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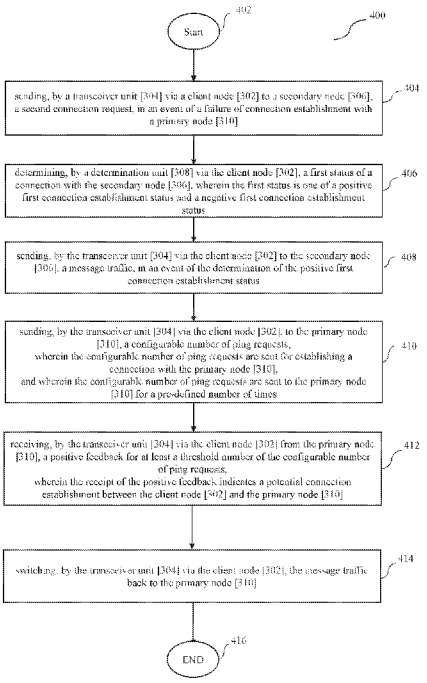


FIG. 4

(57) Abstract: The present disclosure relates to a method [400] and a system [300] for message routing management The present disclosure comprises sending, by a transceiver unit [304], a second connection request and determining by a determination unit [308], a first status of a connection with the secondary node [306]. The present disclosure further comprises the transceiver unit [304] for sending to a secondary node [306], the message traffic, in an event of the determination of the positive first connection establishment status, sending to the primary node [310], a configurable number of ping requests, receiving from the primary node [310], a positive feedback for at least a threshold number of the configurable number of ping requests, wherein the receipt of the positive feedback indicates a potential connection establishment between the client node [302] and the primary node [310] and switching, the message traffic back to the primary node [310].

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# METHOD AND SYSTEM FOR MESSAGE ROUTING MANAGEMENT

## TECHNICAL FIELD

**[0001]** Embodiments of the present disclosure generally relate to message routing management systems. More particularly, embodiments of the present disclosure relate to methods and systems for enhanced message routing management without any manual intervention.

## BACKGROUND

**[0002]** The following description of the related art is intended to provide background information pertaining to the field of the disclosure. This section may include certain aspects of the art that may be related to various features of the present disclosure. However, it should be appreciated that this section is used only to enhance the understanding of the reader with respect to the present disclosure, and not as admissions of the prior art.

**[0003]** Wireless communication technology has rapidly evolved over the past few decades, with each generation bringing significant improvements and advancements. The first generation of wireless communication technology was based on analog technology and offered only voice services. However, with the advent of the second generation (2G) technology, digital communication and data services became possible, and text messaging was introduced. The third generation (3G) technology marked the introduction of high-speed internet access, mobile video calling, and location-based services. The fourth generation (4G) technology revolutionized wireless communication with faster data speeds, better network coverage, and improved security. Currently, the fifth generation (5G) technology is being deployed, promising even faster data speeds, low latency, and the ability to connect multiple devices simultaneously. With each generation, wireless communication technology has become more advanced, sophisticated, and capable of delivering more services to its users.

**[0004]** In the field of telecommunications, a network function is a functional building block within a network infrastructure that includes well-defined external interfaces and behaviour. Further the network function (implemented by server) is a key node in the network. Each network function communicates with one or more other network functions, both as “client” and as “server.” Whenever the network function acts as a client, it initiates requests towards server site. A server node is deployed in primary and secondary architecture to ensure high availability. A primary node of a network function is the main node whereas the second node of a network function is the auxiliary or redundant node.

**[0005]** When the primary node becomes unreachable or unable to serve the requests, the client may send the requests to the secondary node to prevent system failure and disruption of services. However, once the

primary node becomes reachable again, there is a need to switch the traffic back to the primary node automatically without manual intervention because the continued use of the second node may lead to latency issues, etc.

**[0006]** It is emphasized that conventional approaches involve manually detecting the status of primary node and then manually switching the traffic from the secondary node to the primary node. In this approach, it is noted that the manual operator may not be able to detect the reachability of the primary node in time which may lead to continued use of low performing secondary node.

**[0007]** Thus, there exists an imperative need in the art for an enhanced solution for message routing management, which the present disclosure aims to address.

## SUMMARY

**[0008]** This section is provided to introduce certain aspects of the present disclosure in a simplified form that are further described below in the detailed description. This summary is not intended to identify the key features or the scope of the claimed subject matter.

**[0009]** An aspect of the present disclosure may relate to a method for message routing management. The method comprises sending, by a transceiver unit, via a client node to a secondary node, a second connection request, in an event of a failure of connection establishment with a primary node. The method comprises determining, by a determination unit via the client node, a first status of a connection with the secondary node, wherein the first status is one of a positive first connection establishment status and a negative first connection establishment status. The method further comprises sending, by the transceiver unit, via the client node to a secondary node, a message traffic, in an event of the determination of the positive first connection establishment status. The method further comprises sending, by the transceiver unit via the client node to the primary node, a configurable number of ping requests, wherein the configurable number of ping requests are sent for establishing a connection with the primary node, and wherein the configurable number of ping requests are sent to the primary node for a pre-defined number of times. The method comprises receiving, by the transceiver unit, via the client node from the primary node, a positive feedback for at least a threshold number of the configurable number of ping requests, wherein the receipt of the positive feedback indicates a potential connection establishment between the client node and the primary node. The method comprises switching, by the transceiver unit, via the client node, the message traffic back to the primary node.

