US 20200169486A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2020/0169486 A1**

Kwok et al. (43) **Pub. Date: May 28, 2020**

(54) **ENHANCED SIGNAL STRENGTH INDICATOR**

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(21) Appl. No.: **16/201,130**

(22) Filed: **Nov. 27, 2018**

Publication Classification

(51) **Int. Cl.**

H04L 12/26 (2006.01)

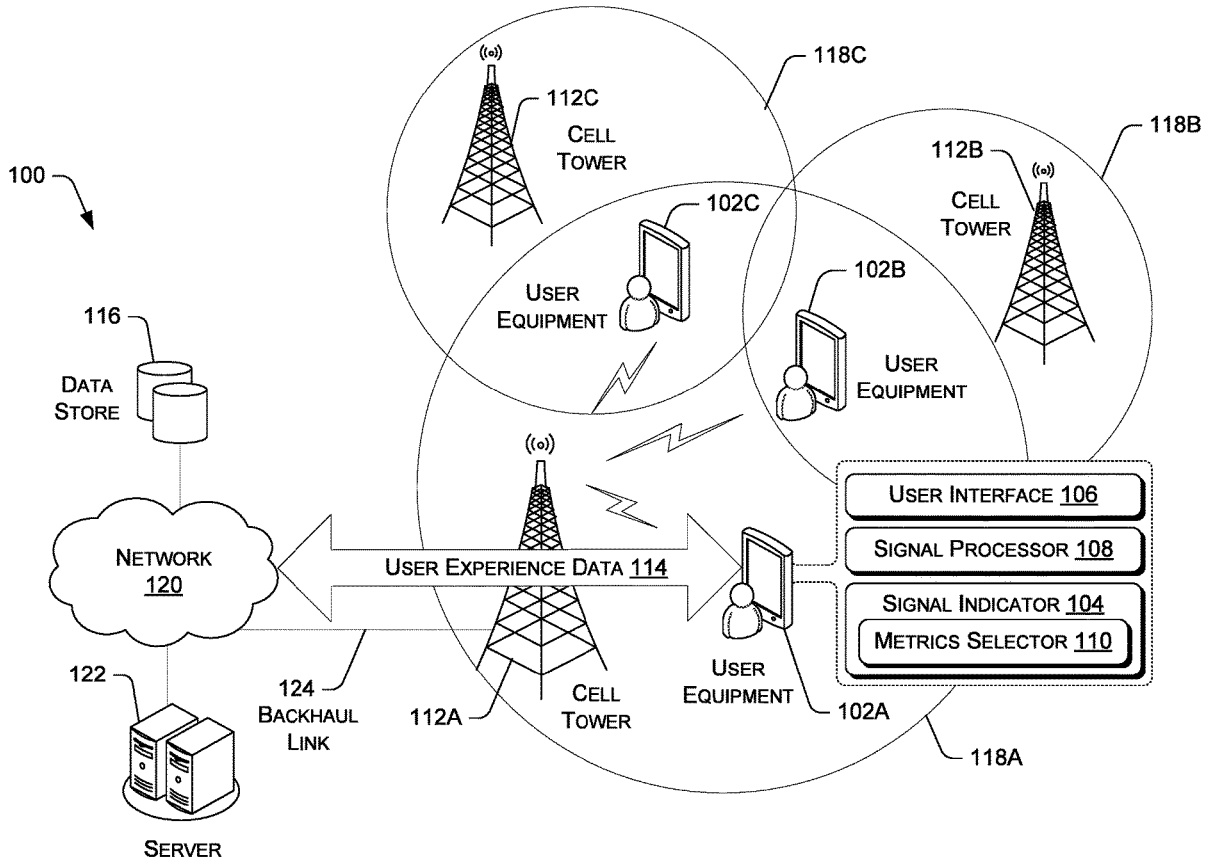
H04B 17/318 (2006.01)

(52) **U.S. Cl.**

CPC ***H04L 43/08*** (2013.01); ***H04B 17/318*** (2015.01)

(57) **ABSTRACT**

Techniques are described herein for presenting signal strength indicators on a display screen of a user equipment based on various telecommunications signals and one or more types of user experience corresponding to network performance metrics in a target geolocation of a network. The signal strength indicia can include one or more sets of signal bars. The user equipment can be equipped to measure the signal strength received. Additionally, the user equipment can analyze network performance metrics such as packet latency, throughput, packet loss, and availability based on user experience. One or more user experience types can be selected in order to compute a value that is representative of the received signal strength and the user experience data. Signal strength indicators are displayed on the display screen of the user equipment based on the measured signal strength and user experience for different forms of communication such as voice, video, and data.



