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Private digital assistant talkgroup integration

Abstract

Systems and methods for integrating an enterprise digital assistant into a public safety talkgroup. One example system includes a talkgroup server communicatively coupled to a dispatch console and a public safety digital assistant server. The talkgroup server includes an electronic processor configured to receive connection information, associated with an incident, for an enterprise digital assistant server, establish a connection with the enterprise digital assistant server based on the connection information, and generate a talkgroup for the incident, the talkgroup members including the public safety digital assistant server, the dispatch console, and the enterprise digital assistant server.

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Background/Summary

BACKGROUND OF THE INVENTION

(1) Tablets, laptops, phones, two-way radios, and other electronic communications devices utilized by first responders (including fire fighters, police officers, and paramedics, among others) provide such users and others with instant access to increasingly valuable additional information and resources. Many such communications devices may further include, or provide access to, electronic digital assistants (DAs), sometimes referred to as “virtual partners,” that may provide the user thereof with valuable information automatically (e.g., without further user input) or semi-automatically (e.g., with some further user input). Such information provided to the user may be based on explicit requests (queries) for such information posed by the user via an input (e.g., such

as a parsed natural language input or an electronic touch interface manipulation associated with a request) in which the electronic DA may, in response, provide such requested valuable information. (2) Electronic DAs are software applications running on underlying electronic hardware that are capable of understanding natural language and may complete electronic tasks in response to user voice inputs, among other additional or alternative types of inputs. These electronic DAs may perform such tasks as taking and storing voice dictation for future reference and retrieval, reading a received text message or an e-mail message aloud, generating a text message or e-mail message reply, looking up requested phone numbers and initiating a phone call to a requested contact, generating calendar appointments and providing appointment reminders, warning users of nearby dangers such as traffic accidents or environmental hazards, and providing many other types of information.

Description

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

- (1) The accompanying figures, where like reference numerals refer to identical or functionally similar elements throughout the separate views, together with the detailed description below, are incorporated in and form part of the specification, and serve to further illustrate embodiments, examples, aspects, and features of concepts that include the claimed subject matter and explain various principles and advantages of those embodiments, examples, aspects, and features.
- (2) FIG. 1 is a diagram of a communications system in accordance with some examples.
- (3) FIG. 2 is a block diagram of a talkgroup server of the communications system of FIG. 1 in accordance with some examples.
- (4) FIG. 3 is a block diagram of an electronic communications device of the communications system of FIG. 1 in accordance with some examples.
- (5) FIG. 4 is a flowchart illustrating a method for operating the communications system of FIG. 1 to establish communications with an enterprise DA server in accordance with some examples.
- (6) FIG. 5 illustrates an example user interface generated by the electronic communications device of FIG. 3 in accordance with some examples.
- (7) FIG. 6 is a method for operating the communications system of FIG. 1 to handle a user inquiry in accordance with some examples.
- (8) FIG. 7 illustrates an example talkgroup conversation between a user of the electronic communications device of FIG. 3 and an enterprise DA server of the system of FIG. 1 in accordance with some examples.
- (9) FIG. 8 is a flowchart illustrating a method for the communications system of FIG. 1 for establishing and handling a user inquiry in accordance with some examples.
- (10) Skilled artisans will appreciate that elements in the figures are illustrated for simplicity and clarity and have not necessarily been drawn to scale. For example, the dimensions of some of the elements in the figures may be exaggerated relative to other elements to help to improve understanding of examples, aspects, and features illustrated.
- (11) In some instances, the apparatus and method components have been represented where appropriate by conventional symbols in the drawings, showing only those specific details that are pertinent to understanding the of various embodiments, examples, aspects, and features so as not to obscure the disclosure with details that will be readily apparent to those of ordinary skill in the art having the benefit of the description herein.

DETAILED DESCRIPTION OF THE INVENTION

- (12) In public safety communication systems, communications devices are often affiliated to different communication groups (also referred to as talkgroups) to perform group communication. Group communication functionality allows a communications device (also referred to as a

talkgroup member) to simultaneously communicate with one or more other devices that are associated with the same talkgroup. Such group communications allow for communications devices to communicate the same message to other devices without the need to establish different communication sessions or repeat transmission of the message to each respective communications device.

(13) In such communications devices (e.g., land mobile radios), a push-to-talk (PTT) interface may be utilized to allow a user of the communications device to actuate a PTT interface to transmit audio on one or more communication channels (which may include a talkgroup channel or a private channel) for reception by multiple communications devices (each associated with a respective user) associated with the talkgroup or for reception by a single communications device of the talkgroup, respectively.

(14) During public safety operations, a talkgroup may be associated with a particular public safety incident (e.g., a robbery, a fire, a wellness check, a medical emergency, a traffic incident, and the like). The users of the talkgroup may utilize a public safety digital assistant (DA), also referred to as virtual partners, to acquire information and/or access resources, for example, associated with the public safety incident. The user, in particular, may provide an inquiry to the public safety DA regarding one or more details about the public safety incident (e.g., any related arrest records, vehicle history, vehicle plate and registration information, historic and outstanding warrants, health information, vehicle registration information, address information, traffic information, and the like) and any other information that may aid the user in making a more informed determination of an action to take or how to resolve a situation, among other possibilities. The public safety DA, in turn, may retrieve the requested information from one or more servers/databases that the public safety DA has access to.

(15) There may be instances where the information requested by the user is not directly accessible by the public safety DA. Such instances may include, for example, when the requested information is enterprise specific information. Enterprise specific information is any data associated with a respective organization (outside of the public safety system) that is collected and stored within a private enterprise database. Such data may include sensor information (e.g., closed-circuit television (CCTV) footage, camera images, occupancy data, employee records, operation hours, security system information, additional sensor information, and the like).

(16) While the public safety DA may request access to such enterprise databases directly or request the information through a management server of the enterprise, even with access to the enterprise database, the public safety DA may not be able to efficiently search for the required information due to enterprise-specific lexicon and syntax that the public safety digital assistant may not recognize. For example, enterprises have their own proprietary/customized DAs that may efficiently navigate through their respective enterprise systems to provide seamless and accurate services to customers or employees of the enterprise. The particular lexicon and syntax recognizable by the enterprise DA may not be the same as (or translate over from) the lexicon and syntax by which the public safety DA operates. It may be beneficial for public safety users to be able to directly interact with enterprise digital assistants and may allow quick access to enterprise-specific information while they are supporting an incident (e.g., at the enterprise itself).

