MULTIPLE FORMAT SECURE VOICE APPARATUS FOR COMMUNICATION HANDSETS

FIELD OF THE INVENTION

This invention relates to communication handsets and more specifically to secure or encrypted handsets.

BACKGROUND OF THE INVENTION

At the present time, there is a large number of different hand-held communication devices, such as remote telephones, cellular telephones, two-way radios, etc. In many instances it is desirable to provide secure or encrypted communications to prevent interception of the information by outside parties. A problem arises because of the large number of different devices. Examples of some different wireless devices are AMPS, GSM (a European TDMA cellular phone), Iridium, IS95 (CDMA), Tetra (a European terrestrial trunked radio), and an example of a wired device is V.34 MODEM.

Each of these wireless and wired devices has a different front-end and a different operating format for the transceiver portion. In order for one manufacturer to produce secure or encryption devices for all of these different communication devices, it is presently necessary to produce a different module for each different device because the module must be compatible with the different front-ends and the different operating formats. Thus, one manufacturer must produce literally dozens of different products to match the dozens of different devices that may require a secure or encryption module. Clearly, this is impractical since the manufacturer may only sell a few of any one module in his particular area. Further, each time that a customer changes the handheld communication device that he is using (e.g., buys a different model of telephone) or purchases a second type of handheld communication device, he must buy a new or another encryption module. This becomes extremely expensive and can severely curtail the customer's exchange and purchase of different equipment.

Also, if any of these encryption modules are to be used by the U.S. Government, each of these encryption modules must be separately certified for use on Government applications. The Government certification process is long and expensive so that a manufacturer loses a great amount of time and money if it attempts to certify several different encryption modules.

Accordingly it is highly desirable to provide multiple format secure voice apparatus for communication handsets.

BRIEF DESCRIPTION OF THE DRAWING

Referring to the drawing, the single FIGURE is a simplified block diagram of multiple format secure voice apparatus for communication handsets in accordance with the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the single FIGURE, a simplified block diagram is illustrated of multiple format secure voice apparatus and communication handset **10** in accordance with the present invention. Handset **10** includes a core unit **12** and a replaceable unit **14**. Core unit **12** includes a complete front end with any desired operator interface elements, such as a speaker **15**, a microphone **16**, a keypad **17**, one or more

displays **18**, etc. Speaker **16** and microphone **17** are connected to an audio circuit **20**, which in a preferred embodiment converts the analog audio signals to digital signals. Examples of digital output audio circuits include A-Law PCM (Pulse Code Modulation) CODECs and μ-Law PCM CODECs that convert audio to 8-bit samples at 8 kHz. Audio circuit **20** provides the digital audio signal on an input/output (I/O) terminal **21**.

Core unit **12** further includes an encryption/decryption element **25** which may incorporate any of the well known encryption algorithms. Generally, for commercial handsets element **25** will include a commercial standard encryption algorithm, such as DES or Triple DES. In handsets certified for use on Government applications the encryption algorithm will be, for example, U.S. Govt. Type 1 or UK "High-grade". As will be understood by those skilled in the art, certification for U.S. Government use is much more difficult and expensive than whatever certification is required for commercial sales. However, as will be understood from the description below, only one certification is required for the single or common core unit **12** so that the certification time and expense is greatly reduced.

Core unit **12** further includes an encode/decode element **27** which converts the digital audio signals from audio circuit **20** into an easily transmitted format. Typical examples of element **27** are a vocoder ACELP, VCELP, AMBE, or IMBE. All of these encode/decode algorithms convert the voice or data from a 64 kbit digital signal into a lower rate signal (2.4 kBPS to 9.6 kBPS, typically). Also, element **27** operates in conjunction with element **25** to encrypt signals to be transmitted and to decrypt received signals. Coded and encrypted signals are present on I/O terminal **28**. Also, in some instances it may be desirable to provide audio directly without encryption and with or without coding. This audio is provided on I/O terminal **21**.

A control element **30** is coupled by means of a bus **31** to audio circuit **20**, encryption/decryption element **25** and encode/decode element **27**. As will be understood, control element **30** provides all of the necessary control signals to control the operation of core unit **12**. Also, keypad **17** is connected to control element **30** to receive any instructions from various controls (e.g., on/off, etc.) and to convert typed messages into digital signals compatible with element **27**. Display **18** is connected to control element **30** and receives signals compatible with the display from control element **30**. Also in some instances (e.g., touch screens and the like) control element **30** may receive signals from display **18**. It will of course be understood that some, all, or additional operator interface elements may be incorporated in core unit **12** and will generally be connected in a manner known in the art. Control element **30** also has an I/O terminal **32** for receiving and communicating various control signals. Also, control element **30** can have a data I/O terminal **33** for connecting core unit **12** directly to various wired devices in an office, home, etc.

Here it should be understood that core unit **12** is designed as a common front end for any or all hand-held communication handsets or devices, including but not limited to well known wireless devices such as AMPS, GSM (a European TDMA cellular phone), Iridium, IS95 (CDMA), Tetra (a European terrestrial trunked radio), and well known wired devices, such as V.34 MODEMs. To accommodate core unit **12** to the various hand-held communication devices, a standard interface coupler **35** is provided. Standard interface coupler **35** is connected to data I/O terminal **28**, Audio I/O terminal **21**. and control I/O terminal **32**.

A mating standard interface coupler **40** is incorporated into any hand-held communication handsets or devices