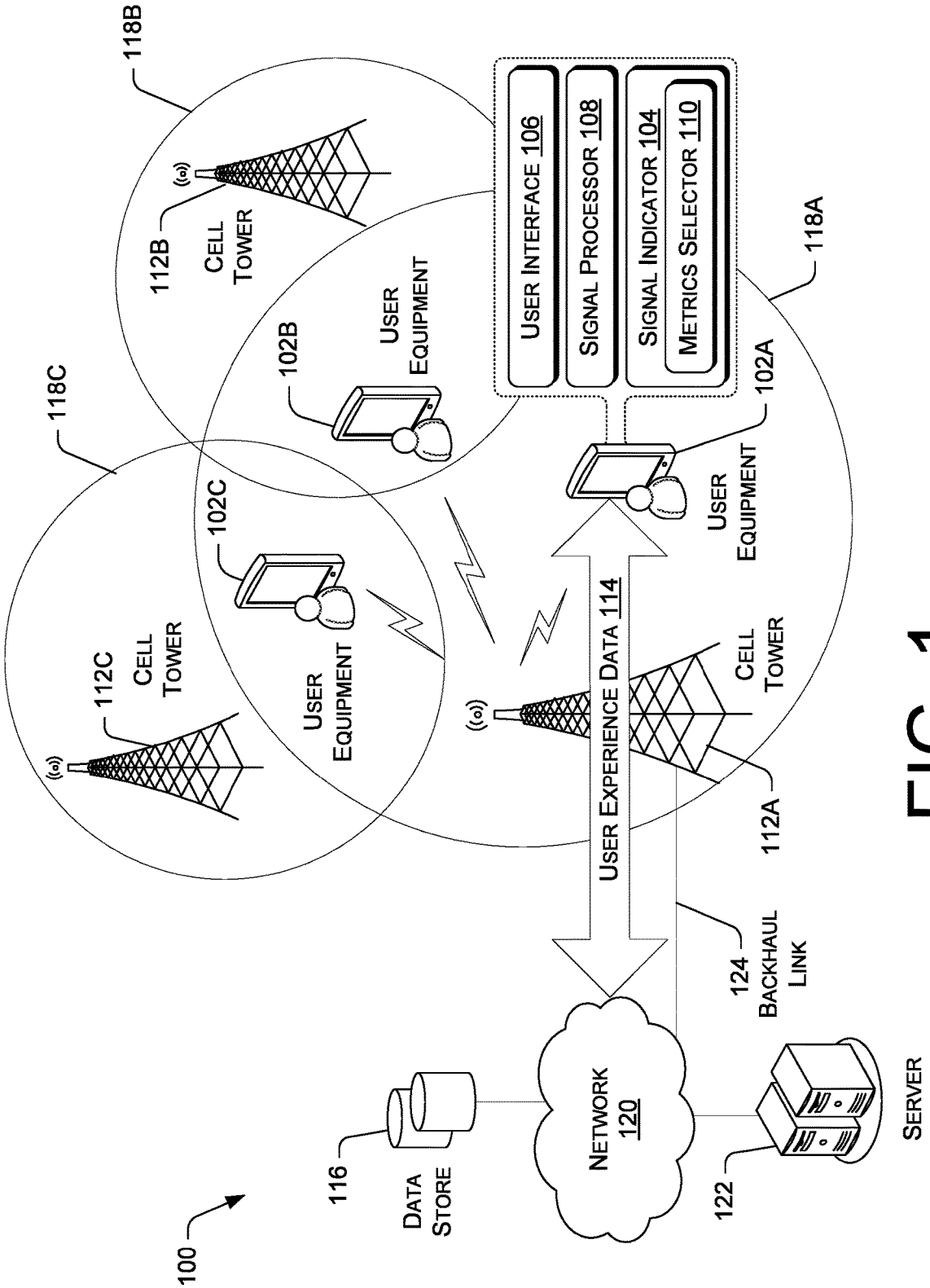

118B
112B
CELL TOWER
USER EQUIPMENT
102B
118C
102C
112C
CELL TOWER
USER EQUIPMENT
USER INTERFACE 106
SIGNAL PROCESSOR 108
SIGNAL INDICATOR 104
METRICS SELECTOR 110
118A
102A
USER EQUIPMENT
USER EXPERIENCE DATA 114
CELL TOWER
112A
124
BACKHAUL LINK
NETWORK 120
116
DATA STORE
122
SERVER
100

FIG. 1

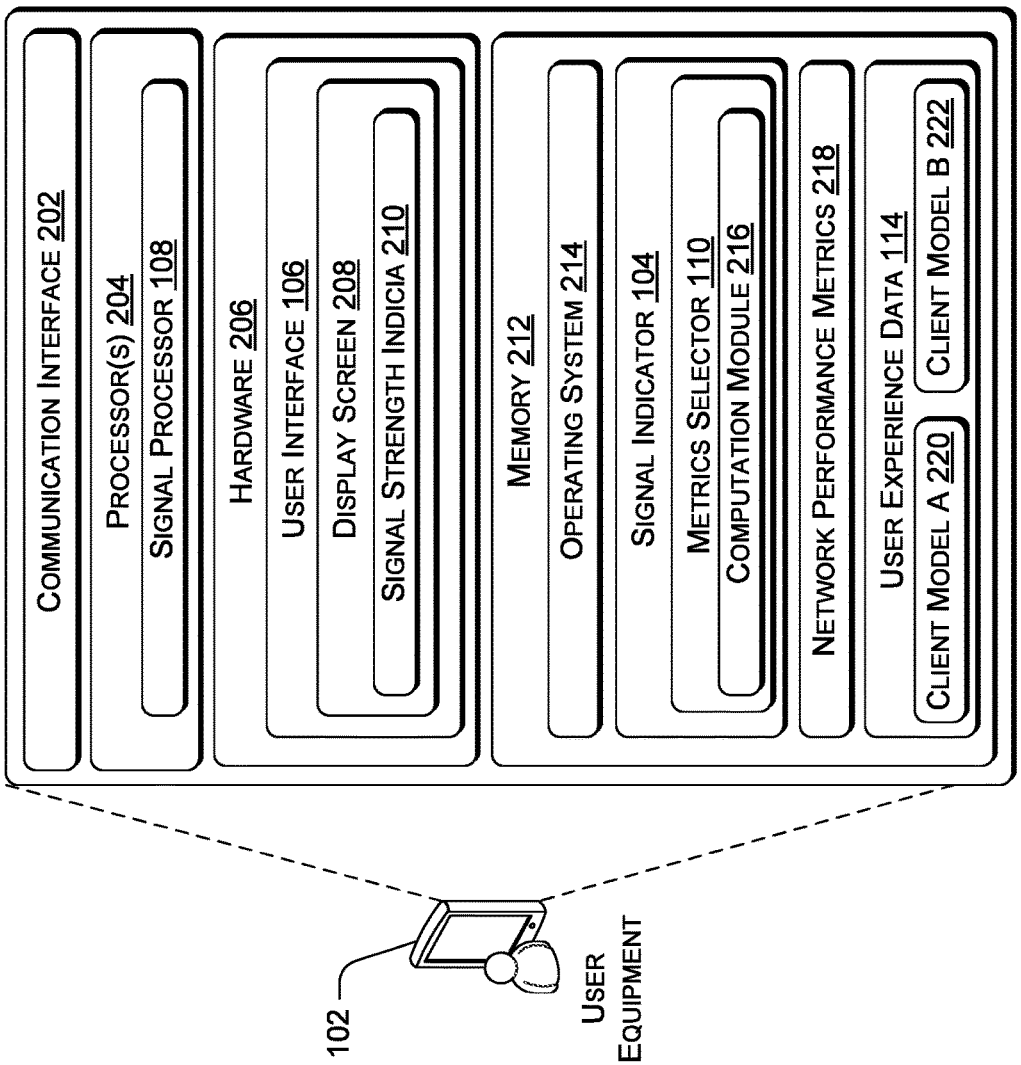

COMMUNICATION INTERFACE 202
PROCESSOR(S) 204
SIGNAL PROCESSOR 108
HARDWARE 206
USER INTERFACE 106
DISPLAY SCREEN 208
SIGNAL STRENGTH INDICIA 210
MEMORY 212
OPERATING SYSTEM 214
SIGNAL INDICATOR 104
METRICS SELECTOR 110
COMPUTATION MODULE 216
NETWORK PERFORMANCE METRICS 218
USER EXPERIENCE DATA 114
CLIENT MODEL A 220
CLIENT MODEL B 222
102
USER EQUIPMENT