**[0010]** In an exemplary aspect of the present disclosure, the present disclosure comprises that prior to the sending, by the client node to the secondary node, the second connection request, the present disclosure comprises sending, by the transceiver unit, via the client node to the primary node, a first connection

request, based on a set of configurable counters, wherein the first connection request is sent by the client node for a connection establishment with the primary node, for sending the message traffic to the primary node. The present disclosure further comprises determining, by the determination unit, via the client node, a second status of a connection with the primary node. The second status is one of a positive second connection establishment status, and a negative second connection establishment status. The positive second connection establishment status is determined in an event when a connection is established between the client node and the primary node, and the negative second connection establishment status is determined in an event when a connection is not established between the client node and the primary node. Further the determination of the negative second connection establishment status indicates the failure of connection establishment with the primary node.

**[0011]** In an exemplary aspect of the present disclosure, the set of configurable counters comprises one or more of a connection refused parameter, a connection timeout parameter, and a request timeout parameter.

**[0012]** In an exemplary aspect of the present disclosure, the configurable number of ping requests are sent by the client node to the primary node periodically at one of a regular configurable interval of time and an irregular interval of time.

**[0013]** In an exemplary aspect of the present disclosure, the present disclosure comprises maintaining, by a database, a primary list of proxy addresses and a secondary list of proxy addresses. The present disclosure further comprises switching, by the transceiver unit, the message traffic, to one or more proxy addresses in the primary list of proxy addresses in an event at least one proxy address from the primary list of proxy addresses is available. The present disclosure further comprises switching, by the transceiver unit, the message traffic, to one or more proxy addresses in the secondary list of proxy addresses in an event when the at least one proxy address from the primary list of proxy addresses is unavailable.

**[0014]** Another aspect of the present disclosure may relate to a system for message routing management. The system is connected to a client node. The system comprises a transceiver unit to send to a secondary node, a second connection request, in an event of a failure of connection establishment with a primary node. The system further comprises a determination unit connected at least to the transceiver unit, the determination unit configured to determine a first status of a connection with the secondary node, wherein the first status is one of a positive first connection establishment status, and a negative first connection establishment status. The transceiver unit is further configured to send, to the secondary node, a message traffic, in an event of the determination of the positive first connection establishment status. The transceiver unit is further configured to send, to the primary node, configurable number of ping requests. The configurable number of ping requests are sent for establishing a connection with the primary node. The configurable number of ping requests are sent to the primary node for a pre-defined number of times. The transceiver unit is further configured to receive, from the primary node, a positive feedback for at least a

threshold number of the configurable number of ping requests. The receipt of the positive feedback indicates a potential connection establishment between the client node and the primary node. The transceiver unit is further configured to switch the message traffic back to the primary node.

**[0015]** Yet another aspect of the present disclosure may relate to a non-transitory computer readable storage medium storing instructions for message routing management, the instructions include executable code which, when executed by one or more units of a system, causes: a transceiver unit of the system to send to a secondary node, a second connection request, in an event of a failure of connection establishment with a primary node. Further, the instructions include executable code which, when executed by one or more units of a system, causes a determination unit of the system to determine a first status of a connection with the secondary node wherein the first status is one of a positive first connection establishment status, and a negative first connection establishment status. Further, the instructions include executable code which, when executed by one or more units of a system, causes the transceiver unit of the system to: send to a secondary node, a message traffic, in an event of the determination of the positive first connection establishment status; and send to the primary node, a configurable number of ping requests. The configurable number of ping requests are sent for establishing a connection with the primary node, and the configurable number of ping requests are sent to the primary node for a pre-defined number of times. Further, the instructions include executable code which, when executed by one or more units of a system, causes the transceiver unit of the system to receive from the primary node, a positive feedback for at least a threshold number of the configurable number of ping requests, wherein the receipt of the positive feedback indicates a potential connection establishment between the user equipment and the primary node.

## OBJECTS OF THE INVENTION

**[0016]** Some of the objects of the present disclosure, which at least one embodiment disclosed herein satisfies are listed herein below.

**[0017]** It is an object of the present disclosure to provide a system and a method for message routing management.

**[0018]** It is another object of the present disclosure to provide a solution that provides high availability in the network architecture.

**[0019]** It is yet another object of the present disclosure to provide a solution that provides enhancement at a client node, as a result of which, the client node is able to monitor connection towards primary node and once the primary node becomes reachable, the traffic is shifted towards primary site automatically.

**[0020]** It is yet another object of the present disclosure to provide a solution that enables the traffic to be shifted back to the primary node, thereby avoiding unforeseen latency at the secondary node.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0021]** 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. Also, the embodiments shown in the figures are not to be construed as limiting the disclosure, but the possible variants of the method and system according to the disclosure are illustrated herein to highlight the advantages of the disclosure. It will be appreciated by those skilled in the art that disclosure of such drawings includes disclosure of electrical components or circuitry commonly used to implement such components.

**[0022]** FIG. 1 illustrates an exemplary block diagram representation of 5th generation core (5GC) network architecture.

**[0023]** FIG. 2 illustrates an exemplary block diagram of a computing device upon which the features of the present disclosure may be implemented in accordance with exemplary implementation of the present disclosure.

**[0024]** FIG. 3 illustrates an exemplary block diagram of a system for message routing management, in accordance with exemplary implementations of the present disclosure.

