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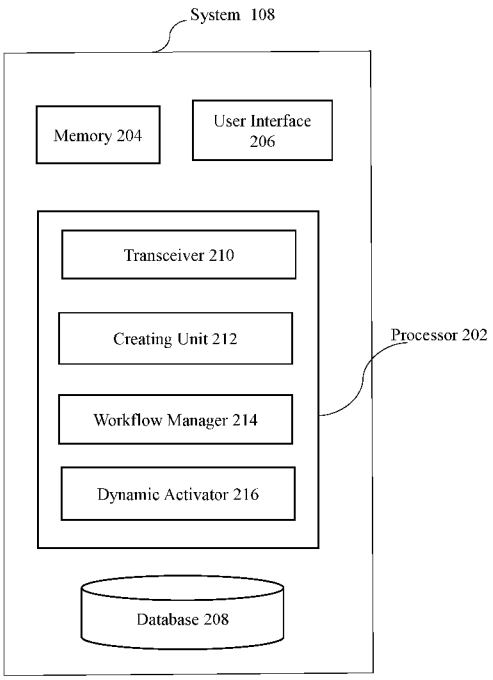

FIG.2

(57) Abstract: The present disclosure relates to a system (108) and a method (500) of dynamically managing bulk provisioning The system (108) includes a transceiver (210) to receive a bulk provisioning request from a Northbound Interface (NBI). The system (108) includes a creating unit (212) to create, utilizing a model, a workflow for the bulk provisioning utilizing one or more parameters retrieved based on the received bulk provisioning request from the NBI. The system (108) includes a workflow manager (214) to execute, the workflow for the bulk provisioning based on the one or more parameters. The system (108) includes a dynamic activator (216) to detect utilizing the model, changes in the one or more parameters based on monitoring the one or more parameters during executing the workflow. The dynamic activator (216) dynamically modifies the workflow for the bulk provisioning based on the changes detected in the one or more parameters.

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METHOD AND SYSTEM FOR DYNAMICALLY MANAGING BULK PROVISIONING

FIELD OF THE INVENTION

[0001] The present invention relates to fulfillment management systems, more particularly relates to a system and a method dynamically managing bulk provisioning in the fulfillment management systems.

BACKGROUND OF THE INVENTION

[0002] Telecommunication service provisioning and activation systems, such as those that provision voice, data and/or video, are constantly evolving to fulfill the market request in a very competitive environment. Many provisioning and service activation systems today have been built for a few services and for specific network technology and may require the coding of new adapters as new network elements are added to the system. Further, provisioning of new services and changes may also require coding of new service logic to fulfill the activation of those services toward the network.

[0003] In the context of 3GPP (3rd Generation Partnership Project), provisioning is essential for service providers to efficiently allocate resources, activate services, and manage configurations, leading to enhanced network performance, subscriber satisfaction, and overall operational efficiency. With growth in the number and complexity of available services, bulk provisioning services toward the network created challenges across different networks and organizational departments. In the case of bulk provisioning, files are created for the provisioning, and copied to a remote server. The same files are fetched from the server based on request and response from a user. In conventional methods, when a file is created, changes in API, server credentials or details, for example changes in username and password, or location of the server, coding and deployment changes are required for bulk provisioning, which

might be time consuming as it requires full time from change to deployment of application.

[0004] Hence, there exists a need for an improved method and system for dynamic bulk provisioning in fulfillment management system, particularly for changes in details of API, files and servers, which should make the process easy and faster for provisioning changes and reduces the time for the development and deployment of application at code level.

SUMMARY OF THE INVENTION

[0005] One or more embodiments of the present disclosure provide a method and a system for dynamically managing bulk provisioning.

[0006] In one aspect of the present invention, the system for dynamically managing bulk provisioning is disclosed. The system includes a transceiver configured to receive a bulk provisioning request from a Northbound Interface (NBI). The system further includes a creating unit configured to create, utilizing a model, a workflow for the bulk provisioning utilizing one or more parameters retrieved based on the received bulk provisioning request from the NBI. The system further includes a workflow manager configured to execute the workflow for the bulk provisioning based on the one or more parameters.

[0007] The system further includes a dynamic activator, configured to detect utilizing the model, changes in the one or more parameters based on monitoring the one or more parameters during executing the workflow. Further, the dynamic activator is configured to dynamically modify in real time, the workflow for the bulk provisioning based on the changes detected in the one or more parameters.

[0008] In an embodiment, the workflow manager is configured to execute the workflow for the bulk provisioning based on the one or more parameters, by creating, a bulk file for the bulk provisioning, replicating, the created bulk file at a server and

transmitting, the bulk provisioning request to one or more southbound nodes for a file transfer requirement and the bulk provisioning.

[0009] In an embodiment, the model is at least one of an Artificial Intelligence/Machine Learning (AI/ML) model. In an embodiment, the one or more parameters include at least one of, Application Programming Interface (API) details, bulk file details, bulk file name, bulk file format, bulk file path, details and credentials of the server where the created bulk file is replicated. In an embodiment, the model is trained with historical data pertaining to the one or more parameters of the workflow. In an embodiment, the server is at least one of a Secure Copy Protocol (SCP) server.

[0010] In an embodiment, the dynamic activator detects, utilizing the model, changes in the one or more parameters based on monitoring the one or more parameters during executing the workflow, by detecting, a change in one or more current parameters of the workflow based on comparing the one or more current parameters with historical data pertaining to the one or more parameters of the workflow.

[0011] In an embodiment, the dynamic activator enables a user to modify the one or more parameters via a user interface required for the bulk provisioning and the file transfer details.

[0012] In another aspect of the present invention, the method for dynamically managing bulk provisioning is disclosed. The method includes the step of receiving a bulk provisioning request from a Northbound Interface (NBI). The method further includes the step of creating, utilizing a model, a workflow for the bulk provisioning utilizing one or more parameters retrieved based on the received bulk provisioning request from the NBI. The method further includes the step of executing the workflow for the bulk provisioning based on the one or more parameters. The method further includes the step of detecting, utilizing the model, changes in the one or more parameters based on monitoring the one or more parameters during executing the

workflow. The method further includes the step of dynamically modifying in real time, the workflow for the bulk provisioning based on the changes detected in the one or more parameters.

[0013] Other features and aspects of this invention will be apparent from the following description and the accompanying drawings. The features and advantages described in this summary and in the following detailed description are not all-inclusive, and particularly, many additional features and advantages will be apparent to one of ordinary skill in the relevant art, in view of the drawings, specification, and claims hereof. Moreover, it should be noted that the language used in the specification has been principally selected for readability and instructional purposes and may not have been selected to delineate or circumscribe the inventive subject matter, resort to the claims being necessary to determine such inventive subject matter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The accompanying drawings, which are incorporated herein, and constitute a part of this disclosure, illustrate exemplary embodiments of the disclosed methods and systems in which like reference numerals refer to the same parts throughout the different drawings. Components in the drawings are not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of the present disclosure. Some drawings may indicate the components using block diagrams and may not represent the internal circuitry of each component. It will be appreciated by those skilled in the art that disclosure of such drawings includes disclosure of electrical components, electronic components or circuitry commonly used to implement such components.

[0015] **FIG. 1** is an exemplary block diagram of an environment for dynamically managing bulk provisioning, according to one or more embodiments of the present invention;

[0016] **FIG. 2** an exemplary block diagram of a system for dynamically managing bulk provisioning, according to one or more embodiments of the present invention;

[0017] **FIG. 3** is a schematic representation of a workflow of the system of **FIG. 1**, according to the one or more embodiments of the present invention;

[0018] **FIG. 4** is an exemplary block diagram of an architecture of the system of dynamically managing bulk provisioning, according to one or more embodiments of the present invention;

[0019] **FIG. 5** is a schematic representation of a method for dynamically managing bulk provisioning, according to one or more embodiments of the present invention; and

[0020] **FIG. 6** is an exemplary flow diagram for dynamically managing bulk provisioning, according to one or more embodiments of the present invention.

