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(54) **AUTOMOTIVE COMMUNICATION SYSTEM**

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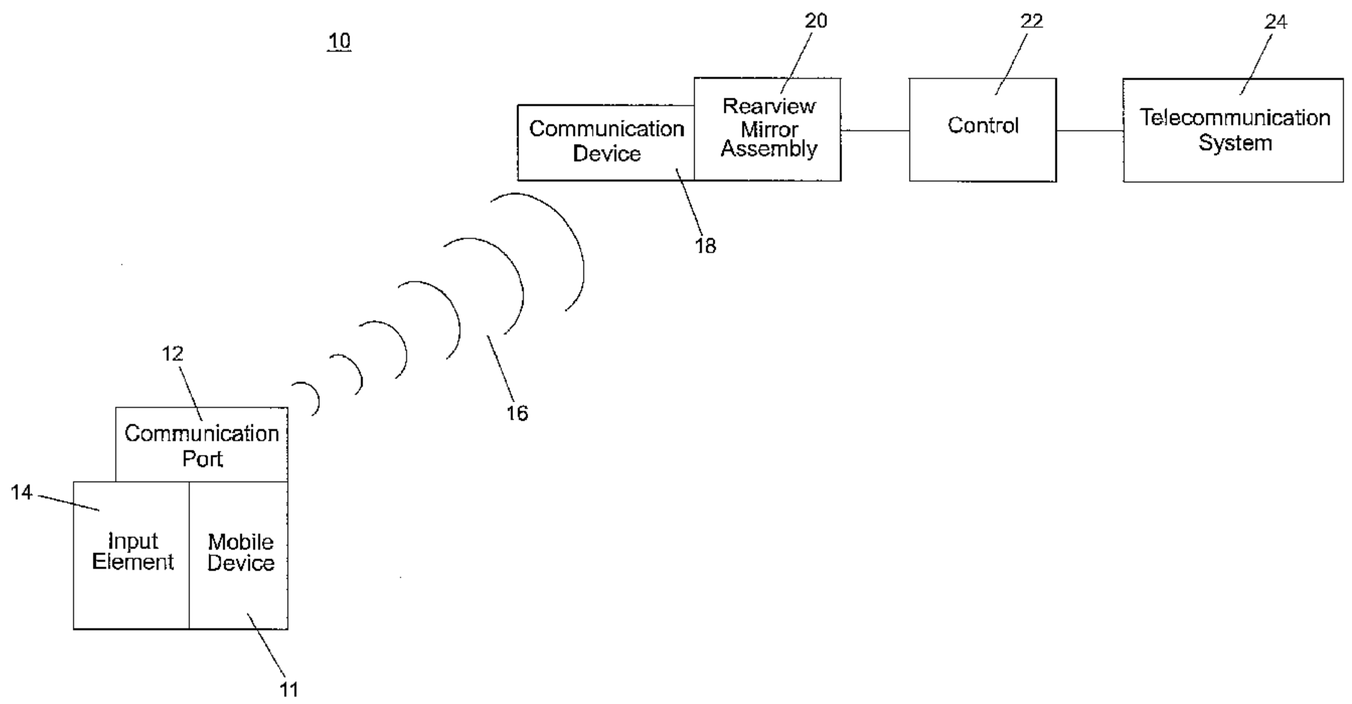
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(57) **ABSTRACT**

An automotive communication system for a vehicle includes a multi-pixel reconfigurable display device disposed at an interior portion of a vehicle. Data is wirelessly communicated to and is received by electronic circuitry of the vehicle from a mobile accessory that is a personal accessory of an occupant of the vehicle. The data is at least in part customized to the geographic location of the vehicle as determined by a global positioning system operable to determine a geographical location. Information derived at least in part from the data is displayed by the display device and is viewable by a driver of the vehicle. The automotive communication system includes voice input and the automotive communication system includes voice generation. The data is from a data provider located external of and remote from the vehicle.

21 Claims, 3 Drawing Sheets



Related U.S. Application Data

continuation of application No. 13/050,133, filed on Mar. 17, 2011, now Pat. No. 8,525,703, which is a continuation of application No. 12/551,849, filed on Sep. 1, 2009, now Pat. No. 7,916,043, which is a continuation of application No. 11/935,795, filed on Nov. 6, 2007, now Pat. No. 7,583,204, which is a continuation of application No. 11/053,436, filed on Feb. 8, 2005, now Pat. No. 7,382,289, which is a continuation of application No. 10/777,812, filed on Feb. 12, 2004, now Pat. No. 6,909,361, which is a continuation of application No. 09/839,678, filed on Apr. 20, 2001, now Pat. No. 6,693,517, said application No. 10/777,812 is a continuation-in-part of application No. 10/365,794, filed on Feb. 13, 2003, now Pat. No. 6,832,719, which is a continuation of application No. 09/687,778, filed on Oct. 13, 2000, now Pat. No. 6,547,133, which is a continuation of application No. 09/057,428, filed on Apr. 8, 1998, now Pat. No. 6,158,655, said application No. 10/777,812 is a continuation-in-part of application No. 10/775,627, filed on Jan. 12, 2006, now Pat. No. 7,158,881, which is a continuation of application No. 10/287,178, filed on Nov. 4, 2002, now Pat. No. 6,678,614, which is a continuation of application No. 09/799,414, filed on Mar. 5, 2001, now Pat. No. 6,477,464, said application No. 13/050,133 is a continuation-in-part of application No. 12/536,930, filed on Aug. 6, 2009, now Pat. No. 8,044,776, which is a continuation of application No. 12/052,341, filed on Mar. 20, 2008, now Pat. No. 7,579,940, which is a continuation of application No. 11/625,374, filed on Jan. 22, 2007, now Pat. No. 7,579,939, which is a continuation of application No. 10/755,915, filed on Jan. 13, 2004, now Pat. No. 7,446,650, which is a continuation of application No. 09/793,002, filed on Feb. 26, 2001, now Pat. No. 6,690,268.

