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(54) Title: WIRELESS NETWORK SHARING DEVICE

Industrial Design

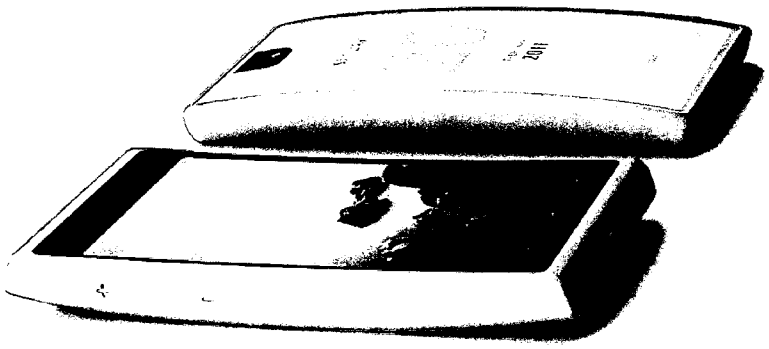

FIGURE 4

(57) Abstract: The field of the invention relates to mobile devices operable to provide sharing of a wireless network. There is provided a mobile device operable to provide instant and automatic sharing of a wireless network in response to a single action by a user, the single action comprising a physical contact gesture with the mobile device by the user, or a voice activation command by the user.

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WIRELESS NETWORK SHARING DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The field of the invention relates to mobile devices operable to provide sharing of a wireless network.

2. Technical Background

Setting up a wireless connection between two mobile devices can be somewhat cumbersome, such as requiring a number of steps with pauses in between while mobile device level processes are executed and/or passwords or PIN codes are entered by users of the devices.

3. Discussion of Related Art

An example of cumbersome pairing occurs in Bluetooth 2.0 released in 2004. In Bluetooth 2.0, each device must enter a PIN code; pairing is only successful if both devices enter the same PIN code. Any 16-byte UTF-8 (Universal Character Set Transformation Format — 8-bit) string may be used as a PIN code, however not all devices may be capable of entering all possible PIN codes.

WI-FI is a registered USA trademark of the Wi-Fi Alliance, 10900-B Stonelake Boulevard, Suite 126, Austin, TX 78759 United States, trademark Registration Number 2525795. A Wi-Fi enabled device such as a personal computer, video game console, smartphone, or digital audio player can connect to the Internet when within range of a wireless network connected to the Internet. The coverage of one or more (interconnected) access points — which may be called hotspots when offering public access — generally comprises an area the size of a few rooms but may be expanded to cover many square miles, depending on the number of access points with overlapping coverage.

SUMMARY OF THE INVENTION

According to a first aspect of the invention, there is provided a mobile device operable to provide instant and automatic sharing of a wireless network in response to a single action by a user, the single action comprising a physical contact gesture with the mobile device by the user, or a voice activation command by the user.

The mobile device may be operable to connect to the internet via a mobile phone network.

The mobile device may be such that a second device is wirelessly connectable to the mobile device via the shared wireless network.

The mobile device may be such that a plurality of devices are wirelessly connectable to the mobile device via the shared wireless network.

The mobile device may be adapted to enable the second device or the plurality of devices to access the internet via the shared wireless network.

The mobile device may be adapted to enable the second device or the plurality of devices to access files on the mobile device via the shared wireless network.

The mobile device may include a hard switch, wherein the single gesture by the user comprises pressing a hard switch of the mobile device.

The mobile device may include a soft switch, wherein the single action by the user comprises pressing the soft switch of the mobile device.

The mobile device may include a hidden mechanical button, wherein the single action by the user comprises pressing the hidden mechanical button of the mobile device.

The mobile device may include a squeeze control, wherein the single action by the user comprises activating the squeeze control of the mobile device.

The mobile device may include capacitor sensor strips operable to detect when the user has picked up the device, wherein the single action by the user comprises picking up the mobile device.

The mobile device may be connectable to a 4G mobile phone network.

The mobile device may be connectable to a 3G mobile phone network.

The mobile device may be connectable to a 2G mobile phone network.

The mobile device may be a bar form factor device.

The mobile device may comprise a touch screen and a further bistable screen.

The mobile device may be one wherein the bistable screen is operable to be refreshed wholly or partially.

The mobile device may be one wherein the bistable screen is operable to be refreshed starting with any pixel in a screen area.

The mobile device may be one wherein the mobile device is operable to define a limited set of users who may connect to the device to enable instant and automatic sharing of a wireless network with the limited set of users.

The mobile device may be one wherein the mobile device is operable to provide a wireless connection to a personal computer, to enable that computer to connect to the internet.

The mobile device may be one wherein the mobile device is operable to provide a wireless connection to two personal computers, to enable file sharing or resource sharing between those two personal computers.

The mobile device may be one wherein the mobile device is operable to provide for file synchronization for files that are shared using automatic sharing of a wireless network via the mobile device.

The mobile device may be a mobile phone.

The mobile device may be a video game console.

The mobile device may be a smartphone.

The mobile device may be a digital audio player.

The mobile device may be a personal computer.

The mobile device may be a tablet computer.

The mobile device may be a personal portable device.

The mobile device may be operable to provide instant and automatic sharing of a wireless network in response to a single action by a user, the single action comprising a physical contact gesture with the mobile device by the user, or a voice activation command by the user, when the device is already turned on and connected to a mobile phone network.

The mobile device may be operable to connect to a wireless dongle, the mobile device further operable to view a file structure of files stored on the wireless dongle.

The mobile device may be operable to view the file structure of files stored on the wireless dongle in a web browser running on the mobile device.

The mobile device may be operable to print a file on the dongle at a printer in connection with the dongle.

The mobile device may be operable to print a file on the dongle at a printer in connection with the mobile device.

The mobile device may be one wherein the device is in connection with the internet, the device further operable to connect to a wireless dongle, the mobile device further operable

to stream audio, video or image files to the wireless dongle in response to a request from the wireless dongle to the mobile device to access a streaming source via the internet.

The mobile device may have a curved shape.

The mobile device may have a concave front face and a convex rear face.

The mobile device may be one wherein the concave front face and the convex rear face have a similar magnitude of curvature.

The mobile device may be one wherein the device is further operable to disable the sharing of the wireless network in response to a further single action by the user, the further single action comprising a physical contact gesture with the mobile device by the user, or a voice activation command by the user.

The mobile device may include a hard switch, wherein the further single action by the user comprises pressing the hard switch of the mobile device.

The mobile device may include a soft switch, wherein the further single action by the user comprises pressing the soft switch of the mobile device.

The mobile device may include a hidden mechanical button, wherein the further single action by the user comprises pressing the hidden mechanical button of the mobile device.

The mobile device may include a squeeze control, wherein the further single action by the user comprises activating the squeeze control of the mobile device.

The mobile device may include capacitor sensor strips operable to detect when the user has picked up the device, wherein the further single action by the user comprises picking up the mobile device.

The mobile device may be one wherein the shared wireless network is a Wi-Fi network.

The mobile device may be one wherein a device local wireless network interface of the mobile device is powered down when a mobile phone network signal strength is below a predefined level.

The mobile device may be one wherein the device local wireless network interface of the mobile device is powered down when the mobile phone network signal strength is below the predefined level for a predefined time interval.

The mobile device may be one wherein the device local wireless network interface of the mobile device is powered down when the device is not connected to a mobile phone network.

The mobile device may be one wherein the device local wireless network interface of the mobile device is powered down when the device is not connected to a mobile phone network for a predefined time interval.

The mobile device may be one wherein the device local wireless network interface of the mobile device is not powered down when the device is acting as a router between other devices on the local wireless network.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows an example of a customer proposition.

Figure 2 shows an example of a smartphone specification.

Figure 3 shows an example of a mobile device industrial design.

Figure 4 shows an example of a mobile device industrial design.

Figure 5 shows an example of a mobile phone hardware specification.

Figure 6 shows examples of chipsets for mobile devices.

Figure 7 shows an example specification for a back screen of a mobile device.

Figure 8 shows an example software architecture of a mobile device.

Figure 9 shows examples of aspects of an example mobile device.

Figure 10 shows examples of an applications concept for a mobile device.

Figure 11 shows examples of applications for a mobile device.

Figure 12 shows further examples of applications for a mobile device.

Figure 13 shows an example of a mobile device with two cameras, with a screen between the cameras.

Figure 14 shows an example of a mobile device in which the microphone is placed in a hole in the body of the mobile device, in the SIM card's eject hole.

DETAILED DESCRIPTION

Mobile hot spot – ('Instant 4G', for example)

We provide a simple hard (or soft) switch on a mobile phone, to enable instant and automatic sharing of a WiFi network, using the phone as a mobile hot spot. For example, a user can instantly share internet access using this switch on the phone, instead of a complex user interface (UI). So one use could be at a party to instantly enable friends to access the internet via your phone. Files on the phone could then also be shared (access control would prevent other files from being shared). Alternatively, files on the phone could be shared without providing internet access. A simple hard (or soft) switch on the mobile phone may be provided to disable sharing of a WiFi network.

We provide a simple hard (or soft) switch on a mobile device, to enable instant and automatic sharing of a WiFi network, using the device as a mobile hot spot. For example, a user can instantly share internet access using this switch on the device, instead of a complex user interface (UI). So one use could be at a party to instantly enable friends to access the internet via your mobile device. Files on the mobile device could then also be shared (access control would prevent other files from being shared). The mobile device may be a mobile phone, a mobile smart phone, or a mobile tablet computer device, for example. Alternatively, files on the mobile device could be shared without providing internet access. A simple hard (or soft) switch on the mobile device may be provided to disable sharing of a WiFi network.

We provide a hidden mechanical button on a mobile phone, to enable instant and automatic sharing of a WiFi network, using the phone as a mobile hot spot. For example, a user can instantly share internet access using this hidden mechanical button on the phone, instead of a complex user interface (UI). So one use could be at a party to instantly enable friends to access the internet via your phone. Files on the phone could then also be shared (access control would prevent other files from being shared). Alternatively, files on the phone could be shared without providing internet access. A hidden mechanical button on the mobile phone may be provided to disable sharing of a WiFi network.

We provide a hidden mechanical button on a mobile device, to enable instant and automatic sharing of a WiFi network, using the device as a mobile hot spot. For example, a user can instantly share internet access using this hidden mechanical button on the device, instead of a complex user interface (UI). So one use could be at a party to instantly enable friends to access the internet via your mobile device. Files on the mobile device could then also be shared (access control would prevent other files from being shared). The mobile device may be a mobile phone, a mobile smart phone, or a mobile tablet computer device, for example. Alternatively, files on the mobile device could be shared without providing internet access. A hidden mechanical button on the mobile device may be provided to disable sharing of a WiFi network.