**[0025]** FIG. 4 illustrates an exemplary flow diagram of method for message routing management in accordance with exemplary implementations of the present disclosure.

**[0026]** The foregoing shall be more apparent from the following more detailed description of the disclosure.

## DETAILED DESCRIPTION

**[0027]** In the following description, for the purposes of explanation, various specific details are set forth in order to provide a thorough understanding of embodiments of the present disclosure. It will be apparent, however, that embodiments of the present disclosure may be practiced without these specific details. Several features described hereafter may each be used independently of one another or with any

combination of other features. An individual feature may not address any of the problems discussed above or might address only some of the problems discussed above.

**[0028]** The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be understood that various changes may be made in the function and arrangement of elements without departing from the spirit and scope of the disclosure as set forth.

**[0029]** Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these specific details. For example, circuits, systems, processes, and other components may be shown as components in block diagram form in order not to obscure the embodiments in unnecessary detail.

**[0030]** Also, it is noted that individual embodiments may be described as a process which is depicted as a flowchart, a flow diagram, a data flow diagram, a structure diagram, or a block diagram. Although a flowchart may describe the operations as a sequential process, many of the operations may be performed in parallel or concurrently. In addition, the order of the operations may be re-arranged. A process is terminated when its operations are completed but could have additional steps not included in a figure.

**[0031]** Further, in accordance with the present disclosure, it is to be acknowledged that the functionality described for the various the components/units can be implemented interchangeably. While specific embodiments may disclose a particular functionality of these units for clarity, it is recognized that various configurations and combinations thereof are within the scope of the disclosure. The functionality of specific units as disclosed in the disclosure should not be construed as limiting the scope of the present disclosure. Consequently, alternative arrangements and substitutions of units, provided they achieve the intended functionality described herein, are considered to be encompassed within the scope of the present disclosure.

**[0032]** The word "exemplary" and/or "demonstrative" is used herein to mean serving as an example, instance, or illustration. For the avoidance of doubt, the subject matter disclosed herein is not limited by such examples. In addition, any aspect or design described herein as "exemplary" and/or "demonstrative" is not necessarily to be construed as preferred or advantageous over other aspects or designs, nor is it meant to preclude equivalent exemplary structures and techniques known to those of ordinary skill in the art. Furthermore, to the extent that the terms "includes," "has," "contains," and other similar words are used in either the detailed description or the claims, such terms are intended to be inclusive—in a manner similar to the term "comprising" as an open transition word—without precluding any additional or other elements.

**[0033]** As used herein, a “processing unit” or “processor” or “operating processor” includes one or more processors, wherein processor refers to any logic circuitry for processing instructions. A processor may be a general-purpose processor, a special purpose processor, a conventional processor, a digital signal processor, a plurality of microprocessors, one or more microprocessors in association with a (Digital Signal Processing) DSP core, a controller, a microcontroller, Application Specific Integrated Circuits, Field Programmable Gate Array circuits, any other type of integrated circuits, etc. The processor may perform signal coding data processing, input/output processing, and/or any other functionality that enables the working of the system according to the present disclosure. More specifically, the processor or processing unit is a hardware processor.

**[0034]** As used herein, “a user equipment”, “a user device”, “a smart-user-device”, “a smart-device”, “an electronic device”, “a mobile device”, “a handheld device”, “a wireless communication device”, “a mobile communication device”, “a communication device” may be any electrical, electronic and/or computing device or equipment, capable of implementing the features of the present disclosure. The user equipment/device may include, but is not limited to, a mobile phone, smart phone, laptop, a general-purpose computer, desktop, personal digital assistant, tablet computer, wearable device or any other computing device which is capable of implementing the features of the present disclosure. Also, the user device may contain at least one input means configured to receive an input from unit(s) which are required to implement the features of the present disclosure.

**[0035]** It should be noted that the terms "first", "second", "primary", "secondary", "target" and the like, herein do not denote any order, ranking, quantity, or importance, but rather are used to distinguish one element from another.

**[0036]** As used herein, “storage unit” or “memory unit” refers to a machine or computer-readable medium including any mechanism for storing information in a form readable by a computer or similar machine. For example, a computer-readable medium includes read-only memory (“ROM”), random access memory (“RAM”), magnetic disk storage media, optical storage media, flash memory devices or other types of machine-accessible storage media. The storage unit stores at least the data that may be required by one or more units of the system to perform their respective functions.

**[0037]** As used herein “interface” or “user interface refers to a shared boundary across which two or more separate components of a system exchange information or data. The interface may also be referred to as a set of rules or protocols that define communication or interaction of one or more modules or one or more units with each other, which also includes the methods, functions, or procedures that may be called.

**[0038]** All modules, units, components used herein, unless explicitly excluded herein, may be software modules or hardware processors, the processors being a general-purpose processor, a special purpose

processor, a conventional processor, a digital signal processor (DSP), a plurality of microprocessors, one or more microprocessors in association with a DSP core, a controller, a microcontroller, Application Specific Integrated Circuits (ASIC), Field Programmable Gate Array circuits (FPGA), any other type of integrated circuits, etc.

**[0039]** As used herein the transceiver unit includes at least one receiver and at least one transmitter configured respectively for receiving and transmitting data, signals, information or a combination thereof between units/components within the system and/or connected with the system.