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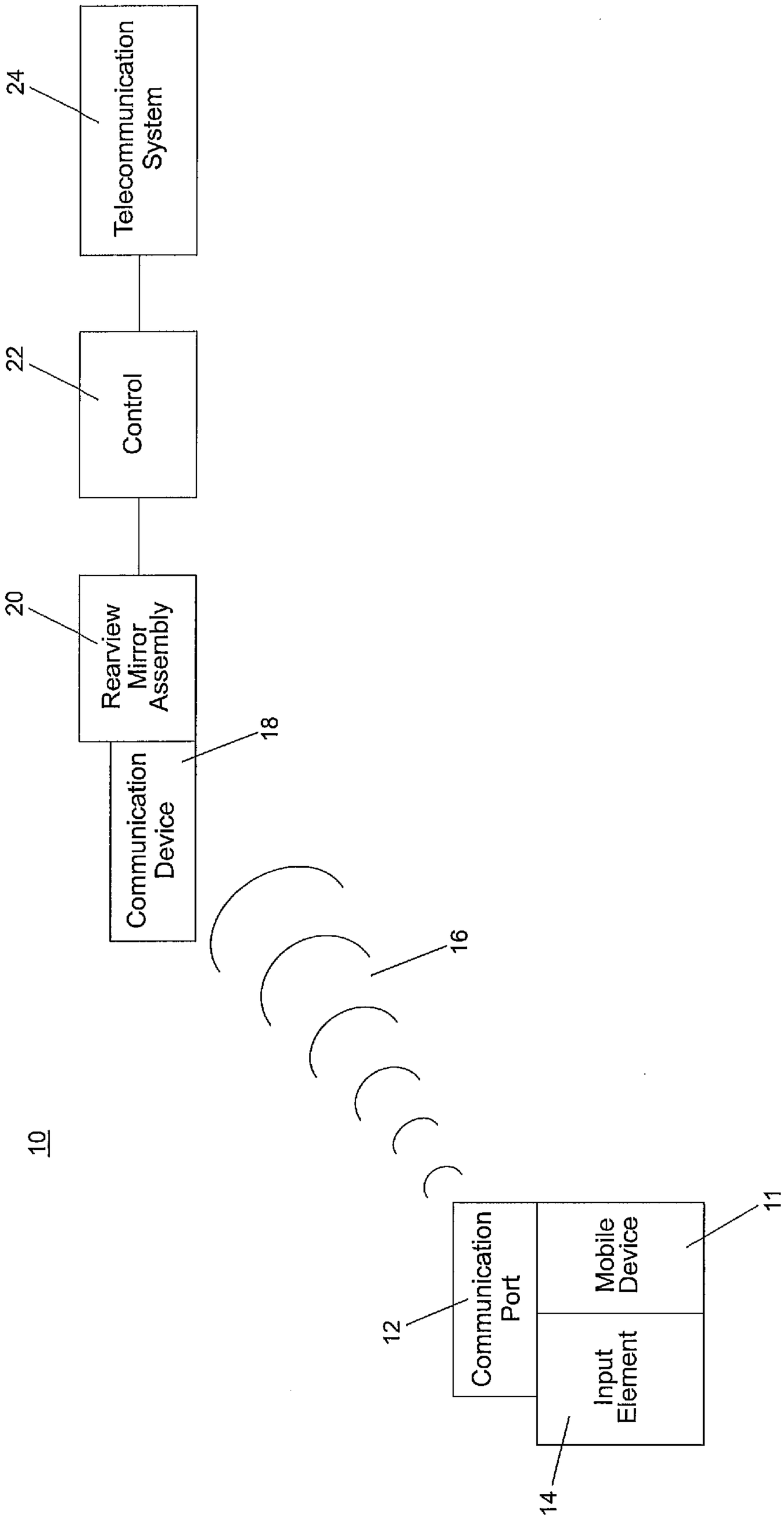

10
Mobile Device
11
Input Element
14
Communication Port
12
16
Communication Device
18
Rearview Mirror Assembly
20
Control
22
Telecommunication System
24

