line or other configuration, must be one in four (25%).

For example: If three kiosks are located together, for a common purpose(s), in a group, line or other configuration, then a minimum of one kiosk must be compliant with Standards for Accessible Design. If eight kiosks are located together, for a common purpose(s), in a group, line or other configuration, then a minimum of two kiosks must be compliant with Standards for Accessible design. If a single kiosk is located, for a specific purpose(s), whether or not in proximity to other kiosks located for other purpose(s), then it must be compliant with Standards for Accessible Design.

2.1.   It is recommended that only 'accessible' kiosks be installed until 25% of the total kiosk population in any given location, grouping, common purpose or application meet Standards for Accessible Design

2.2.   This minimum kiosk population density applies to owned, jointly owned, leased, shared use, controlled, franchised or operated kiosks or other ICT terminals

deployed in public spaces, public amenities and in places of public accommodation or service.

   2.3.   To comply with the ACAA Standards for Accessible Design only 'accessible' kiosks should be installed until 25% of the kiosk population meets the requirements for Accessible Design.

   2.4.   To comply with the ACAA, 25% of the kiosk population, located together for a common purpose(s), in a group, line or other configuration, must be compliant by December 12th 2022

3. Dimensional and Physical

Awaiting content

4. Software as a primary customer interface

Awaiting content

5. Hardware as a primary customer interface

5.1 Visual display screens.

  5.1.1 703.5.1 ADA 2010 - Finish and Contrast (for text. Note: appears to not apply to digital signs)

  5.1.2 703.6.2 ADA 2010 - Finish and Contrast (for pictograms)

  5.1.3 703.7.1 Finish and Contrast.(for symbols of accessibility)

  5.1.4 707.6.3.1 Contrast. (for function keys)

  5.1.5 407.3 Operable Parts - Contrast -- [ICT Refresh Final Rule](#)

  5.1.6 408 Display Screens - [ICT Refresh Final Rule](#)

5.2 Tactilely Discernible Controls.

Commentary: Alternative means of content navigation must be provided for those who cannot see, read or interact with touch screens. Alternative means of content navigation must provide access to all information, services and products provided to those without impairments or disabilities. Alternate means of content navigation must include provision to navigate audible descriptions, instructions, directions and content.

Current Standards:

2010 ADA Standards for Accessible Design, section 707.6.

2010 ADA Standards for Accessible Design, section 707

Section 508 Standards for Electronic and Information Technology as published in the Federal Register on December 21, 2000, subpart B Technical Standards section

1194.25 (which refers the user to follow 1194.23)

Best Practice:

5.2.1. Kiosks that feature tactile devices to navigate information, services or products provided by the kiosk(s), shall comply with the following:

5.2.2. Controls and keys shall be tactilely discernible (explorable by tactile means) without activating the controls or keys. (Taken from Section 508, 1194.23, 1)

5.2.3. Controls and keys shall have industry standard, tactile identifiers (idents).

5.2.4. Where provided, keys and controls shall contrast visually and tactilely from background surfaces. Keytops should be raised above the surrounding surfaces by at least 0.5 mm. Commentary: This clause includes corrections to 707.6.3.1. so should not reference that clause.

5.2.5. Controls and keys shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls and keys shall not exceed 3.0 Newtons. *Commentary: It should be noted that in current standards a maximum activation force of 5 lbs (in excess of 30.0 Newtons) is specified. This is, by orders of magnitude, too high and would likely cause strain or injury to many disabled operators. A maximum key actuation force of 300 grams. (3.0 Newtons) should be specified. An optimum actuation force of between 150 to 250 grams should also be specified.*

5.2.6. If key repeat is supported, the delay before repeat shall be adjustable to at least 2 seconds. Key repeat rate shall be adjustable to 2 seconds per character. (Taken from Section 508, 1194.23, 3)

5.2.7. The status of all locking or toggle controls or keys shall be visually discernible and discernible either through touch or sound. (Taken from Section 508, 1194.23, 2)

5.2.8. The operational boundaries of each key should be tactilely and visibly discernable. The operational area or boundary of each key should have a strong visual contrast with the surrounding surface. A minimum contrast ratio of 3:1 is required.