We provide squeeze control on a mobile phone, to enable instant and automatic sharing of a WiFi network, using the phone as a mobile hot spot. For example, a user can instantly share internet access using this squeeze control on the phone, instead of a complex user interface (UI). So one use could be at a party to instantly enable friends to access the internet via your phone. Files on the phone could then also be shared (access control would prevent other files from being shared). Alternatively, files on the phone could be shared without providing internet access. Squeeze control on the mobile phone may be provided to toggle on/off the sharing of a WiFi network.

We provide squeeze control on a mobile device, to enable instant and automatic sharing of a WiFi network, using the device as a mobile hot spot. For example a user can instantly share internet access using this squeeze control on the device, instead of a complex user interface (UI). So one use could be at a party to instantly enable friends to access the internet via your mobile device. Files on the mobile device could then also be shared (access control would prevent other files from being shared). The mobile device may be a mobile phone, a mobile smart phone, or a mobile tablet computer device, for example. Alternatively, files on the mobile device could be shared without providing internet access. Squeeze control on the mobile device may be provided to toggle on/off the sharing of a WiFi network.

We provide capacitor sensor strips in a mobile phone, so that the mobile phone can know if a user has picked it up, such that when a user has picked it up, this enables instant and automatic sharing of a WiFi network, using the phone as a mobile hot spot. For example,

a user can instantly share internet access by picking up the phone, instead of a complex user interface (UI). So one use could be at a party to instantly enable friends to access the internet via your phone. Files on the phone could then also be shared (access control would prevent other files from being shared). Alternatively, files on the phone could be shared without providing internet access. Instant and automatic sharing of a WiFi network may be disabled when the user puts the phone down.

We provide capacitor sensor strips in a mobile device, so that the mobile device can know if a user has picked it up, such that when a user has picked it up, this enables instant and automatic sharing of a WiFi network, using the device as a mobile hot spot. For example a user can instantly share internet access by picking up the device, instead of a complex user interface (UI). So one use could be at a party to instantly enable friends to access the internet via your mobile device. Files on the mobile device could then also be shared (access control would prevent other files from being shared). The mobile device may be a mobile phone, a mobile smart phone, or a mobile tablet computer device, for example. Alternatively, files on the mobile device could be shared without providing internet access. Instant and automatic sharing of a WiFi network may be disabled when the user puts the device down.

The mobile phone may be connected to a 4G mobile phone network. The mobile phone may be connected to a 3G mobile phone network. The mobile phone may be connected to a 2G mobile phone network. The mobile device may be connected to a 4G mobile phone network. The mobile device may be connected to a 3G mobile phone network. The mobile device may be connected to a 2G mobile phone network.

The mobile device (eg. mobile phone) may be a bar form factor device. The device case may be a single block. The device may have a touch screen. The device operating system may be Google Android. The device may have a bistable screen. The device may have a touch screen and a further bistable screen. The bistable screen may be one which can be refreshed wholly or partially, such as for a limited screen area or the whole screen area, starting with any pixel in that screen area. A glass substrate of the device may be curved in conformity with device surface curvature.

The bar form factor display device may comprise a plurality of display screens. Bar form factors include slab, slate, block, bar and candybar. Bar form factor display devices, eg. slate devices such as the iPhone™ and the iPad™, are known. However, these devices comprise only a single display screen. A bar form factor device may be a slate device.

The mobile device (eg. mobile phone) may be used to define a limited set of users who may connect to the device to enable instant and automatic sharing of a WiFi network with the limited set of users.

The mobile device (eg. mobile phone) may provide a wireless connection to a personal computer, to enable that computer to connect to the internet.

The mobile device (eg. mobile phone) may provide a wireless connection to two personal computers, to enable file sharing or resource sharing (eg. sharing of application software) between those two personal computers via a trusted intermediary: the mobile device.

The mobile device (eg. mobile phone) may provide for file synchronization for files that are shared using automatic sharing of a WiFi network via the mobile device.

The mobile device may be a personal computer, a video game console, a smartphone, a digital audio player, a mobile phone or a tablet computer, for example. The mobile device may include an integral GPS antenna.

The mobile device (eg. mobile phone) may provide instant and automatic sharing of a wireless network in response to a single action by a user, the single action comprising a physical contact gesture by the user with the mobile device, or a voice activation command, when the device is already turned on and connected to a mobile phone network. Sharing may be with a device of another user, or with a plurality of other user devices.

Virtual Web-USB interface for wireless devices

iPhone/iPad has no universal serial bus (USB) connector – a major disadvantage. We provide a WiFi connection from a WiFi dongle with a USB interface; a mobile device can then interface to a memory in the WiFi dongle, plus any external device that the USB

dongle is plugged into, just as though the USB interface was native to the mobile device. So you could view the file structure of files stored on the USB dongle itself in a web browser on the mobile device, or print to a printer the USB dongle is interfaced to, or print to a printer the mobile phone is connected to, for example. The mobile device (eg. mobile phone) may provide automatic wireless network sharing.

USB stick for in-vehicle audio

In-vehicle (eg. in-car) audio systems often have USB interfaces for MP3 files, but have no way of accessing internet radio (that is currently only available on really high-end systems). We provide a wireless data enabled USB dongle that can receive streaming radio (e.g. for internet radio stations, Spotify etc.) The wireless data enabled USB dongle may interface wirelessly with a mobile phone or other mobile device. The mobile phone or other mobile device may provide automatic wireless network sharing. The mobile phone or other mobile device may provide wireless access to the internet, thereby providing access via the internet to radio stations that cannot be received by a vehicle radio broadcast receiver. The USB dongle captures a data stream and converts it to a sequence of files – just like the MP3 files the in-vehicle (eg. in-car) audio is designed to read. This enables even a basic in-vehicle (eg. in-car) audio device to have playback/rewind, store etc. functionality for internet radio.

The streamed audio is stored as at least two separate files, which allows the user to choose to skip to the next track using the car audio system software. The user can listen to music online in his vehicle (eg. a car) with no modifications to the in-vehicle (eg. in-car) audio system. An online interface is used for setting up the service, selecting stream source. The online interface may be provided by the mobile phone or other mobile device.

Device with no visible mechanical buttons Example

The mobile device (eg. mobile phone) may present a seamless, unibody surface – although it can still have hidden mechanical buttons e.g. for volume up, volume down.

Squeeze control Example

The mobile device (eg. mobile phone) may be turned on or off by squeezing it.

Curved phone Example

A unique and organic phone shape – essential for rapid product differentiation in a crowded space. The mobile phone has a concave front face and a convex rear face, which may be of same or similar magnitude of curvature. Concave front may match a path of a finger as wrist rotates. Hence it's very natural to use. Having a curved surface as the vibrating distributed mode loudspeaker (DML) speaker is also better since if the main screen (eg. LCD) with the speaker exciters was instead a flat surface, then it would sound unpleasant if that flat surface is placed down against a tabletop. Curving the surface prevents this happening. Preferred curvature of front and back is cylindrical, rather than spherical or aspherical.

The convex back can have a bistable display. Since the normal resting position is front face down, the back screen with bi-stable display is normally displayed when phone is in the resting position. This resting position is stable. If phone is placed back down (ie convex face down), the phone could spin, which is unstable. Hence a user will likely place phone front face (i.e. concave face) down, with the bi-stable screen showing.

When the phone is in a pocket, the front face (concave face) can face inwards, since this better matches leg curvature. This can be the better configuration (as opposed to front face up) for antenna reception.

Curved device Example

A unique and organic device shape – essential for rapid product differentiation in a crowded space. The mobile device has a concave front face and a convex rear face, which may be of same or similar magnitude of curvature. Concave front may match a path of a finger as wrist rotates. Hence it's very natural to use. Having a curved surface as the vibrating DML speaker is also better since if the main screen (eg. LCD) with the speaker exciters was instead a flat surface, then it would sound unpleasant if that flat surface is placed down against a tabletop. Curving the surface prevents this happening. Preferred curvature of front and back is cylindrical, rather than spherical or aspherical.

The convex back can have a bistable display. Since the normal resting position is front face down, the back screen with bi-stable display is normally displayed when device is in the resting position. This resting position is stable. If the device is placed back down (ie convex face down), the device could spin, which is unstable. Hence a user will likely place device front face (i.e. concave face) down, with the bi-stable screen showing.

When the device is in a pocket, the front face (concave face) can face inwards, since this better matches leg curvature. This can be the better configuration (as opposed to front face up) for antenna reception.

The curved device may be a mobile phone, a mobile smart phone, a mobile tablet computer device, a personal computer, a video game console, or a digital audio player, for example.

Capacitive 'Hold' sensors Example

With a conventional phone, one has to manually activate the home screen if the phone is in its idle state, usually by pressing a button. We use capacitor sensor strips in the phone, so that the phone can know if the user has picked it up and then automatically wake-up – e.g. activate the start-up/home screen.

This could be used instead of a soft or hard key lock on the phone as well as for the screen brightness.

LAN connectivity management (Wi-Fi interface management for portable devices)

A portable router device is provided with a Wide Area Network (WAN) interface (using for instance standardized telecommunications such as 2G/3G/4G/LTE) and a Local Area Network (LAN) interface (for instance WiFi networks, campus networks, personal networks including Bluetooth and other short range network connectivity). The LAN interface may be switched on only when the device has connected to the WAN. The LAN interface may be switched on only within a predefined range of WAN signal strength. Other devices are able to connect, through the router, to the WAN network (for example to the internet) via the LAN interface when the LAN interface is activated.

The LAN interface of the router device may be deactivated when the device is not connected to a WAN network. The LAN interface of the router device may be deactivated when the WAN signal strength is below a predefined level. In one example the signal level has to be below the threshold for a certain time before the LAN interface is deactivated. The router device may maintain the LAN activation if for instance there is communication between other devices on the LAN, even when otherwise it would have deactivated the LAN interface because for example there is no connection to a WAN network or the WAN signal strength is below a predefined level.

The router device reduces power consumption (it is powered for instance with a battery or powered by mains electricity) when the LAN interface is switched off.

When the WAN connection is absent, or the WAN signal strength is too weak, deactivating the LAN interface will also provide the correct user experience for users of other LAN devices possibly using the router device.

The other LAN devices will for instance not try to connect to the internet using the router, if the router is in a low WAN signal strength area (non-serviceable area).