**[0040]** As discussed in the background section, that in the field of telecommunication, each network function communicates with one or more other network functions both as a client and a server. Whenever the network function acts as the client, it initiates request towards the server. A server node is deployed in a primary architecture and a secondary architecture to ensure high availability. A primary node of the network function is a main node whereas a secondary node of the network function is an auxiliary or a redundant node. Further, when the primary node becomes unreachable or unable to serve requests, the client may send the requests to the secondary node to prevent a system failure and disruption of services. However, once the primary node becomes reachable again, there is a need to switch the traffic back to the primary node automatically without manual intervention because continued use of the secondary node may lead to latency issues, etc. In addition to this, the currently known solutions are not able to detect reachability of the primary node in time which may lead to continued use of low performing node i.e., the secondary node. Hence, the current known solutions have several shortcomings. The present disclosure aims to overcome the above-mentioned and other existing problems in this field of technology by providing a novel solution for message routing management. The present disclosure involves sending a connection request to a secondary node in an event of a failure of connection establishment with a primary node. Further, if the secondary node shows a positive status in response the connection request, a message traffic is then transmitted to the secondary node. Thereafter, a configurable number of ping requests are sent to the primary node for establishing a connection with primary node. Upon receiving a positive feedback from the primary node in response to the ping requests, the message traffic is routed from the secondary node to the primary node, without any manual intervention.

**[0041]** **FIG. 1** illustrates an exemplary block diagram representation of 5th generation core (5GC) network architecture, in accordance with exemplary implementation of the present disclosure. As shown in FIG. 1, the 5GC network architecture [100] includes a user equipment (UE) [102], a radio access network (RAN) [104], an access and mobility management function (AMF) [106], a Session Management Function (SMF) [108], a Service Communication Proxy (SCP) [110], an Authentication Server Function (AUSF) [112], a Network Slice Specific Authentication and Authorization Function (NSSAAF) [114], a Network Slice Selection Function (NSSF) [116], a Network Exposure Function (NEF) [118], a Network Repository Function (NRF) [120], a Policy Control Function (PCF) [122], a Unified Data Management (UDM) [124],

an Application Function (AF) [126], a User Plane Function (UPF) [128], a data network (DN) [130], wherein all the components are assumed to be connected to each other in a manner as obvious to the person skilled in the art for implementing features of the present disclosure.

**[0042]** Radio Access Network (RAN) [104] is the part of a mobile telecommunications system that connects user equipment (UE) [102] to the core network (CN) and provides access to different types of networks (e.g., 5G network). It consists of radio base stations and the radio access technologies that enable wireless communication.

**[0043]** Access and Mobility Management Function (AMF) [106] is a 5G core network function responsible for managing access and mobility aspects, such as UE registration, connection, and reachability. It also handles mobility management procedures like handovers and paging.

**[0044]** Session Management Function (SMF) [108] is a 5G core network function responsible for managing session-related aspects, such as establishing, modifying, and releasing sessions. It coordinates with the User Plane Function (UPF) [128] for data forwarding and handles IP address allocation and QoS enforcement.

**[0045]** Service Communication Proxy (SCP) [110] is a network function in the 5G core network that facilitates communication between other network functions by providing a secure and efficient messaging service. It acts as a mediator for service-based interfaces.

**[0046]** Authentication Server Function (AUSF) [112] is a network function in the 5G core responsible for authenticating UEs during registration and providing security services. It generates and verifies authentication vectors and tokens.

**[0047]** Network Slice Specific Authentication and Authorization Function (NSSAAF) [114] is a network function that provides authentication and authorization services specific to network slices. It ensures that UEs can access only the slices for which they are authorized.

**[0048]** Network Slice Selection Function (NSSF) [116] is a network function responsible for selecting the appropriate network slice for a UE based on factors such as subscription, requested services, and network policies.

**[0049]** Network Exposure Function (NEF) [118] is a network function that exposes capabilities and services of the 5G network to external applications, enabling integration with third-party services and applications.

**[0050]** Network Repository Function (NRF) [120] is a network function that acts as a central repository for information about available network functions and services. It facilitates the discovery and dynamic registration of network functions.

**[0051]** Policy Control Function (PCF) [122] is a network function responsible for policy control decisions, such as QoS, charging, and access control, based on subscriber information and network policies.

**[0052]** Unified Data Management (UDM) [124] is a network function that centralizes the management of subscriber data, including authentication, authorization, and subscription information.

**[0053]** Application Function (AF) [126] is a network function that represents external applications interfacing with the 5G core network to access network capabilities and services.

**[0054]** User Plane Function (UPF) [128] is a network function responsible for handling user data traffic, including packet routing, forwarding, and QoS enforcement.

**[0055]** Data Network (DN) [130] refers to a network that provides data services to user equipment (UE) [102] in a telecommunications system. The data services may include but are not limited to Internet services, private data network related services.

**[0056]** **FIG. 2** illustrates an exemplary block diagram of a computing device [200] upon which the features of the present disclosure may be implemented in accordance with exemplary implementation of the present disclosure. In an implementation, the computing device [200] may also implement a method for message routing management utilising the system. In another implementation, the computing device [200] itself implements the method for message routing management using one or more units configured within the computing device [200], wherein said one or more units are capable of implementing the features as disclosed in the present disclosure.