(17) Accordingly, systems and methods are provided herein for, among other things, creating and managing public safety talkgroups to include enterprise DA servers. Among other things, embodiments and aspects provided herein, rather than having the public safety DA search the enterprise database system directly or request the enterprise DA server to search according to the user inquiry, add the enterprise DA server itself to a public safety talkgroup to receive and handle the user inquiry directly within the talkgroup. This allows talkgroup users to inquire directly to the enterprise DA server, rather than through the public safety DA server of the talkgroup. Using such embodiments, users of the talkgroup are able to request and receive enterprise information more quickly and accurately, avoiding additional steps and potential incorrect inquiry requests performed

at the public safety DA server.

(18) One example provides a system, which includes a talkgroup server communicatively coupled to a dispatch console and a public safety digital assistant server. The talkgroup server includes an electronic processor configured to receive connection information, associated with an incident, for an enterprise digital assistant server, establish a connection with the enterprise digital assistant server based on the connection information, and generate a talkgroup for the incident, the talkgroup members including the public safety digital assistant server, the dispatch console, and the enterprise digital assistant server.

(19) Another example embodiment provides a method for operating a communications system including digital assistant communications. The method includes receiving connection information, associated with an incident, for an enterprise digital assistant server, establishing a connection with the enterprise digital assistant server based on the connection information, and generating a talkgroup for the incident, the talkgroup including a public safety digital assistant server, a dispatch console, and the enterprise digital assistant server.

(20) For ease of description, some or all of the example systems presented herein are illustrated with a single exemplar of each of its component parts. Some examples may not describe or illustrate all components of the systems. Other examples may include more or fewer of each of the illustrated components, may combine some components, or may include additional or alternative components.

(21) It should be understood that although certain figures presented herein illustrate hardware and software located within particular devices, these depictions are for illustrative purposes only. In some instances, the illustrated components may be combined or divided into separate software, firmware, and/or hardware. For example, instead of being located within and performed by a single electronic processor, logic and processing may be distributed among multiple electronic processors. Regardless of how they are combined or divided, hardware and software components may be located on the same computing device or may be distributed among different computing devices connected by one or more networks or other suitable communication links.

(22) As used in the present application, the term “talkgroup” refers to a virtual radio channel that is used for communication among a group of subscriber units/electronic communications devices. As noted, an organization may have several talkgroups and each talkgroup may be associated with a particular mission (incident) of the organization. An incident refers to a task or activity assigned to one or more members of an organization or a sub-division thereof. For example, a talkgroup may include a group of police officers patrolling a predefined neighborhood. Similarly, a talkgroup may include members who have the same role or designation (e.g., police officer, detective, paramedic, and the like) within an incident. For example, paramedics and firefighters responding to a distress call may be grouped into two different talkgroups part of the same mission. Each electronic communications device in a particular talkgroup is assigned a talkgroup identifier, which allows the electronic communications device to communicate with other electronic communications devices assigned the same talkgroup identifier. Although the examples and embodiments below are described in terms of a single talkgroup, it should be understood that electronic communications devices (and thus the users of the electronic communications devices) may be assigned to multiple talkgroups at the same time.

(23) FIG. 1 is a diagram of one example of a communications system **100**. In the example illustrated, the system **100** includes a talkgroup server **200** communicatively coupled to a dispatch console **102** and a public safety digital assistant (DA) server **104A**. The system also includes a talkgroup database **106** communicatively coupled to the talkgroup server **200** and, in some aspects, the public safety DA server **104A**. The talkgroup server **200** is further configured to be communicatively coupled to one or more of a plurality of electronic communication devices **108** (i.e., subscriber units). The talkgroup server **200**, described more particularly below with respect to FIG. 2, is configured to establish and perform communications to and from an enterprise DA server

104B.

(24) As illustrated in FIG. 1, the database **106** may be a database housed on a suitable database server communicatively coupled to and accessible by the talkgroup server **200**. In alternative embodiments, the database **106** may be part of a cloud-based database system (e.g., a data warehouse) external to the system **100** and accessible by the talkgroup server **200** over one or more wired or wireless networks. In some instances, all or part of the database **106** may be locally stored on the talkgroup server **200**. The database **106** electronically stores talkgroup information (e.g., data designating talkgroup assignments for the electronic communications devices **108**, associated users of the electronic communications devices **108** within the respective talkgroups, and the like) and talkgroup device data (e.g., model, configuration, and user characteristic information for the electronic communications devices **108**), and, in some instances, contextual condition data (e.g., telemetry and other data relating to the electronic communications devices **108** and respective users of the electronic communications devices **108** transmitted by the electronic communications devices **108** to the talkgroup server **200**).

(25) The electronic communications devices **108** are communicatively coupled via a communications network **110**. The communications network **110** may include a land mobile radio (LMR) network, a terrestrial trunked radio (TETRA) network, or a digital mobile radio (DMR) network. The communications network **110** may also include a wide area network (WAN) (e.g., a transport control protocol/internet protocol (TCP/IP) based network), a cellular network, (e.g., a long-term evolution (LTE) network), a device-to-device network, and combinations or derivatives thereof. In the illustrated examples, each of the electronic communications devices **108** communicate with the talkgroup server **200** through a base station **112**.

(26) In some instances, talkgroups are created and administered by the talkgroup server **200**. The talkgroup server **200** may, for example, create a talkgroup related to a particular incident based on communications from the dispatch console **102**. The dispatch console **102** is a dispatch controller for a public safety organization. The talkgroup server **200** communicates with the plurality of electronic communications devices **108** via the communications network **110**.

(27) In some instances, the talkgroup server **200** may be a central network equipment or a dispatch controller used by a public safety agency such as a fire department or police department. In other instances, the talkgroup server **200** may be any network equipment used by an agency, network administrator, or telecommunications provider.