5.2.9. Keys should operate reliably, with a similar tactile dynamic, when pressed anywhere within the discernable keytop boundary, including on or close to a keytop's discernable boundary.

5.2.10. Confirmation of a keypress should be given by an audible or tactile response to the keypress.

5.2.11. Keytop characters or symbols should consist of an accessible, open, san-serif font / icons, with strong visual contrast against the keytop's operational surface.

5.3. Alphabetic Keys

Where provided, individual alphabetic keys shall be arranged in a QWERTY-based keyboard layout and the "F" and "J" keys (home keys) shall be tactilely distinct from the other keys.

Commentary: The inclusion of alpha characters on numeric keypads as alternative associated keytop characters is not recommended as the international norms for alternate alpha characters differ from country to country. Additional characters on keytops also compromise the clarity and readability of the primary numeric keys.
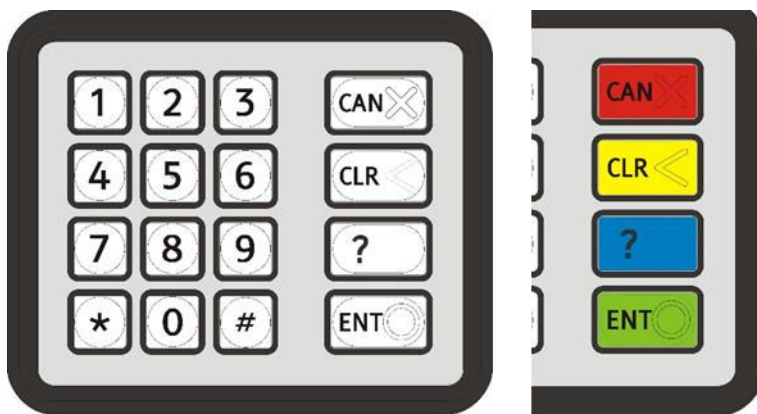
5.4. Numeric Keys

Figure 1. Typical example of a tactilely discernable numeric keypad with function keys.

Where provided, numeric keys shall be arranged in a 12 key telephone format configuration (1, 2, 3 along the top row of keys). The number five key shall be tactilely distinct from the other keys by means of a home key tactile ident.

5.4.1. The numeric keys should be positioned in a grid format on either a regular 16mm or 19mm pitch.

5.4.2. Where additional 'function keys' are to be integrated as part of the numeric keypad, then they should be arranged vertically in a column to the right of the numeric keys. E.g. From top to bottom; CAN, CLR, ?, ENT. *Commentary: This is the most widely accepted and internationally recognized layout for accessible numeric keypads, often referred to as 'International Telephone Format*.