**[0057]** The computing device [200] may include a bus [202] or other communication mechanism for communicating information, and a processor [204] coupled with bus [202] for processing information. The processor [204] may be, for example, a general-purpose microprocessor. The computing device [200] may also include a main memory [206], such as a random access memory (RAM), or other dynamic storage device, coupled to the bus [202] for storing information and instructions to be executed by the processor [204]. The main memory [206] also may be used for storing temporary variables or other intermediate information during execution of the instructions to be executed by the processor [204]. Such instructions, when stored in non-transitory storage media accessible to the processor [204], render the computing device [200] into a special-purpose machine that is customized to perform the operations specified in the instructions. The computing device [200] further includes a read only memory (ROM) [208] or other static

storage device coupled to the bus [202] for storing static information and instructions for the processor [204].

**[0058]** A storage device [210], such as a magnetic disk, optical disk, or solid-state drive is provided and coupled to the bus [202] for storing information and instructions. The computing device [200] may be coupled via the bus [202] to a display [212], such as a Cathode Ray Tube (CRT), Liquid Crystal Display (LCD), Light Emitting Diode (LED) display, Organic LED (OLED) display, etc. for displaying information to a computer user. An input device [214], including alphanumeric and other keys, touch screen input means, etc. may be coupled to the bus [202] for communicating information and command selections to the processor [204]. Another type of user input device may be a cursor controller [216], such as a mouse, a trackball, or cursor direction keys, for communicating direction information and command selections to the processor [204], and for controlling cursor movement on the display [212]. This input device typically has two degrees of freedom in two axes, a first axis (e.g., x) and a second axis (e.g., y), that allow the device to specify positions in a plane.

**[0059]** The computing device [200] may implement the techniques described herein using customized hard-wired logic, one or more ASICs or FPGAs, firmware and/or program logic which in combination with the computing device [200] causes or programs the computing device [200] to be a special-purpose machine. According to one implementation, the techniques herein are performed by the computing device [200] in response to the processor [204] executing one or more sequences of one or more instructions contained in the main memory [206]. Such instructions may be read into the main memory [206] from another storage medium, such as the storage device [210]. Execution of the sequences of instructions contained in the main memory [206] causes the processor [204] to perform the process steps described herein. In alternative implementations of the present disclosure, hard-wired circuitry may be used in place of or in combination with software instructions.

**[0060]** The computing device [200] also may include a communication interface [218] coupled to the bus [202]. The communication interface [218] provides a two-way data communication coupling to a network link [220] that is connected to a local network [222] and the local network [222] is further connected to the host [224]. For example, the communication interface [218] may be an integrated services digital network (ISDN) card, cable modem, satellite modem, or a modem to provide a data communication connection to a corresponding type of telephone line. As another example, the communication interface [218] may be a local area network (LAN) card to provide a data communication connection to a compatible LAN. Wireless links may also be implemented. In any such implementation, the communication interface [218] sends and receives electrical, electromagnetic or optical signals that carry digital data streams representing various types of information.

**[0061]** The computing device [200] can send messages and receive data, including program code, through the network(s), the network link [220] and the communication interface [218]. In the Internet example, a server [230] might transmit a requested code for an application program through the Internet [228], the ISP [226], the local network [222] and the communication interface [218]. The received code may be executed by the processor [204] as it is received, and/or stored in the storage device [210], or other non-volatile storage for later execution.

**[0062]** Referring to **FIG. 3**, an exemplary block diagram of a system [300] for message routing management, is shown, in accordance with the exemplary implementations of the present disclosure. The system [300] comprises at least one transceiver unit [304], at least one determination unit [308] and at least one storage unit [312]. Also, all the components/ units of the system [300] are assumed to be connected to each other unless otherwise indicated below. As shown in the figures all units shown within the system should also be assumed to be connected to each other. Also, in FIG. 3 only a few units are shown, however, the system [300] may comprise multiple such units or the system [300] may comprise any such numbers of said units, as required to implement the features of the present disclosure.

**[0063]** The system [300] is configured for message routing management, with the help of the interconnection between the components/units of the system [300].

**[0064]** In order to manage the message routing, the transceiver unit [304] is configured to send to a secondary node [306], a second connection request, in an event of a failure of connection establishment with a primary node [310].

**[0065]** As used herein, "connection request" refers to a request for establishment of communication between two nodes for transmission of a message traffic in a network.

**[0066]** For example, in a telecommunication network, there are two nodes (i.e., the primary node [310] and the secondary node [306]). A user equipment (i.e., client node) sends a connection request to the primary node [310], however, due to a technical error, there is a failure in connection establishment between the client node, i.e., the user equipment, and the primary node [310], based on the connection request. In the event of failure of connection establishment with the primary node [310], the connection request is transmitted to the secondary node [306].

**[0067]** The present disclosure encompasses that the transceiver unit [304], prior to sending to the secondary node [306] the second connection request, is configured to send, to the primary node [310], a first connection request, based on a set of configurable counters. The first connection request is sent by the client node [302] for a connection establishment with the primary node [310], for sending a message traffic to the primary node [310].

**[0068]** For example, the transceiver unit [304] is configured to send the first connection request to the primary node [310] for establishing a connection with the primary node [310], before sending the second connection request to the secondary node [306] based on the set of configurable counters.

**[0069]** As used herein, "message traffic" refers to a number of messages (i.e., requests, response) sent and received in the network during a communication procedure associated with the network.