(28) The dispatch console **102** may be directly coupled to the talkgroup server **200**, as shown, or may be indirectly coupled to talkgroup server **200** via one or more internal or external networks (not shown). The dispatch console **102** allows an administrator or dispatcher at a dispatch console to initiate infrastructure-sourced group communications to groups of the electronic communications devices **108**, among other features and functions. In accordance with some aspects, the dispatch console **102** may also be added to one or more talkgroups as a member of the talkgroups, for example, to transmit and/or listen to communications of the talkgroups. In some instances, some or all of the functionality of the dispatch console **102** may be incorporated into the talkgroup server **200** and vice versa. In some instances, the talkgroup server **200** and the dispatch console are incorporated into a single device.

(29) The public safety DA server **104A** and the enterprise DA servers **104B** are part of a separate public safety database network (not shown) and an enterprise database network, respectively. Each of the DA servers **104A**, **104B** are configured to implement a respective digital assistant program. The digital assistant programs may be a software application running on underlying electronic hardware (e.g., one or more of an electronic processor) that is capable of understanding natural language (i.e., processing unstructured inputs/data) and may complete electronic digital-assistant tasks in response to user voice inputs, detection of a contextual situation (e.g., detection of an incident based on processing the incident data), instructions received from other devices, among other additional or alternative type of inputs. Each of the digital assistant programs, implemented

on either or both of the public safety DA sever **104A** and the enterprise DA server **104B**, may include one or more of a natural language processing (NLP) engine configured to determine the intent and/or content of an unstructured input, for example, an oral inquiry received from a user of the electronic communications device **108**. Based on the intent and/or content of the inquiry, the respective server **104A**, **104B** may perform one or more of digital assistant tasks which may include, among other things, requesting information from one or more databases (not shown) of a respective network of the respective DA servers **104A**, **104B**.

(30) The public safety DA server **104A** is communicatively coupled to one or more databases and/or servers associated with a public safety system network (not shown). The public safety DA server **104A**, through the public safety system network, is configured to access public safety information (e.g., arrest records, historic and outstanding warrants, health information, vehicle registration information, address information, and the like) to execute one or more digital-assistant tasks that are assigned based on its capabilities and/or particular user inquiry. The public safety DA server **104A** may also be able to access publicly available information (e.g., historic or present weather information, address information, contact information, etc.) through one or more additional network systems (not shown). The public safety DA server **104A** may also be configured to access talkgroup information (e.g., talkgroup membership information, information regarding other talkgroups present on the public safety system network, and the like) by making talkgroup information inquiries to the talkgroup database **106** (or the talkgroup server **200**).

(31) The enterprise DA server **104B** is communicatively coupled to one or more databases and/or servers associated with an enterprise network (not shown). The enterprise DA server, through the enterprise network, is configured to access information related to the enterprise (e.g., closed-circuit television (CCTV) footage, camera images, occupancy data, employee records, operation hours, security system information, additional sensor information, inventory for the enterprise, location(s) of that inventory, whether the inventory is hazardous, and the like) to execute one or more digital-assistant tasks that are assigned based on its capabilities and/or the particular user inquiry. The enterprise DA server **104B** may further be configured to access information related to one or more other enterprises associated with the enterprise. The enterprise DA server, in some instances, is configured to access publicly available information through one or more additional network systems.

(32) It should be understood that, while DA functionality described herein as being performed by the DA servers **104A** and **104B**, it should be understood that at least some DA functionality is implemented at the talkgroup server **200** and/or one or more of the electronic communications devices **108**. For example, the electronic communications device **108** and/or the talkgroup server **200** may be configured to perform natural language processing (NLP) on an audible user inquiry received by the electronic communications device **108**.

(33) In some instances, either or both of the DA servers **104A** and **104B** perform machine learning functions, for example, to improve performance in comprehension of user inquiries and what information is required to fulfill the inquiry. Machine learning generally refers to the ability of a computer program to learn without being explicitly programmed. In some instances, a computer program (e.g., a learning engine) is configured to construct an algorithm based on inputs. Supervised learning involves presenting a computer program with example inputs and their desired outputs. The computer program is configured to learn a general rule that maps the inputs to the outputs from the training data it receives. Example machine learning engines include decision tree learning, association rule learning, artificial neural networks, classifiers, inductive logic programming, support vector machines, clustering. Bayesian networks, reinforcement learning, representation learning, similarity and metric learning, sparse dictionary learning, and genetic algorithms. Using all of these approaches, a computer program can ingest, parse, and understand data, and progressively refine algorithms for data analytics.

(34) On a singular basis, one of the electronic communications devices **108** may be referred to

herein as an electronic communications device **108**. Each of the electronic communications device **108** is a portable communications device, and may be, for example, a mobile two-way radio, a smart telephone, a smart watch, a laptop computer, a tablet computer, or other similar device capable of operating as described herein. As described in detail herein, the talkgroup server **200** sends talkgroup commands (e.g., adding or removing devices **108** from one or more talkgroups) to the electronic communications devices **108**. The electronic communications devices **108** transmit talkgroup communications, as described in detail herein, to the talkgroup server **200**.

(35) It should be noted that FIG. 1 illustrates only one example of the system **100**. In other instances, the system **100** may include more or fewer components and may perform functions that are not explicitly described herein. In addition, although the talkgroup server **200** is illustrated as communicating with the electronic communications device **108** via a single communications network **110**, the talkgroup server **200** may communicate with the electronic communications devices **108** via multiple communication networks (constructed in accordance with various network protocols) and connections (e.g., wired or wireless connections). Further, although the system **100** is shown as a centralized system, the system **100** may also be implemented as a decentralized system in which the functionality of the talkgroup server **200** is accomplished within one or more of the electronic communications devices **108**, or in other network infrastructure (not shown).

(36) FIG. 2 schematically illustrates one example of the talkgroup server **200**. In the example illustrated, the talkgroup server **200** includes an electronic processor **210**, a memory **220**, a transceiver **230**, and an input/output interface **240**. The electronic processor **210**, the memory **220**, the transceiver **230**, and the input/output interface **240** communicate over one or more control and/or data buses (e.g., a communication bus **250**). FIG. 2 illustrates only one example of a talkgroup server **200**. The talkgroup server **200** may include more or fewer components and may perform functions other than those explicitly described herein.