5.4.3. Function keys should be tactilely and visually differentiated from the numeric keys by adoption of an extended horizonal spacing (pitch) between the function keys and their adjacent numeric keys. The spacing between the right hand edge of the adjacent numeric key and the left hand edge of each function key should be three times (3x) that of the horizontal spacing between the edges of two adjacent numeric keys. The function keys must include the designated tactile idents associated with their specific function. E.g Raised tactile X, raised tactile <, raised tactile ? and raised tactile O(circle).
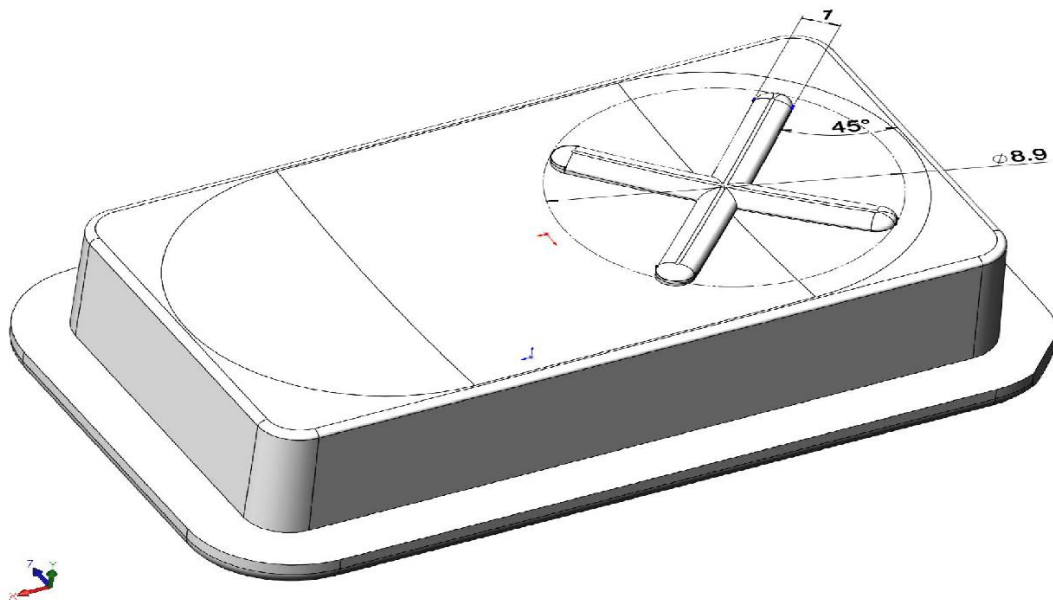

Figure 2. Typical example and form of a tactile ident to denote the specific purpose of a function key. In this case 'CANCEL'.

5.4.4. Tactile idents should be a minimum 5.0mm tall x 5.0mm wide. However, it is recommended that tactile idents should, where possible, be larger. (e.g. 10.0mm x 10.0mm). Tactile lines should be approximately 1.0mm in width and be raised a minimum 0.5mm above the surrounding surface. Tactile Idents should have radiused edges to avoid sharp corners being presented to the user's fingertips. Where possible function keys should also be delineated by color. E.g. Red, Yellow, Blue, Green.

5.4.5. It is recommended that the Enter Key (when included in a standard numeric keypad array) should be situated as the bottom right key in the keypad

array. (See figure 1 as an example keypad layout). This does not apply when an 'enter' (or select) key is included as part of a directional or content navigation keypad.

5.5. Audible output.

5.5.1. Audible descriptions, instructions, directions and content.

should be accessible by lifting a handset or connecting a headset, earbuds or assistive hearing device via a standard 3.5mm jack plug socket. Lifting a handset or connection of a headset, earbuds or assistive hearing device must initiate an audible **welcome message** that should include instructions about setting the sound volume and (when the user is ready) how to begin (initiate) the audio program (usually by pressing a select or enter key). The **welcome message** should repeat continuously until the audio program is initiated or the handset is replaced, or the headset, handset, earbuds or assistive hearing device is disconnected. *Commentary: This feature is intended to provide the user with as much time as may be necessary to position and adjust the handset, headset, earbuds or assistive hearing device before initiating the audio program*.

5.5.2. When the kiosk provides audible output, the audio signal shall be provided at a standard signal level through an industry standard 3.5mm jack plug socket that will allow for private listening.

5.5.3. It must be possible for the kiosk user to pause or dwell at any point in the audio program where a decision or action is required by the user. It should also be possible for the user to go back, to hear again the description of the choices available or actions required.

5.5.4. At any point in the audible program it should be possible for the user to abandon the transaction by disconnecting the headset or assistive hearing device. Reconnection of the headset or assistive hearing device will return the audio program to the initial **welcome message**.

5.5.5. The user should, at any time, be able to abandon the transaction and return to the initial **welcome message** by pressing and holding down the enter/select button for a minimum duration of 3 seconds. *(This should be explained during the Welcome Message.)*.