**[0070]** The present disclosure encompasses that the set of configurable counters comprises one or more of a connection refused parameter, a connection timeout parameter, and a request timeout parameter Further, in an implementation of the present disclosure as disclosed herein, the set of configurable parameters may further comprise a retry threshold, one or more primary configuration, one or more secondary configuration, etc. It is to be noted that the set of configurable counters as disclosed herein are exemplary in nature. Further, is understood that the set of configurable counters may comprise one or more counters that could be obvious to a person skilled in the art to implement the solution of the present disclosure. The embodiments disclosed herein are not exhaustive and variations known to those skilled in the art are considered within the scope of the present disclosure.

**[0071]** The present disclosure further encompasses that the connection refused parameter is a parameter that indicates a failed connection with a node in the network. The connection timeout parameter is a parameter that indicates that the client node [302] attempts to connect with a server node, however the server node is taking too long to respond due to a network congestion scenario, a server overload scenario or one or more misconfigured settings. The request timeout parameter is a parameter that indicates a maximum duration that the client node [302] is willing to wait for a response associated with the request from the server node after a successful connection has been established with the server node.

**[0072]** Further, the determination unit [308] is connected at least to the transceiver unit [304]. The determination unit [308] configured to determine a first status of a connection with the secondary node [306]. The first status is one of a positive first connection establishment status and a negative first connection establishment status.

**[0073]** Further, the determination unit [308] may utilize one or more standard determination protocols for determining the first status of the connection with the secondary node [306]. The one or more standard determination protocol may include a ping protocol, a transmission control protocol handshake, internet control message protocol echo requests, etc.

**[0074]** The present disclosure encompasses that the positive first connection establishment status indicates a successful connection establishment status of the client node [302] with the secondary node [306] based on the second connection request. Further, the present disclosure encompasses that the negative first

connection establishment status indicates an unsuccessful connection establishment status of the client node [302] with the secondary node [306] based on the second connection request.

**[0075]** The present disclosure encompasses that post the transceiver unit [304] sends the first connection request, the determination unit [308] is configured to determine a second status of a connection with the primary node [310].

**[0076]** The second status is one of a positive second connection establishment status, and a negative second connection establishment status.

**[0077]** The positive second connection establishment status is determined in an event a connection is established between the client node [302] and the primary node [310] based on the first connection request. The negative second connection establishment status is determined in an event a connection is not established between the client node [302] and the primary node [310] based on the first connection request.

**[0078]** Thereafter, the transceiver unit [304] is further configured to send to the secondary node [306], the message traffic, in an event of the determination of the positive first connection establishment status.

**[0079]** Further, the transceiver unit [304] is further configured to send to the primary node [310], configurable number of ping requests such as 5 ping requests per hour. The configurable number of ping requests are sent for establishing the connection with the primary node [310]. The configurable number of ping requests are sent to the primary node [310] for a pre-defined number of times.

**[0080]** The present disclosure encompasses that ping is a process of sending an Internet Control Message Protocol (ICMP) Echo Request to a specified interface on the network and waiting for a response based on the ICMP Echo Request. Also, when a ping command is issued, a ping signal is transmitted to a specified address in the network.

**[0081]** The present disclosure encompasses that the configurable number of ping requests are sent by the transceiver unit [304] to the primary node [310] periodically at one of a regular configurable interval of time and an irregular interval of time.

**[0082]** Thereafter, the transceiver unit [304] is configured to receive from the primary node [310], a positive feedback for at least a threshold number of the configurable number of ping requests. The receipt of the positive feedback indicates a potential connection establishment between the client node [302] and the primary node [310].

**[0083]** Further, the transceiver unit [304] is configured to switch the message traffic back to the primary node [310].

**[0084]** In addition to this, the system [300] further comprises a database. The database is configured to maintain a primary list of proxy addresses and a secondary list of proxy addresses.

**[0085]** The present disclosure encompasses that the proxy address refers to a unique identifier assigned to a network proxy which substitutes an Internet Protocol (IP) address associated with a user equipment for communication with an IP server in the network.

**[0086]** For example, the primary list of proxy address may include plurality of proxy addresses that are considered primary i.e., the proxy addresses having high priority for routing the message traffic. Furthermore, the primary list of proxy address may include a first set of addresses of proxy servers, gateways and other network devices.

**[0087]** For example, the secondary list of proxy address may include a plurality of backup proxy address and/or a plurality of alternative proxy address which may be used in case the primary proxy addresses are unavailable. Furthermore, the secondary list of proxy address may include a second set of addresses of proxy servers, gateways and secondary network devices.

**[0088]** Further, the transceiver unit [304] is configured to switch the message traffic, to one or more proxy addresses in the primary list of proxy addresses in an event at least one proxy address from the primary list of proxy addresses is available.

**[0089]** Thereafter, the transceiver unit [304] is configured to switch the message traffic, to one or more proxy addresses in the secondary list of proxy addresses in an event all proxy addresses from the primary list of proxy addresses are unavailable. Further, the transceiver unit [304] may utilize one or more standard protocols for switching the message traffic.

**[0090]** Referring to **FIG. 4**, an exemplary flow diagram of method [400] for message routing management in accordance with exemplary implementations of the present disclosure is shown. In an implementation the method [400] is performed by the system [300]. Also, as shown in **FIG. 4**, the method [400] starts at step [402].