(37) In some instances, the electronic processor **210** is implemented as a microprocessor with separate memory, such as the memory **220**. In other instances, the electronic processor **210** may be implemented as a microcontroller (with memory **220** on the same chip). In other instances, the electronic processor **210** may be implemented using multiple processors. In addition, the electronic processor **210** may be implemented partially or entirely as, for example, a field-programmable gate array (FPGA), and application specific integrated circuit (ASIC), and the like and the memory **220** may not be needed or be modified accordingly. In the example illustrated, the memory **220** includes non-transitory, computer-readable memory that stores instructions that are received and executed by the electronic processor **210** to carry out functionality of the talkgroup server **200** described herein. The memory **220** may include, for example, a program storage area and a data storage area. The program storage area and the data storage area may include combinations of different types of memory, such as read-only memory and random-access memory.

(38) The transceiver **230** enables wireless communication from the talkgroup server **200** to, for example, the electronic communications devices **108** (via the communications network **110**), the dispatch console **102**, the public safety DA server **104A**, the enterprise DA server **104B**, and the database **106**. In other instances, rather than the transceiver **230**, the talkgroup server **200** may include separate transmitting and receiving components, for example, a transmitter, and a receiver. In yet other instances, the talkgroup server **200** may not include a transceiver **230** and may communicate with the components of the system **100** via a network interface and a wired connection to the communications network **110**.

(39) As noted above, the talkgroup server **200** may include the input/output interface **240**. The input/output interface **240** may include one or more input mechanisms (e.g., a touch screen, a keypad, a button, a knob, and the like), one or more output mechanisms (e.g., a display, a printer, a speaker, and the like), or a combination thereof. The input/output interface **240** receives input from input devices actuated by a user (e.g., a dispatcher), and provides output to output devices with which the user interacts. In some instances, as an alternative or in addition to managing inputs and

outputs through the input/output interface **240**, the talkgroup server **200** may receive user input, provide user output, or both by communicating with an external device, such as a console computer, over a wired or wireless connection.

(40) The public safety DA server **104A** and the enterprise DA server **104B** are each suitable server devices including hardware components similar to the talkgroup server **200** described above (e.g., one or more of an electronic processor, memory, and transceiver). In some instances, either or both DA servers **104A**, **104B** may be part of a cloud-based server network.

(41) FIG. **3** schematically illustrates an electronic communications device **108** according to some examples. In the particular example illustrated, the electronic communications device **108** includes, among other things, a device electronic processor **310**, a device memory **320**, a device transceiver **330**, and a device input/output interface **340**. The device electronic processor **310**, the device memory **320**, the device transceiver **330**, and the device input/output interface **340** communicate over one or more control and/or data buses (e.g., a device communication bus **350**). FIG. **3** illustrates only one example of the electronic communications device **108**. The electronic communications device **108** may include more or fewer components than illustrated and may perform additional functions other than those described herein.

(42) The device electronic processor **310** may be implemented in various ways including ways that are similar to those described above with respect to the electronic processor **210**. Likewise, the device memory **320** may be implemented in various ways including ways that are similar to those described with the respect to the memory **220**. The device memory **320** may store instructions that are received and executed by the device electronic processor **310** to carry out the functionality described herein.

(43) The device transceiver **330** enables wireless communication from the electronic communications device **108** to, for example, the talkgroup server **200** via the communications network **110**. In other instances, rather than a device transceiver **330**, the electronic communications device **108** may include separate transmitting and receiving components, for example, a transmitter and a receiver.

(44) The device input/output interface **340** may include one or more input mechanisms (e.g., a microphone, a touch screen, a keypad, a button, a knob, a push-to-talk (PTT) selection mechanism, and the like), one or more output mechanisms (e.g., a display, a speaker, and the like), or a combination thereof.

(45) In the illustrated example, the device input/output interface **340** includes a display **345**. The display **345** is a suitable display such as, for example, a liquid crystal display (LCD) touch screen, or an organic light-emitting diode (OLED) touch screen. In some instances, the electronic communications device **108** implements a graphical user interface (GUI) (e.g., generated by the electronic processor **310**, from instructions and data stored in the memory **320**, and presented on the display **345**), that enables a user to interact with the device **108**. In some instances, the electronic communications device **108** enables display remotely, for example, using a display (configured similarly to the display **345**) from the electronic communications device **108**.

(46) In some instances, the electronic communications device **108** communicates with one or more external devices that may be part of a personal area network (PAN) of devices. The one or more external devices may include, for example, a holster sensor, an environmental sensor, a biometric sensor, a body-mountable camera, and the like.

(47) The electronic communications device **108** comprise, or provide access to, electronic DAs (e.g., through the public safety DA server **104A** and, via the method **400** of FIG. **4** described in more detail below, the enterprise DA server **104B**) that may provide the user thereof with valuable information in an automated (e.g., without further user input) or semi-automated (e.g., with some further user input) fashion. The information provided to the user may be based on explicit requests for such information posed by the user via an input (e.g., such as a parsed natural language input or an electronic touch interface manipulation associated with an explicit request) in which the

electronic digital assistant may reactively provide such requested valuable information.

(48) As some existing examples, electronic digital assistants such as Siri™ provided by Apple, Inc. and Google Assistant™ provided by Google LLC, are software applications running on underlying electronic hardware that are capable of understanding natural language and may complete electronic tasks in response to user voice inputs, among other additional or alternative types of inputs. These electronic digital assistants may perform such tasks as taking and storing voice dictation for future reference and retrieval, reading a received text message or an e-mail message aloud, generating a text message or e-mail message reply, looking up requested phone numbers and initiating a phone call to a requested contact, generating calendar appointments and providing appointment reminders, warning users of nearby dangers such as traffic accidents or environmental hazards, and providing many other types of information in a reactive or proactive manner.