Already existing devices such as portable routers and phones with a portable router function, will provide the option to enable or disable the LAN interface, but not depending on if the device is connected to WAN network or not.

There is provided a portable router device; it has WAN interface (eg. 2G/3G/4G) and LAN interface (eg. WiFi). In the case in which we have a WAN (eg. 2G, 3G,4G) signal, the LAN (eg. Wi-Fi) interface is switched on and Wi-Fi devices are able to connect to the WAN through the router. In the case in which we don't have WAN signal, we turn LAN interface (eg. Wi-Fi) off to save the battery power and to provide the right user experience in Wi-Fi devices such as iPhone: they'll not try to connect to internet through the router in the case in which the router is in a non-serviceable area.

Note

It is to be understood that the above-referenced arrangements are only illustrative of the application for the principles of the present invention. Numerous modifications and alternative arrangements can be devised without departing from the spirit and scope of the present invention. While the present invention has been shown in the drawings and fully described above with particularity and detail in connection with what is presently deemed to be the most practical and preferred example(s) of the invention, it will be apparent to those of ordinary skill in the art that numerous modifications can be made without departing from the principles and concepts of the invention as set forth herein.

APPENDIX 1: Wi-Fi PRIMER

WI-FI is a registered USA trademark of the Wi-Fi Alliance, 10900-B Stonelake Boulevard, Suite 126, Austin, TX 78759 United States, trademark Registration Number 2525795. A Wi-Fi enabled device such as a personal computer, video game console, smartphone, or digital audio player can connect to the Internet when within range of a wireless network connected to the Internet. The coverage of one or more (interconnected) access points — which may be called hotspots when offering public access — generally comprises an area the size of a few rooms but may be expanded to cover many square miles, depending on the number of access points with overlapping coverage.

The Alliance has generally enforced the use of 'Wi-Fi' to describe only a narrow range of connectivity technologies including wireless local area network (WLAN) based on the IEEE 802.11 standards, device to device connectivity (such as Wi-Fi Peer to Peer, also known as Wi-Fi Direct), and a range of technologies that support PAN (Personal area network), LAN (Local area network) and even WAN (Wide area network) connections.

A Wi-Fi enabled device such as a personal computer, video game console, smartphone or digital audio player can connect to the Internet when within range of a wireless network connected to the Internet. The coverage of one or more (interconnected) access points — which may be called hotspots — can comprise an area as small as a few rooms or as large as many square miles. Coverage in the larger area may depend on a group of access points with overlapping coverage. Wi-Fi technology has been used in wireless mesh networks, for example, in London, UK.

In addition to private use in homes and offices, Wi-Fi can provide public access at Wi-Fi hotspots provided either free-of-charge or to subscribers to various commercial services. Organizations and businesses - such as those running airports, hotels and restaurants - often provide free-use hotspots to attract or assist clients.

A wireless access point (WAP) connects a group of wireless devices to an adjacent wired LAN. An access point resembles a network hub, relaying data between connected wireless devices in addition to a (usually) single connected wired device, most often an ethernet hub or switch, allowing wireless devices to communicate with other wired devices.

Wireless adapters allow devices to connect to a wireless network. These adapters connect to devices using various external or internal interconnects such as PCI (Peripheral Component Interconnect), miniPCI (mini Peripheral Component Interconnect), USB (Universal Serial Bus), ExpressCard, Cardbus and PC Card (originally PCMCIA Card; PCMCIA stands for Personal Computer Memory Card International Association). As of 2010, most newer laptop computers come equipped with internal adapters. Internal cards are generally more difficult to install.

Wireless routers integrate a Wireless Access Point, ethernet switch, and internal router firmware application that provides IP (Internet Protocol) routing, NAT (Network address translation), and DNS (Domain Name System) forwarding through an integrated WAN-interface. A wireless router allows wired and wireless ethernet LAN devices to connect to a (usually) single WAN device such as a cable modem or a DSL (Digital Subscriber Line) modem. A wireless router allows all three devices, mainly the access point and router, to be configured through one central utility. This utility is usually an integrated web server that is accessible to wired and wireless LAN clients and often optionally to WAN clients. This utility may also be an application that is run on a desktop computer such as Apple's AirPort.

Wireless network bridges connect a wired network to a wireless network. A bridge differs from an access point: an access point connects wireless devices to a wired network at the data-link layer. Two wireless bridges may be used to connect two wired networks over a wireless link, useful in situations where a wired connection may be unavailable, such as between two separate homes.

Wireless range-extenders or wireless repeaters can extend the range of an existing wireless network. Strategically placed range-extenders can elongate a signal area or allow for the signal area to reach around barriers such as those pertaining in L-shaped corridors. Wireless devices connected through repeaters will suffer from an increased latency for each hop. Additionally, a wireless device connected to any of the repeaters in the chain will have a throughput limited by the "weakest link" between the two nodes in the chain from which the connection originates to where the connection ends.

APPENDIX 2: CONCEPTS

A. Yota introduction

1. The main focus for Yota's IP protection strategy will be its new LTE phone. The LTE phone will include innovative software, hardware and provide an innovative user experience.

B. List of Concepts

1. 'Meet Camera' – seeing eye-to-eye when video conferencing

Conventional video phones give a very poor user experience because there's rarely eye-to-eye contact – instead, the caller seems to be looking away from you since he's looking away from the camera. We place cameras on either side of the LCD screen to create a virtual camera in the centre of the screen, using an algorithm based on the two images. The image taken by the virtual camera is what is shown to the other party: this gives the impression to the other party that you are looking directly at them – a much better user experience.

One advantage of Meet Camera is that one can approach a large panel display with always on video-conferencing and talk directly to the person shown on it – giving the feeling of eye-to-eye contact.

The face displayed by the virtual camera can be placed in the centre of the screen, even if the face of the person whose image is being captured moves significantly away from the centre of the screen. This placement can be accomplished by a tracking algorithm. See Figure 13.

2. Capacitive 'Hold' sensors

With a conventional phone, one has to manually activate the home screen if the phone is in its idle state, usually by pressing a button. We use capacitor sensor strips in the phone, so that the phone can know if the user has picked it up and then automatically wake-up – e.g. activate the start-up/home screen.

This could be used instead of a soft or hard key lock on the phone as well as for the screen brightness.

3. DML Phone speaker

It's hard to get good quality audio performance, unless you have a large speaker with a large and ugly speaker hole. We use NXT plc distributed mode loudspeaker (DML) technology here to vibrate the entire phone screen - the whole screen surface acts as the speaker. The speaker hole can be fully eliminated. One can use two small drivers/exciters under the glass to make the screen vibrate. DML has never been used before to drive a screen surface in a mobile phone. Haptic feedback can be provided by the drivers too – a new use for the DML exciters.

4. Mobile hot spot - 'Instant 4G'

We provide a simple hard (or soft) switch on phone, to enable instant and automatic sharing of a WiFi network, using the phone as a mobile hot spot. A user can instantly share internet access using this switch on the phone, instead of a complex user interface (UI). So one could use be at a party to instantly enable friends to access the internet via your phone. Files on the phone could then also be shared (access control would prevent other files from being shared).

5. Virtual Web-USB interface for wireless devices

iPhone/iPad has no USB connector – a major disaadvantage. We provide a WiFi connection from a WiFi dongle with a USB interface; the iPhone/iPad can then interface to a memory in the WiFi dongle, plus any external device that the USB dongle is plugged into, just as though the USB interface was native to the iPhone. So you could view the file structure of files stored on the USB dongle itself in a web browser on the iPhone, or print to a printer the USB dongle is interfaced to.

6. USB stick for in-car audio

In-car audio systems often have USB interfaces for MP3 files, but will have no way of accessing internet radio (that is currently only available on really high-end systems). We provide a wireless data enabled USB dongle that can receive streaming radio (e.g. for internet radio stations, Spotify etc.) The USB dongle captures the data stream and converts

it to a sequence of files – just like the MP3 files the in-car audio is designed to read. This enables even a basic in-car audio device to have playback/rewind, store etc. functionality for internet radio.

The streamed audio is stored as at least two separate files, which allows the user to choose to skip to the next track using the car audio system software. The user can listen to music online in his car with no modifications to the in-car audio system. An online interface is used for setting up the service, selecting stream source.

7. User experience (UX) to identify sound sources

Individual sound sources (different people speaking at a phone in hands-free mode) are identified with two or more inbuilt microphones. Then the individual sources are graphically represented on the device relative to their position in the room. A visual interface on the phone enables selection by hand of which sound source to record e.g. to optimise the noise cancellation/sonic focus for the selected sound source. This could be advantageous in for instance meetings where one person is talking and you want to aggressively noise cancel everything else.

8. Phone with no visible mechanical buttons

The phone presents a seamless, unibody surface – although it can still have hidden mechanical buttons e.g. for volume up, volume down.

9. Squeeze control

You can turn the phone on or off by squeezing it.

10. Curved phone

A unique and organic phone shape – essential for rapid product differentiation in a crowded space. The mobile phone has a concave front face and a convex rear face, of same or similar magnitude of curvature. Concave front matches path of finger as wrist rotates. Hence it's very natural to use. Having a curved surface as the vibrating DML speaker is also better since if the LCD with the speaker exciters was instead a flat surface, then it

would sound unpleasant if that flat surface is placed down against a tabletop. Curving the surface prevents this happening. Preferred curvature of front and back is cylindrical, rather than spherical or aspherical.

The convex back can have a bistable display. Since the normal resting position is front face down, the back screen with bi-stable display is normally displayed when phone is in the resting position. This resting position is stable. If phone is placed back down (ie convex face down), the phone could spin, which is unstable. Hence a user will likely place phone front face (i.e. concave face) down, with the bi-stable screen showing.

When the phone is in a pocket, the front face (concave face) can face inwards, since this better matches leg curvature. This can be the better configuration (as opposed to front face up) for antenna reception.

11. Microphone in SIM card "eject hole"

The microphone is placed in a hole in the body of the mobile device, in the SIM card's eject hole. See Figure 14.

12. Tactile casing of mobile device

The casing of the mobile device consists of a material that can change its tactile properties from wood to metal ("morphing").

APPENDIX 3: PRIMER ON LTE

3GPP Long Term Evolution (LTE), is the latest standard in the mobile network technology tree that produced the GSM/EDGE and UMTS/HSPA network technologies. It is a project of the 3rd Generation Partnership Project (3GPP), operating under a name trademarked by one of the associations within the partnership, the European Telecommunications Standards Institute.