5.5.6. When products deliver voice output in a public area, incremental volume control shall be provided with output amplification up to a level of at least 65 dB. Where the ambient noise level of the environment is above 45 dB, a volume gain of at least 20 dB above the ambient level shall be user

selectable. A function shall be provided to automatically reset the volume to the default level after every use.

5.5.7. Timed Response - where a timed response is required, the user shall be alerted visually, as well as by touch or sound and shall be given the opportunity to indicate that more time is needed to complete a required / requested task or action.

5.6. Voice Recognition and Speech Command

Commentary:

Voice Recognition and Speech Command Technology as an assistive interface for ICT in public spaces is not currently mandated. However, it is being considered by regulatory bodies and the expectation is that it will be added to future mandates.

The emergence of Voice Recognition as a means of biometric confirmation of identity, coinciding with the profound impact of AI on speech commanded ICT, will drive adoption of speech command technology in public spaces and applications. Whereas this presents many challenges and risks to privacy and protection of personal data, it will lead to a new era of equality in access to information, services and products for those with disabilities. It will be necessary for accessibility mandates, regulation and standards to be adapted in support of this revolutionary change in the way humans interface with the digital world. Speech Command Technology creates significant new opportunities for independent living.

Who is Listening?

Commentary: When a private citizen purchases a connected smart speaker device for home use, he/she makes an informed decision to install that device into their home environment. Before connecting their new device to the manufacturer's cloud-based AI applications new customers are required to agree and accept many terms and conditions of service. By doing so they make a decision to accept a listening device into their home; albeit with an option to mute that device or switch it off at any time. The customer knows where the device is located, what its connected status is and how to switch it off.

However, to overcome the latency (delay) inherent in delivering cloud-based AI services to a device that has just been switched on, these devices (by default) usually remain in a powered and connected configuration. Amazon have referred to this default configuration as "Always on, always ready". This configuration is sometimes referred to by other commentators as "Always on, always listening". The device needs to be configured in this way to operate as an effective 'hands free' Voice Recognition and Speech Commanded information system.

In a Public Environment.

Speech Command (henceforth referred to as SC) and Voice Recognition (henceforth referred to as VR) technology may provide an effective and valuable improvement in accessibility to public ICT systems. Applications such as public transport ticketing and airline check-in terminals would be typical examples.

As part of a multi-modal approach to accessibility, Speech Command will provide an additional option for those with disabilities (and those without) to confirm their biometric identity and to interface with the kiosk's application software. The kiosk user will be able to choose from a combination of tactile, audible or visual interface devices to best meet their specific accessibility needs.

However, it is essential that all kiosk users and those members of the public in proximity to the kiosk be made aware that the terminal includes Voice Recognition and/or Speech Command technology and that the Speech Command facility is "on and listening". This awareness is essential for two reasons:

To inform the kiosk user that Speech Command / Voice Recognition technology is available for their use and convenience.

To warn members of the public (in proximity) that their conversations may/will be picked up by the Speech Command / Voice Recognition facility and may be transmitted to a remote server for analysis, processing and possible retention.

This awareness must be provided for members of the public who are sighted, partially sighted, non-sighted or hearing impaired.

5.6.1. Adoption of a Universal Symbol

A universally recognized symbol for Speech Command functionality will be adopted by the Kiosk and Self Service industry.

The symbol's purpose is to indicate the presence of voice recording, voice recognition or speech command technology.

Commentary: A KMA member has designed a high contrast, highly visible and tactilely discernible symbol that can be easily applied to most kiosks.

During the development of this symbol, the KMA member worked closely with the UK's Royal National Institute for Blind People (RNIB). Feedback received from the RNIB has influenced the symbol design. This to aid recognition, ease of use, and to ensure that all contours and edges are rounded to make it comfortable to the touch.

As with any new symbol, but especially tactile symbols, people will need to learn its meaning. This highlights the importance of introducing a standard symbol which can be used across all kiosks and sectors to ensure that blind people need only learn one symbol.

5.6.2. When voice recognition, voice recording or speech commanded services are activated, the symbol must be illuminated with a bright white light.