(49) As noted, talkgroup servers (e.g., the talkgroup server **200**) may establish and manage talkgroups. The talkgroup server **200** further provides user inquiries for the public safety DA server **104A**. As noted above, when information related to a particular enterprise (not directly accessible to the public safety DA server **104A**) is requested by a user, the information provided to the user, in response, may be delayed due to extra steps in authorizing the public safety DA server **104A** to access a particular enterprise database or having the public safety DA server **104A** request the information through an enterprise management server (e.g., the enterprise DA server **104B**). Such instances not only introduce delay, but also present potential misinterpretation of the particular user inquiry due to syntax/stored dictionary differences between the public safety DA server **104A** and the enterprise DA server **104B**. This can result in inefficient use and delay in the delivery or accurate information to users of the communications network.

(50) FIG. **4** illustrates an example method **400** for operating a communications system to establish communications with an enterprise DA server. Although the method **400** is described in conjunction with the system **100** as described herein, the method **400** could be used with other systems and devices. In addition, the method **400** may be modified or performed differently than the specific example provided. For example, in some instances the talkgroup created, as described below, may not include a public safety DA server.

(51) As an example, the method **400** is described as being performed by the talkgroup server **200** and, in particular, the electronic processor **210**. However, it should be understood that in some instances, portions of the method **400** may be performed by other devices, including for example, one or more of the DA servers **104A** and **104B**, the dispatch console **102**, and/or the electronic communications device **108**. Additional electronic processors may also be included in the DA servers **104A**, **104B**, the dispatch console **102**, and/or the electronic communications device **108** that perform all or a portion of the method **400**. For ease of description, the method **400** is described in terms of a single enterprise DA server (e.g., the enterprise DA server **104B**). However, the method **400** may be applied to multiple enterprise DA servers.

(52) At block **402**, the electronic processor **210** receives connection information, associated with an incident, for an enterprise digital assistant server (e.g., the enterprise DA server **104B**). The connection information is received, in particular, from the dispatch console **102** which receives the information from the enterprise DA server **104B**. In some instances, the dispatch console **102** receives the information automatically from the enterprise DA server **104B** (e.g., as part of a connection request). For example, the enterprise DA server **104B** may include or utilize a security network detection software for automatic detection or recognition of an incident related to the enterprise. In response to a detection/recognition of an incident, the enterprise DA server **104B** may automatically provide information, for establishing a connection to the enterprise DA server **104B** directly, to the dispatch console **102**. In some instances, the dispatch console **102** receives the information from the enterprise DA server **104B** via a request to the server **104B**. For example, the dispatch console **102** may transmit a request for connection information and/or information related to an incident associated with an enterprise of the enterprise DA server **104B**. In response, the

enterprise DA server **104B** may provide information, for establishing a connection to the enterprise DA server **104B**, to the dispatch console **102**. In both instances, the enterprise DA server **104B** may provide information regarding a particular instance (either as determined by the enterprise DA server **104B** or as requested by the dispatch console **102**).

(53) At block **404**, the electronic processor **210**, based on the connection information, establishes a communication channel/connection with the enterprise DA server **104B**. The connection information from the enterprise DA server **104B** may include one or more of a unique identifier, a wake word, address information, and password information for the enterprise DA server **104B**. The connection information may include, for example, enterprise DA server **104B** identification information such as enterprise DA server **104B** information (e.g., a hostname, an IP address, a port number, an access password, and the like). A wake word is a term (commonly a name) included in a user inquiry used to activate a DA function (e.g., to retrieve and display information according to a user inquiry).

(54) As mentioned above, in addition to the connection information, the dispatch console **102** may also receive incident information from the enterprise DA server **104B** in addition to the connection information. The incident information may include, for example, CCTV/video and/or camera footage, sensor information (e.g., smoke detectors information, humidity information, temperature information, etc.), occupancy data, employee information, vendor information, and the like.

(55) At block **406**, the electronic processor **210** generates a talkgroup for the incident. The talkgroup includes at least the public safety DA server **104A**, the dispatch console **102**, and the enterprise DA server **104B**. The electronic processor **210** may further add one or more additional devices (for example one or more of the electronic communications devices **108**).

(56) FIG. 5 is an example display **500** generated by the electronic communications device **108** (in particular, the display **345**). The display **500** displays the members of the talkgroup generated, for example, at block **406** of the method **400** of FIG. 4. As shown in FIG. 5, the display **500** includes a list of a talkgroup **502** including a plurality of talkgroup members **504A-504F**. Members **504A-504C** are users each associated with a respective electronic communications device **108**. Member **504D** is a dispatcher (e.g., participating from the dispatch console **102**). Members **504E** and **504F** are digital assistants for the public safety DA server **104A** and the enterprise DA server **104B**, respectively. As further described in regard to FIG. 6, following adding the enterprise DA server **104B** to the talkgroup at block **406** of the method **400**, a user of a communications device **108** of the talkgroup generated at block **406** (including, in some instances, the dispatch console **102**) is able to transmit a user inquiry directly to the enterprise DA server **104B** through the talkgroup server **200**.

(57) FIG. 6 illustrates an example method **600** for a communications system for handling a user inquiry. The method **600** is performed following establishing a communication channel between the talkgroup server **200** and the enterprise DA server **104B** as described above in regard to the method **400** of FIG. 4. Although the method **600** is described in conjunction with the system **100** as described herein, the method **600** could be used with other systems and devices. In addition, the method **600** may be modified or performed differently than the specific example provided. For example, in some instances the talkgroup described below may not include a public safety DA server and, thus, may not determine whether a user inquiry includes a public safety DA wake word.

(58) As an example, the method **600** is described as being performed by the talkgroup server **200** and, in particular, the electronic processor **210**. However, it should be understood that in some aspects, portions of the method **600** may be performed by other devices, including for example, one or more of the DA servers **104A** and **104B**, the dispatch console **102**, and/or the electronic communications device **108**. Additional electronic processors may also be included in the DA servers **104A**, **104B**, the dispatch console **102**, and/or the electronic communications device **108** that perform all or a portion of the method **600**. For ease of description, the method **600** is described in terms of a single “user inquiry,” which may be from any one of the electronic

communications devices **108**, and to a single enterprise server (e.g., the enterprise DA server **104B**) and a single public safety DA server (e.g., the public safety DA server **104A**). However, the method **600** may be applied to multiple portable communications devices and/or multiple public safety and/or enterprise DA servers.