FIG. 2

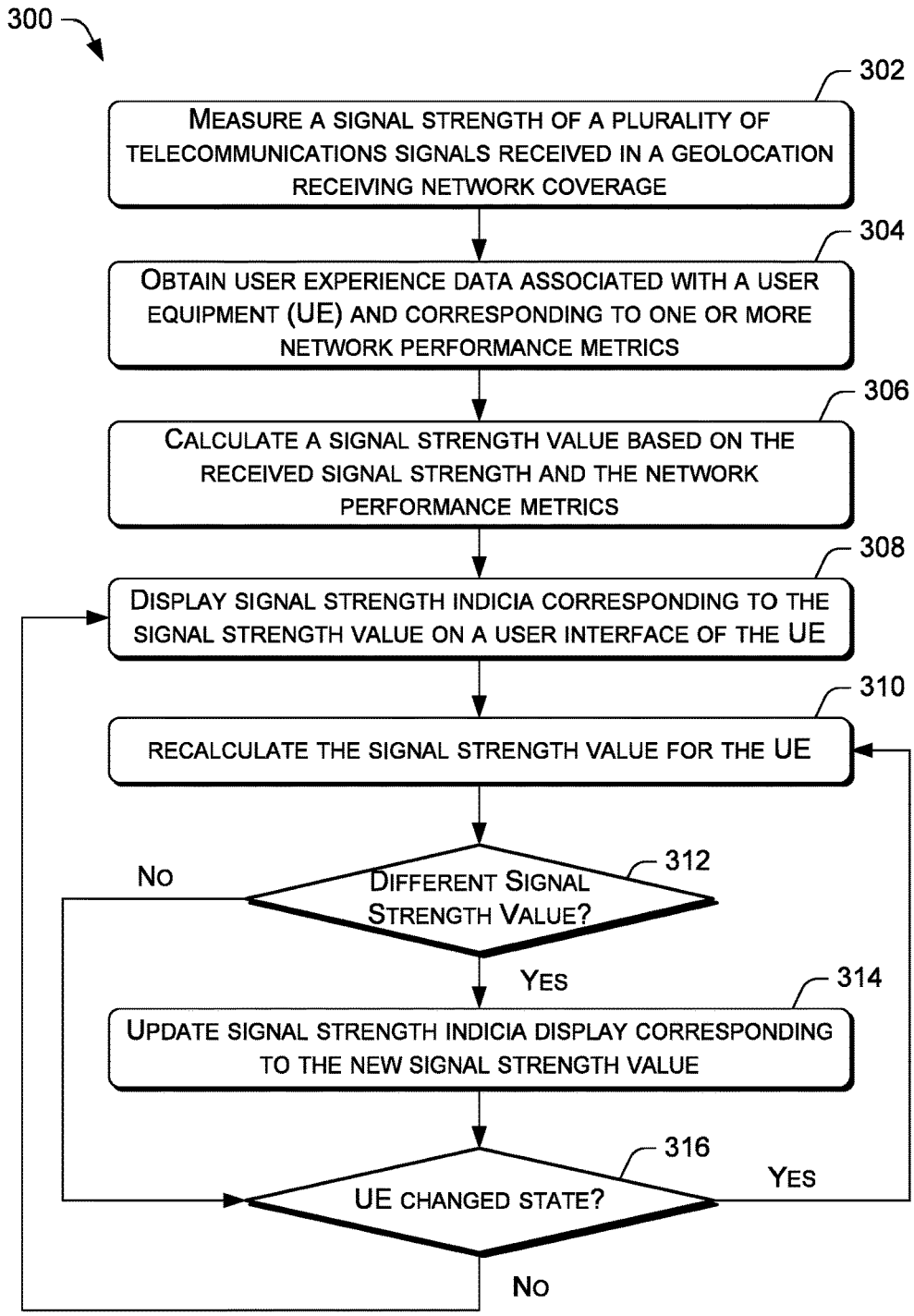

300
302
MEASURE A SIGNAL STRENGTH OF A PLURALITY OF TELECOMMUNICATIONS SIGNALS RECEIVED IN A GEOLOCATION RECEIVING NETWORK COVERAGE
304
OBTAIN USER EXPERIENCE DATA ASSOCIATED WITH A USER EQUIPMENT (UE) AND CORRESPONDING TO ONE OR MORE NETWORK PERFORMANCE METRICS
306
CALCULATE A SIGNAL STRENGTH VALUE BASED ON THE RECEIVED SIGNAL STRENGTH AND THE NETWORK PERFORMANCE METRICS
308
DISPLAY SIGNAL STRENGTH INDICIA CORRESPONDING TO THE SIGNAL STRENGTH VALUE ON A USER INTERFACE OF THE UE
310
RECALCULATE THE SIGNAL STRENGTH VALUE FOR THE UE
312
DIFFERENT SIGNAL STRENGTH VALUE?
NO
YES
314
UPDATE SIGNAL STRENGTH INDICIA DISPLAY CORRESPONDING TO THE NEW SIGNAL STRENGTH VALUE
316
UE CHANGED STATE?
YES
NO