The current generation of mobile telecommunication networks are collectively known as 3G (for "third generation"). Although LTE is often marketed as 4G, first-release LTE does not fully comply with the IMT Advanced 4G requirements. The pre-4G standard is a step toward LTE Advanced, a 4th generation standard (4G) of radio technologies designed to increase the capacity and speed of mobile telephone networks. LTE Advanced is backwards compatible with LTE and uses the same frequency bands, while LTE is not backwards compatible with 3G systems.

MetroPCS and Verizon Wireless in the United States and several worldwide carriers announced plans, beginning in 2009, to convert their networks to LTE. The world's first publicly available LTE-service was opened by TeliaSonera in the two Scandinavian capitals Stockholm and Oslo on the 14th of December 2009. LTE is a set of enhancements to the Universal Mobile Telecommunications System (UMTS) which was introduced in 3rd Generation Partnership Project (3GPP) Release 8. Much of 3GPP Release 8 focuses on adopting 4G mobile communication's technology, including an all-IP flat networking architecture. On August 18, 2009, the European Commission announced it will invest a total of €18 million into researching the deployment of LTE and the certified 4G system LTE Advanced.

While it is commonly seen as a cell phone or common carrier development, LTE is also endorsed by public safety agencies in the US as the preferred technology for the new 700 MHz public-safety radio band. Agencies in some areas have filed for waivers hoping to use the 700 MHz spectrum with other technologies in advance of the adoption of a nationwide standard.

The LTE specification provides downlink peak rates of at least 100 Mbps, an uplink of at least 50 Mbps and RAN round-trip times of less than 10 ms. LTE supports scalable carrier bandwidths, from 1.4 MHz to 20 MHz and supports both frequency division duplexing (FDD) and time division duplexing (TDD).

Part of the LTE standard is the System Architecture Evolution, a flat IP-based network architecture designed to replace the GPRS Core Network and ensure support for, and mobility between, some legacy or non-3GPP systems, for example GPRS and WiMAX respectively.

The main advantages with LTE are high throughput, low latency, plug and play, FDD and TDD in the same platform, an improved end-user experience and a simple architecture resulting in low operating costs. LTE will also support seamless passing to cell towers with older network technology such as GSM, cdmaOne, UMTS, and CDMA2000. The next step for LTE evolution is LTE Advanced and is currently being standardized in 3GPP Release 10.

APPENDIX 4: PRIMER ON LTE ADVANCED

LTE Advanced is a preliminary mobile communication standard, formally submitted as a candidate 4G system to ITU-T in late 2009, was approved into ITU, International Telecommunications Union, IMT-Advanced and expected to be finalized by 3GPP in early 2011. It is standardized by the 3rd Generation Partnership Project (3GPP) as a major enhancement of the 3GPP Long Term Evolution (LTE) standard.

The LTE format was first proposed by NTT DoCoMo of Japan and has been adopted as the international standards. LTE standardization has come to a mature state by now where changes in the specification are limited to corrections and bug fixes. The first commercial services were launched in Scandinavia in December 2009 followed by the United States and Japan in 2010. More first release LTE networks are expected to be deployed globally during 2010 as a natural evolution of several 2G and 3G systems, including Global system for mobile communications (GSM) and Universal Mobile Telecommunications System (UMTS) (3GPP as well as 3GPP2).

Being described as a 3.9G (beyond 3G but pre-4G) technology the first release LTE does not meet the IMT Advanced requirements for 4G also called IMT Advanced as defined by the International Telecommunication Union such as peak data rates up to 1 Gbit/s. The ITU has invited the submission of candidate Radio Interface Technologies (RITs) following their requirements as mentioned in a circular letter. The work by 3GPP to define a 4G candidate radio interface technology started in Release 9 with the study phase for LTE-Advanced. The requirements for LTE-Advanced are defined in 3GPP Technical Report (TR) 36.913, "Requirements for Further Advancements for E-UTRA (LTE-Advanced)." These requirements are based on the ITU requirements for 4G and on 3GPP operators' own requirements for advancing LTE. Major technical considerations include the following:

- Continual improvement to the LTE radio technology and architecture
- Scenarios and performance requirements for interworking with legacy radio access technologies
- Backward compatibility of LTE-Advanced with LTE. An LTE terminal should be able to work in an LTE-Advanced network and vice versa. Any exceptions will be considered by 3GPP.

- Account taken of recent World Radiocommunication Conference (WRC-07) decisions regarding new IMT spectrum as well as existing frequency bands to ensure that LTE-Advanced geographically accommodates available spectrum for channel allocations above 20 MHz. Also, requirements must recognize those parts of the world in which wideband channels are not available.

Likewise, 802.16m, 'WiMAX 2', has been approved by ITU into the IMT Advanced family. WiMAX 2 is designed to be backward compatible with WiMAX 1/1.5 devices. Most vendors now support ease of conversion of earlier 'pre-4G', pre-advanced versions and some support software defined upgrades of core base station equipment from 3G.

The mobile communication industry and standardization organizations have therefore started to work on 4G access technologies such as LTE Advanced. At a workshop in April 2008 in China 3GPP agreed the plans for future work on Long Term Evolution (LTE). A first set of 3GPP requirements on LTE Advanced has been approved in June 2008. Besides the peak data rate 1 Gbit/s that fully supports the 4G requirements as defined by the ITU-R, it also targets faster switching between power states and improved performance at the cell edge. Detailed proposals are being studied within the working groups.

CONCEPTS

There are provided multiple concepts in this disclosure. The following may be of assistance in defining some of these concepts.

A. Mobile device operable to provide instant and automatic sharing of a wireless network in response to a single action by a user

There is provided a mobile device operable to provide instant and automatic sharing of a wireless network in response to a single action by a user, the single action comprising a physical contact gesture with the mobile device by the user, or a voice activation command by the user. Further features may include:

- The mobile device may be operable to connect to the internet via a mobile phone network.

- The mobile device may be such that a second device is wirelessly connectable to the mobile device via the shared wireless network.

- The mobile device may be such that a plurality of devices are wirelessly connectable to the mobile device via the shared wireless network.

- The mobile device may be adapted to enable the second device or the plurality of devices to access the internet via the shared wireless network.

- The mobile device may be adapted to enable the second device or the plurality of devices to access files on the mobile device via the shared wireless network.

- The mobile device may include a hard switch, wherein the single gesture by the user comprises pressing a hard switch of the mobile device.

- The mobile device may include a soft switch, wherein the single action by the user comprises pressing the soft switch of the mobile device.

- The mobile device may include a hidden mechanical button, wherein the single action by the user comprises pressing the hidden mechanical button of the mobile device.

- The mobile device may include a squeeze control, wherein the single action by the user comprises activating the squeeze control of the mobile device.

- The mobile device may include capacitor sensor strips operable to detect when the user has picked up the device, wherein the single action by the user comprises picking up the mobile device.

- The mobile device may be connectable to a 4G mobile phone network.

- The mobile device may be connectable to a 3G mobile phone network.

- The mobile device may be connectable to a 2G mobile phone network.

- The mobile device may be a bar form factor device.

- The mobile device may comprise a touch screen and a further bistable screen.

- The mobile device may be one wherein the bistable screen is operable to be refreshed wholly or partially.

- The mobile device may be one wherein the bistable screen is operable to be refreshed starting with any pixel in a screen area.

- The mobile device may be one wherein the mobile device is operable to define a limited set of users who may connect to the device to enable instant and automatic sharing of a wireless network with the limited set of users.

- The mobile device may be one wherein the mobile device is operable to provide a wireless connection to a personal computer, to enable that computer to connect to the internet.

- The mobile device may be one wherein the mobile device is operable to provide a wireless connection to two personal computers, to enable file sharing or resource sharing between those two personal computers.

- The mobile device may be one wherein the mobile device is operable to provide for file synchronization for files that are shared using automatic sharing of a wireless network via the mobile device.

- The mobile device may be a mobile phone.

- The mobile device may be a video game console.

- The mobile device may be a smartphone.

- The mobile device may be a digital audio player.

- The mobile device may be a personal computer.

- The mobile device may be a tablet computer.

- The mobile device may be a personal portable device.

- The mobile device may be operable to provide instant and automatic sharing of a wireless network in response to a single action by a user, the single action comprising a physical contact gesture with the mobile device by the user, or a voice activation command by the user, when the device is already turned on and connected to a mobile phone network.

- The mobile device may be operable to connect to a wireless dongle, the mobile device further operable to view a file structure of files stored on the wireless dongle.

- The mobile device may be operable to view the file structure of files stored on the wireless dongle in a web browser running on the mobile device.

- The mobile device may be operable to print a file on the dongle at a printer in connection with the dongle.

- The mobile device may be operable to print a file on the dongle at a printer in connection with the mobile device.

- The mobile device may be one wherein the device is in connection with the internet, the device further operable to connect to a wireless dongle, the mobile device further operable to stream audio, video or image files to the wireless dongle in response to a request from the wireless dongle to the mobile device to access a streaming source via the internet.

- The mobile device may have a curved shape.

- The mobile device may have a concave front face and a convex rear face.

- The mobile device may be one wherein the concave front face and the convex rear face have a similar magnitude of curvature.

- The mobile device may be one wherein the device is further operable to disable the sharing of the wireless network in response to a further single action by the user, the further single action comprising a physical contact gesture with the mobile device by the user, or a voice activation command by the user.

- The mobile device may include a hard switch, wherein the further single action by the user comprises pressing the hard switch of the mobile device.

- The mobile device may include a soft switch, wherein the further single action by the user comprises pressing the soft switch of the mobile device.

- The mobile device may include a hidden mechanical button, wherein the further single action by the user comprises pressing the hidden mechanical button of the mobile device.

- The mobile device may include a squeeze control, wherein the further single action by the user comprises activating the squeeze control of the mobile device.

- The mobile device may include capacitor sensor strips operable to detect when the user has picked up the device, wherein the further single action by the user comprises picking up the mobile device.

- The mobile device may be one wherein the shared wireless network is a Wi-Fi network.

- The mobile device may be one wherein a device local wireless network interface of the mobile device is powered down when a mobile phone network signal strength is below a predefined level.

- The mobile device may be one wherein the device local wireless network interface of the mobile device is powered down when the mobile phone network signal strength is below the predefined level for a predefined time interval.

- The mobile device may be one wherein the device local wireless network interface of the mobile device is powered down when the device is not connected to a mobile phone network.

- The mobile device may be one wherein the device local wireless network interface of the mobile device is powered down when the device is not connected to a mobile phone network for a predefined time interval.