**[0091]** At step [404], the method [400] comprises sending, by a transceiver unit [304] via a client node [302] to a secondary node [306], a second connection request, in an event of a failure of connection establishment with a primary node [310].

**[0092]** As used herein, "connection request" refers to a request for establishment of communication between two nodes for transmission of a message traffic in a network.

**[0093]** For example, in a telecommunication network, there are two nodes (i.e., the primary node [310] and the secondary node [306]). A user equipment (i.e., client node) sends a connection request to the primary node [310], however, due to a technical error, there is a failure a connection establishment between the client node i.e., the user equipment and the primary node [310] based on the connection request. In the event of failure of connection establishment with the primary node [310], the connection request is transmitted to the secondary node [306].

**[0094]** The present disclosure encompasses that prior to the sending, by the client node [302] to the secondary node [306], the second connection request, the method comprises sending, by the transceiver unit [304] via the client node [302] to the primary node [310], a first connection request, based on a set of configurable counters.

**[0095]** The present disclosure encompasses that the set of configurable counters comprises one or more of a connection refused parameter, a connection timeout parameter, and a request timeout parameter. Further, in an implementation of the present disclosure as disclosed herein, the set of configurable parameters may further comprise a retry threshold, one or more primary configuration, one or more secondary configuration, etc. It is to be noted that the set of configurable counters as disclosed herein are exemplary in nature. Further, is understood that the set of configurable counters may comprise one or more counters that could be obvious to a person skilled in the art to implement the solution of the present disclosure. The embodiments disclosed herein are not exhaustive and variations known to those skilled in the art are considered within the scope of the present disclosure.

**[0096]** The present disclosure encompasses that the connection refused parameter is a parameter that indicates a failed connection. The connection timeout parameter is a parameter that indicates that the client node [302] attempts to connect with a server node, however the server node is taking too long to respond due to network congestion, server overload or one or more misconfigured settings. The request timeout parameter is a parameter that indicates a maximum duration that the client node [302] is willing to wait for a response from the server node after a successful connection has been established.

**[0097]** The first connection request is sent by the client node [302] for a connection establishment with the primary node [310], for sending a message traffic to the primary node [310].

**[0098]** For example, the transceiver unit [304] is configured to send the first connection request to the primary node [310] for establishing a connection between with the primary node [310], before sending the second connection request to the secondary node [306], based on the set of configurable counters.

**[0099]** As used herein, "message traffic" refers to a number of messages (i.e., requests, response) sent and received in the network, during a communication procedure associated with the network.

**[0100]** Further, prior to the sending, by the client node [302] to the secondary node [306], the second connection request, the method [400] further comprises: determining, by a determination unit [308] via the client node [302], a second status of a connection with the primary node [310], wherein the second status is one of a positive second connection establishment status, and a negative second connection establishment status.

**[0101]** The positive second connection establishment status is determined in an event a connection is established between the client node [302] and the primary node [310], based on the first connection request. The negative second connection establishment status is determined in an event a connection is not established between the client node [302] and the primary node [310]. The determination of the negative second connection establishment status indicates the failure of connection establishment with the primary node [310] based on the first connection request.

**[0102]** The present disclosure encompasses that the positive first connection establishment status indicates a successful connection establishment status of the client node [302] with the secondary node [306] based on the second connection request. Further, the present disclosure encompasses that the negative first connection establishment status indicates an unsuccessful connection establishment status of the client node [302] with the secondary node [306] based on the second connection request.

**[0103]** Further, the determination unit [308] may utilize one or more standard determination protocols for determining the first status of the connection with the secondary node [306]. The one or more standard determination protocol may include a ping protocol, a transmission control protocol handshake, internet control message protocol echo requests.

**[0104]** At step [406], the method [400] comprises determining, by the determination unit [308], via the client node [302], a first status of a connection with the secondary node [306], wherein the first status is one of a positive first connection establishment status and a negative first connection establishment status.

**[0105]** At step [408], the method [400] comprises sending, by the transceiver unit [304], via the client node [302] to the secondary node [306], the message traffic, in an event of the determination of the positive first connection establishment status.

**[0106]** At step [410], the method [400] comprises sending, by the transceiver unit [304] via the client node [302] to the primary node [310], a configurable number of ping requests such as 5 ping request per hour.

The configurable number of ping requests are sent for establishing a connection with the primary node [310]. The configurable number of ping requests are sent to the primary node [310] for a pre-defined number of times.

**[0107]** The present disclosure encompasses that ping is a process of sending an Internet Control Message Protocol (ICMP) Echo Request to a specified interface on the network and waiting for a response based on the ICMP Echo Request. Also, when a ping command is issued, a ping signal is transmitted to a specified address in the network.

**[0108]** The present disclosure encompasses that the configurable number of ping requests are sent by the client node [302] to the primary node [310] periodically at one of a regular configurable interval of time and an irregular interval of time.

**[0109]** The configurable number of ping requests are sent for establishing a connection with the primary node [310]. The configurable number of ping requests are sent to the primary node [310] for a pre-defined number of times.

**[0110]** At step [412], the method [400] comprises receiving, by the transceiver unit [304] via the client node [302] from the primary node [310], a positive feedback for at least a threshold number of the configurable number of ping requests.

**[0111]** The receipt of the positive feedback indicates a potential connection establishment between the client node [302]and the primary node [310].

**[0112]** At step [414], the method [400] comprises switching, by the transceiver unit [304] via the client node [302], the message traffic back to the primary node [310].

