

[005] The information transmitted to the centralized location could be performed over a local area network, such as with “WiFi” network based on IEEE 802.11 standards. The problem, however, with this network is that it is often difficult to secure sufficient local area network access for the purpose of providing centralized monitoring. Moreover, when a patient is located remotely from a critical care health service center (e.g., at home), access to traditional local area network facilities such as a WiFi network may be unavailable or not sufficiently reliable to support critical care monitoring applications.

[006] An alternative to WiFi is ZIGBEE, which is based on the IEEE 802.15.4 standard for wireless personal area networks. ZIGBEE networks have previously been used for collecting information from a variety of medical devices in accordance with IEEE 11073 Device Specializations for point-of-care medical device communication, including for example pulse oximeters, blood pressure monitors, pulse monitors, weight scales and glucose meters.

[007] The advantages of ZIGBEE networks are that the network is dynamically configurable (e.g., “self-healing” mesh configurations) and operates with low power requirements (e.g., enabling ZIGBEE transceivers to be integrally coupled to the medical devices under battery power). However, transmission ranges between individual ZIGBEE transceivers are generally limited to no more than several hundred feet. As a consequence, ZIGBEE networks are generally unusable for centralized monitoring locations located off-site.

[008] The networks are not the only issue. In some cases the physiological data from each patient may relate to significant health conditions. However, sometimes the data may not be communicated fast enough to the local care givers because of delay and/or signal interference. Further, even if communicated to the care givers, they may not react quickly or still require outside assistance, such as emergency 911 responders.

SUMMARY OF THE INVENTION

[008a] According to a first aspect of the present invention, there is provided a wireless relay module comprising:

a receiver capable of wirelessly receiving medical device data over a wireless relay network from at least one medical device;

a first transmitter capable of wirelessly transmitting medical device data to a second wireless relay module over the wireless relay network;

a second transmitter capable of wirelessly transmitting the medical device data over an internet-accessible wireless communication network;

a controller coupled to the first and second transmitters, the controller capable of controlling the wireless relay module to select one of said first or said second transmitter for transmitting the medical device data received by the receiver and the controller capable of establishing a connection via the first or second transmitter with an emergency responder when an emergency condition exists;

a phone device coupled to the controller, the phone device capable of initiating the connection with the emergency responder; and

a signal generator coupled to the phone device, the signal generator capable of producing a signal indicative of the emergency condition for transmission over the connection with the emergency responder.

[008b] According to a second aspect of the present invention, there is provided a computerized method comprising the steps of:

receiving medical device data at a wireless relay module wirelessly transmitted from one or more medical devices;

determining at the wireless relay module that at least a portion of the received data is indicative of an emergency condition;

generating an emergency signal at the wireless relay module indicative of the emergency condition;

selecting by the wireless relay module one of a first transmitter capable of transmitting the emergency signal over a wireless relay network and a second transmitter capable of transmitting the emergency signal over an internet-accessible wireless communication network;

establishing a wireless connection with an emergency responder by the selected one of the first transmitter or the second transmitter; and

transmitting the generated emergency signal to the emergency responder by the selected one of the first transmitter or the second transmitter.

[008c] According to a third aspect of the present invention, there is provided a wireless relay network comprising:

at least a first wireless relay module and a second wireless relay module, wherein each wireless relay module comprises a receiver capable of receiving a signal comprising medical device data from one or more medical devices over a wireless relay network, a first transmitter capable of transmitting the medical device data over an internet-accessible wireless communication network, and a second transmitter capable of transmitting the medical device data over a wireless relay network;

said first and second wireless relay modules including respective controllers, wherein each controller is capable of processing the received medical device data to detect information associated with the location of said one or more medical devices and of generating location information data for the one or more medical devices; and

said controller further being capable of selecting one of the first or second transmitter for transmitting said location information data to a remote monitoring device.

[008d] According to a fourth aspect of the present invention, there is provided a wireless relay module comprising:

a receiver capable of wirelessly receiving medical device data over a wireless relay network from at least one medical device;

a first transmitter capable of wirelessly transmitting medical device data over the wireless relay network;

a second transmitter capable of wirelessly transmitting data over an internet-accessible wireless communication network;

a location device capable of generating a location signal;

a controller coupled to the first and second transmitters, the controller capable of selecting one of said first or second transmitter for transmitting medical device data received by the receiver, and establishing a connection using the first or second transmitter with an emergency responder when an emergency condition exists;

a phone device coupled to the controller, the phone device capable of initiating the connection with the emergency responder; and

a signal generator coupled to the phone device, the signal generator capable of producing a signal indicative of the emergency condition and including the location signal, for transmission by the first or second transmitter to the emergency responder.

[009] ~~The Embodiments of~~ present invention ~~is~~ are directed to wireless relay module and method of the same for enabling emergency call functionality in networked communications between a series of medical devices and remote monitoring device via wireless relay networks and/or internet-accessible wireless communications networks. The wireless relay module comprises a receiver capable of wirelessly receiving medical device data over a wireless relay network from at least one medical device along with a first transmitter capable of wirelessly transmitting medical