[0021] The foregoing shall be more apparent from the following detailed description of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0022] Some embodiments of the present disclosure, illustrating all its features, will now be discussed in detail. It must also be noted that as used herein and in the appended claims, the singular forms "a", "an" and "the" include plural references unless the context clearly dictates otherwise.

[0023] Various modifications to the embodiment will be readily apparent to those skilled in the art and the generic principles herein may be applied to other embodiments. However, one of ordinary skill in the art will readily recognize that the present disclosure including the definitions listed here below are not intended to be limited to the embodiments illustrated but is to be accorded the widest scope consistent with the principles and features described herein.

[0024] A person of ordinary skill in the art will readily ascertain that the illustrated steps detailed in the figures and here below are set out to explain the exemplary embodiments shown, and it should be anticipated that ongoing technological development will change the manner in which particular functions are performed. These examples are presented herein for purposes of illustration, and not limitation. Further, the boundaries of the functional building blocks have been arbitrarily defined herein for the convenience of the description. Alternative boundaries can be defined so long as the specified functions and relationships thereof are appropriately performed. Alternatives (including equivalents, extensions, variations, deviations, etc., of those described herein) will be apparent to persons skilled in the relevant art(s) based on the teachings contained herein. Such alternatives fall within the scope and spirit of the disclosed embodiments.

[0025] As per various embodiments depicted, the present invention discloses a system and a method for dynamically managing bulk provisioning.

[0026] **FIG. 1** illustrates an exemplary block diagram of an environment **100** for dynamically managing bulk provisioning, according to one or more embodiments of the present disclosure. In this regard, the environment **100** includes a User Equipment (UE) **102**, a server **104**, a network **106** and a system **108** communicably coupled to each other for dynamically managing bulk provisioning. The UE **102** aids a user to interact with the system **108** for executing the workflow for the bulk provisioning.

[0027] As per the illustrated embodiment and for the purpose of description and illustration, the UE **102** includes, but not limited to, a first UE **102a**, a second UE **102b**, and a third UE **102c**, and should nowhere be construed as limiting the scope of the present disclosure. In alternate embodiments, the UE **102** may include a plurality of UEs as per the requirement. For ease of reference, each of the first UE **102a**, the second UE **102b**, and the third UE **102c**, will hereinafter be collectively and individually referred to as the "User Equipment (UE) **102**".

[0028] In an embodiment, the UE **102** is one of, but not limited to, any electrical, electronic, electro-mechanical or an equipment and a combination of one or more of the above devices such as virtual reality (VR) devices, augmented reality (AR) devices, laptop, a general-purpose computer, desktop, personal digital assistant, tablet computer, mainframe computer, or any other computing device.

[0029] The environment **100** includes the server **104** accessible via the network **106**. The server **104** may include, by way of example but not limitation, one or more of a standalone server, a server blade, a server rack, a bank of servers, a server farm, hardware supporting a part of a cloud service or system, a home server, hardware running a virtualized server, one or more processors executing code to function as a server, one or more machines performing server-side functionality as described herein, at least a portion of any of the above, some combination thereof. In an embodiment, the entity may include, but is not limited to, a vendor, a network operator, a company, an organization, a university, a lab facility, a business enterprise side, a defence facility side, or any other facility that provides service.

[0030] The network **106** includes, by way of example but not limitation, one or more of a wireless network, a wired network, an internet, an intranet, a public network, a private network, a packet-switched network, a circuit-switched network, an ad hoc network, an infrastructure network, a Public-Switched Telephone Network (PSTN), a cable network, a cellular network, a satellite network, a fiber optic network, or some combination thereof. The network **106** may include, but is not limited to, a Third Generation (3G), a Fourth Generation (4G), a Fifth Generation (5G), a Sixth Generation (6G), a New Radio (NR), a Narrow Band Internet of Things (NB-IoT), an Open Radio Access Network (O-RAN), and the like.

[0031] The network **106** may also include, by way of example but not limitation, at least a portion of one or more networks having one or more nodes that transmit, receive, forward, generate, buffer, store, route, switch, process, or a combination thereof, etc. one or more messages, packets, signals, waves, voltage or current levels,

some combination thereof, or so forth. The network **106** may also include, by way of example but not limitation, one or more of a wireless network, a wired network, an internet, an intranet, a public network, a private network, a packet-switched network, a circuit-switched network, an ad hoc network, an infrastructure network, a Public-Switched Telephone Network (PSTN), a cable network, a cellular network, a satellite network, a fiber optic network, a VOIP or some combination thereof.

[0032] The environment **100** further includes the system **108** communicably coupled to the server **104** and the UE **102** via the network **106**. The system **108** is configured to dynamically manage bulk provisioning. As per one or more embodiments, the system **108** is adapted to be embedded within the server **104** or embedded as an individual entity.

[0033] Operational and construction features of the system **108** will be explained in detail with respect to the following figures.

[0034] **FIG. 2** is an exemplary block diagram of the system **108** for dynamically managing bulk provisioning, according to one or more embodiments of the present invention.

[0035] As per the illustrated embodiment, the system **108** includes one or more processors **202**, a memory **204**, a user interface **206**, and a database **208**. For the purpose of description and explanation, the description will be explained with respect to one processor **202** and should nowhere be construed as limiting the scope of the present disclosure. In alternate embodiments, the system **108** may include more than one processors **202** as per the requirement of the network **106**. The one or more processors **202**, hereinafter referred to as the processor **202** may be implemented as one or more microprocessors, microcomputers, microcontrollers, digital signal processors, central processing units, state machines, logic circuitries, single board computers, and/or any devices that manipulate signals based on operational instructions.

[0036] As per the illustrated embodiment, the processor **202** is configured to fetch and execute computer-readable instructions stored in the memory **204**. The memory **204** may be configured to store one or more computer-readable instructions or routines in a non-transitory computer-readable storage medium, which may be fetched and executed to create or share data packets over a network service. The memory **204** may include any non-transitory storage device including, for example, volatile memory such as RAM, or non-volatile memory such as disk memory, EPROMs, FLASH memory, unalterable memory, and the like.

[0037] In an embodiment, the user interface **206** includes a variety of interfaces, for example, interfaces for a graphical user interface, a web user interface, a Command Line Interface (CLI), and the like. The user interface **206** facilitates communication of the system **108**. In one embodiment, the user interface **206** provides a communication pathway for one or more components of the system **108**. Examples of such components include, but are not limited to, the UE **102** and the database **208**.

[0038] The database **208** is one of, but not limited to, a centralized database, a cloud-based database, a commercial database, an open-source database, a distributed database, an end-user database, a graphical database, a No-Structured Query Language (NoSQL) database, an object-oriented database, a personal database, an in-memory database, a document-based database, a time series database, a wide column database, a key value database, a search database, a cache databases, and so forth. The foregoing examples of database **308** types are non-limiting and may not be mutually exclusive e.g., a database can be both commercial and cloud-based, or both relational and open-source, etc.

[0039] In order for the system **108** to dynamically manage bulk provisioning, the processor **202** includes one or more modules. In one embodiment, the one or more modules includes, but not limited to, a transceiver **210**, a creating unit **212**, a workflow manger **214**, and a dynamic activator **216** communicably coupled to each other to dynamically manage bulk provisioning.

[0040] The transceiver **210**, the creating unit **212**, the workflow manger **214**, and the dynamic activator **216** in an embodiment, may be implemented as a combination of hardware and programming (for example, programmable instructions) to implement one or more functionalities of the processor **202**. In the examples described herein, such combinations of hardware and programming may be implemented in several different ways. For example, the programming for the processor **202** may be processor-executable instructions stored on a non-transitory machine-readable storage medium and the hardware for the processor may comprise a processing resource (for example, one or more processors), to execute such instructions. In the present examples, the memory **204** may store instructions that, when executed by the processing resource, implement the processor. In such examples, the system **108** may comprise the memory **204** storing the instructions and the processing resource to execute the instructions, or the memory **204** may be separate but accessible to the system **108** and the processing resource. In other examples, the processor **202** may be implemented by electronic circuitry.