Figure 1

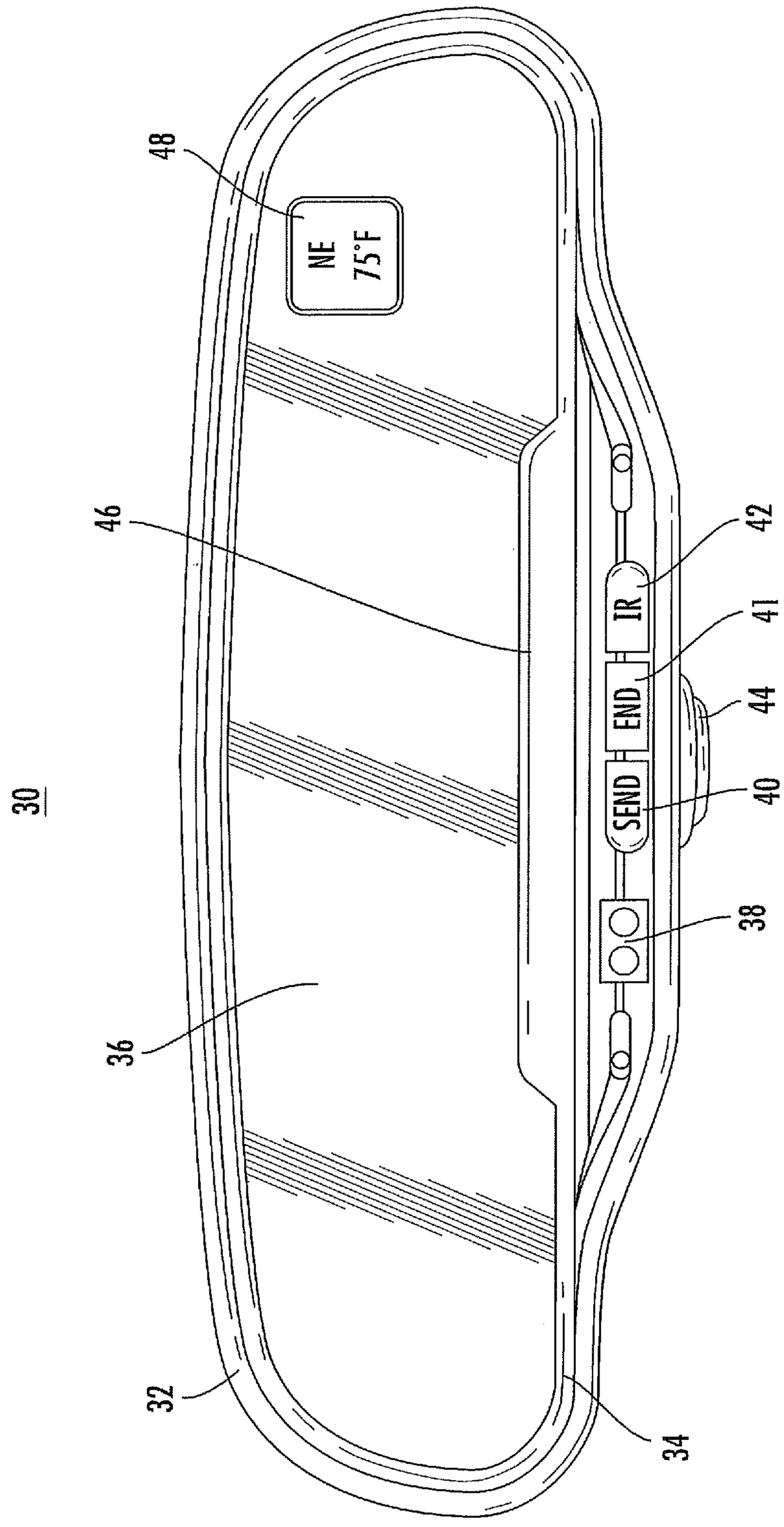


FIG. 2

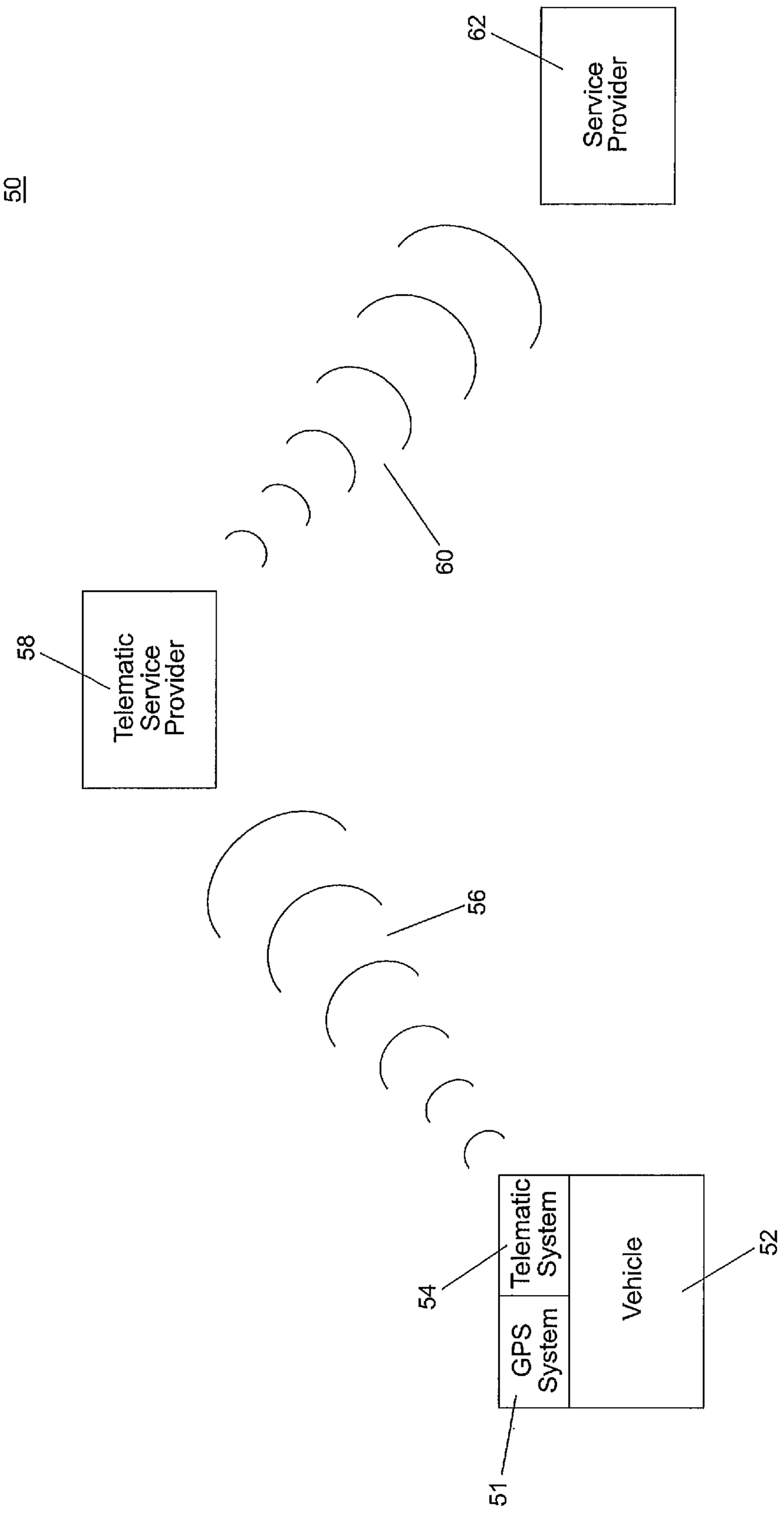

50
62
Service Provider
60
58
Telematic Service Provider
56
54
Telematic System
GPS System
Vehicle
51
52