(59) At block **602**, the electronic processor **210** receives, from a communications device associated with an incident responder and assigned to the talkgroup, a user inquiry including a wake word. The communications device may be, for example, one of the electronic communications device **108** or, in some instances, the dispatch console **102**. In some instances, the user inquiry may include incident information (e.g., a photo, a video, an audio file, sensor data, a document file, etc.) related to the user inquiry (e.g., to narrow a search criteria). In some instances, the user inquiry may include more than one requested function for the DA of the particular server **104A**, **104B** to perform.

(60) At block **604**, the electronic processor **210** determines whether the wake word included in the user inquiry is associated with the public safety DA server **104A** or the enterprise DA server **104B**. If the wake word is associated with the public safety DA server **104A**, the processor **210** provides the user inquiry to the public safety DA server **104A** (block **606**). If the wake word is associated with the enterprise DA server **104B**, the processor **210** provides the user inquiry to the (block **608**). In response to the user inquiry, the respective DA server (the public safety DA server **104A** and the enterprise DA server **104B**) is configured to provide, to one or more of the electronic communications devices **108** of the talkgroup (and/or the dispatch console **102**), the requested information in response to the user inquiry. The respective electronic communications device(s), in turn, provide the requested information through an audio (e.g., via a speaker) or a video output (e.g., via a display such as the display **345**) of the communications device associated with the incident responder.

(61) In some instances, the wake word associated with the enterprise DA server **104B** is an enterprise assigned wake word, a talkgroup server assigned wake word, and/or a common enterprise DA wake word. An enterprise assigned wake word is a predetermined term assigned by and/or utilized by the enterprise of the enterprise DA server. The talkgroup server assigned wake word is a term that is assigned to the enterprise DA server **104B** by the talkgroup server **200**. The talkgroup server **200**, in some instances, is configured to compare an enterprise assigned wake word of the enterprise digital assistant server to a public safety wake word assigned to the public safety DA server **104A**, and assign a talkgroup server assigned wake word (to be internally used within the talkgroup generated at block **406** of the method **400** of FIG. **4**) to the enterprise DA server **104B**. The talkgroup server **200** may assign a different wake word in response to determining that a level of similarity between the enterprise assigned wake word and the public safety wake word exceeds a predetermined similarity threshold. In other words, the talkgroup server **200** may be configured to assign a new wake word to the enterprise DA server **104B**, for example, when the talkgroup server **200** determines that the enterprise wake word is too similar (phonetically or textually) to the public safety wake word associated with the public safety DA server **104A** and/or, in some instances, a name of a user of one of the electronic communications devices **108** of the talkgroup. This may be done, for example, to avoid misinterpretation of which DA server the user inquiry is directed to and/or if a user inquiry is directed to a DA server at all.

(62) In some instances, the talkgroup server **200** is configured to recognize user inquiries that include a common enterprise DA wake word. The common enterprise DA wake word is a wake word applicable to all enterprise digital assistants (e.g., “Enterprise DA,” “Enterprise Bot,” and the like). The talkgroup server **200**, in turn, may assign the common enterprise DA wake word to the enterprise DA server **104B** to be internally used within the talkgroup generated at block **406** of the method **400** of FIG. **4**.

(63) The talkgroup server **200** may further be configured to notify the enterprise DA server **104B** of the new enterprise wake word (the talkgroup server assigned wake word and/or the common

enterprise wake word) such that the enterprise DA server **104B** will perform DA functions according to a received user inquiry that includes the new enterprise wake word. The talkgroup server **200** also may be configured to change the new enterprise wake word included within a user inquiry to the enterprise assigned wake word prior to transmitting the user inquiry to the enterprise DA server **104B**.

(64) For example, the enterprise assigned wake word for the enterprise DA server **104B** may be “Rodney” while the public safety wake word for the public safety DA server **104A** may be “Connie.” The talkgroup server **200**, upon determining that the wake words are too similar, may assign the wake word “Kurt” to the enterprise DA server **104B**. Thus, while the enterprise DA server **104B** is still referred to within the enterprise network as “Connie,” a user of the electronic communications device **108** may use the wake word “Kurt” to refer a user inquiry to the enterprise DA server **104B**.

(65) In some instances, as mentioned above, the talkgroup server **200** may modify information included in the user inquiry (e.g., the wake word or additional information) provided to the enterprise DA server **104B**. Such information may be modified based on one or more public safety data privacy policies. This may be done, for example, to prevent confidential public safety information from being transmitted. Likewise, the enterprise DA server **104B** may modify information provided to the server **200** according to one or more enterprise data privacy policies to prevent confidential enterprise information from being transmitted. In some instances, the talkgroup server **200** is configured to block, from being transmitted to the enterprise DA server **104B**, all communications within the talkgroup that do not contain a wake word associated with the enterprise DA server **104B** (e.g., an enterprise assigned wake word, a talkgroup server assigned wake word, and/or a common enterprise digital assistant wake word).

(66) FIG. 7 is an example **700** of a talkgroup conversation between a user **702** of a communications device (e.g., the electronic communications device **108**) and an enterprise DA **704** of an enterprise DA server (e.g., the enterprise DA server **104B**). Although illustrated as a text-based conversation, it should be understood that the blocks described below may be performed via audio alone or in combination with text.

(67) In the illustrated example, the enterprise DA **704** is part of an airport facility. As illustrated at text box **706A**, the user **702** provides, to the talkgroup, a user inquiry including a wake word (in the illustrated example, “Cony”) associated with the enterprise DA **704**. The user inquiry, in the illustrated example, is a request for a suspect's location. The user inquiry also includes a photo of the suspect. At block **706B**, the enterprise DA **704** provides the requested information (the suspect's location) in addition to a photo of the suspect at the present location.