FIG. 3

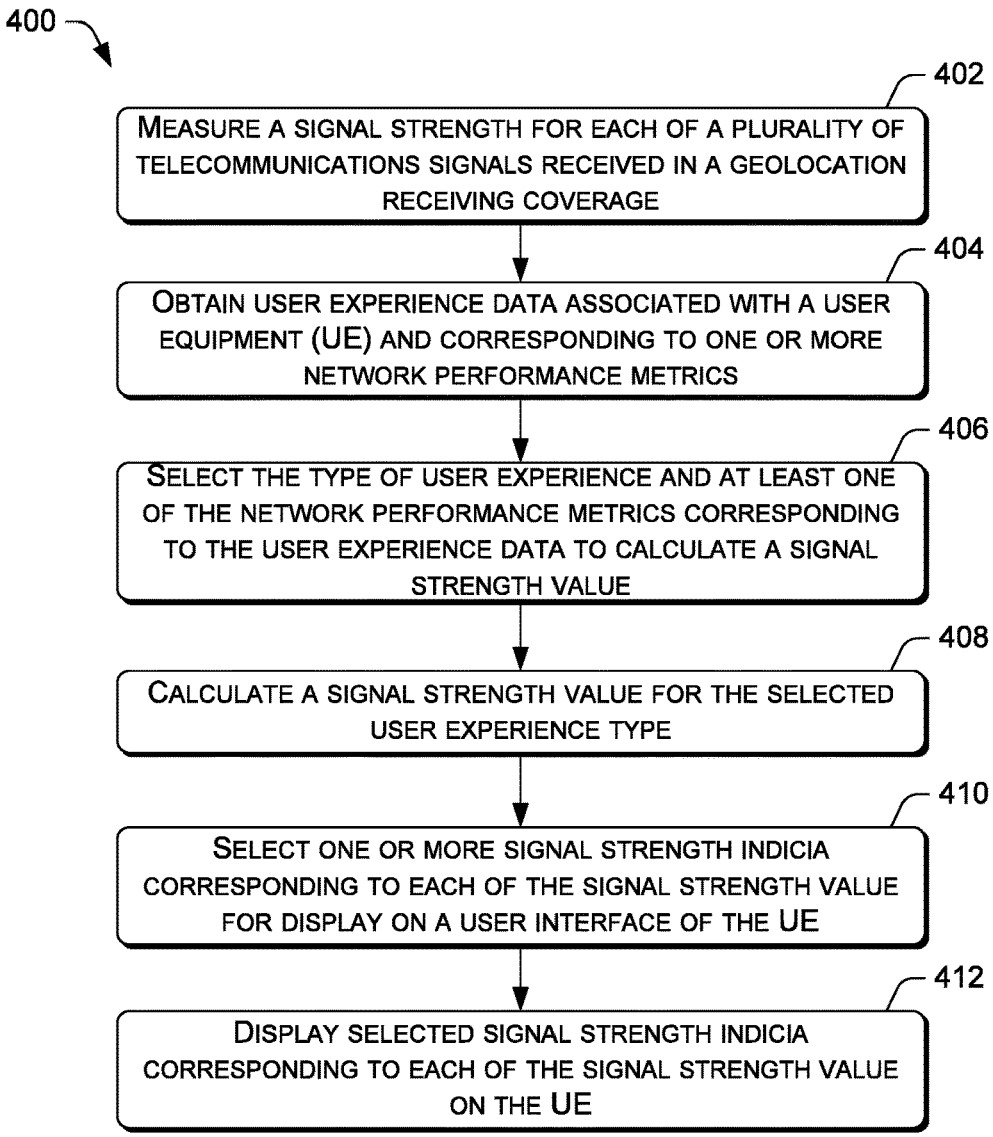

400
402
MEASURE A SIGNAL STRENGTH FOR EACH OF A PLURALITY OF TELECOMMUNICATIONS SIGNALS RECEIVED IN A GEOLOCATION RECEIVING COVERAGE
404
OBTAIN USER EXPERIENCE DATA ASSOCIATED WITH A USER EQUIPMENT (UE) AND CORRESPONDING TO ONE OR MORE NETWORK PERFORMANCE METRICS
406
SELECT THE TYPE OF USER EXPERIENCE AND AT LEAST ONE OF THE NETWORK PERFORMANCE METRICS CORRESPONDING TO THE USER EXPERIENCE DATA TO CALCULATE A SIGNAL STRENGTH VALUE
408
CALCULATE A SIGNAL STRENGTH VALUE FOR THE SELECTED USER EXPERIENCE TYPE
410
SELECT ONE OR MORE SIGNAL STRENGTH INDICIA CORRESPONDING TO EACH OF THE SIGNAL STRENGTH VALUE FOR DISPLAY ON A USER INTERFACE OF THE UE
412
DISPLAY SELECTED SIGNAL STRENGTH INDICIA CORRESPONDING TO EACH OF THE SIGNAL STRENGTH VALUE ON THE UE

FIG. 4

ENHANCED SIGNAL STRENGTH INDICATOR

BACKGROUND

[0001] Many mobile devices utilize a set of signal bars of increasing height to display the received signal strength from a cellular network. Traditionally, a set of signal bars comprise five bars, and these signal bars serve as a visual indicator to enable users to judge connectivity, which can depend on various factors such as proximity to a cell tower, nearby obstructions, network traffic, and/or so forth. While devices can display or illuminate more signal bars to indicate a stronger signal in certain areas, there is no standard measurement for representing signal strength or field strength. Additionally, the ways in which these signal bars reflect reception varies greatly between devices, as each manufacturer uses a different algorithm to represent signal strength. In some cases, the representation of the signal bars can also vary between devices even from the same manufacturer. Additionally, signal indicator values may vary according to telecommunications service providers.

[0002] Moreover, in areas where signal reception would normally be strong, the signal bars would generally indicate, display, or illuminate all five bars. However, the signal bars are not depictive of various factors that can have an effect on reception or that may cause complete failure due to radio frequency (RF) interference. For instance, mobile devices located inside a building with thick walls or underground areas can lack reception unless they are wired for cell signals. Accordingly, it is impossible to read objective signal data from the signal bars in a reliable and meaningful manner.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] The detailed description is described with reference to the accompanying figures, in which the leftmost digit(s) of a reference number identifies the figure in which the reference number first appears. The use of the same reference numbers in different figures indicates similar or identical items.

[0004] FIG. **1** illustrates example network architecture for determining signal strength using standardized measurements and user experience data.