Figure 3

AUTOMOTIVE COMMUNICATION SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 14/535,742, filed Nov. 7, 2014, now U.S. Pat. No. 9,221,399, which is a continuation of U.S. patent application Ser. No. 14/015,444, filed Aug. 30, 2013, now U.S. Pat. No. 8,884,788, which is a continuation of U.S. patent application Ser. No. 13/050,133, filed Mar. 17, 2011, now U.S. Pat. No. 8,525,703, which is a continuation of U.S. patent application Ser. No. 12/551,849, filed Sep. 1, 2009, now U.S. Pat. No. 7,916,043, which is a continuation of U.S. patent application Ser. No. 11/935,795, filed Nov. 6, 2007, now U.S. Pat. No. 7,583,204, which is a continuation of U.S. patent application Ser. No. 11/053,436, filed on Feb. 8, 2005, now U.S. Pat. No. 7,382,289, which is a continuation of U.S. patent application Ser. No. 10/777,812, filed on Feb. 12, 2004, now U.S. Pat. No. 6,909,361, which is a continuation of U.S. patent application Ser. No. 09/839,678, filed on Apr. 20, 2001, now U.S. Pat. No. 6,693,517, which claims priority from U.S. provisional application Ser. No. 60/199,676, filed on Apr. 21, 2000, the disclosures of which are hereby incorporated herein by reference in their entirety; and application Ser. No. 10/777,812 is a continuation-in-part of U.S. patent application Ser. No. 10/365,794, filed on Feb. 13, 2003, now U.S. Pat. No. 6,832,719, which is a continuation of U.S. patent application Ser. No. 09/687,778, filed Oct. 13, 2000, now U.S. Pat. No. 6,547,133, which is a continuation of U.S. patent application Ser. No. 09/057,428, filed Apr. 8, 1998, now U.S. Pat. No. 6,158,655; and application Ser. No. 10/777,812 is a continuation-in-part of U.S. patent application Ser. No. 10/755,627, filed on Jan. 12, 2004, now U.S. Pat. No. 7,158,881, which is a continuation of U.S. patent application Ser. No. 10/287,178, filed on Nov. 4, 2002, now U.S. Pat. No. 6,678,614, which is a continuation of U.S. patent application Ser. No. 09/799,414, filed on Mar. 5, 2001, now U.S. Pat. No. 6,477,464, which claims priority from U.S. provisional patent application Ser. No. 60/187,960, filed on Mar. 9, 2000; and U.S. patent application Ser. No. 13/050,133 is a continuation-in-part of U.S. patent application Ser. No. 12/536,930, filed Aug. 6, 2009, now U.S. Pat. No. 8,044,776, which is a continuation of U.S. patent application Ser. No. 12/052,341, filed Mar. 20, 2008, now U.S. Pat. No. 7,579,940, which is a continuation of U.S. patent application Ser. No. 11/625,374, filed Jan. 22, 2007, now U.S. Pat. No. 7,579,939, which is a continuation of U.S. patent application Ser. No. 10/755,915, filed Jan. 13, 2004, now U.S. Pat. No. 7,446,650, which is a continuation of U.S. application Ser. No. 09/793,002, filed Feb. 26, 2001, now U.S. Pat. No. 6,690,268, which claims benefit of U.S. provisional applications, Ser. No. 60/263,680, filed Jan. 23, 2001; Ser. No. 60/243,986, filed Oct. 27, 2000; Ser. No. 60/238,483, filed Oct. 6, 2000; Ser. No. 60/237,077, filed Sep. 30, 2000; Ser. No. 60/234,412, filed Sep. 21, 2000; Ser. No. 60/218,336, filed Jul. 14, 2000; and Ser. No. 60/186,520, filed Mar. 2, 2000.

BACKGROUND OF THE INVENTION

This invention relates to data and information communication within an automobile and particularly to automotive mirror assemblies adapted to communicate wirelessly with other vehicular accessories and/or with personal accessories of occupants of the vehicle.

SUMMARY OF THE INVENTION

A vehicle may have features and/or accessories connected by a variety of wireless links and/or wired links, such as are described in commonly assigned U.S. Pat. No. 6,396,408, which claims priority from U.S. provisional patent application Ser. No. 60/196,577, filed on Mar. 31, 2000, and U.S. Pat. No. 6,294,989, the disclosures of which are hereby incorporated herein by reference. For example, some vehicle features, accessories and functions can be interconnected by and/or can communicate by wire connection, by wireless infrared communication, wireless microwave communication, by wireless RF communication, or by any combination of the above.

As described also in commonly assigned U.S. Pat. No. 6,690,268, which relates to U.S. provisional application Ser. No. 60/263,680, filed on Jan. 23, 2001, U.S. provisional application Ser. No. 60/243,986, filed on Oct. 27, 2000, U.S. provisional application Ser. No. 60/238,483, filed on Oct. 6, 2000, U.S. provisional application Ser. No. 60/237,077, filed on Sep. 30, 2000, U.S. provisional application Ser. No. 60/234,412, filed on Sep. 21, 2000, U.S. provisional application Ser. No. 60/218,336, filed on Jul. 14, 2000, and U.S. provisional patent application Ser. No. 60/186,520, filed on Mar. 2, 2000, and in commonly assigned U.S. Pat. Nos. 6,000,823 and 5,959,367, all of the disclosures of which are hereby incorporated herein by reference, the vehicle and particularly the interior/exterior mirror assembly can host a variety of features and accessories. Also, such features and accessories can be connected via cable elements, such as coaxial cable, a multi-ribbon cable, a multiwire cable, and/or a fiber-optic cable (for communicating by optical method), or can be connected without wires, such as by short range RF wireless communication such as provided by Motorola, Schaumberg, Ill. via their BLUETOOTH protocol or by infrared wireless communication such as provided via the IrDA protocol available from Clarinet System Inc. of San Jose, Calif.

The present invention is particularly suitable for use in a "connected car," i.e., an automobile in two-way communication with a remote party such as by a telematic wireless communication link, and most preferably, connected to an information source such as the WorldWide WEB via the INTERNET. This present invention provides compatibility and interoperability for mobile devices, such as hand-held mobile phones, personal digital assistants (PDA) such as a PalmPilot PDA, hand-held personal identifiers, hand-held remote entry devices, such as a key fob as known in the automotive arts including active and passive entry key fobs, and the like.