(68) At block **706C**, the user **702** provides another user inquiry to the enterprise DA **704**, including the wake word for the enterprise DA **704**, requesting flight details for an airport gate that the suspect was reported to be at (by the enterprise DA **704** at block **706B**). The user inquiry at block **706C** also includes a request for passenger information for a particular individual (“John Smith”) for the flight at the airport gate. At block **706D**, the enterprise DA **704** provides the requested information to the user **702**.

(69) FIG. 8 illustrates an example method **800** for a communications system for establishing and handling a user inquiry directed to an enterprise DA (e.g., provided by the enterprise DA server **104B**). The method **800** incorporates both the method **400** of FIG. 4 and the method **600** of FIG. 6 and further includes steps performed by the enterprise DA server **104B**. Although the method **800** is described in conjunction with the system **100** as described herein, the method **800** could be used with other systems and devices. In addition, the method **800** may be modified or performed differently than the specific example provided.

(70) As an example, the method **600** is described as being performed by the talkgroup server **200** (e.g., by the electronic processor **210**) and the enterprise server **104B**. However, it should be understood that, as noted above, in some instances, portions of the method **600** may be performed

by other devices of the system **100**.

(71) At block **802**, the enterprise DA server **104B** determines an incident requiring public safety support based on information from one or more sensors (e.g., of the enterprise, to which the enterprise DA server **104B** is associated). At block **804**, the enterprise DA server **104B** provides the sensor information related to the incident and enterprise DA server information to the dispatch console **102**.

(72) At block **806**, the talkgroup server **200** receives the enterprise DA server information and the incident information and based on the enterprise DA server information, establishes a communication channel/connection with the enterprise DA server **104B**. The talkgroup server **200** stores the enterprise DA server information (in the illustrated example, an identifier and an enterprise wake word) as an enterprise DA profile (block **808**) and generates a talkgroup including at least the enterprise DA server **104B** and an electronic communications device (e.g., the dispatch console **102** and/or one or more of the electronic communications devices **108**). The talkgroup may also include a public safety DA server (e.g., the public safety DA server **104A**).

(73) The talkgroup server **200**, at block **810**, determines whether the enterprise DA wake word is similar to a wake word associated with the public safety DA server **104A** (e.g., exceeds a similarity threshold as described above) or is otherwise ambiguous (e.g., difficult to pronounce or too similar to a particular term/command or talkgroup participant name). In instances where the enterprise DA wake word is determined to be either or both similar and/or ambiguous, the talkgroup server **200** reassigns a new wake word to the enterprise DA server **104B** for use within the talkgroup (block **812**). When the new enterprise DA wake word is provided in a user inquiry, the enterprise DA server **104B** responds accordingly based on the particular user inquiry.

(74) At block **814**, the dispatch console **102**, in conjunction with the talkgroup server **200**, creates an incident talkgroup. The incident talkgroup includes as members the enterprise DA and the public safety DA.

(75) In instances where the enterprise DA wake word is determined not to be similar or ambiguous, block **812** is skipped. In either instance, the talkgroup server **200** provides user inquiries that include the enterprise wake word (whether original to the enterprise DA server **104B**, newly assigned wake word, and/or a common enterprise DA wake word as described above) to the enterprise DA server **104B** (block **816**). At block **818**, the talkgroup server **200** modifies or blocks information within the talkgroup conversation and will only provide user queries to the enterprise DA server **104B** that include a wake word associated with/assigned to the enterprise DA server **104B**. The enterprise DA server **104B**, in turn at block **820**, processes the user inquiry based on, for example, enterprise database information, NLP, and/or one or more privacy policies of the enterprise DA server **104B** (or enterprise network thereof). At block **822**, the enterprise DA server **104B** provides the requested information to the talkgroup server **200**. The talkgroup server **200** accordingly provides the received information to one or more of the electronic communications devices **108** of the established talkgroup.

(76) In the foregoing specification, specific examples have been described. However, one of ordinary skill in the art appreciates that various modifications and changes can be made without departing from the scope of the invention as set forth in the claims below. Accordingly, the specification and figures are to be regarded in an illustrative rather than a restrictive sense, and all such modifications are intended to be included within the scope of present teachings.

(77) The benefits, advantages, solutions to problems, and any element(s) that may cause any benefit, advantage, or solution to occur or become more pronounced are not to be construed as a critical, required, or essential features or elements of any or all the claims. The invention is defined solely by the appended claims including any amendments made during the pendency of this application and all equivalents of those claims as issued.

(78) Moreover, in this document, relational terms such as first and second, top and bottom, and the like may be used solely to distinguish one entity or action from another entity or action without

necessarily requiring or implying any actual such relationship or order between such entities or actions. The terms “comprises,” “comprising,” “has,” “having,” “includes,” “including,” “contains,” “containing,” or any other variation thereof, are intended to cover a non-exclusive inclusion, such that a process, method, article, or apparatus that comprises, has, includes, contains a list of elements does not include only those elements but may include other elements not expressly listed or inherent to such process, method, article, or apparatus. An element preceded by “comprises . . . a,” “has . . . a,” “includes . . . a,” or “contains . . . a” does not, without more constraints, preclude the existence of additional identical elements in the process, method, article, or apparatus that comprises, has, includes, contains the element. The terms “a” and “an” are defined as one or more unless explicitly stated otherwise herein. The terms “substantially,” “essentially,” “approximately,” “about,” or any other version thereof, are defined as being close to as understood by one of ordinary skill in the art, and in one non-limiting embodiment the term is defined to be within 10%, in another embodiment within 5%, in another embodiment within 1% and in another embodiment within 0.5%. The term “coupled” as used herein is defined as connected, although not necessarily directly and not necessarily mechanically. A device or structure that is “configured” in a certain way is configured in at least that way but may also be configured in ways that are not listed.

(79) It will be appreciated that some examples may be comprised of one or more generic or specialized processors (or “processing devices”) such as microprocessors, digital signal processors, customized processors and field programmable gate arrays (FPGAs) and unique stored program instructions (including both software and firmware) that control the one or more processors to implement, in conjunction with certain non-processor circuits, some, most, or all of the functions of the method and/or apparatus described herein. Alternatively, some or all functions could be implemented by a state machine that has no stored program instructions, or in one or more application specific integrated circuits (ASICs), in which each function or some combinations of certain of the functions are implemented as custom logic. Of course, a combination of the two approaches could be used.