[0041] In one embodiment, the transceiver **210** of the system **108** is configured to receive a bulk provisioning request from a Northbound Interface (NBI). The bulk provisioning refers to the process of simultaneously provisioning multiple items or resources in large quantities. The bulk provisioning request typically involves but not limited to, the simultaneous creation, modification, or allocation of multiple resources or items based on a single request. The NBI is an application programming interface (API) or protocol that allows a lower-level network component to communicate with a higher-level or more central component. The lower-level network component includes but not limited to, switches, routers, Access Points (APs), Network Interface Cards (NICs), hubs, firewalls and network load balancers. The higher-level or more central component includes but not limited to, Software-Defined Networking (SDN) controller, Network Management System (NMS), orchestration platform, policy management server, network analytics platform, Service Function Chaining (SFC) controller, and cloud orchestrator.

[0042] Upon receiving the bulk provisioning request, the creating unit **212** is configured to create a workflow for the bulk provisioning. The workflow of the bulk provisioning is created by utilizing a model and the one or more parameters. The one or more parameters are retrieved based on the received bulk provisioning request from the NBI. The workflow is a series of steps or tasks that are executed in a specific sequence to achieve a particular goal or objective. The workflow includes but is not limited to, policy-based workflow, service provisioning workflow, traffic engineering workflow, event-driven workflow, and analytics-driven workflow. The model is at least one of an Artificial Intelligence/Machine Learning (AI/ML) model. The AI/ML models is at least one of supervised learning models, unsupervised learning models, reinforcement learning models, deep learning models, and Natural Language Processing (NLP) models. The model is trained with historical data pertaining to the one or more parameters of the workflow. The historical data refers to part data collected over a period of time that is relevant to the parameters and processes involved in the workflow. The historical data includes, but not limited to, past request data, workflow parameters data, performance metrics, user and system interaction logs, environmental data, outcome data. The one or more parameters include at least one of but not limited to, Application Programming Interface (API) details, bulk file details, bulk file name, bulk file format, bulk file path, details and credentials of the server **104** where the created bulk file is replicated. The API details refer to the specification and information required to interact with the API. The API details include, but not limited to, endpoint Uniform Resource Locators (URLs), Hyper Text Transfer Protocol (HTTP) methods such as (GET, POST, PUT, DELETE), authentication information, headers, request and response formats, rate limits. The bulk file details refer to the comprehensive information about the bulk file to be processed. The bulk file details include, but not limited to bulk file name, bulk file format, bulk file path, file size, data structure. The bulk file name is a specific name assigned to the bulk file. The bulk file format refers to the structure and encoding of the data within the file. The bulk file format includes, but is not limited to, Comma-Separated Values (CSV), JavaScript Object Notation (JSON), Extensible Markup Language (XML), plain text (TXT). The

bulk file path is the directory or location where the bulk file is stored. The bulk file path includes, but is not limited to, absolute path, relative path, network path.

[0043] Upon creating the workflow, the workflow manager **214** is configured to execute the workflow for the bulk provisioning based on the one or more parameters. The workflow manager **214** executes the workflow for the bulk provisioning based on the one or more parameters by creating a bulk file for the bulk provisioning. Upon creating the bulk file for the bulk provisioning, the workflow manager **214** replicates the created bulk file at the server **104**. The server **104** is at least one of a but not limited to, Secure Copy Protocol (SCP) server.

[0044] On replicating the created bulk file, the workflow manager **214** transmits the bulk provisioning request to one or more southbound nodes for a file transfer requirement and the bulk provisioning. The one or more southbound nodes refer to devices, components, or interfaces that are responsible for communication between higher-level network management systems (such as controllers or orchestrators) and the physical or virtual network infrastructure. The one or more southbound nodes includes but not limited to, network functions, switches and routers, Access Points (APs), firewalls and security appliances, load balancers, virtual switches, Software-Defined Networking (SDN) controllers.

[0045] Upon transmitting the bulk provisioning request to one or more southbound nodes by workflow manager **214**, the dynamic activator **216** is configured to detect the changes in one or more parameters. The changes in the one or more parameters are detected based on monitoring the one or more parameters during executing the workflow by utilizing the model. The dynamic activator **216** detects the changes in one or more parameters by detecting a change in a one or more current parameters of the workflow. The one or more current parameters refers to the one or more parameters present in real time. More specifically, the change in the one or more current parameters of the workflow is detected based on comparing the one or more current

parameters with historical data pertaining to the one or more parameters of the workflow.

[0046] Upon detecting the change in the one or more current parameters, the dynamic activator **216** enables a user using the UE **102** to modify the one or more parameters. The user modifies the one or more parameters via the user interface **206** required for the bulk provisioning and the file transfer details. Thereafter, the dynamic activator **216** dynamically modifies the workflow for the bulk provisioning based on the changes detected in the one or more parameters. Thus, the bulk provisioning is managed dynamically. By doing so, the system **108** improves the processing speed of the processor **202** by configuring the bulk requests without requiring any change at code level. Thus, the development and deployment time of the processor **202 is s**aved.

[0047] In an embodiment, the system **108** also automatically detects the number of requests. If the number of requests is more, the system **108** pushes the number of requests in bulk instead of single pushing and fall back to single once the load is stabilized. The sudden increase in number of requests can be due to any failure on Southbound Interface (SBI) leading to queuing or sudden push of orders or requests from NBI etc.

[0048] **FIG. 3** describes a preferred embodiment of the system **108** of **FIG. 2**, according to various embodiments of the present invention. It is to be noted that the embodiment with respect to **FIG. 3** will be explained with respect to the first UE **102a** and the system **108** for the purpose of description and illustration and should nowhere be construed as limited to the scope of the present disclosure.

[0049] As mentioned earlier in **FIG. 1**, each of the first UE **102a** the second UE **102b**, and the third UE **102c** may include an external storage device, a bus, a main memory, a read-only memory, a mass storage device, communication port(s), and a processor. The exemplary embodiment as illustrated in **FIG. 3** will be explained with

respect to the first UE **102a**. The first UE **102a** includes one or more primary processors **302** communicably coupled to the one or more processors **202** of the system **108**.

[0050] The one or more primary processors **302** are coupled with a memory unit **304** storing instructions which are executed by the one or more primary processors **302**. Execution of the stored instructions by the one or more primary processors **302** enables the first UE **102a** to change the one or more parameters, in a real time while executing the workflow for the bulk provisioning based on an input received from the user via the user interface of the UE **102.**

[0051] As mentioned earlier in **FIG. 2**, the one or more processors **202** of the system **108** is configured to dynamically manage bulk provisioning**.** As per the illustrated embodiment, the system **108** includes the one or more processors **202**, the memory **204**, the user interface **206,** and the database **208**. The operations and functions of the one or more processors **202**, the memory **204**, the user interface **206,** and the database **208** are already explained in **FIG. 2**. For the sake of brevity, a similar description related to the working and operation of the system **108** as illustrated in **FIG. 2** has been omitted to avoid repetition.

[0052] Further, the processor **202** includes the transceiver **310**, the creating unit **212**, the workflow manager **214**, and the dynamic activator **216**. The operations and functions of the transceiver **310**, the creating unit **212**, the workflow manager **214**, and the dynamic activator **216** are already explained in **FIG. 2**. Hence, for the sake of brevity, a similar description related to the working and operation of the system **108** as illustrated in **FIG. 2** has been omitted to avoid repetition. The limited description provided for the system **108** in **FIG. 3**, should be read with the description as provided for the system **108** in the **FIG. 2** above, and should not be construed as limiting the scope of the present disclosure.

[0053] **FIG. 4** is an exemplary block diagram of an architecture **400** of the system **108** of dynamically managing bulk provisioning, according to one or more embodiments of the present invention.

[0054] According to the exemplary embodiment, the system **108** includes, but may not be limited to, an operation and management unit **402**, the workflow manager **214**, the dynamic activator **216**, a message broker **404**, a graph database **406**, a distributed data lake database **408**, a cache data store **410**, a load balancer **412**, the user interface **206**, and a dynamic routing management **414**.