[0005] FIG. **2** is a block diagram showing various components of an illustrative computing device that can provide one or more experience based signal strength indicia.

[0006] FIG. **3** is a flow diagram of an example process for determining and displaying signal strength indicia based on standardized measurements and user experience data.

[0007] FIG. **4** is a flow diagram of an example process for determining and displaying one or more selected signal strength indicia based on standardized measurements and selected user experience.

DETAILED DESCRIPTION

[0008] This disclosure is directed to techniques for presenting signal strength indicators on a display screen of a user equipment (UE) based on various telecommunications signals and user experience data. The signal strength indicia can comprise one or more sets of signal bars, dots, or other symbols. In various embodiments, one or more user equipment can be equipped with a signal processor that is configured to measure the signal strength received from a nearby cell tower in a coverage area or zone. Additionally, the user equipment can implement various analysis techniques to analyze network performance metrics such as packet latency, throughput, packet loss, and availability based on user experience. One or more types of user experience can be selected via a selection module in order to compute a signal strength value that is proportional to the received signal strength and the user experience data that comprise corresponding network performance metrics. The signal strength value can be used to depict appropriate signal strength indicia. In various embodiments, the user experience data or metrics can be passed onto a server. The server can communicate with a data store, which can comprise a user profile and account related information.

[0009] Based on the signal strength and the user experience data for different forms of communication (e.g., voice, video, data, etc.), and various network considerations, claimed embodiments of the present invention may present signal strength indicators associated with each user experience (e.g., voice experience, video experience, data experience, etc.) on the display screen of the user equipment. Accordingly, the user equipment may have signal strength indicators that are presented for each of the voice experience, video experience, and data experience when telecommunications signals are available. The number of signal bars presented for each type of user experience may vary based at least partially on the signal strength of the telecommunications signals and the user experience data. For instance, a first set of signal bars representing voice experience may display more bars than a second set of signal bars representing experience when the user experience metrics for voice is greater than the user experience metrics for data. Additionally, or alternatively, the first, second, and third sets of signal bars can be consolidated or averaged such that the signal strength indicia can be presented as a single set of signal bars, thereby representing the user's overall experience. The techniques described herein may be implemented in a number of ways. Example implementations are provided below with reference to the following figures.

Example Network Architecture

[0010] FIG. **1** illustrates example architecture for determining signal strength using standardized measurements and user experience. The architecture comprises a system **100** including a plurality of user equipment **102**A-**102**C. The user equipment **102**A-**102**C comprises smartphones, mobile devices, personal digital assistants (PDAs), or other common wireless communication devices that are capable of receiving inputs, processing the inputs, and generating output data. The user equipment **102**A-**102**C can also include a personal computer or workstation, a server device, a laptop, a tablet, a media-playing device, a portable gaming system, and/or so forth, depending upon embodiments. For example, a user may use the user equipment **102**A-**102**C to make voice calls, send and receive text messages, and transmit digital media or digital content. One or more user equipment **102**A-**102**C is connected to a network **120** (e.g., a core network) of a telecommunication network utilizing one or more cell towers **112**A-**112**C, wireless base stations, or any other common wireless or wire line network access technologies. The core network can include a plurality of servers that implement network components (e.g., the Serving GPRS Support Node (SGSN) and the Gateway GPRS Support Node (GGSN)).

[0011] Each of the cell towers **112**A-**112**C provides network coverage in target geolocations **118**A-**118**C. Each of the cell towers **112**A-**112**C can also connect to the network **120** via a backhaul link **124** or other distributed portions of the network **120**. The backhaul link **124** may be configured to employ any common wire line communication technology, including but not limited to, optical fiber, coaxial cable, twisted pair cable, Ethernet cable, and power-line cable, along with any common wireless communication technology.

[0012] The network **120** as shown herein is intended to depict a simplified representation of a network that implements various types of technology as they become available. For example, the network **120** can be a cellular network that implements 2G, 3G, 4G, and long-term evolution (LTE), LTE advanced, high-speed data packet access (HSDPA), evolved high-speed packet access (HSPA+), universal mobile telecommunication system (UMTS), code-division multiple access (CDMA), global system for mobile communications (GSM), WiMax, and WiFi access technologies.

[0013] The user equipment **102**A-**102**C is configured to provide a signal indicator **104** for displaying signal strength indicia on a user interface **106** (e.g., a display screen). The signal strength indicia can comprise one or more sets of signal bars of increasing height or dots to display the received signal strength from the network **120**. For example, more signal bars can be displayed or illuminated to indicate a strong signal and fewer signal bars can be displayed or illuminated to indicate a weak signal. Additionally, the signal strength indicia can be configured to display signal strength for different types of user experiences. For example, the signal strength indicia can comprise a first set of bars for voice experience, a second set of bars for data experience, and a third set of bars for video experience. Each set of bars can display or illuminate a different number of signal bars. For instance, the first set of bars can illuminate four out of five bars and the second set of bars can illuminate two out of five bars. The signal strength indicia can be based at least partially on the signal strength detected and measured by the user equipment **102**A-**102**C from the cell towers **112**A-**112**C. Additionally, the signal strength indicia can be based at least partially on the user experience data obtained via the user equipment **102**A-**102**C.

[0014] It is noted that the signal strength indicia indicates the strength of the signal from a particular network to which the user equipment **102**A-**102**C is connected. For example, if the user equipment **102**A-**102**C is using CDMA services, then the signal strength indicia indicates the strength of the CDMA signal. Similarly, if the user equipment is using a wireless local area network such as WiFi, the signal strength indicia indicate the strength of the WiFi signal. In various embodiments, a user may make the choice of services or technologies used. For example, the user can utilize a native application on the user equipment **102**A-**102**C to configure user preferences and settings.

[0015] Additionally, the user equipment **102**A-**102**C can measure signal strength using various techniques, depending on the network **120**. For instance, user equipment **102**A-**102**C in UMTS networks can use received signal code power (RSCP), user equipment **102**A-**102**C in GSM networks can use received signal strength indicator (RSSI), and user equipment **102**A-**102**C in LTE networks can utilize reference signal received power (RSRP). Signal strength and signal quality reflecting the RSCP, RSSI, or RSRP value can be measured in decibels (dBm).