Accessories may be provided at the purchase of the vehicle as in-vehicle installed items or may be carried in and out of the vehicle by the user. Such can be provided with ports or interfaces adapted to communicate via the use of a cable or wired communication, but more preferably a wireless communication. For example, a modular phone may be equipped with an RF communication link operating under a short-range wireless communication protocol, such as BLUETOOTH available from Motorola of Schaumberg, Ill., that communicates with the vehicle wirelessly so that, for example, telephone communication can be conducted via the audio system of the vehicle while the occupant possessing the BLUETOOTH-equipped phone is using the phone. Likewise, a phone or other mobile device can be equipped with an infrared (IR) communication interface/port such as an IrDA port than can provide wireless infrared connectivity.

A vehicle mirror-based wireless communication system, according to an aspect of the invention, includes an interior rearview mirror assembly including an interior mirror reflective element, a housing for the reflective element, and a mirror-mounted communication device. The mirror-mounted communication device includes a communication data port for short-range communication with a mobile device that is a personal accessory of an occupant of the vehicle. The communication device further includes a telecommunication link from the vehicle to an external provider of information or service. In this manner, the communication device provides connectivity between a low-power mobile device and a provider of information or service separated from the vehicle.

A vehicle mirror-based wireless communication system, according to another aspect of the invention, includes an interior rearview mirror assembly including an interior mirror reflective element and a housing for the reflective element. A remote telematic server is provided that is remote from the vehicle. A vehicular dynamic interactive communication system is provided at the rearview mirror assembly. The communication system includes a Global Positioning System (GPS) for determining a geographic location of the vehicle and a first communication link with the remote telematic server. The mirror-based wireless communication system further includes at least one service provider and a second communication link between the at least one service provider and the telematic server. In this manner, the communication system communicates identification data to the telematic server pertaining to either the location, identity and/or direction heading of the vehicle. The at least one service provider provides assistance data to the vehicle via the first and second communication links. The assistance data is customized to the location identity and/or direction heading of the vehicle.

These and other objects, advantages and features of this invention will become apparent upon review of the following specification in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an electrical block diagram of a vehicle mirror-based wireless communication system, according to the invention;

FIG. **2** is a front elevation of an interior rearview mirror assembly, according to the invention; and

FIG. **3** is an electronic block diagram of a vehicle mirror-based wireless communication system, according to another aspect of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In order for mobile devices to be used within the interior cabin of a vehicle, such as an automobile, the vehicle must be equipped with at least one complementary interface/port capable of wireless communication with the mobile device within the vehicle cabin, or when approaching the vehicle from the exterior. Where wireless infrared connectivity is used, it is preferred that line-of-sight communication be possible between the mobile device and the interface/port of the vehicle that serves as the interface and exchange point for data between the mobile device and the vehicle electronics system/accessories. In this regard, placement of an IR data port at the interior rearview mirror assembly (such as at or in the case/bezel of the assembly, or attached to the mirror assembly support about which the casing housing is adjustable, or at or in a pod attached to the attachment mount of the interior mirror assembly to the vehicle, such as to a mirror mounting button on a windshield as are known in the mirror arts) has the advantage of being high mounted and central, and so accessible to all vehicle occupants including those in both the front seats and in rear seats.

The interior rearview mirror of the vehicle (and optionally an exterior side view mirror of the vehicle) is preferably equipped with at least one infrared communication port such as an IrDA (Infrared Data Port) such as the devices available from by Clarinet Systems Inc., San Jose, Calif. for wireless connectivity to other IrDA devices such as the Personal Digital Assistants (PDA) like the Palm Pilot Palm III, IIIx, V, VII, Glenarye pager, Motorola 2000X Pagewriter, and similar devices and cellular phones equipped with IrDA ports such as the Nokia 6210, Windows CE devices, laptop computers, and similar mobile devices having wireless communication capabilities to paging, cellular, or satellite systems. Also, by connecting a mobile device to the vehicle via a vehicle-mounted, preferably mirror-mounted, wireless connectivity interface/port, a low-feature and/or low-power mobile device can be linked to the vehicle, and the vehicle (including its on-board computer) can serve as the modem/communication port/computer for the mobile device, thus greatly expanding the capability of the mobile device. This enables wireless connectivity of devices that originally could not act as a wireless modem.

Also, mobile devices typically have restricted display capabilities. By connecting wirelessly to the vehicle and to the vehicle's electronics (such as a vehicle computer), the greater display capability and/or greater computing power of the vehicle (such as a vehicle video display, preferably mirror-mounted, such as disclosed in commonly assigned U.S. Pat. No. 6,690,268, which relates to U.S. provisional application Ser. No. 60/263,680, filed on Jan. 23, 2001, U.S. provisional application Ser. No. 60/243,986, filed on Oct. 27, 2000, U.S. provisional application Ser. No. 60/238,483, filed on Oct. 6, 2000, U.S. provisional application Ser. No. 60/237,077, filed on Sep. 30, 2000, U.S. provisional application Ser. No. 60/234,412, filed on Sep. 21, 2000, U.S. provisional application Ser. No. 60/218,336, filed on Jul. 14, 2000, and U.S. provisional patent application Ser. No. 60/186,520, filed Mar. 2, 2000, the disclosures of which are hereby incorporated herein by reference), can be accessed and used by the mobile device.