[0055] In an embodiment, the user interface **206** receives the bulk provisioning request form the UE **102.** Upon receiving the bulk provisioning request, the user interface **206** transmits the bulk provisioning request to the operation and management unit **402**. The operation and management unit **402** creates the workflow for the bulk provisioning. The workflow for the bulk provisioning is created by utilizing the model and the one or more parameters retrieved based on the received bulk provisioning request. The model is at least one of the Artificial Intelligence/Machine Learning (AI/ML) model. The model is trained with historical data pertaining to the one or more parameters of the workflow. The one or more parameters include at least one of, Application Programming Interface (API) details, bulk file details, bulk file name, bulk file format, bulk file path, details and credentials of the server **104** where the created bulk file is replicated.

[0056] Upon creating the workflow for the bulk provisioning, the operation and management unit **402** transmits the created workflow to the workflow manager **214.** The workflow manager **214** executes the workflow for the bulk provisioning based on the one or more parameters. The workflow manager **214** executes the workflow for the bulk provisioning by creating the bulk file for the bulk provisioning. Upon creating the bulk file, the workflow manager **214** replicates the created bulk file at the server **104**. Thereafter the workflow manager **214** transmits the bulk provisioning request to one or more southbound nodes for the file transfer requirement and the bulk

provisioning. Further, the workflow manager **214** includes a message broker **404** and a graph database **406**. The message broker **404** and the graph database **406** stores the executed workflow for the bulk provisioning.

[0057] The workflow manager **214** executes the workflow with the help of the dynamic activator **216**. The dynamic activator **216** detects the changes in the one or more parameters by utilizing the model. The changes in the one or more parameters are detected based on monitoring the one or more parameters during executing the workflow. The dynamic activator **216** detects the changes in one or more parameters by detecting a change in the one or more current parameters of the workflow. The detection is performed based on comparing the one or more current parameters with historical data pertaining to the one or more parameters of the workflow. The historical data pertaining to the one or more parameters of the workflow are fetched from a distributed data lake **408** and a cache data store **410.**

[0058] The distributed data lake **408** is a data storage repository that centralizes, organizes, and protects large amounts of structured, semi-structured, and unstructured data pertaining to the details associated with the execution of the workflow from the dynamic activator **216**. The cache data store **410** helps in storing recently stored data or frequently accessed data pertaining to the details associated with the execution of the workflow. Further, the dynamic routing manager **414** is configured to fetch details associated with the execution of the workflow from the distributed data lake **408** and the cache data store **410.**

[0059] In an embodiment, the dynamic activator **216** enables the user to modify the one or more parameters via the user interface **206** required for the bulk provisioning and the file transfer details. Thereafter, the dynamic activator **216** dynamically modifies the workflow for the bulk provisioning based on the changes detected in the one or more parameters. For instance, in case of a change in the bulk provisioning API, then the user may log into the user interface and change the workflow and the same

workflow may be reflected in the provisioning and the workflow manager may execute the same workflow as the same way for the previous workflow.

[0060] In an embodiment, the load balancer **412** is communicably coupled with the dynamic activator **216** and the user interface **206**. The load balancer **412** dynamically balances the workflows for the bulk provisioning at the dynamic activator **216**.

[0061] **FIG. 5** is a flow diagram of a method **500** for dynamically managing bulk provisioning, according to one or more embodiments of the present invention. For the purpose of description, the method **500** is described with the embodiments as illustrated in **FIG. 2** and should nowhere be construed as limiting the scope of the present disclosure.

[0062] At step **502**, the method **500** includes the step of receiving the bulk provisioning request from the NBI by the transceiver **210**.

[0063] At step **504**, the method **500** includes the step of creating the workflow for the bulk provisioning by the creating unit **212**. The workflow for the bulk provisioning is created by utilizing the model and the one or more parameters retrieved based on the received bulk provisioning request from the NBI.

[0064] At step **506**, the method **500** includes the step of executing the workflow for the bulk provisioning based on the one or more parameters by the workflow manager **214**. The step of executing the workflow for the bulk provisioning includes the step of creating the bulk file for the bulk provisioning. The step of executing the workflow for the bulk provisioning further includes the step of replicating the created bulk file at the server **104**. The step of executing the workflow for the bulk provisioning further includes the step of transmitting the bulk provisioning request to one or more southbound nodes for a file transfer requirement and the bulk provisioning.

[0065] At step **508**, the method **500** includes the step of detecting, utilizing the model, changes in the one or more parameters based on monitoring the one or more

parameters during executing the workflow by the dynamic activator **216**. The step of detecting the changes in the one or more parameters includes the step of detecting a change in one or more current parameters of the workflow. The detection is performed based on comparing the one or more current parameters with historical data pertaining to the one or more parameters of the workflow.

[0066] At step **510**, the method **500** includes the step of dynamically modifying the workflow for the bulk provisioning based on the changes detected in the one or more parameters in real time by dynamic activator **216**.

[0067] **FIG. 6** is an exemplary flow diagram for dynamically managing bulk provisioning, according to one or more embodiments of the present invention.

[0068] According to the illustrated flow diagram, the bulk provisioning request is received from the NBI **602**. The NBI **602** transmits the bulk provisioning request to FMS **604** for creating the workflow for the bulk provisioning request by utilizing the model and the one or more parameters. Upon receiving the bulk provisioning request, the FMS **604** creates the workflow and transfers the file to the SCP server **606**. Simultaneously, the FMS **604** transmits the request of bulk provision to a state one, then to a state two in an order and then completes the response for the request of bulk provision. The state 1 and the state 2 are basically the Application Programming Interface (API) invocation which gets executed sequentially to different network nodes such as Policy Control Function (PCF), Unified Data Management (UDM) etc. If the API gets changed to state one or state two, or if any username and password of the SCP server **606** gets changed or the location of the server gets changed, then from FMS user interface **608** these details may be changed using the FMS user interface **608**.

[0069] The present invention further discloses a non-transitory computer-readable medium having stored thereon computer-readable instructions. The computer-readable instructions are executed by the processor **202**. The processor **202** is

configured to receive, a bulk provisioning request from a Northbound Interface (NBI). The processor **202** is further configured to create, utilizing a model, a workflow for the bulk provisioning utilizing one or more parameters retrieved based on the received bulk provisioning request from the NBI. The processor **202** is further configured to execute, the workflow for the bulk provisioning based on the one or more parameters. The processor **202** is further configured to detect utilizing the model, changes in the one or more parameters based on monitoring the one or more parameters during executing the workflow. The processor **202** is further configured to dynamically modify in real time, the workflow for the bulk provisioning based on the changes detected in the one or more parameters.

[0070] A person of ordinary skill in the art will readily ascertain that the illustrated embodiments and steps in description and drawings (FIG.1-6) are set out to explain the exemplary embodiments shown, and it should be anticipated that ongoing technological development will change the manner in which particular functions are performed. These examples are presented herein for purposes of illustration, and not limitation. Further, the boundaries of the functional building blocks have been arbitrarily defined herein for the convenience of the description. Alternative boundaries can be defined so long as the specified functions and relationships thereof are appropriately performed. Alternatives (including equivalents, extensions, variations, deviations, etc., of those described herein) will be apparent to persons skilled in the relevant art(s) based on the teachings contained herein. Such alternatives fall within the scope and spirit of the disclosed embodiments.

[0071] The present disclosure incorporates technical advancement that the system has the capability to configure bulk requests and no code level changes are required in the system. Thus, the development and deployment time is saved. All the details used for bulk provisioning and file transfer are made configurable so that any changes are easily performed in very trifling time frame.

[0072] The present invention offers multiple advantages over the prior art and the above listed are a few examples to emphasize on some of the advantageous features. The listed advantages are to be read in a non-limiting manner.