- The mobile device may be one wherein the device local wireless network interface of the mobile device is not powered down when the device is acting as a router between other devices on the local wireless network.

Method of providing instant and automatic sharing of a wireless network in response to a single action by a user of a mobile device, comprising the step of providing instant and automatic sharing of the wireless network in response to the single action by the user, the single action comprising a physical contact gesture with the mobile device by the user, or a voice activation command by the user.

Computer program product operable to provide instant and automatic sharing of a wireless network in response to a single action by a user of a mobile device, the computer program product when running on the mobile device operable to provide instant and automatic sharing of the wireless network in response to the single action by the user, the single action comprising a physical contact gesture with the mobile device by the user, or a voice activation command by the user.

B. USB dongle for streamed files, eg. audio (eg. internet radio), video or image files

There is provided a wireless data enabled USB dongle operable to receive streamed files. Further features may include:

- Files may be audio, video, or images.
- streamed audio is internet radio
- USB dongle may interface wirelessly with a mobile phone or other mobile device
- The mobile phone or other mobile device may provide automatic wireless network sharing
- USB dongle operable to connect to an in-vehicle USB socket, wherein an in-vehicle computer system is operable to play audio files on the dongle.
- mobile phone or other mobile device may provide wireless access to the internet
- mobile phone or other mobile device may provide wireless access to the internet, wherein access is provided via the internet to radio stations that cannot be received by a vehicle radio broadcast receiver
- USB dongle operable to capture a data stream and converts it to a sequence of files

- Files may be MP3 files
- Files may be audio files
- Files may be video files
- Files may be images
- USB dongle enables an in-vehicle (eg. in-car) audio system to have playback/rewind, store etc. functionality for audio files.
- USB dongle enables an in-vehicle (eg. in-car) display system to have playback/rewind, store etc. functionality for video files.
- USB dongle enables an in-vehicle (eg. in-car) display system to have step forward, step backward, store etc. functionality for image files.
- streamed audio is stored as at least two separate files, which allows the user to choose to skip to the next track using the car audio system software.
- streamed video is stored as at least two separate files, which allows the user to choose to skip to the next track using the car video system software.
- The user can listen to audio (eg. music) online in his vehicle (eg. a car) with no modifications to the in-vehicle (eg. in-car) audio system.
- The user can view video online in his vehicle (eg. a car) with no modifications to the in-vehicle (eg. in-car) video system.
- An online interface is used for setting up the service, selecting stream source.
- The online interface may be provided by the mobile phone or other mobile device.
- Dongle may be a USB stick for in-vehicle audio

CLAIMS

1. Mobile device operable to provide instant and automatic sharing of a wireless network in response to a single action by a user, the single action comprising a physical contact gesture with the mobile device by the user, or a voice activation command by the user.

2. Mobile device of Claim 1, wherein the mobile device is operable to connect to the internet via a mobile phone network.

3. Mobile device of Claims 1 or 2, wherein a second device is wirelessly connectable to the mobile device via the shared wireless network.

4. Mobile device of Claims 1 or 2, wherein a plurality of devices are wirelessly connectable to the mobile device via the shared wireless network.

5. Mobile device of Claims 3 or 4, adapted to enable the second device or the plurality of devices to access the internet via the shared wireless network.

6. Mobile device of any of Claims 3 to 5, adapted to enable the second device or the plurality of devices to access files on the mobile device via the shared wireless network.

7. Mobile device of any previous Claim including a hard switch, wherein the single action by the user comprises pressing a hard switch of the mobile device.

8. Mobile device of any of Claims 1 to 6 including a soft switch, wherein the single action by the user comprises pressing a soft switch of the mobile device.

9. Mobile device of any of Claims 1 to 6 including a hidden mechanical button, wherein the single action by the user comprises pressing a hidden mechanical button of the mobile device.

10. Mobile device of any of Claims 1 to 6 including a squeeze control, wherein the single action by the user comprises activating a squeeze control of the mobile device.

11. Mobile device of any of Claims 1 to 6 including capacitor sensor strips operable to detect when the user has picked up the device, wherein the single action by the user comprises picking up the mobile device.

12. Mobile device of any previous Claim, wherein the mobile device is connectable to a 4G mobile phone network.

13. Mobile device of any previous Claim, wherein the mobile device is connectable to a 3G mobile phone network.

14. Mobile device of any previous Claim, wherein the mobile device is connectable to a 2G mobile phone network.

15. Mobile device of any previous Claim, wherein the mobile device is a bar form factor device.

16. Mobile device of any previous Claim, wherein the mobile device comprises a touch screen and a further bistable screen.

17. Mobile device of Claim 16, wherein the bistable screen is operable to be refreshed wholly or partially.

18. Mobile device of Claim 17, wherein the bistable screen is operable to be refreshed starting with any pixel in a screen area.

19. Mobile device of any previous Claim, wherein the mobile device is operable to define a limited set of users who may connect to the device to enable instant and automatic sharing of a wireless network with the limited set of users.

20. Mobile device of any previous Claim, wherein the mobile device is operable to provide a wireless connection to a personal computer, to enable that computer to connect to the internet.

21. Mobile device of any previous Claim, wherein the mobile device is operable to provide a wireless connection to two personal computers, to enable file sharing or resource sharing between those two personal computers.

22. Mobile device of any previous Claim, wherein the mobile device is operable to provide for file synchronization for files that are shared using automatic sharing of a wireless network via the mobile device.

23. Mobile device of any previous Claim, wherein the mobile device is a mobile phone.

24. Mobile device of any of Claims 1 to 22, wherein the mobile device is a video game console.

25. Mobile device of any of Claims 1 to 22, wherein the mobile device is a smartphone.

26. Mobile device of any of Claims 1 to 22, wherein the mobile device is a digital audio player.

27. Mobile device of any of Claims 1 to 22, wherein the mobile device is a personal computer.

28. Mobile device of any of Claims 1 to 22, wherein the mobile device is a tablet computer.

29. Mobile device of any previous Claim, wherein the mobile device is a personal portable device.

30. Mobile device of any previous Claim, wherein the mobile device is operable to provide instant and automatic sharing of a wireless network in response to a single action by a user, the single action comprising a physical contact gesture with the mobile device by the user, or a voice activation command by the user, when the device is already turned on and connected to a mobile phone network.

31. Mobile device of any previous Claim, wherein the device is operable to connect to a wireless dongle, the mobile device further operable to view a file structure of files stored on the wireless dongle.

32. Mobile device of Claim 31, wherein the device is operable to view the file structure of files stored on the wireless dongle in a web browser running on the mobile device.

33. Mobile device of Claim 31, wherein the device is operable to print a file on the dongle at a printer in connection with the dongle.

34. Mobile device of Claim 31, wherein the device is operable to print a file on the dongle at a printer in connection with the mobile device.

35. Mobile device of any of Claims 1 to 30, wherein the device is in connection with the internet, the device further operable to connect to a wireless dongle, the mobile device further operable to stream audio, video or image files to the wireless dongle in response to a request from the wireless dongle to the mobile device to access a streaming source via the internet.

36. Mobile device of any previous Claim, wherein the mobile device has a curved shape.

37. Mobile device of Claim 36, wherein the device has a concave front face and a convex rear face.

38. Mobile device of Claim 37, wherein the concave front face and the convex rear face have a similar magnitude of curvature.

39. Mobile device of any previous Claim, the device further operable to disable the sharing of the wireless network in response to a further single action by the user, the further single action comprising a physical contact gesture with the mobile device by the user, or a voice activation command by the user.

40. Mobile device of Claim 39 including a hard switch, wherein the further single action by the user comprises pressing the hard switch of the mobile device.

41. Mobile device of Claim 39 including a soft switch, wherein the further single action by the user comprises pressing the soft switch of the mobile device.

42. Mobile device of Claim 39 including a hidden mechanical button, wherein the further single action by the user comprises pressing the hidden mechanical button of the mobile device.

43. Mobile device of Claim 39 including a squeeze control, wherein the further single action by the user comprises activating the squeeze control of the mobile device.

44. Mobile device of Claim 39 including capacitor sensor strips operable to detect when the user has picked up the device, wherein the further single action by the user comprises picking up the mobile device.

45. Mobile device of any previous Claim, wherein the shared wireless network is a Wi-Fi network.

46. Mobile device of any previous Claim, wherein a device local wireless network interface of the mobile device is powered down when a mobile phone network signal strength is below a predefined level.

47. Mobile device of Claim 46, wherein the device local wireless network interface of the mobile device is powered down when the mobile phone network signal strength is below the predefined level for a predefined time interval.

48. Mobile device of Claims 46 or 47, wherein the device local wireless network interface of the mobile device is powered down when the device is not connected to a mobile phone network.

49. Mobile device of any of Claims 46 to 48, wherein the device local wireless network interface of the mobile device is powered down when the device is not connected to a mobile phone network for a predefined time interval.

50. Mobile device of any of Claims 46 to 49, wherein the device local wireless network interface of the mobile device is not powered down when the device is acting as a router between other devices on the local wireless network.

51. Mobile device operable to provide instant and automatic sharing of a wireless network in response to a single action by a user, the single action comprising a physical contact gesture with the mobile device by the user, or a voice activation command by the user, the mobile device substantially as hereinbefore described with reference to, and/or as illustrated by, the drawings.