[0016] The user equipment **102**A-**102**C comprises a signal processor **108**. The signal processor **108** can be coupled to a memory unit that includes appropriate processing modules to implement the appropriate physical layers and protocol stacks to enable signal processing. For example, the signal processor **108** can comprise digital signal processors or other types of processing units for determining the received signal strength (i.e., in dBm) from the cell towers **112**A-**112**C. In various embodiments, the signal processor **108** can measure various components of signal strength such as the upload and download speeds of telecommunications signals.

[0017] The user equipment **102**A-**102**C is further configured to collect user experience data **114** in each of the target geolocations **118**A-**118**C to be receiving network coverage. The user experience data **114** can correspond a user's voice experience, video experience, data experience, and/or so forth. The user experience data **114** can correspond to one or more network performance metrics. Without limitation, the metrics comprise packet latency, throughput, packet loss, availability, and/or so forth. The user experience data **114** can comprise service quality data such as call failures, call drops, delay measurements, level measurements, email and Short Message Service (SMS) metrics, RSSI, RSCP, RSRP, and/or so forth.

[0018] In various embodiments, the user experience data obtained at the user equipment **102**A-**102**C can be transmitted to a server **122** in communication with the network **120**. The server **122** may include general-purpose computers, such as desktop computers, tablet computers, laptop computers, servers (e.g., on-premise servers), or other electronic devices that are capable of receiving inputs, processing the inputs, and generating output data. The server **122** may be operated by the telecommunications service provider or a third-party entity that is working with the telecommunications service provider.

[0019] The server **122** may store data such as user experience data **114** in a data store **116** or in other distributed storage systems. As servers can be readily added or removed, the server **122** can include a plurality of physical machines that may be grouped together and presented as a single computing system. Each physical machine of the plurality of physical machines may comprise a node in a cluster. The server **122** may also be in the form of virtual machines, such as virtual engines (VE) and virtual private servers (VPS). In various embodiments, the server **122** can implement network performance monitoring and analysis tools or performance managers. In this way, the server **122** can utilize user experience data **114** in order to analyze performance measures, mitigate or troubleshoot any identified problems, and/or so forth.

[0020] In various embodiments, the signal indicator **104** can implement a selection module such as a metrics selector **110** for selecting one or more network performance metrics and the user experience data **114** corresponding to each type of user experience. For example, the metric selector **110** can select user experience data **114** corresponding to packet latency and throughput for a user's data experience. In this way, the metrics selector **110** can obtain user experience data associated with specific network performance metrics for different types of user experiences. The metrics selector **110** can select one or more network performance metrics based on user input or user settings of the user equipment **102**A-

102C or based on communications received from the server **122**. More specifically, the user equipment **102**A-**102**C can receive a user input to display signal strength indicia for only data experience. Upon selecting one or more network performance metrics and user experience data **114** via the metrics selector **110**, the signal indicator **104** can calculate a signal strength value based at least partially on the signal strength of a telecommunications signal and the user experience data corresponding to the type of user experience. The signal strength value can correspond to one or more signal strength indicia for display on the user equipment **102**A-**102**C.

Example Computing Device Components

[0021] FIG. **2** is a block diagram showing various components of an illustrative computing device, wherein the computing device can comprise a user equipment **102**. It is noted that the user equipment **102** as described herein can operate with more or fewer of the components shown herein. Additionally, the user equipment **102** as shown herein or portions thereof can serve as a representation of one or more user equipment **102** of the present system.

[0022] The user equipment **102** may include a communication interface **202**, one or more processors **204**, hardware **206**, and memory **212**. The communication interface **202** may include wireless and/or wired communication components that enable the user equipment **102** to transmit data to and receive data from other networked devices. In at least one example, the one or more processors **204** may be a central processing unit(s) (CPU), graphics processing unit(s) (GPU), both a CPU and GPU, or any other sort of processing unit(s). Additionally, the processor(s) **204** can include a signal processor **108** (e.g., a digital signal processor). Each of the one or more processors **204** may have numerous arithmetic logic units (ALUs) that perform arithmetic and logical operations as well as one or more control units (CUs) that extract instructions and stored content from processor cache memory, and then executes these instructions by calling on the ALUs, as necessary during program execution.

[0023] The one or more processors **204** may also be responsible for executing all computer applications stored in the memory, which can be associated with common types of volatile (RAM) and/or nonvolatile (ROM) memory. The hardware **206** may include at least one user interface **106**, data communication, or data storage hardware. For example, the user interfaces **106** may include a data output device (e.g., a display screen **208**, audio speakers), and one or more data input devices. The data input devices may include but are not limited to, combinations of one or more of keypads, keyboards, mouse devices, touch screens that accept gestures, microphones, voice or speech recognition devices, and any other suitable devices.

[0024] The memory **212** may be implemented using computer-readable media, such as computer storage media. Computer-readable media includes, at least, two types of computer-readable media, namely computer storage media and communications media. Computer storage media includes volatile and nonvolatile, removable and non-removable media implemented in any method or technology for storage of information such as computer-readable instructions, data structures, program modules, or other data. Computer storage media includes, but is not limited to, RAM, ROM, EEPROM, flash memory or other memory technology, CD-ROM, DVD, high-definition multimedia/data storage disks, or other optical storage, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, or any other non-transmission medium that can be used to store information for access by a computing device. In contrast, communication media may embody computer-readable instructions, data structures, program modules, or other data in a modulated data signal, such as a carrier wave, or other transmission mechanisms.

[0025] The processors **204** and the memory **212** of the user equipment **102** may implement an operating system **214** and a signal indicator **104**. The operating system **214** may include components that enable the user equipment **102** to receive and transmit data via various interfaces (e.g., user controls, communication interface, and/or memory input/output devices), as well as process data using the processors **204** to generate output. The operating system **214** may include a presentation component that presents the output (e.g., display the data on an electronic display, store the data in memory, transmit the data to another electronic device, etc.). Additionally, the operating system **214** may include other components that perform various additional functions generally associated with an operating system.