REFERENCE NUMERALS

[0073] Environment- 100

[0074] User Equipment (UE)- 102

[0075] Server- 104

[0076] Network- 106

[0077] System -108

[0078] Processor- 202

[0079] Memory- 204

[0080] User Interface- 206

[0081] Database- 208

[0082] Transceiver- 210

[0083] Creating Unit- 212

[0084] Workflow Manager- 214

[0085] Dynamic activator- 216

[0086] Primary processor- 302

[0087] Memory- 304

[0088] Operation and Management Unit- 402

[0089] Message Broker- 404

[0090] Graph Database- 406

[0091] Distributed Data Lake- 408

[0092] Cache Data store- 410

[0093] Load Balancer- 412

[0094] Dynamic Routing Manager- 414

We Claim:

1. A method (500) for dynamically managing bulk provisioning, the method (500) comprising the steps of:

receiving, by one or more processors (202), a bulk provisioning request from a Northbound Interface (NBI);

creating, by the one or more processors (202), utilizing a model, a workflow for the bulk provisioning utilizing one or more parameters retrieved based on the received bulk provisioning request from the NBI;

executing, by the one or more processors (202), the workflow for the bulk provisioning based on the one or more parameters;

detecting, by the one or more processors (202), utilizing the model, changes in the one or more parameters based on monitoring the one or more parameters during executing the workflow; and

dynamically modifying in real time, by the one or more processors (202), the workflow for the bulk provisioning based on the changes detected in the one or more parameters.

2. The method (500) as claimed in claim 1, wherein the step of, executing, the workflow for the bulk provisioning based on the one or more parameters, includes the steps of:

creating, by the one or more processors (202), a bulk file for the bulk provisioning;

replicating, by the one or more processors (202), the created bulk file at a server (104); and

transmitting, by the one or more processors (202), the bulk provisioning request to one or more southbound nodes for a file transfer requirement and the bulk provisioning.

3. The method (500) as claimed in claim 1, wherein the model is at least one of, an Artificial Intelligence/Machine Learning (AI/ML) model.

4. The method (500) as claimed in claim 1, wherein the one or more parameters include at least one of, Application Programming Interface (API) details, bulk file details, bulk file name, bulk file format, bulk file path, details and credentials of the server (104) where the created bulk file is replicated.

5. The method (500) as claimed in claim 1, wherein the model is trained with historical data pertaining to the one or more parameters of the workflow.

6. The method (500) as claimed in claim 1, wherein the server (104) is at least one of a Secure Copy Protocol (SCP) server.

7. The method (500) as claimed in claim 1, wherein the step of, detecting, utilizing the model, changes in the one or more parameters based on monitoring the one or more parameters during executing the workflow, includes the step of:

detecting, by the one or more processors (202), a change in one or more current parameters of the workflow based on comparing the one or more current parameters with historical data pertaining to the one or more parameters of the workflow.

8. The method (500) as claimed in claim 1, wherein the one or more processor (202) enables a user to modify the one or more parameters via a user interface required for the bulk provisioning and the file transfer details.

9. A system (108) for dynamically managing bulk provisioning, the system (108) comprising:

a transceiver (210), configured to, receive, a bulk provisioning request from a Northbound Interface (NBI);

a creating unit (212) configured to, create, utilizing a model, a workflow for the bulk provisioning utilizing one or more parameters retrieved based on the received bulk provisioning request from the NBI;

a workflow manager (214), configured to, execute, the workflow for the bulk provisioning based on the one or more parameters;

a dynamic activator (216), configured to:

detect utilizing the model, changes in the one or more parameters based on monitoring the one or more parameters during executing the workflow; and

dynamically modify in real time, the workflow for the bulk provisioning based on the changes detected in the one or more parameters.

10. The system (108) as claimed in claim 9, wherein the workflow manager (214) is configured to execute, the workflow for the bulk provisioning based on the one or more parameters, by:

creating, a bulk file for the bulk provisioning;

replicating, the created bulk file at a server; and

transmitting, the bulk provisioning request to one or more southbound nodes for a file transfer requirement and the bulk provisioning.

11. The system (108) as claimed in claim 9, wherein the model is at least one of, an Artificial Intelligence/Machine Learning (AI/ML) model.

12. The system (108) as claimed in claim 9, wherein the one or more parameters include at least one of, Application Programming Interface (API) details, bulk file details, bulk file name, bulk file format, bulk file path, details and credentials of the server where the created bulk file is replicated.

13. The system (108) as claimed in claim 9, wherein the model is trained with historical data pertaining to the one or more parameters of the workflow.

14. The system (108) as claimed in claim 9, wherein the server (104) is at least one of a Secure Copy Protocol (SCP) server.

15. The system (108) as claimed in claim 9, wherein the dynamic activator (216) detects, utilizing the model, changes in the one or more parameters based on monitoring the one or more parameters during executing the workflow, by:

detecting, a change in one or more current parameters of the workflow based on comparing the one or more current parameters with historical data pertaining to the one or more parameters of the workflow.

16. The system (108) as claimed in claim 9, wherein the dynamic activator (216) enables a user to modify the one or more parameters via a user interface required for the bulk provisioning and the file transfer details.

17. A User Equipment (UE) (102), comprising:

one or more primary processors (302) communicatively coupled to one or more processors (202), the one or more primary processors (302) coupled with a memory (304), wherein said memory (304) stores instructions which when executed by the one or more primary processors (302) causes the UE (102) to:

changing, the one or more parameters, in a real time while executing the workflow for the bulk provisioning based on an input received from the user via a user interface (206) of the UE (102); and

wherein the one or more processors (202) is configured to perform the steps as claimed in claim 1.

18. A non-transitory computer-readable medium having stored thereon computer-readable instructions that, when executed by a processor (202), causes the processor (202) to:

receive, a bulk provisioning request from a Northbound Interface (NBI);

create, utilizing a model, a workflow for the bulk provisioning utilizing one or more parameters retrieved based on the received bulk provisioning request from the NBI;

execute, the workflow for the bulk provisioning based on the one or more parameters;

detect utilizing the model, changes in the one or more parameters based on monitoring the one or more parameters during executing the workflow; and

dynamically modify in real time, the workflow for the bulk provisioning based on the changes detected in the one or more parameters.