(80) Moreover, an embodiment can be implemented as a computer-readable storage medium having computer readable code stored thereon for programming a computer (e.g., comprising a processor) to perform a method as described and claimed herein. Examples of such computer-readable storage mediums include, but are not limited to, a hard disk, a CD-ROM, an optical storage device, a magnetic storage device, a ROM (Read Only Memory), a PROM (Programmable Read Only Memory), an EPROM (Erasable Programmable Read Only Memory), an EEPROM (Electrically Erasable Programmable Read Only Memory) and a Flash memory. Further, it is expected that one of ordinary skill, notwithstanding possibly significant effort and many design choices motivated by, for example, available time, current technology, and economic considerations, when guided by the concepts and principles disclosed herein will be readily capable of generating such software instructions and programs and ICs with minimal experimentation.

(81) The Abstract of the Disclosure is provided to allow the reader to quickly ascertain the nature of the technical disclosure. It is submitted with the understanding that it will not be used to interpret or limit the scope or meaning of the claims. In addition, in the foregoing Detailed Description, it can be seen that various features are grouped together in various embodiments for the purpose of streamlining the disclosure. This method of disclosure is not to be interpreted as reflecting an intention that the claimed embodiments require more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive subject matter lies in less than all features of a single disclosed embodiment. Thus, the following claims are hereby incorporated into the Detailed Description, with each claim standing on its own as a separately claimed subject matter.

Claims

1. A system for digital assistant communications, the system comprising: a talkgroup server communicatively coupled to a dispatch console and a public safety digital assistant server, the talkgroup server including an electronic processor configured to: receive connection information, associated with an incident, for an enterprise digital assistant server, establish a connection with the enterprise digital assistant server based on the connection information, generate a talkgroup for the incident, having talkgroup members including the public safety digital assistant server, the dispatch console, and the enterprise digital assistant server, receive, from a communications device associated with an incident responder and assigned to the talkgroup, a user inquiry including a wake word, provide the user inquiry to the enterprise digital assistant server in response to determining that the wake word is associated with the enterprise digital assistant server, and provide the user inquiry to the public safety digital assistant server in response to determining that the wake word is associated with the public safety digital assistant server.
2. The system of claim 1, wherein the wake word associated with the enterprise digital assistant server is one selected from the group consisting of an enterprise assigned wake word, a talkgroup server assigned wake word, and a common enterprise digital assistant wake word.
3. The system of claim 1, wherein the electronic processor is further configured to: compare an enterprise assigned wake word of the enterprise digital assistant server to a public safety wake word assigned to the public safety digital assistant server, and assign a talkgroup server assigned wake word to the enterprise digital assistant server in response to determining that a level of similarity between the enterprise assigned wake word and the public safety wake word exceeds a predetermined similarity threshold.
4. The system of claim 1, wherein the electronic processor is further configured to assign a common enterprise digital assistant wake word.
5. The system of claim 1, wherein the electronic processor is further configured to: block, from the enterprise digital assistant server, all communications within the talkgroup that do not contain at least one selected from the group consisting of an enterprise assigned wake word, a talkgroup server assigned wake word, or a common enterprise digital assistant wake word.
6. The system of claim 1, wherein the electronic processor is further configured to receive, from the enterprise digital assistant server, requested information in response to the user inquiry, and provide the requested information through an audio or a video output of the communications device associated with the incident responder.
7. The system of claim 1, wherein the electronic processor is further configured to modify information within the user inquiry provided to the enterprise digital assistant server based on a public safety data privacy policy.
8. The system of claim 1, wherein the electronic processor is further configured to receive information, through the dispatch console, regarding the incident from the enterprise digital assistant server in addition to the connection information.
9. The system of claim 1, wherein the connection information includes at least one selected from a group consisting of a unique identifier of the enterprise digital assistant server, a wake word, address information, and password information.
10. The system of claim 1, wherein the dispatch console receives a connection request including the connection information from the enterprise digital assistant server.
11. The system of claim 1, wherein the dispatch console receives the connection information from the enterprise digital assistant server in response to the dispatch console transmitting a request to the enterprise digital assistant server.
12. A method for operating a communications system including digital assistant communications, the method comprising: receiving connection information, associated with an incident, for an

enterprise digital assistant server, establishing a connection with the enterprise digital assistant server based on the connection information, generating a talkgroup for the incident, the talkgroup including a public safety digital assistant server, a dispatch console, and the enterprise digital assistant server, receiving, from a communications device associated with an incident responder and assigned to the talkgroup, a user inquiry including a wake word, providing the user inquiry to the enterprise digital assistant server in response to determining that the wake word is associated with the enterprise digital assistant server, and providing the user inquiry to the public safety digital assistant server in response to determining that the wake word is associated with the public safety digital assistant server.

13. The method of claim 12, wherein the wake word associated with the enterprise digital assistant server is one selected from the group consisting of an enterprise assigned wake word, a talkgroup server assigned wake word, and a common enterprise digital assistant wake word.

14. The method of claim 12, the method further comprising: comparing an enterprise assigned wake word of the enterprise digital assistant server to a public safety wake word assigned to the public safety digital assistant server, and assigning a talkgroup server assigned wake word to the enterprise digital assistant server in response to determining that a level of similarity between the enterprise assigned wake word and the public safety wake word exceeds a predetermined similarity threshold.

15. The method of claim 12, the method further comprising assigning a common enterprise digital assistant wake word.

16. The method of claim 12, the method further comprising: blocking, from the enterprise digital assistant server, all communications within the talkgroup that do not contain at least one selected from the group consisting of an enterprise assigned wake word, a talkgroup server assigned wake word, and a common enterprise digital assistant wake word.

17. The method of claim 12, the method further comprising: receiving, from the enterprise digital assistant server, requested information in response to the user inquiry, and providing the requested information through an audio or a video output of the communications device associated with the incident responder.

18. The method of claim 12, the method further comprising modifying information within the user inquiry provided to the enterprise digital assistant server based on a public safety data privacy policy.