Customer Proposition

1. Value Proposition

- ✓ 1st own Yota-branded 4G smartphone aimed to deliver unique technology, services and user experience

2. Unique Sales points

- ✓ Individual Style, easy personalization
- ✓ 1+ Communications
- ✓ Always On notifications and themes on back cover
- ✓ Mobile Broadband
- ✓ Cutting edge technology
- ✓ Surface Sound
- ✓ Brand UI

FIGURE 1

Smartphone Specification

Category	Requirements
ID, Dimensions	Touch curved monoblock, EPD on back side Size: 120 x 62 x 12.5 Weight: TBD
AP	Qualcomm MSM 8260 Dual Core Scorpion – 1.2GHz/1.2GHz (Apps) High-end Multimedia and Connectivity chipset
Connectivity	MDM 9200 LTE FDD (Bands 7, 13, 14, 1, 4, 20) LTE TDD (Bands 38, 40) GSM / EDGE 850 / 900 / 1800 / 1900 3G / HSPA 900 / 1800 / 2100 MSM 8260 (On-board) Wi-Fi b/g/n, Bluetooth 4.0, gpsOne Gen 8 with GNSS
OS	Google Android 3.x (h, i, j)
Calls	2G/3G, VoIP, Video Calls Exact Implementation TB
Audio	On-board Audio: 128-Voice Polyphony, QconcertPlus, Dolby 5.1 Surround, Echo and Noise Cancellation. Additional ANC (Audience). 2 Microphones. NXT display surface sound (No speakers)

Category	Requirements
Camera	Camera: 5MP AF, 4x Digital zoom, LED flash. Front – 1MP. Exact Camera spec: TBD
Sensors	Proximity, Light, Accelerometer, Compass Squeeze
Display	Front: 4" WVGA (800 x 480 Or 854 x 480) Technology: AMOLED or sIPS / FFS Nissha Capacitive touch screen with Integrated NXT sound and Haptics Glass: Gorilla Glass (Corning)
Back Screen	Electronic Paper Display under glass on back side (E-INK).
Battery	1500 – 2000 mAh (TBD) High Capacity and High Density
Memory	NAND 1 GB; RAM 512 MB; Flash 32 GB
Case and materials	Case: Single block Materials: Plastic or Texin™ Exact materials spec: TBD
Accessories	Inbox + Optional Accessories concept TBD