[0026] The signal indicator **104** can be operatively connected to the user interface **106** and the signal processor **108**. The user interface **106** comprises a display screen **208** that can display or illuminate one or more signal strength indicia **210**. The signal strength indicia **210** can comprise one or more sets of signal bars, dots, or other symbols. Each set of the signal bars of the signal strength indicia **210** can represent the signal strength of a specific user experience. For instance, a first set of signal bars can be used for voice experience, a second set of signal bars can be used for data experience, and a third set of signal bars can be used for video experience. Additionally, or alternatively, the signal strength indicia **210** can comprise a single set of signal bars that can correspond to a consolidated signal strength values for a voice experience, a data experience, and a video experience. In this regard, the signal strength values for the voice experience, the data experience, and the video experience can be averaged or calculated into a single integer value in any number of appropriate ways in order to represent an overall user experience. In various embodiments, the signal strength indicia **210** can change or update in real-time or in near real-time based at least partially on the real-time or near real-time user experience. For instance, the signal strength indicia **210** can display more or fewer signal bars during a phone call to represent the most up-to-date signal strength value for a user's voice experience.

[0027] The signal indicator **104** comprises a metrics selector **110**. The metrics selector **110** comprises a computation module **216** for calculating the signal strength values for various user experience types. The metrics selector **110** is configured to select one or more network performance metrics **218** corresponding to the user experience data **114** associated with one or more user experience type. For instance, the metrics selector **110** can select one or more network performance metrics **218** such as latency and jitter correlating to user experience data **114** (e.g., such as how fast pages load and how fast transactions complete) for data experience because increased latency and jitter can result in poor user data experience. Upon selecting a user experience type (e.g., voice experience, video experience, data experience, etc.), the user experience data **114** and network per-

formance metrics **218** (e.g., latency and packet loss) corresponding to the selected user experience type are used to calculate, via the computational module **216**, the signal strength value of the user experience type.

[0028] The user experience data **114** can comprise one or more client models **220**, **222** based on historical usage of voice, data, or video by a user over a predetermined time interval. The metrics selector **110** can use the one or more client models **220**, **222** in real-time to select one or more network performance metrics **218** that represent the current user experience. Additionally, the computation module **216** can preemptively calculate changes in signal strength values for different user experience based on the client models **220**, **222**. For example, the client models **220**, **222** can be used to identify trends or patterns for usage. In this regard, the client models **220**, **222** can help determine when and where a user most often utilizes data services. Thus, the computation module **216** can be configured to calculate a predicted signal strength value for data experience using selected network performance and based on an inference that the user is about to use data.

[0029] The predicted signal strength value may be represented by the signal strength indicia **210** in various ways. For instance, the predicted signal strength can be reflected as a change in color of the current signal bars for data. More specifically, the signal bars can be displayed in red if the signal strength value is predicted to deteriorate. Conversely, the signal bars can be displayed in green if the signal strength value is predicted to improve. In another example, the predicted signal strength can be reflected as a symbol. More specifically, a downward pointing arrow can be displayed adjacent to the signal bars if the signal strength value is predicted to deteriorate. Conversely, an upward pointing arrow can be displayed adjacent to the signal bars if the signal strength value is predicted to improve.

[0030] In various embodiments, the memory **212** can also include network performance metrics **218** and one or more sets of user experience data **114**. In various embodiments, the signal indicator **104** can also interface with an application programming interface (API) for providing access to user experience data **114** or one or more network performance metrics.

Example Processes

[0031] FIGS. **3** and **4** present illustrative processes **300-400** for providing enhanced signal strength indicia on user equipment. The processes **300-400** are illustrated as a collection of blocks in a logical flow chart, which represents a sequence of operations that can be implemented in hardware, software, or a combination thereof. In the context of software, the blocks represent computer-executable instructions that, when executed by one or more processors, perform the recited operations. Generally, computer-executable instructions may include routines, programs, objects, components, data structures, and the like that perform particular functions or implement particular abstract data types. The order in which the operations are described is not intended to be construed as a limitation, and any number of the described blocks can be combined in any order and/or in parallel to implement the process. For discussion purposes, the processes **300-400** are described with reference to the system **100** of FIG. **1**.

[0032] FIG. **3** is a flow diagram of an example process **300** for determining and displaying signal strength indicia based on standardized measurements and user experience data, from the perspective of one or more user equipment in communication with a network. At block **302**, a user equipment can measure, for example, using a signal processor, signal strength of a plurality of telecommunications signals received in a geolocation receiving coverage. At block **304**, the user equipment obtains user experience data in real time or in near-real time, wherein the user experience data corresponds to one or more network performance metrics and a user experience type. At lock **306**, the user equipment, via a computation module of a signal indicator, calculates a signal strength value based on the received signal strength and the network performance metrics.

[0033] It is noted that the signal strength value can be calculated in any number of appropriate ways. For example, the received signal strength and the network performance metrics can be averaged. In another example, the received signal strength and the network performance metrics can be represented as functions and relations. At block **308**, the user equipment displays, on a user interface, signal strength indicia corresponding to the signal strength value on the user equipment. In various embodiments, the signal indicator can provide one or more ranges of the signal strength values that correspond to the signal strength indicia. For instance, the signal strength indicia can display one signal bar if the calculated signal strength value falls within a first range of the signal strength values and display two signal bars if the calculated signal strength value falls within a second range of the signal strength values.

[0034] At block **310**, the user equipment can periodically recalculate the signal strength value for the user equipment. At decision block **312**, the user equipment can determine if the signal strength of the telecommunications signals has changed. For example, the signal strength can change if the user equipment has changed its location. If the signal strength has changed ("yes" response from the decision block **312**), the user equipment can display the updated signal strength indicia, wherein the updated signal strength indicia corresponds to the new signal strength value, as indicated in block **314**. At decision block **316**, the user equipment can change its state. For example, the user equipment can switch from an active mode to an idle mode. If the state of the user equipment has changed ("yes" response from the decision block **316**), the server can recalculate the signal strength value, as indicated in block **310**.

[0035] FIG. **4** is a flow diagram of an example process **400** for determining and displaying one or more selected signal strength indicia based on standardized measurements and selected network performance metrics and user experience data. At block **402**, a user equipment measures a signal strength for each of a plurality of telecommunications signals received in a geolocation receiving network coverage. At block **404**, the user equipment obtains user experience data corresponding to one or more network performance metrics in real time or in near-real time. The obtained user experience data can be transmitted to a server and/or a data store. In this regard, the user equipment can transmit the user experience data on a scheduled basis or upon receiving a request for the user experience data from the server. The server can implement a data retrieving scheme in order to manage data retrieval, management, and storage, depending upon embodiments.