A separate display is located behind the mirror reflector. In such a configuration where a display element is behind the mirror reflector, the reflective mirror coating of the mirror reflective element can be locally at least partially removed at the location of the display element disposed behind the mirror element. Optionally, where all the reflective mirror coating is removed, a semitransparent but significantly reflecting coating or series of coatings (such as a thin metal film coating or a multilayer of coatings, including a thin metal coating of silver, aluminum, rhodium (or their alloys), or the like, or a dichroic coating or coating stack, can be used that substantially masks the display element from driver notice until the display element is powered to display information, such as disclosed in U.S. Pat. Nos. 5,668,663 and 5,724,187, which are incorporated by reference in their entireties. Such has been described as "display on demand" in the art. Such display can include a "display on demand" such as disclosed in U.S. Pat. Nos. 5,668,663 and 5,724,187 noted above. In this regard, it is preferable that the display be a light-emitting display, such as a fluorescent display, a vacuum fluorescent display, a field emission display, an electroluminescent display, a fluorescent display, a plasma

display, or a light-emitting diode display, such as an organic or inorganic light-emitting diode display. Alternatively, the reflective element may comprise a substantially reflecting, significantly light-transmitting reflective element, such as disclosed in U.S. Pat. Nos. 5,668,663 and 5,724,187 noted above. An example, such as a semitransparent reflector, would be a third surface reflector coated on the third surface of an electrochromic mirror element, as known in the electrochromic mirror art, consisting of a thin metal coating (such as of silver, silver alloy, aluminum, aluminum alloy) that is significantly reflecting of at least 60%, preferably at least 70% and most preferably at least 75% but also significantly transmitting in the range of between 5% to 30%, preferably in the range of between 10% and 25% and most preferably in the range of between 15% and 20%. Preferably, the thin metal coating is overcoated with a transparent conductor such as indium tin oxide when contacting an electrochromic medium (preferably an electrochromic solid polymer film) when serving as a combined third surface reflector/conductor layer in an electrochromic laminate cell construction. For further details of suitable reflective elements with portions of the reflective mirror coating adapted to permit light to transmit through the reflective element or of a highly reflecting/significantly transflective reflective element, reference is made to U.S. Pat. Nos. 5,668,663 and 5,724,187.

This access can be facilitated via protocols such as the Wireless Application Protocol (WAP) for mobile devices and can be networked via sub-networks of the WorldWide Web by systems providers such as JP Systems Inc. of Dallas, Tex. Such networks are designed for mobile devices and include client applications, gateways, and backend servers integrating with open standards, such as WAP. The server compresses and optimizes data so that it can be sent to wireless devices in a format that is best suited to those devices. Typically this data is displayed in a few lines of text, preferably a scrolling line of text data, to suit such mobile interactive transceivers. When connected within a vehicle, preferably such data is displayed at the interior rearview mirror.

As described in commonly assigned U.S. Pat. No. 6,477,464, which claims priority from U.S. provisional patent application Ser. No. 60/187,960 filed on Mar. 9, 2000, and U.S. Pat. No. 6,553,308, which claims priority from U.S. provisional application Ser. No. 60/131,593 filed on Apr. 29, 1999, the disclosures of which are hereby incorporated herein by reference, provision of a display and particularly a scrolling text display at the interior rear view assembly of the vehicle (and/or the exterior rear view mirror assembly) has many advantages including ease of readability and recognition by the driver of the vehicle.

The interfacing of a mobile accessory to the vehicle via a wireless link, preferably a wireless IR link, can be further enhanced by linking to the vehicle's GPS system. The GPS system can provide location/directional information to the driver. This can facilitate a PUSH communication protocol whereby information and messages are automatically transmitted to the driver. Alternatively, or in addition, a PULL communication protocol can be used whereby the driver selects information at his/her request only. This optionally can be a user-defined option. For example, assume the vehicle equipped with the present invention is approaching a service/convenience/food supplier such as a Starbucks coffee location or a service station. The in-vehicle GPS system can alert the WAP hardware located either in the vehicle or, through the IrDA port, on the handheld device and offer a discount such as a $0.25 electronic coupon if the driver decides to stop for a particular purchase at that store. The vehicle location is wirelessly transmitted from the vehicle to a system such as ONSTAR™ available from General Motors or a similar system. The location of the vehicle is then provided to a service location proximate to the location of the vehicle or in the direction of travel of the vehicle. Such service provider(s) can then communicate wirelessly back to the vehicle specific information/service offers/discount information/advertisements, and the driver or other occupants of the vehicle can make decisions based on this received information and/or can specifically communicate with such service provider(s). Also, INTERNET and/or telemetry sites and services can be provided at a low cost or free to the driver, and with the compensation to the remote service provider be via advertisements received at the vehicle and displayed to the driver. By linking via the GPS system of the vehicle, such advertisements can be customized to suit the particular geographic location where the vehicle is located. Also, customized entertainment and/or information can be provided by wireless communication to the vehicle, such as from a digital satellite radio station, and with content, such as advertisements, local news broadcasts, weather data, traffic data, and the like, customized to the particular location of the vehicle via dynamic interactive communication that communicates GPS data concerning the vehicle location and heading, generated by an in-vehicle GPS system, from the vehicle to a remote receiver (such as a web site, telemetry service or media station) via wireless transmission and receiving of data to and from the vehicle, and, preferably, via an IrDA-port, to a mobile device such as a personal cell phone or PDA in the vehicle.

Another embodiment of the invention is the placement of mobile device communication ports such IrDA ports in the vehicle cabins of automobiles in a rental car fleet. Preferably, the communication port, such as an IrDA port, is placed at the interior rearview mirror assembly, as this is a central location that is readily accessed by a variety of drivers, many of who will be new to the type of rented model, but who will have had previous familiarity with accessing a mirror-mounted IrDA port. This would enable the temporary user of the vehicle access mobile communication and services as well as communication to the rental company if the vehicle breaks down or requires servicing. Certain vehicles could also be equipped with faxes and keyboards for a mobile office capable of sending and receiving information.

In addition to these features, the IrDA port can serve as the interface to systems within the mirror such as a palm-sized keyboard similar to a handheld PDA where the operator can compose, edit, and access systems located in the mirror. This system can be available as an option because, due to the open architecture of the IrDA port, the operator can also interface the system with the existing PDA, phone, or other mobile device capable of composing or editing messages. This provides a useful interface for the operator for entering street addresses and E-mail messages.