FIGURE 2

Industrial Design

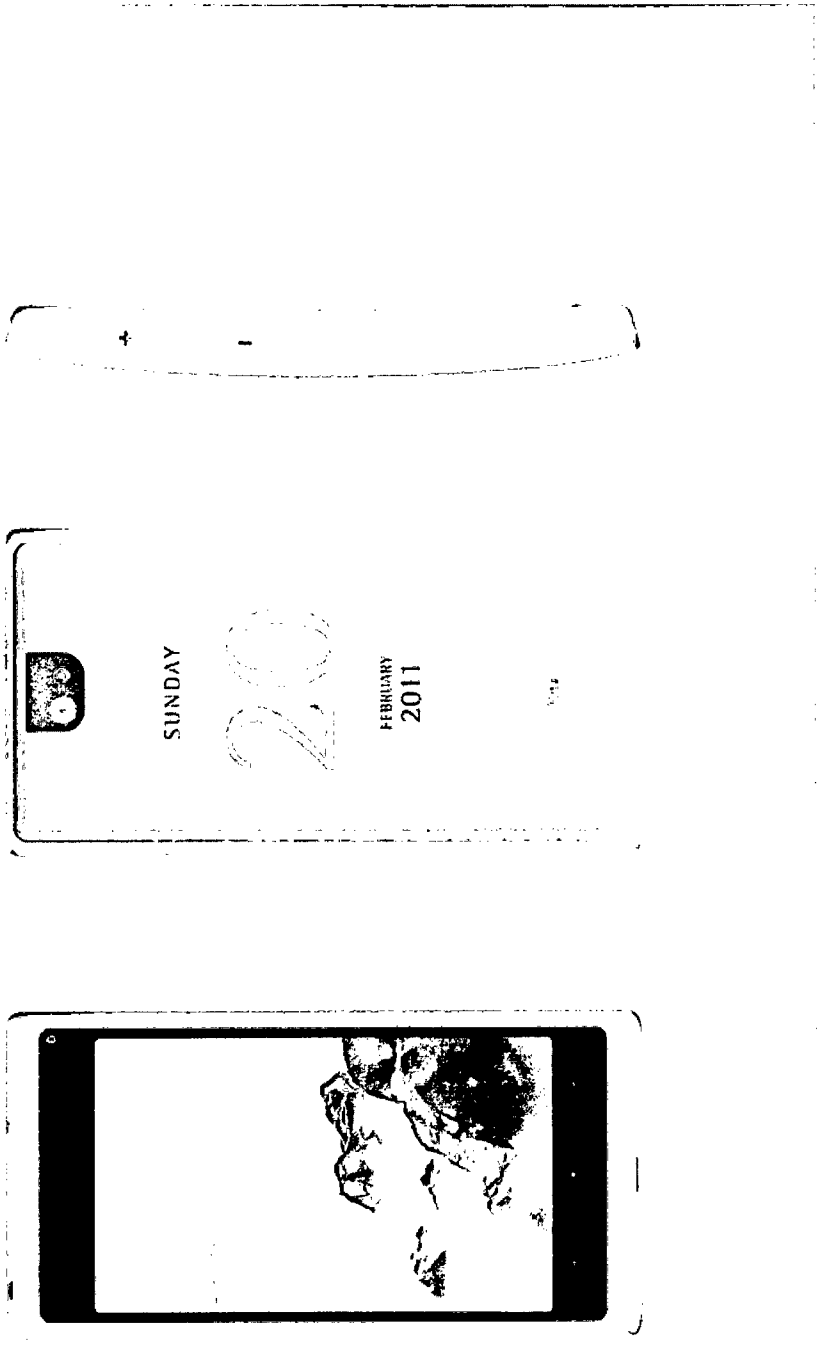


FIGURE 3

Industrial Design

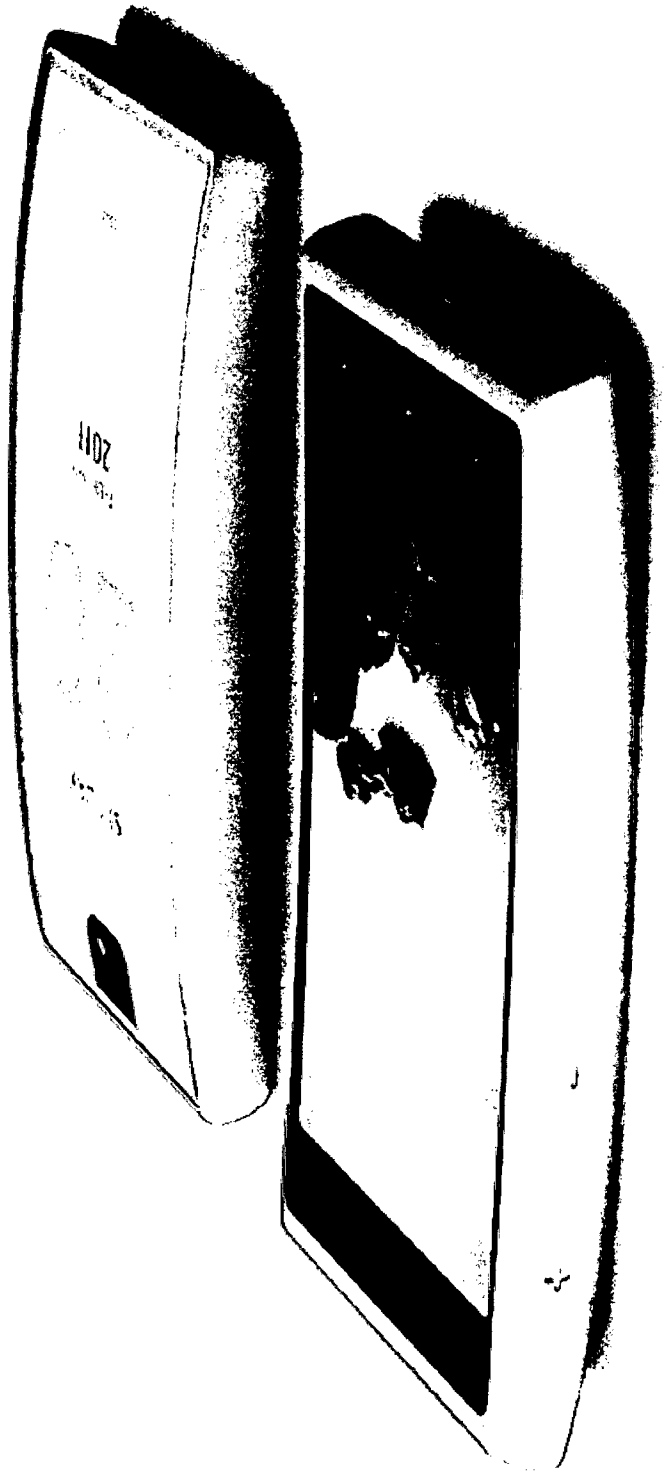


FIGURE 4

Hardware

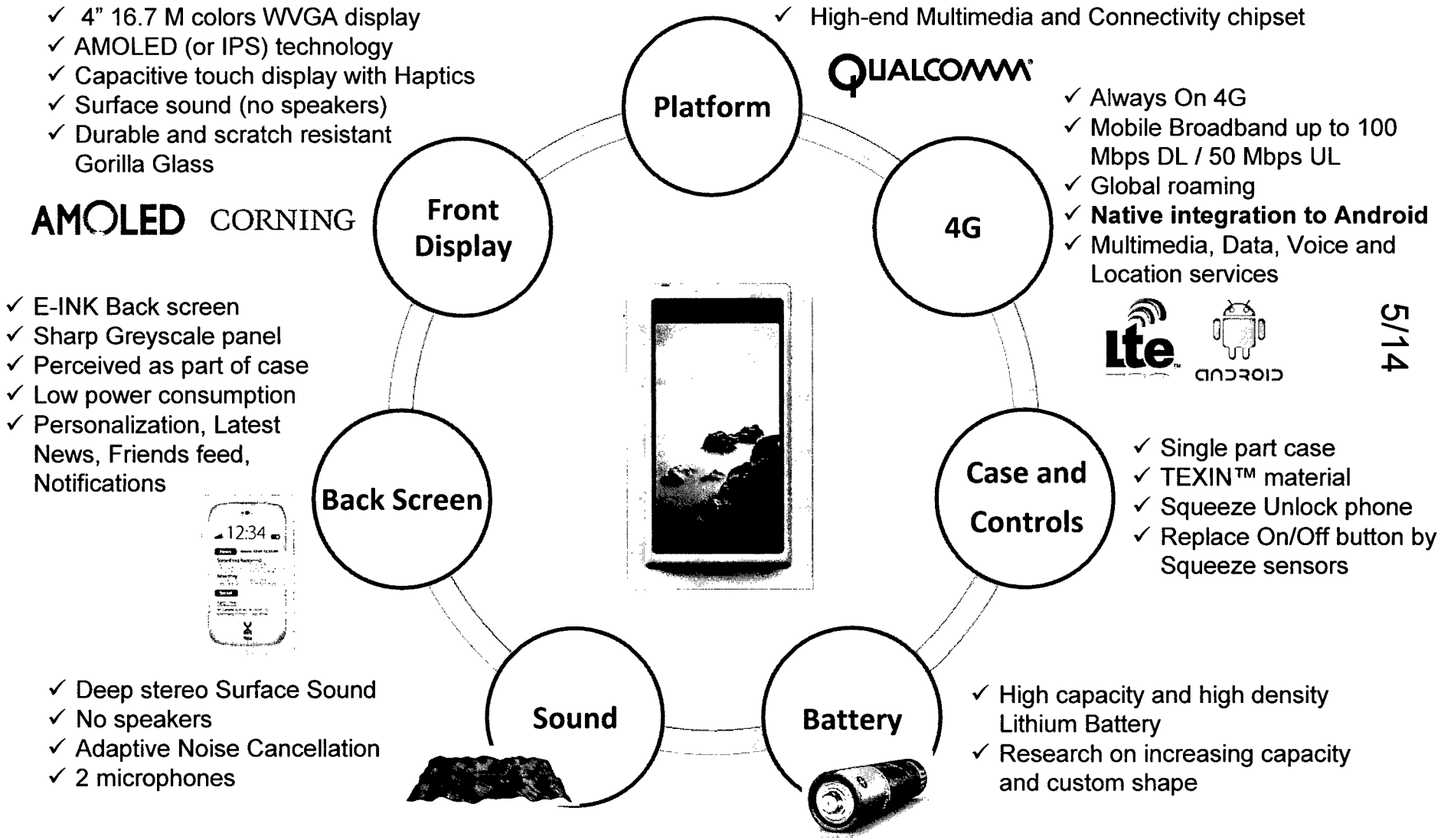


FIGURE 5

Platform: Qualcomm MSM 8260 + MDM 9200

FEATURES	MSM8260
Process Technology	45nm
Package	976 NSP 14x14x1.4mm (0.4mm pitch)
Processor	Dual Core Scorpion – 1.2GHz/1.2GHz (Apps) QDSP6V3 – 400MHz (Apps) ARM11 + L2 – 490MHz (Modem) QDSP4 – 147MHz (Modem)
MODEM	HSPA+ GSM/GPRS/EDGE
Peak Data Rates UL/DL	**HSPA+:** DL 14Mbps / UL 5.76Mbps
Modem Enhancements	**UMTS:** Equalizer, Rx Diversity **GSM:** SAIC
Frequency Support	**UMTS:** 800/850/900/1700/1900/2100/AWS **GSM:** QB EGPRS (850, 900, 1800, 1900)
RF+PMIC Chipset	QTR8615 (RxD) + PM8058 + PM8901 QTR9215 (no RxD)+ PM8058 + PM8901
Memory	333MHz ISM/266MHz LPDDR2
LCD Support	24-bit, WXGA (1280x800)
Bluetooth	WCN 2243 BT 4.0, low energy, FM Rx/Tx
WLAN	802.11b/g/n WCN1314
USB	USB2.0 High Speed OTG (480Mbps)

FEATURES	MSM8260
Qtv (Video Decode)	**Playback:** 30fps 1080p (MPEG-4 / MPEG-2 / H.264 / DivX / VC-1 / WMV-9) 30fps @ FWVGA (H.263) 30fps D1 (Sorenson Spark, On2 VP6) **Streaming:** 30fps 1080p (MPEG-4 / MPEG-2 / H.264 / DivX / VC-1 / WMV-9) 30fps D1 (H.263 / VP6 / Spark)
Qcamcorder (Offline Video Encoding)	30fps @1080p (MP4/H.264) 30fps @ FWVGA (H.263)
Qcamera	16M Pixel
Audio	128-Voice Polyphony QconcertPlus, Dolby 5.1 Surround, Low Power Audio Core Enhanced Echo Cancellation FLUENCE (Noise cancellation)
Graphics	Adreno 220 Max LCD: WXGA - Triangles/s: 88M peak - 3D Pixels/s: 532M peak - Instructions/s: 2,660M - Dedicated OVG Core APIs: OpenGL ES 1.1, OpenGL ES 2.0, Direct Draw, OpenVG1.1, SVG Tiny 1.2, BREW 2D
GPS	**gpsOne Gen 8 with GNSS** ,Standalone Assisted, gpsOneXTRA, 2db improvement vs Gen 7
Security and DRM	SecureMSM v4 with TrustZone Microsoft WMDRM 10 / HDCP OEM Programmable OTP Storage

FEATURES	MDM9200
Process Technology	45nm
Package	504 CSP, 13x13x1.4mm (0.5mm pitch)
Processor	ARM926-256MHz QDSP6-600MHz
MODEM	Release 8 LTE Release 8 DC-HSPA+ GSM/EGPRS
Peak Data Rates UL/DL	**DC-HSPA+:** DL 42Mbps / UL 5.76Mbps **LTE FDD:** DL 100Mbps / UL 50 Mbps (Cat 3) **LTE TDD:** DL 68Mbps / UL 17 Mbps (Cat 3)
Modem Enhancements	**UMTS:** RxD, EQ, SCH-IC, Q-ICE, 2x2 DL MIMO **LTE:** 2x2 DL SU-MIMO with SIC **GSM:** SAIC
Frequency Support	**UMTS:** 3GPP: 700 MHz, 800 MHz, 850 MHz, 900 MHz, 1700 MHz, 1800 MHz, 1900 MHz, 2100 MHz, 2300MHz, 2600 MHz **GSM:** QB EGPRS (850, 900,1800, 1900)
RF+PMIC Chipset	RTR8600 + PM8028
USB	USB 2.0 All Speed Peripheral or Host
GPS	**gpsOne Gen 8 with GNSS** Standalone Assisted, gpsOneXTRA, 2db improvement vs Gen 7

FIGURE 6

Back Screen

1. Image

- ✓ Resolution: 700~900 x 480 (target: similar to front display)
- ✓ Colors: 16 Grey scale (E-ink) or 65K (LG) (TBD)
- ✓ Contrast: 10:1 ~ 20:1 (TBD), Reflective ratio: 40%+
- ✓ Refresh ratio: 150 ms ~ 400 ms (TBD)
- ✓ Ability to refresh any area starting from 1 pixel
- ✓ Color scheme must conform to case color

2. Power Consumption

- ✓ Approx. 1000 full screen updates: 300 mAh
- ✓ To minimize power consumption update rate should be minimized to ~ twice per minute
- ✓ Does not consume / require power when in bi-stable state

3. Manufacturing

- ✓ Curved shape, Laminated to glass

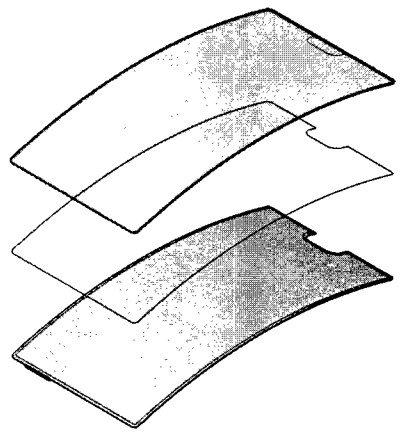
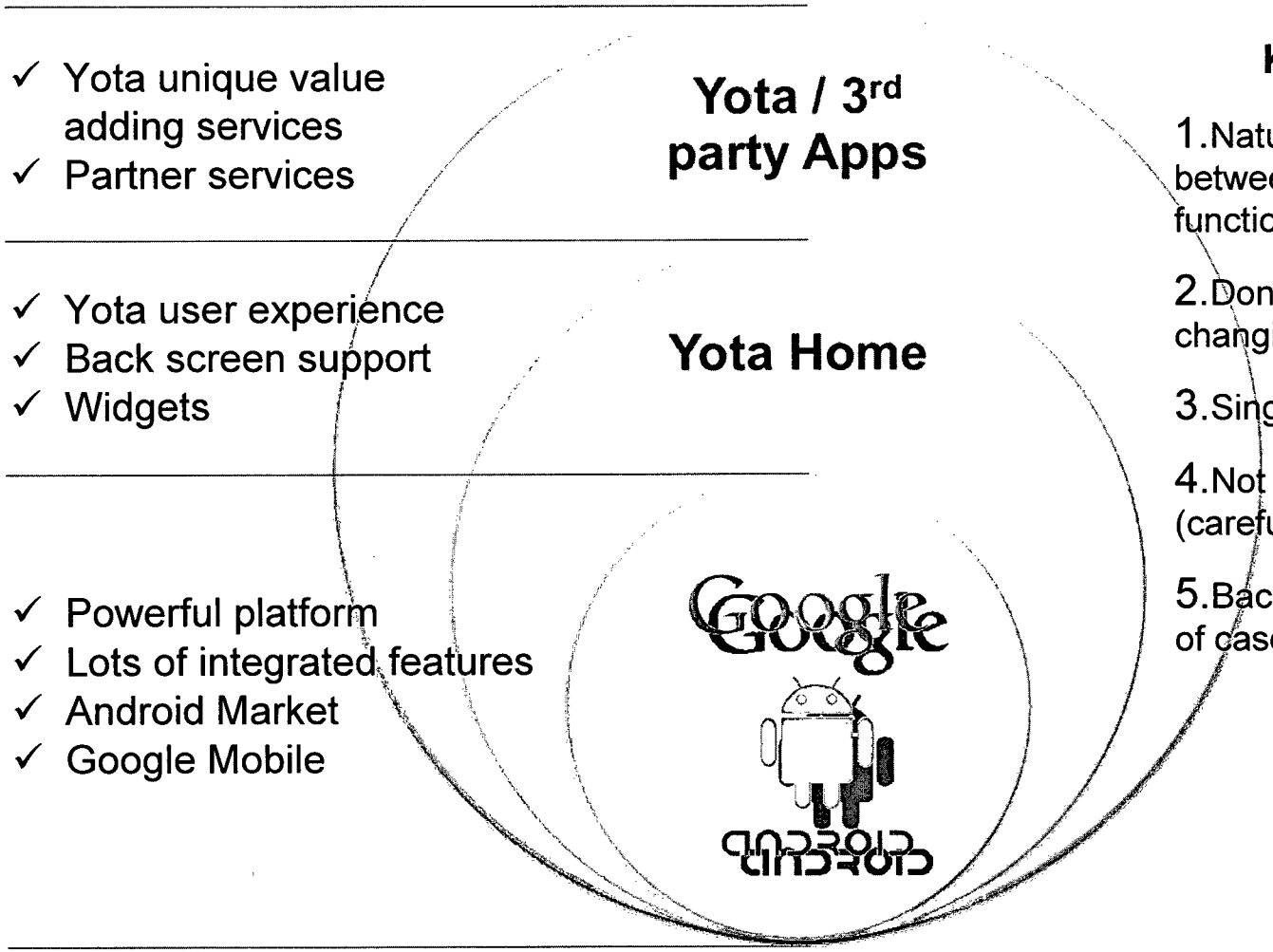