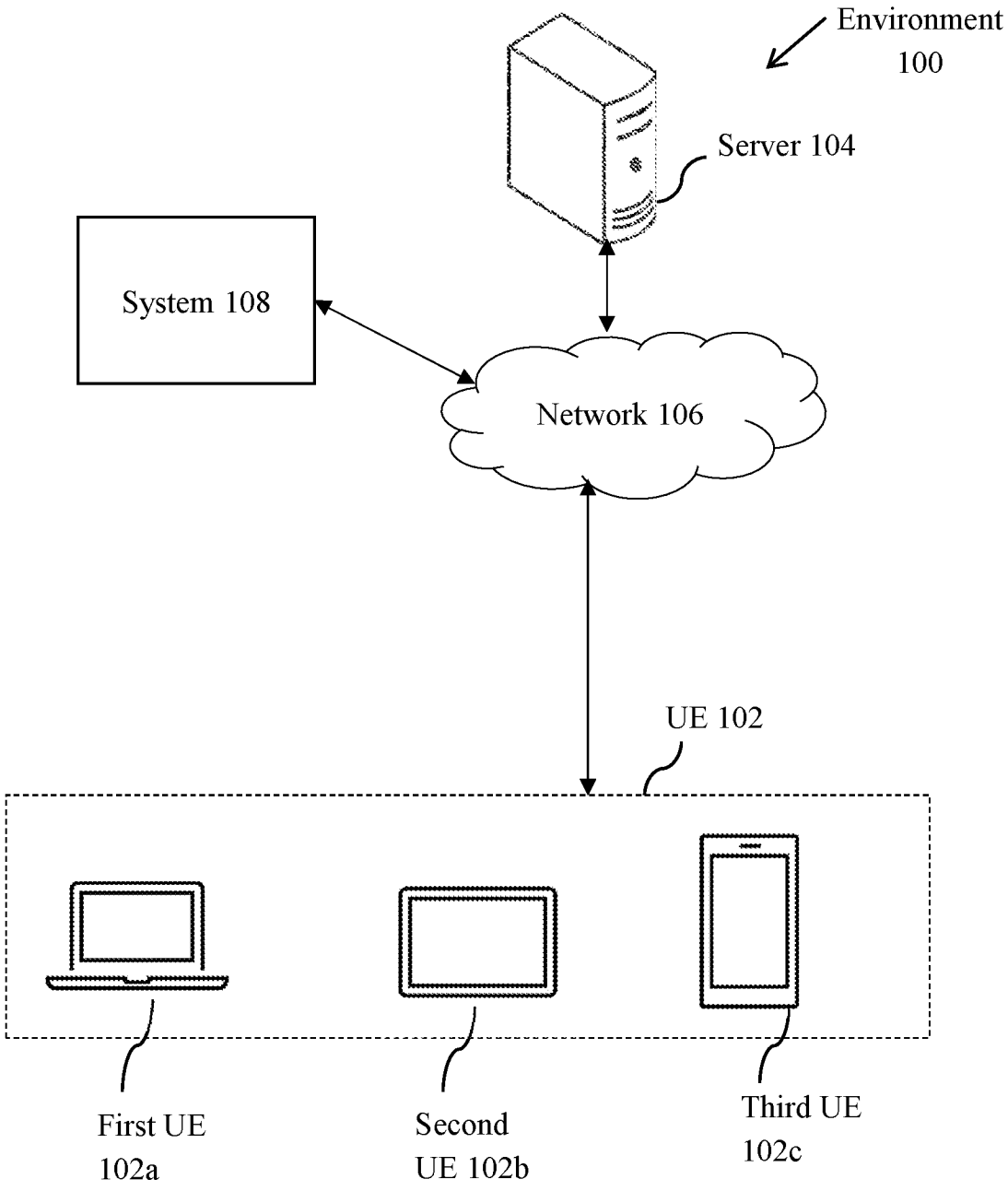
Environment
100
Server 104
System 108
Network 106
UE 102
First UE
102a
Second
UE 102b
Third UE
102c

FIG. 1

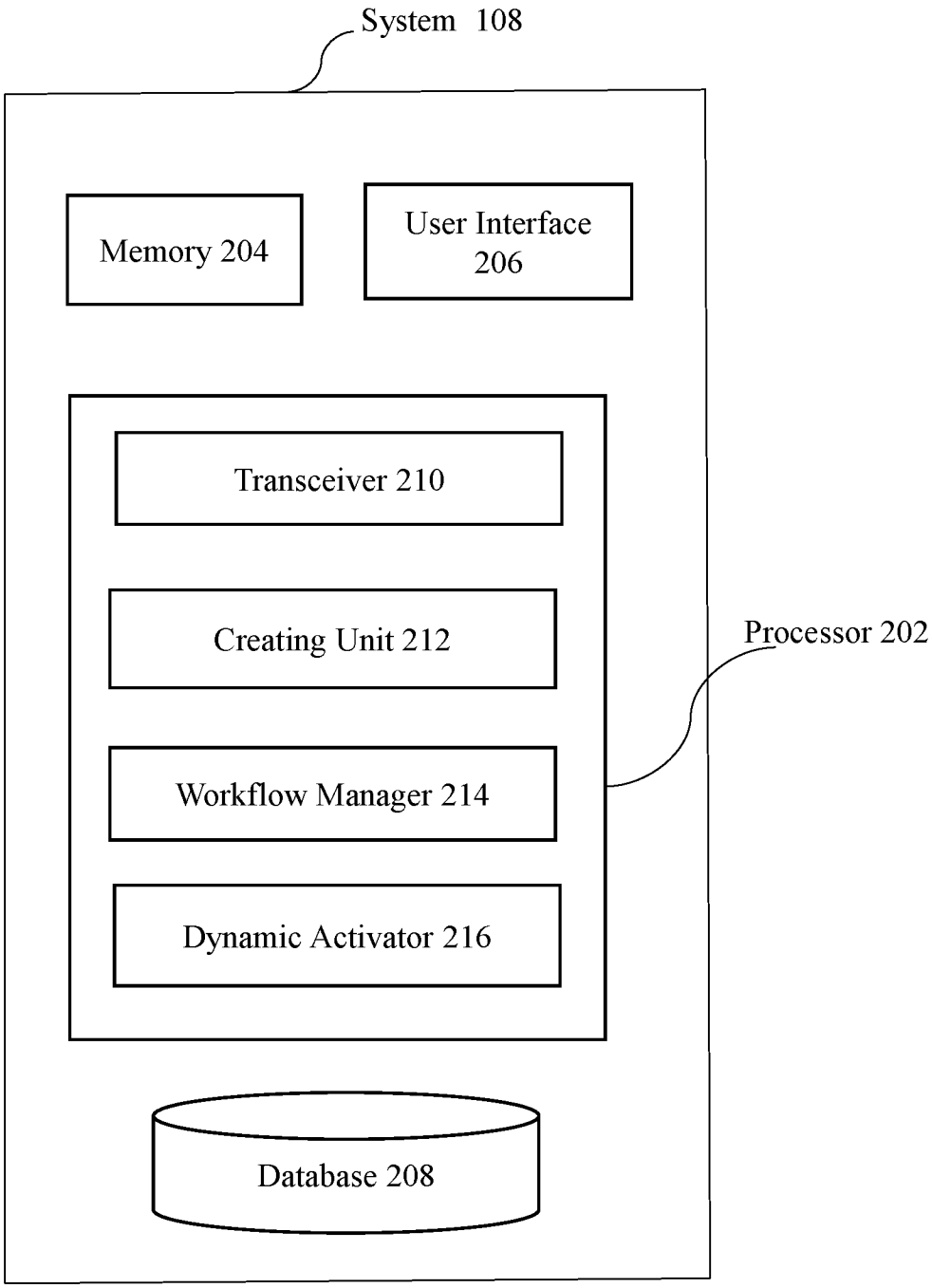
System 108
Memory 204
User Interface 206
Transceiver 210
Creating Unit 212
Workflow Manager 214
Dynamic Activator 216
Processor 202
Database 208