In addition, the interior rearview mirror assembly can aid in the interfacing of the mobile communication protocol/needs of a particular brand/model of mobile device (such as, for example, a Palm Pilot™ PDA) to a particular vehicle model of a car manufacturer. For example, the vehicle bus system for a GM vehicle may be different than the architecture for a Ford vehicle. The interior mirror assembly in the respective model/brand of vehicle can function to allow the PalmPilot™, for example, owned by a person to interact with whatever automobile that person carries that PalmPilot™ into, whether a GM vehicle, a Ford vehicle or any other vehicle equipped with a mirror-mounted IrDA-port.

FIG. **1** illustrates an embodiment of the present invention. Mirror-mounted wireless communication system **10** includes a mobile device **11** equipped with a mobile device communication port **12** (preferably an IrDA-port that transmits/receives data via infrared wireless communication). When data is input to mobile device **11** via input element **14** (which may be a keypad or a touch or stylus actuated screen), a communication signal **16** is wirelessly transmitted to mirror-mounted communication device **18** mounted at interior rearview mirror assembly **20** that is located within the interior cabin of a vehicle (not shown). Preferably, interior mirror assembly **20** is in electronic/data communication with the vehicle electronic system/accessories schematically represented by control **22** in FIG. **1**. Control **22** links to vehicle-based telecommunication system **24** that provides a wireless telecommunication link from the vehicle to an external service/information provider.

Also, the mobile device may wirelessly communicate with the vehicle when the driver is approaching the vehicle when parked, such as to provide identity to the vehicle in order to activate/deactivate a security system, an entry system such as door locks, and the like. Also, the mobile device can take part in vehicle-based remote transactions, such as purchases, banking transactions, and the like, such as are described in commonly assigned U.S. Pat. No. 6,158,655, the disclosure of which is hereby incorporated herein by reference. The mobile device, such as a PDA, may include driver license, insurance, registration and similar data that can be displayed to the like of a police officer using a vehicle-based video screen. The vehicle can have built-in codes that authorize use of the vehicle by particular drivers/owners of particular mobile devices.

An interior rearview mirror system **30** incorporating the present invention is shown in FIG. **2**. Interior rearview mirror assembly **32** includes a mirror reflector element **36** that is within mirror casing **34**. Reflector element **36** may be a prismatic mirror element or an electrically variable reflectance element such as an electro-optic reflective element such as an electrochromic reflective element such as described in commonly assigned U.S. Pat. No. 5,140,455; 5,151,816; 5,567,360; 5,525,264; 5,610,756; 5,406,414; 5,253,109; 5,076,673; 5,073,012 or 5,117,346, which are hereby incorporated herein by reference, and in publications: N. R. Lynam, "Electrochromic Automotive Day/Night Mirrors", SAE Technical Paper Series 870636 (1987); N. R. Lynam, "Smart Windows for Automobiles", SAE Technical Paper Series 900419 (1990); N. R. Lynam and A. Agrawal, "Automotive Applications of Chromogenic Materials", Large Area Chromogenics: Materials and Devices for Transmittance Control, C. M. Lampert and C. G. Granquist, EDS., Optical Engineering Press, Washington (1990), the disclosures of which are hereby incorporated by reference herein in their entireties.

A communication transmitting and/or receiving data port **38** is located in the front, lower bezel portion of casing **34**, below mirror reflector element **36**. When mirror system **30** is mounted in a vehicle (such as attached to a vehicle windshield or to a vehicle header, as is known in the mirror art), communication port **38** is adapted to receive data from and/or transmit data to a mobile device (such as a PDA or a cellular phone) by wireless data communication. Preferably, communication port **38** comprises an IR data port. Manually operated controls, **40**, **41** and **42**, facilitate exchange of data between mirror system **30** and a mobile device. Mirror system **30** also includes a multi-text display **46**, that preferably comprises a multi-pixel display, more preferably a reconfigurable display and most preferably a display capable of scrolling, such as described in commonly assigned U.S. Pat. No. 6,477,464, which claims priority from U.S. provisional application Ser. No. 60/187,960 filed on Mar. 9, 2000, and U.S. patent application Ser. No. 09/817,874, filed on Mar. 26, 2001, now U.S. Pat. No. 7,224,324, which claims priority from U.S. provisional application Ser. No. 60/192,721, filed on Mar. 27, 2000, the disclosures of which are hereby incorporated herein by reference. Mirror system **30** also includes a display of compass direction and external or interior vehicular temperature.

Also, a mobile device in data communication with mirror system **30** can optionally attach to or dock with the interior mirror assembly, and/or can form a pendant accessory thereto, such as is described in commonly assigned U.S. Pat. No. 6,428,172, the disclosure of which is hereby incorporated herein by reference.

Also, the mobile device can link to a vehicle bus system, such as a CAN or LIN system such as disclosed in commonly assigned U.S. Pat. No. 6,396,408, which claims priority from U.S. provisional patent application Ser. No. 60/196,577, filed on Mar. 31, 2000, the disclosures of which are hereby incorporated herein by reference, via data communication with communication port **38** of mirror system **30**.

A vehicular dynamic interactive communication system **50** is shown in FIG. **3**. Vehicle **52** includes an in-vehicle GPS system **51** that receives GPS information from a satellite system (not shown) that identifies the geographic location of the vehicle, and its direction while travelling on a highway. This data and other information, such as vehicle type, driver personal information, and the like, is processed by in-vehicle telematic system **54**, which communicates via two-way wireless link **56** with a remote telematic service provider **58** (such as an ONSTAR™ system or a dial-in computer server or the like). Telematic service provider **58**, upon identifying the location, identity and direction heading of vehicle **52**, conveys this data via two-way communication link **60** (also, preferably, a wireless link) to a service provider **62** (such as a gas station, store, cinema, WEB site, toll center, banking center, satellite radio provider, and the like). Service provider **62**, upon receipt of input data from vehicle **52** via link **60**, provides data/information/service back to vehicle **52** via telematic service provider **58**, and preferably with this data/information/service customized to the geographic location and heading of vehicle **52** as generated by GPS system **51**.