The applied symbol should be positioned such that it can be easily seen or tactilely located as a user approaches or addresses the kiosk.

Commentary: A proposed specification for the Voice Recognition / Speech Command symbol is reproduced below. The KMA member (originator) and the RNIB propose to make this symbol available as a "free-to-use" graphic device.

The KMA member will offer a physical, manufactured version of the graphic device, in the form of an illuminated panel with an integrated proximity sensor.
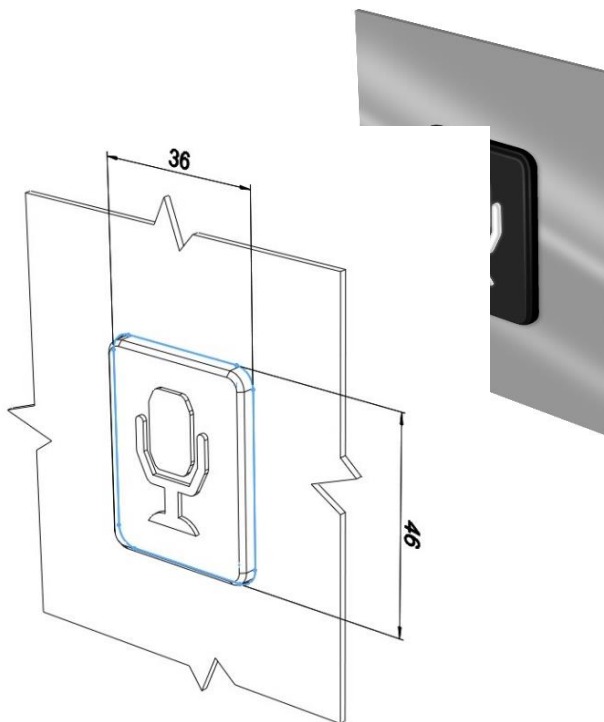

Figure 3. Speech Command Symbol (artwork available).

5.7. Microphones

5.7.1. Kiosks that offer telecommunication features, speech command or voice recognition technology must support and provide the means for voice input.

5.7.2. This must be by the provision of a suitable microphone (or microphone array) permanently installed as a fixture of the kiosk and by provision of a standard 3.5mm jack plug socket for connection of an audio headset or ear-piece (equipped with its own microphone).

5.7.3. The system microphone(s) must default to and remain in a deactivated (muted) condition until such time that a kiosk user is detected in the kiosk's interface zone.

5.7.4. A proximity or pressure sensing device should be used to un-mute the microphone(s) of the voice reception, voice recognition or speech commanded system when a person enters and remains within the kiosk interface zone for a minimum period of 3 seconds. The interface zone is considered as the space immediately in front of the kiosk within a range of 0.7m from the kiosk's operational front surface.

5.7.5. The microphone(s) must be deactivated (muted) should the kiosk user decide, at any time, to decline the use of the voice reception, voice recognition or speech commanded features, or within 10 seconds of the user leaving the kiosk interface zone.

5.7.6. A recognizable audible signal (e.g. chime or voice message) should be transmitted through the kiosk's integrated sound system, or via any connected headset or assistive hearing device, to notify those with impaired sight that the microphone(s) have been activated or de-activated (muted or unmuted).

5.7.7. In many public kiosk locations or applications it will be necessary to employ advanced noise cancelling and beam focusing technology to enable effective operation of the voice reception, voice recognition or speech commanded features.

5.7.8. Connection of a headset or assistive hearing device (equipped with its own integrated microphone) must be detected by the host kiosk and the functionality of any permanently installed microphone (or microphone array) must be automatically adjusted to accommodate and allow correct functioning of the headset or hearing aid device

5.7.9. To facilitate reliable and continued functionality, audio device connection points and/or permanently installed microphone devices must survive regular sanitation (wash-down) procedures and should resist the hard use and abuse associated with ICT installations in public spaces.