FIG.2

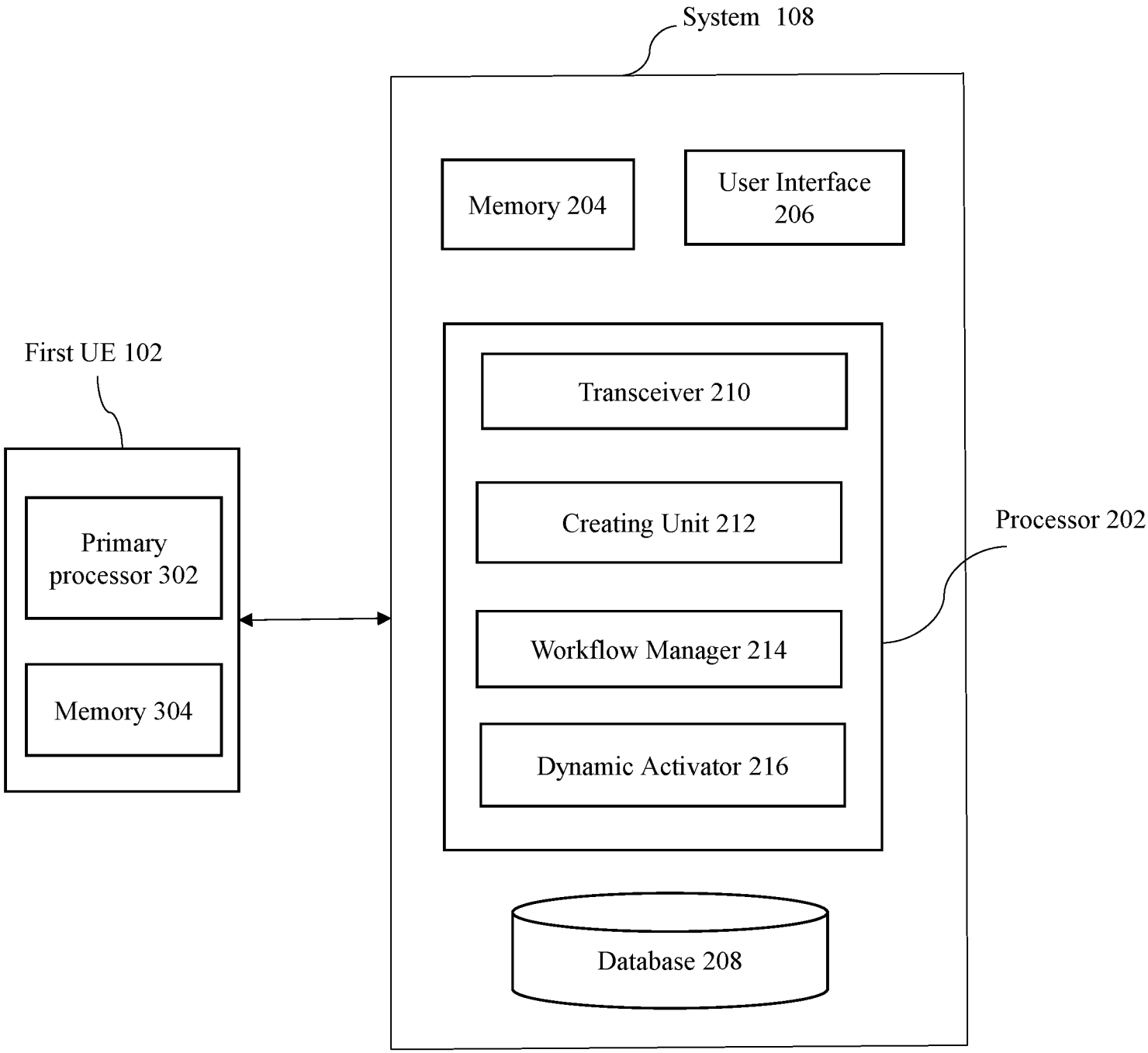
System 108
Memory 204
User Interface 206
First UE 102
Transceiver 210
Primary processor 302
Creating Unit 212
Processor 202
Workflow Manager 214
Memory 304
Dynamic Activator 216
Database 208

FIG.3

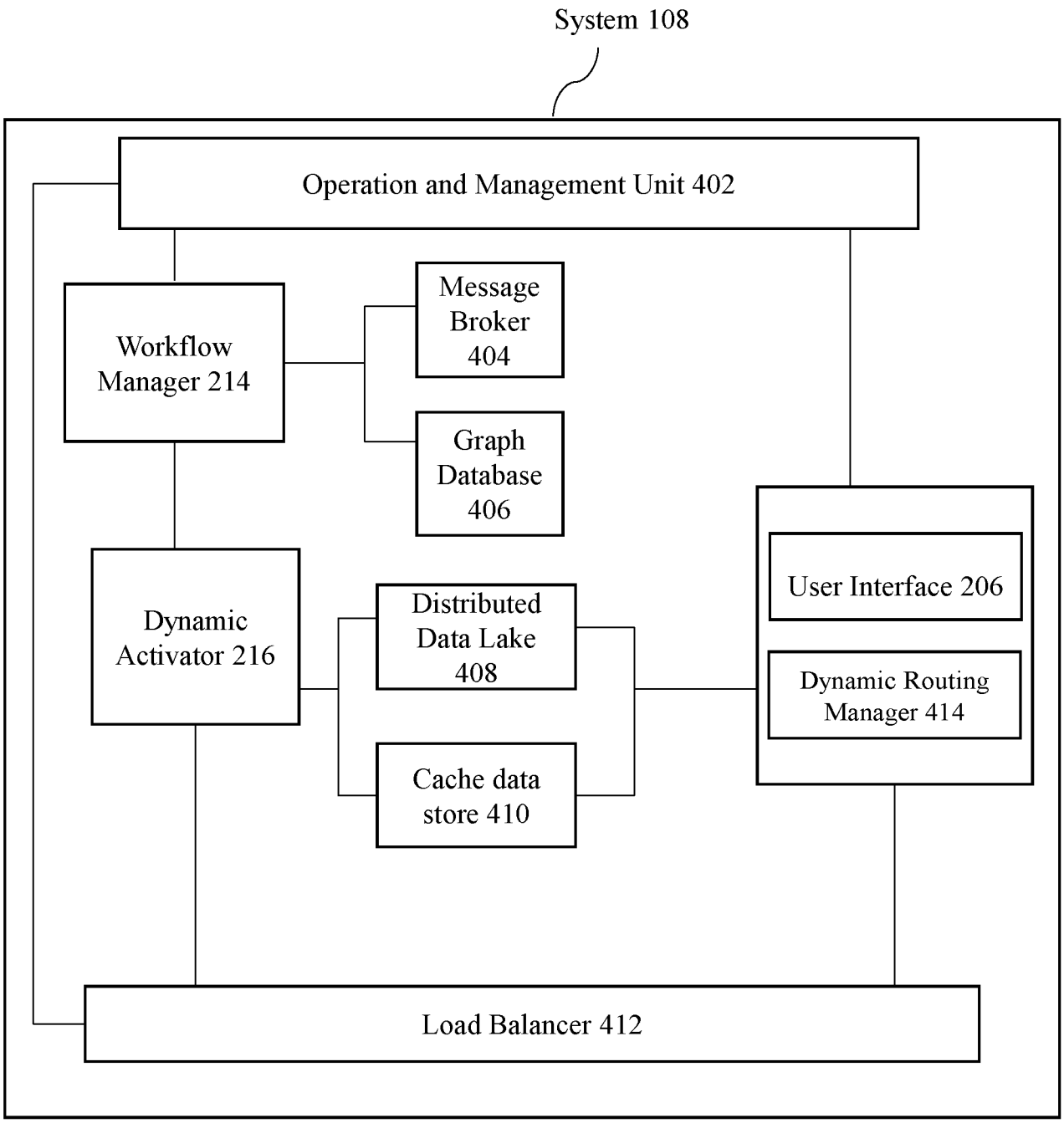
System 108
Operation and Management Unit 402
Workflow Manager 214
Message Broker 404
Graph Database 406
Dynamic Activator 216
Distributed Data Lake 408
Cache data store 410
User Interface 206
Dynamic Routing Manager 414
Load Balancer 412