Also, many mobile devices such as PDAs, cellular phones, and the like, require manual input of data. However, while driving in a car, this may be impractical and/or unsafe for the driver. By linking such mobile devices to a vehicle, as disclosed in the present invention, an in-vehicle voice detection/voice recognition/voice generation system, such as are described in commonly assigned U.S. Pat. No. 6,428,172 and U.S. Pat. No. 6,420,975, the disclosures of which are hereby incorporated herein by reference, can be used to operate the mobile device while traveling in the vehicle. For example, by using an in-vehicle voice detection/recognition/generation system, and by linking a PDA to the vehicle as disclosed in the present invention, the driver can hear data stored in the PDA (such as calendar information, notes and the like) by playback via the vehicle audio system (and with the vehicle voice generation system receiving digital data stored in the PDA via wireless, or less desirably wired, link of the PDA to the vehicle and then converting this digital data to a simulated voice that reads the digital data to the driver via the vehicle audio system). Likewise, the in-vehicle voice detection/recognition/generation system can

receive spoken words from the driver, convert these to digital data, and communicate this to the PDA.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An automotive communication system for a vehicle, said automotive communication system comprising:

a multi-pixel reconfigurable display device disposed at an interior portion of a vehicle equipped with said automotive communication system;

wherein data is wirelessly communicated to and is received by electronic circuitry of the equipped vehicle from a mobile accessory that is a personal accessory of an occupant of the equipped vehicle;

wherein said data is at least in part customized to a geographic location of the equipped vehicle as determined by a global positioning system operable to determine the geographical location of the equipped vehicle;

wherein information derived at least in part from said data is displayed by said display device and is viewable by a driver of the equipped vehicle who is operating the equipped vehicle;

wherein said automotive communication system includes voice input and said automotive communication system includes voice generation; and

wherein said data is from a data provider located external of and remote from the equipped vehicle.

2. The automotive communication system of claim **1**, wherein said data is wirelessly communicated via at least one of a PUSH communication protocol and a PULL communication.

3. The automotive communication system of claim **2**, wherein said data provider comprises a telematics provider.

4. The automotive communication system of claim **1**, wherein said automotive communication system comprises a link to a vehicle bus system.

5. The automotive communication system of claim **1**, wherein said automotive communication system comprises a user input, said user input comprising at least one of a key input and a touch input.

6. The automotive communication system of claim **1**, wherein said data is wirelessly communicated to and is received by said electronic circuitry of the equipped vehicle from said mobile accessory via a BLUETOOTH link.

7. The automotive communication system of claim **6**, wherein said data is associated with a web site.

8. The automotive communication system of claim **6**, wherein said mobile accessory comprises a telephone.

9. The automotive communication system of claim **1**, wherein said display device is disposed in the interior of the equipped vehicle at an interior mirror assembly of the equipped vehicle and wherein a user input for said automotive communication system is located at said interior mirror assembly.

10. The automotive communication system of claim **1**, wherein said automotive communication system comprises a BLUETOOTH protocol and wherein said data is wirelessly communicated via at least one of a PUSH communication protocol and a PULL communication.

11. The automotive communication system of claim **1**, wherein information derived at least in part from said data and displayed by said display device suits the geographic location where the equipped vehicle is located.

12. The automotive communication system of claim **11**, wherein said information relates to at least one of (i) a service provider and (ii) entertainment.

13. The automotive communication system of claim **12**, wherein information is displayed by said display device in accordance with a PULL communication protocol whereby displayed information is at request of the driver of the equipped vehicle.

14. An automotive communication system for a vehicle, said automotive communication system comprising:

a multi-pixel reconfigurable display device disposed at an interior portion of a vehicle equipped with said automotive communication system;

wherein data is wirelessly communicated to and is received by electronic circuitry of the equipped vehicle from a mobile accessory that is a personal accessory of an occupant of the equipped vehicle;

wherein said data is at least in part customized to a geographic location of the equipped vehicle as determined by a global positioning system operable to determine the geographical location of the equipped vehicle;

wherein information derived at least in part from said data is displayed by said display device and is viewable by a driver of the equipped vehicle who is operating the equipped vehicle;

wherein said automotive communication system includes voice input and said automotive communication system includes voice generation;

wherein said data is from a data provider located external of and remote from the equipped vehicle;

wherein information derived at least in part from said data and displayed by said display device suits the geographic location where the equipped vehicle is located; and

wherein information is displayed by said display device in accordance with a PULL communication protocol whereby displayed information is at request of the driver of the equipped vehicle.

15. The automotive communication system of claim **14**, wherein said mobile accessory comprises a telephone.

16. The automotive communication system of claim **15**, wherein said data is wirelessly communicated to and is received by said electronic circuitry of the equipped vehicle from said mobile accessory via a BLUETOOTH link.

17. The automotive communication system of claim **16**, wherein said information relates to at least one of (i) a service provider and (ii) entertainment.

18. An automotive communication system for a vehicle, said automotive communication system comprising:

a multi-pixel reconfigurable display device disposed at an interior portion of a vehicle equipped with said automotive communication system;

wherein data is wirelessly communicated to and is received by electronic circuitry of the equipped vehicle from a mobile accessory that is a personal accessory of an occupant of the equipped vehicle;

wherein said mobile accessory comprises a telephone;

wherein said data is at least in part customized to a geographic location of the equipped vehicle as determined by a global positioning system operable to determine the geographical location of the equipped vehicle;

wherein information derived at least in part from said data is displayed by said display device and is viewable by a driver of the equipped vehicle who is operating the equipped vehicle;

wherein said automotive communication system includes voice input and said automotive communication system includes voice generation;

wherein said data is from a data provider located external of and remote from the equipped vehicle; and

wherein information derived at least in part from said data and displayed by said display device suits the geographic location where the equipped vehicle is located.

19. The automotive communication system of claim **18**, wherein said automotive communication system comprises a user input.

20. The automotive communication system of claim **19**, wherein data is wirelessly communicated to and is received by said electronic circuitry of the equipped vehicle from said mobile accessory via a BLUETOOTH link.

21. The automotive communication system of claim **20**, wherein information is displayed by said display device in accordance with a PULL communication protocol whereby displayed information is at request of the driver of the equipped vehicle.

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