FIGURE 7

Software Architecture



Key Rules

1. Natural integration between layers, no functionality overlap
2. Don't mess with changing Core Android
3. Single UI Concept
4. Not overloaded UI (careful use of 3D)
5. Back screen is a part of case, not a display

FIGURE 8

Yota Home

1. Yota User Interface (UI)

- ✓ Customized UI: Home and Lock Screen, Menu, Contacts, Caller, Apps Launching / Switching, etc.
- ✓ UI Guidelines creation

Yota

2. Back Screen

- ✓ Interactions, Control, Use cases, Personalization, Widgets, Privacy

3. Preinstalled Widgets

- ✓ E.g. Clock, Social aggregator, Communications Log, “Favorites” Bucket, News, Weather, Yota Connection, Battery, Contacts Favorites, Latitude, Player…
- ✓ Provide the Key 10 Widgets

FIGURE 9

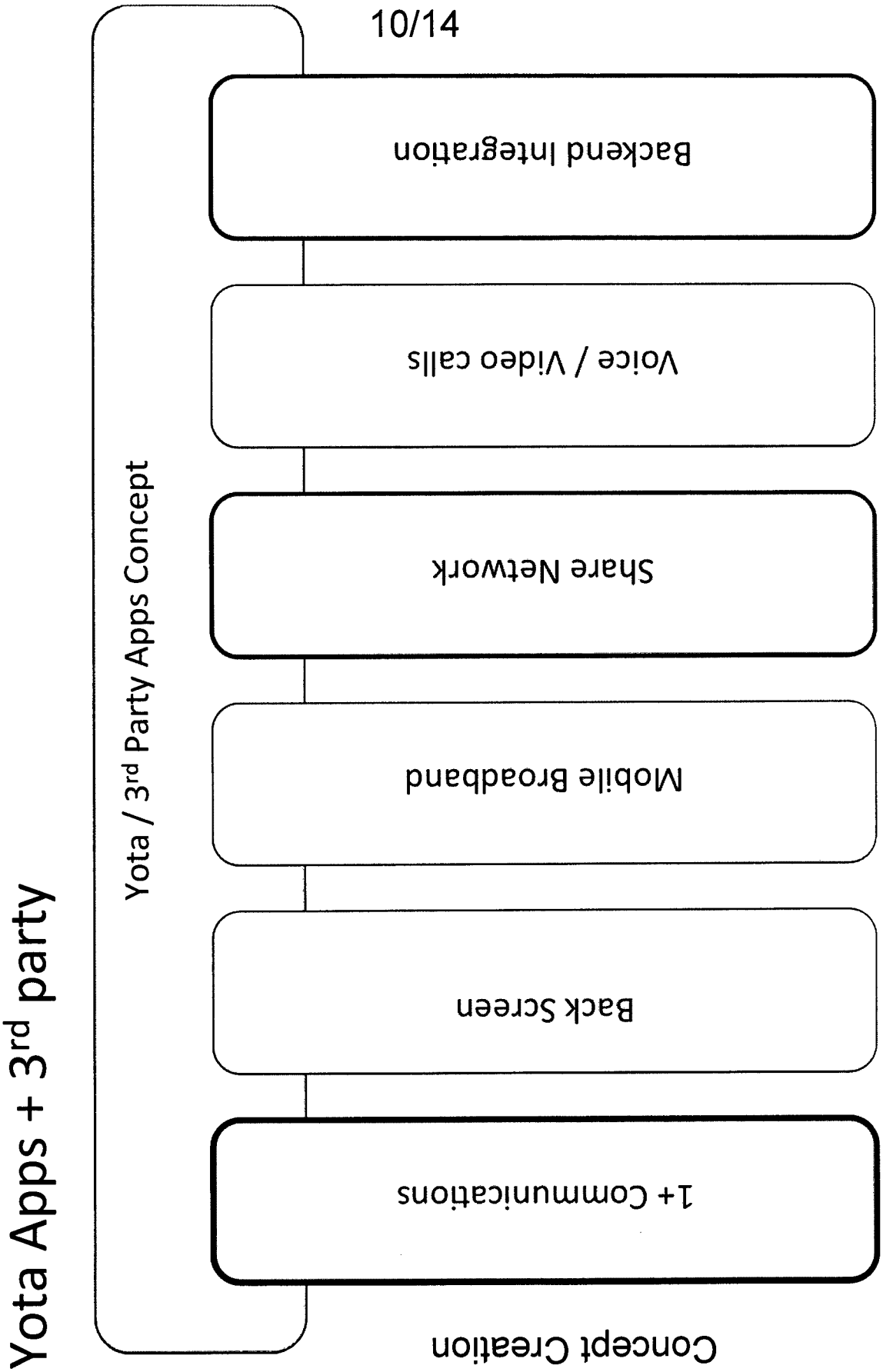

Yota Apps + 3rd party
Yota / 3rd Party Apps Concept
Concept Creation
1+ Communications
Back Screen
Mobile Broadband
Share Network
Voice / Video calls
Backend Integration

FIGURE 10

Ideas for Applications

1. 1+ Communications

- ✓ Communications with 1 closest person
- ✓ Instant delivery, no confirmation
- ✓ Share screen (Movies, games, "see what I see")
- ✓ Back screen Drawing and Tapping

2. Back Screen

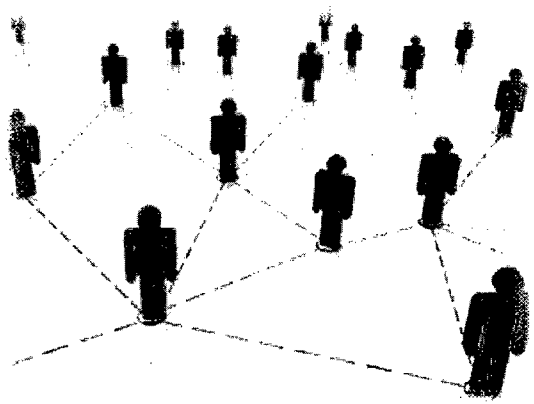
- ✓ Context related Themes (Weather, Location, Environment)
- ✓ Widgets, Notifications
- ✓ Personalization
- ✓ Post cards
- ✓ Operator Push (Congratulations, Customer info, …)

3. Mobile Broadband

- ✓ Applications leveraging super fast Mobile Broadband
- ✓ Content, Video Calls, Video Sharing

FIGURE 11

Ideas for Applications



4. Share Network

- ✓ Personal WiFi Hotspot anywhere
- ✓ Share network
- ✓ PC tethering

5. Voice / Video Calls

- ✓ Free VoIP / Video Calls (as part of Data), e.g. Skype
- ✓ Integration with Caller applications

6. Back End Integration

- ✓ Features leveraging close operator and device integration
- ✓ Remote Device management
- ✓ Over the Air device provisioning and services

7. Other

- ✓ First Switch On
- ✓ Transparent Update of features

FIGURE 12

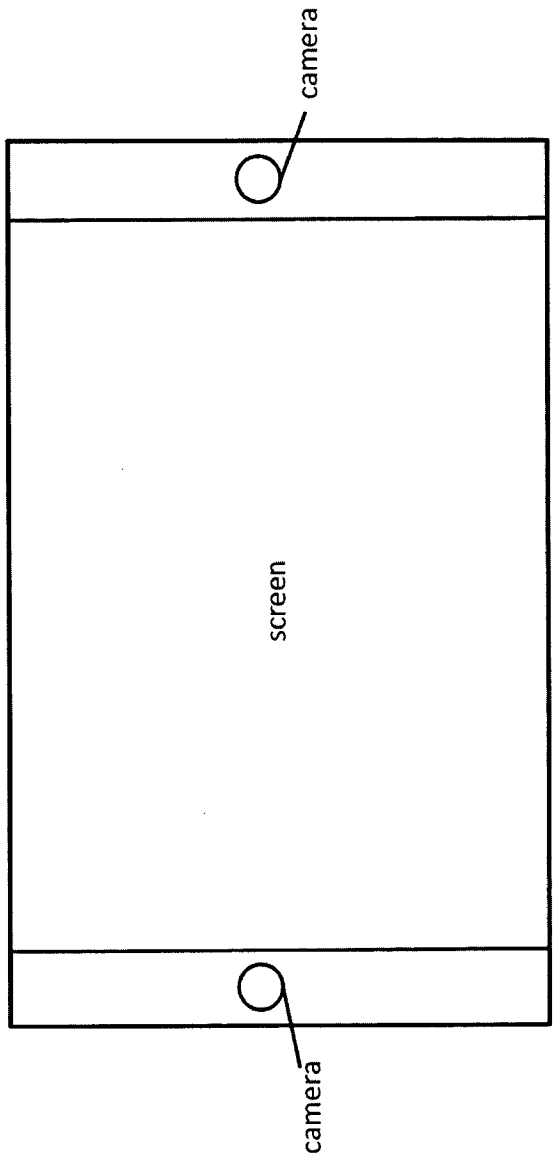


FIGURE 13

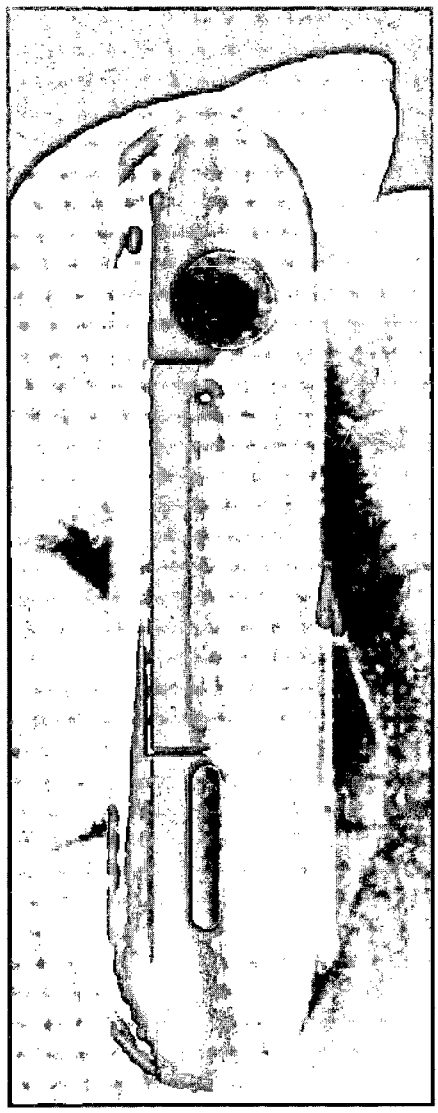


FIGURE 14