FIG.4

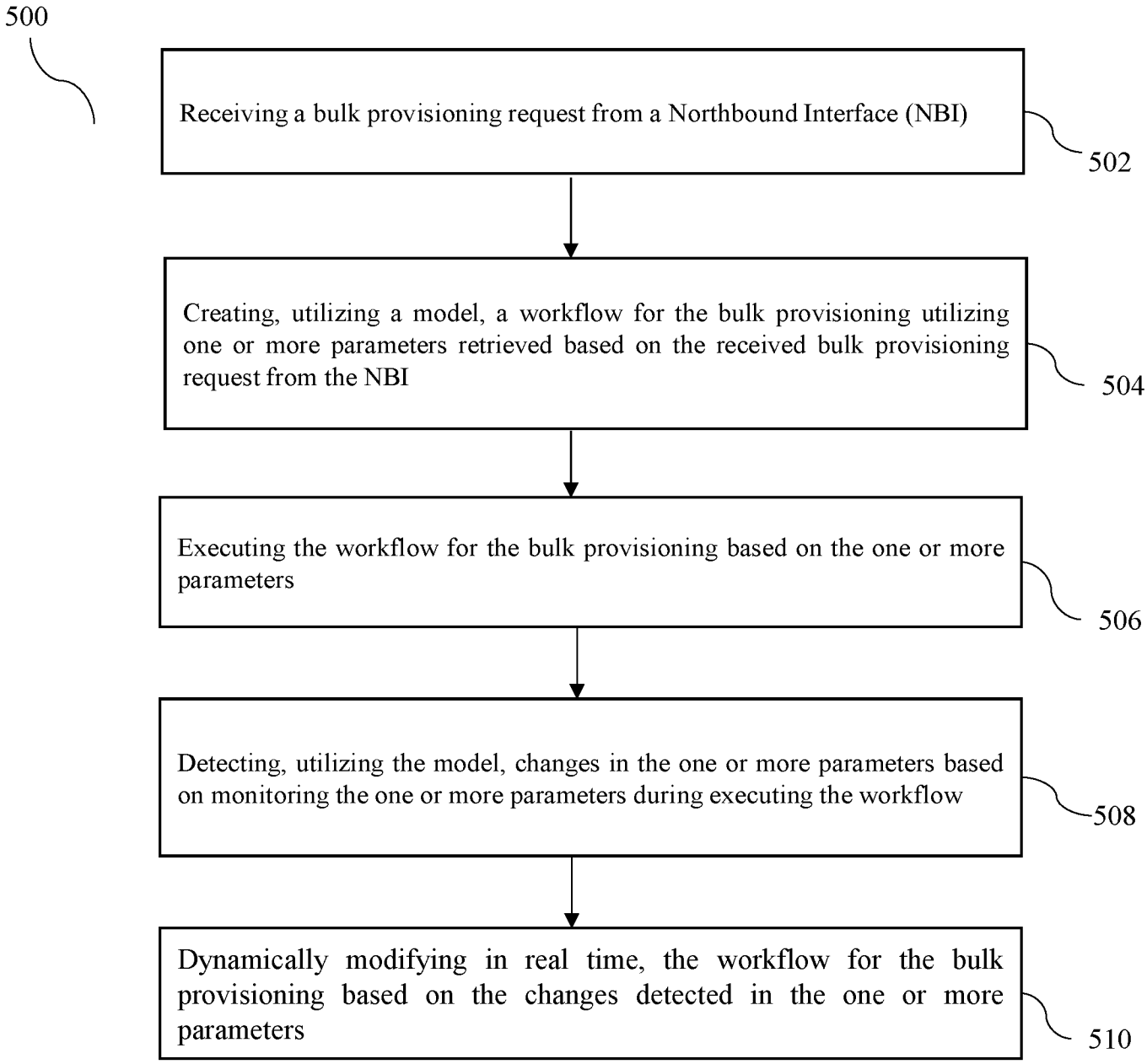
500
Receiving a bulk provisioning request from a Northbound Interface (NBI)
502
Creating, utilizing a model, a workflow for the bulk provisioning utilizing one or more parameters retrieved based on the received bulk provisioning request from the NBI
504
Executing the workflow for the bulk provisioning based on the one or more parameters
506
Detecting, utilizing the model, changes in the one or more parameters based on monitoring the one or more parameters during executing the workflow
508
Dynamically modifying in real time, the workflow for the bulk provisioning based on the changes detected in the one or more parameters
510

FIG. 5

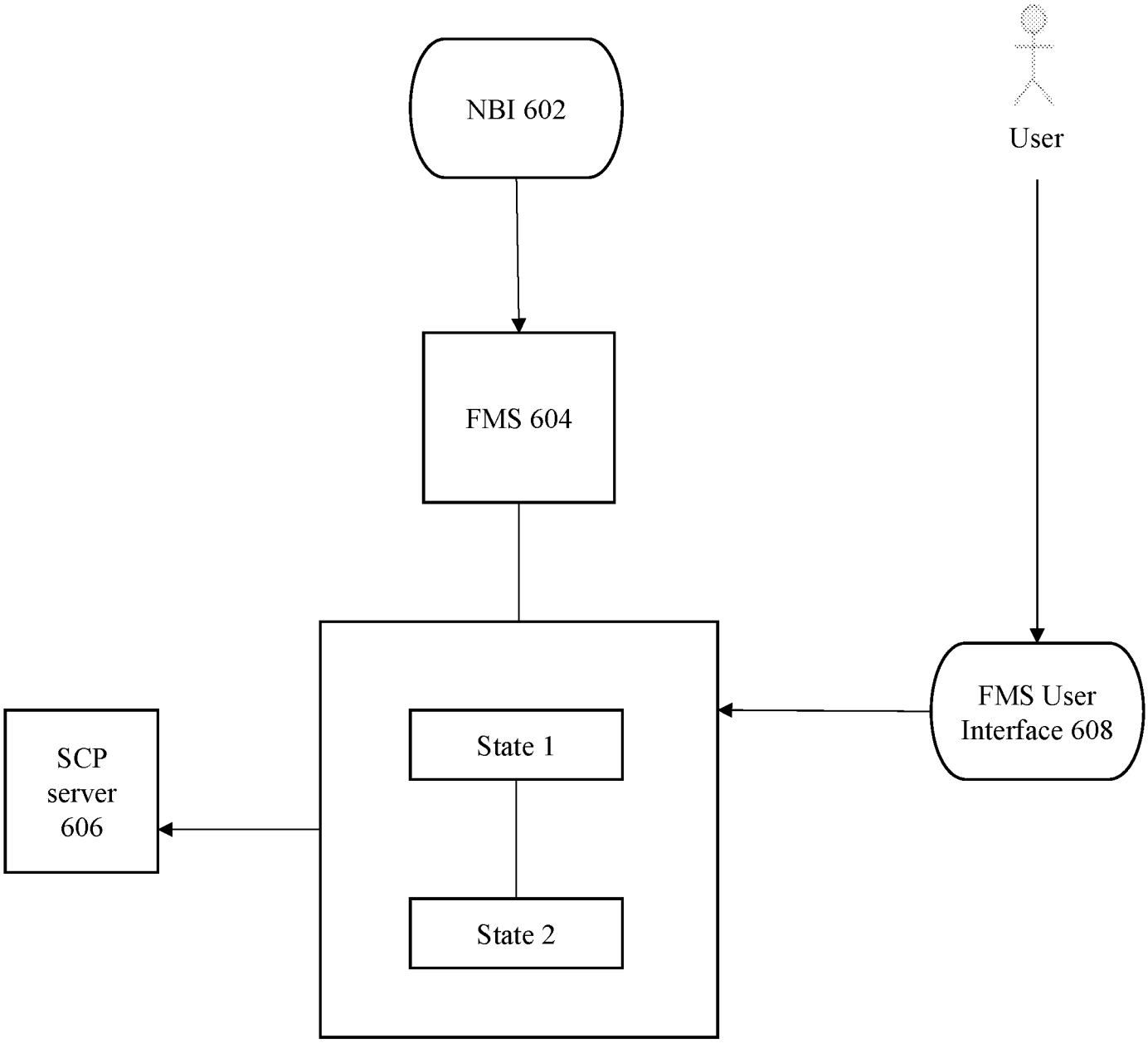
NBI 602
User
FMS 604
FMS User Interface 608
SCP server 606
State 1
State 2

FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN2024/051231

A. CLASSIFICATION OF SUBJECT MATTER
G06Q10/0633,G06Q10/10,H04W4/50,H04W16/10,H04L41/147,H04L41/0806,G06N20/00 Version=2024.01
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06Q, H04W, H04L, G06N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database consulted during the international search (name of database and, where practicable, search terms used)
PatSeer, IPO Internal Database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN111629380A (SHENYANG INTELLIGENT ROBOT INNOVATION CENTER CO LTD) 04 SEPTEMBER 2020 (04-09-2020) (English Translation Copy from Google Patents) [ABSTRACT, CLAIMS 1-9, DESCRIPTION]	1-18
Y	WO2016065773A1 (ZTE CORPORATION) 06 MAY 2016 (06-05-2016) (English Translation Copy from Google Patents) [ABSTRACT, CLAIMS 1-6, DESCRIPTION]	1-18

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27-11-2024	27-11-2024
Name and mailing address of the ISA/ Indian Patent Office Plot No.32, Sector 14,Dwarka,New Delhi-110075 Facsimile No.	Authorized officer Arun Prasad Telephone No. +91-1125300200

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IN2024/051231

Citation	Pub.Date	Family	Pub.Date
WO 2016065773 A1	06-05-2016	CN 105634767 A	01-06-2016