[0036] At block **406**, the user equipment can implement a metrics selector to select at least one of the network performance metrics based on the type of user experience (e.g., voice experience, video experience, data experience, etc.) to calculate a signal strength value. At block **408**, the user equipment calculates a signal strength value for each of the user experience type using corresponding network performance metrics and user experience data. In this regard, the signal strength value for voice can be greater than the signal strength value for video. Thus, the signal strength value can differ depending on the user experience type. At block **410**, the user equipment can select one or more signal strength indicia corresponding to each of the signal strength value for display on the user equipment. At block **412**, the user equipment can display selected signal strength indicia corresponding to each of the signal strength value on the user equipment. Thus, the user equipment can display signal strength indicia for certain user experience types.

CONCLUSION

[0037] Although the subject matter has been described in language specific to structural features and/or methodological acts, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features or acts described. Rather, the specific features and acts are disclosed as exemplary forms of implementing the claims.

What is claimed is:

1. One or more non-transitory computer-readable media storing computer-executable instructions that upon execution cause one or more processors to perform acts comprising:

measuring a signal strength of a telecommunications signal received at a user equipment in a target geolocation in which a network coverage is to be provided;

obtaining user experience data for a plurality of user experience types at the user equipment, the user experience data corresponding to one or more network performance metrics;

calculating a signal strength value based at least partially on the signal strength and the one or more network performance metrics corresponding to the user experience data; and

displaying signal strength indicia corresponding to the signal strength value.

2. The one or more non-transitory computer-readable media of claim **1**, wherein the plurality of user experience types comprises a first user experience type and a second user experience type;

calculating a first signal strength value for the first user experience type based at least partially on the user experience data corresponding to the first user experience type; and

calculating a second signal strength value for the second user experience type based at least partially on the user experience data corresponding to the second user experience type.

3. The one or more non-transitory computer-readable media of claim **2**, wherein the acts further comprise:

simultaneously displaying a first signal strength indicium corresponding to the first signal strength value and a second signal strength indicium corresponding to the second signal strength value.

4. The one or more non-transitory computer-readable media of claim **2**, wherein the acts further comprise:

selecting a first signal strength indicium corresponding to the first signal strength value for display.

5. The one or more non-transitory computer-readable media of claim **1**, wherein the plurality of user experience types comprises a voice experience, a data experience, and a video experience.

6. The one or more non-transitory computer-readable media of claim **1**, wherein the acts further comprise:

selecting at least one of the one or more network performance metrics; and

calculating a second signal strength value based at least partially on the signal strength and the one or more network performance metrics selected.

7. The one or more non-transitory computer-readable media of claim **1**, wherein the one or more network performance metrics comprises packet latency, throughput, packet loss, and availability.

8. The one or more non-transitory computer-readable media of claim **1**, wherein the acts further comprise:

periodically recalculating the signal strength value based at least partially on the signal strength and the one or more network performance metrics; and

updating the signal strength indicia displayed on the user equipment.

9. The one or more non-transitory computer-readable media of claim **1**, wherein the signal strength indicia comprise at least one set of signal bars or dots.

10. A computer-implemented method, comprising:

measuring a signal strength of a telecommunications signal received in a target geolocation in which a network coverage is to be provided;

collecting a first set of user experience data corresponding to one or more network performance metrics;

calculating at least one signal strength value based at least partially on the signal strength of the telecommunications signal and the one or more network performance metrics; and

displaying one or more signal strength indicia corresponding to the at least one signal strength value.

11. The computer-implemented method of claim **10**, further comprising the steps of:

switching from an idle mode to an active mode;

collecting a second set of user experience data corresponding to the one or more network performance metrics;

calculating a second signal strength value based at least partially on the signal strength and the one or more network performance metrics; and

displaying a second signal strength indicium corresponding to the second signal strength value.

12. The computer-implemented method of claim **10**, wherein the first set of user experience data is collected in real-time or in near real-time.

13. The computer-implemented method of claim **10**, further comprising the steps of:

selecting at least one of the one or more network performance metrics.

14. The computer-implemented method of claim **10**, further comprising the steps of:

selecting one of the one or more signal strength indicia for display.

15. The computer-implemented method of claim **10**, wherein the first set of user experience data correlates with an account that is associated with a plurality of user equipment and a plurality of users.

16. A system, comprising:

one or more non-transitory storage mediums configured to provide stored code segments, the one or more non-transitory storage mediums coupled to one or more processors, each configured to execute the code segments and causing the one or more processors to:

measure a signal strength of a telecommunications signal received at a user equipment in a first state in a target geolocation in which a network coverage is to be provided;

obtain a first set of user experience data from the user equipment in the first state, the first set of user experience data corresponding to one or more network performance metrics;

calculate a signal strength value based at least partially on the signal strength and the one or more network performance metrics; and

display one or more signal strength indicia corresponding to the signal strength value when the user equipment is in the first state.

17. The system of claim **16**, wherein the one or more processors are further configured to:

change a state of the user equipment;

measure the signal strength of the telecommunication signal received at the user equipment in a second state in the target geolocation; and

obtain a second set of user experience data from the user equipment in the second state, the second set of user experience data corresponding to the one or more network performance metrics.

18. The system of claim **17**, wherein the first state comprises an active mode and the second state comprises an idle mode.

19. The system of claim **16**, wherein the first set of user experience data corresponds to a first user experience type.

20. The system of claim **19**, wherein the one or more processors are further configured to:

obtain a second set of user experience data from the user equipment, the second set of user experience data corresponding to a second user experience type and the one or more network performance metrics;

select a first group of the one or more network performance metrics corresponding to the first user experience type;

select a second group of the one or more network performance metrics corresponding to the second user experience type;

calculate a first signal strength value based at least partially on the signal strength and the first group of the one or more network performance metrics; and

calculate a second signal strength value based at least partially on the signal strength and the second group of the one or more network performance metrics.

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