5.7.10. As a minimum requirement, water and dust resistance in accordance with IP54 (or equivalent) must be achieved.

5.7.11. A minimum impact resistance of 10J must be achieved.
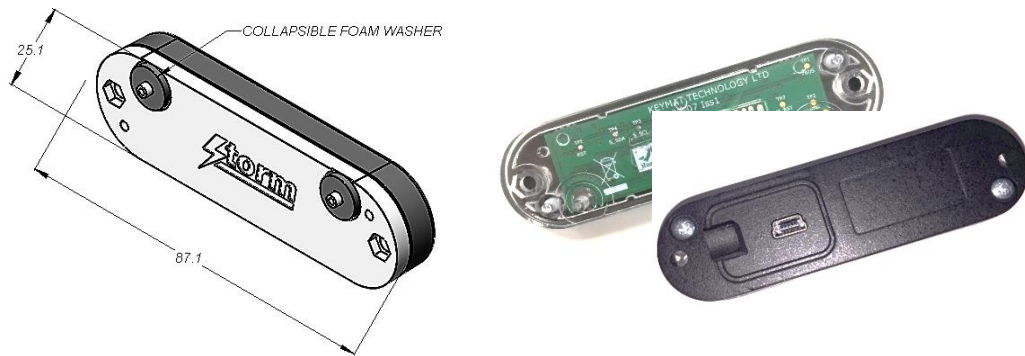
5.8. Speakers

5.8.1. Kiosks that offer an audio program or any audible content must support and provide the means for audible reproduction of sound or speech.

5.8.2. This must be by provision of a standard 3.5mm jack plug socket for connection of an audio headset, handset, ear-piece or assistive hearing aid device and by provision of a suitable amplified speaker system permanently installed as a fixture of the kiosk.

5.8.3. In many public kiosk locations or applications it will be necessary to employ sound directing or sound focusing technology to prevent noise pollution or irritation to those in the local vicinity of the kiosk.

5.8.4. Connection of a headset, handset, earpiece or assistive hearing aid device (equipped with its own integrated speakers) must be detected by the host kiosk and the functionality of any permanently installed amplified speakers must be automatically adjusted to accommodate and allow correct functioning of the headset or hearing aid device.

5.8.5. Tactilely discernible sound volume controls must be easily accessible to those using assistive headsets, earpieces or hearing aid devices.

5.8.6. Tactilely discernible sound volume controls must be accessible and functioning throughout the kiosk user session. Wherever possible tactilely discernible controls should be suitably shaped to

enable function with headsticks or assistive easy grip styli.

Figure 5. Tactilely discernible sound volume controls must be provided and easily accessible to those using assistive headsets, handsets, earpieces or hearing aid devices and those using headsticks or easy-grip styli.

5.8.7. To facilitate reliable and continued functionality, audio device connection points and/or permanently installed amplified speakers must be provided.

5.8.8. Connection points for audio devices such as assistive headsets, earpieces or hearing aid devices must be identified by a raised tactile headset icon positioned adjacent to the connection point.

5.8.9. Connection points should accommodate connection of a standard 3.5mm diameter jack plug.

5.8.10. Connection points for audio devices must survive regular sanitation (wash-down) procedures and should resist the hard use and abuse associated with ICT installations in public spaces.

5.8.11. A minimum requirement for water and dust resistance in accordance with IP54 (or equivalent) should be achieved.

5.8.12. A minimum impact resistance of 10J should be achieved

5.9. Wireless Devices

5.9.1. For those kiosk users who prefer to use wireless headsets, earbuds or implants in preference to wired devices with a cable and jack-plug connector, it must be possible to connect a personal wireless transponder (usually powered by a button cell battery) into the jack-plug socket. These personal devices provide audio communication between the transponder and a paired personal headset. *Commentary: The transponder would be removed and retained by the kiosk user when the kiosk session is completed*.

Figure 4. Compact wireless transponder. These devices can be paired with a wireless headset or earpiece to provide a private listening capability. The transponder can be plugged directly into the kiosk's audio jack socket. Other brands and types of transponder are available.