**[0113]** The method [400] terminates at step [416].

**[0114]** The present disclosure encompasses that the method further comprising maintaining, by a database, a primary list of proxy addresses and a secondary list of proxy addresses.

**[0115]** The present disclosure encompasses that the proxy address refers to a unique identifier assigned to a network proxy which substitutes an Internet Protocol (IP) address associated with a user equipment for communication with an IP server in the network.

**[0116]** For example, the primary list of proxy address may include a plurality of proxy addresses that are considered primary i.e., the proxy address having high priority for routing the message traffic. Furthermore,

the primary list of proxy address may include a first set of addresses of proxy servers, gateways and other network devices.

**[0117]** For example, the secondary list of proxy address may include a plurality of backup of proxy address and/or a plurality of alternative proxy address which may be used in case the primary proxy addresses are unavailable. Furthermore, the secondary list of proxy address may include a second set of addresses of proxy servers, gateways and secondary network devices.

**[0118]** The method further comprises switching, by the transceiver unit [304], the message traffic, to one or more proxy addresses in the primary list of proxy addresses in an event when at least one proxy address from the primary list of proxy addresses is available.

**[0119]** The method further comprises switching, by the transceiver unit [304], the message traffic, to one or more proxy addresses in the secondary list of proxy addresses in an event all proxy addresses from the primary list of proxy addresses is unavailable.

**[0120]** For example, a solution for message routing management as disclosed herein by the present disclosure may be utilized in telecommunication field. A telecommunication organization may utilize the system for providing an enhanced experience to a subscriber. Further, the telecommunication organization may have a telecommunication network with plurality of nodes, base stations and server. The transceiver unit [304] of the solution as disclosed herein may send a connection request A to the secondary node [306] which is the alternate node of the primary node [310] in case there is failure in connection establish between the client node [302] and the primary node [310]. Thereafter, the determination unit [308] identifies the status of the secondary node [306], the status may be positive connection establishment or the negative positive connection establishment. In case the status is positive connection establishment, then the transceiver unit [304] sends the message traffic to the secondary node [306]. In parallel, the transceiver unit [304] sends a plurality of ping requests to the primary node [310] for establishing the connection with the primary node [310]. In case of the positive feedback from the primary node [310] in response of the ping requests is detected, the message traffic is switched to the primary node [310] without any manual intervention.

**[0121]** For another example, a user device i.e., the client node [302] attempts to connect to the primary node [310] via sending a connection request and due to any technical failure, a connection was not established, so the transceiver unit [304] transmits the connection request to the secondary node [306] for establishing the connection based on the connection request. In the meantime, the transceiver unit [304] sends a plurality of ping requests to the primary node [310], such as 5 times in 5 minutes. Upon receiving a positive response from the primary node [310] in response to the ping requests, the transceiver unit [304] switches the message traffic to the primary node [310]. Thereby the present disclosure ensures that there is

minimum disruption in the user experience and a reliable connection is maintained during one or more telecommunication activities.

**[0122]** The present disclosure further discloses a non-transitory computer readable storage medium storing instructions for message routing management, the instructions include an executable code which, when executed by one or more units of a system [300], causes: a transceiver unit [304] of the system [300] to send to a secondary node [306], a second connection request, in an event of a failure of connection establishment with a primary node [310], a determination unit [308] of the system [300] to determine a first status of a connection with the secondary node [306] wherein the first status is one of a positive first connection establishment status, and a negative first connection establishment status; the transceiver unit [304] of the system [300] to send to a secondary node [306], the message traffic, in an event of the determination of the positive first connection establishment status; the transceiver unit [304] of the system [300] to send to the primary node [310], a configurable number of ping requests, wherein the configurable number of ping requests are sent for establishing a connection with the primary node [310], and wherein the configurable number of ping requests are sent to the primary node [310] for a pre-defined number of times; the transceiver unit [304] of the system [300] to receive from the primary node [310], a positive feedback for at least a threshold number of the configurable number of ping requests, wherein the receipt of the positive feedback indicates a potential connection establishment between the user equipment and the primary node [310].

**[0123]** As is evident from the above, the present disclosure provides a technically advanced solution for message routing management. The present solution provides a solution that facilitates a seamless switch of a message traffic between two nodes without any manual intervention for reducing network disruptions. Further, if an initial connection request with an initial node fails, another connection request is transmitted to another node and in case another node shows positive feedback, then the message traffic is routed to the another node. Thereafter, a client node transmits a configurable number of ping requests to the initial node. Upon receiving positive feedback from the initial node in response to the ping requests, the message traffic is routed to the initial node. Hence, the switching or routing of the message traffic from one node to another node is done without any manual intervention that reduces one or more potential network disruptions. Further, the method and system of the present disclosure ensures an automatic redirection of the message traffic to the initial node (i.e., the primary node) without the need of manual intervention. Furthermore, present disclosure provides a solution that enables the message traffic to be shifted back to the initial node (i.e., primary node), thereby avoiding unforeseen latency at another node (i.e., secondary node). Hence, the present disclosure provides seamless message routing among a plurality of nodes, reduced network disruptions and automatic re-routing.

**[0124]** While considerable emphasis has been placed herein on the disclosed implementations, it will be appreciated that many implementations can be made and that many changes can be made to the

implementations without departing from the principles of the present disclosure. These and other changes in the implementations of the present disclosure will be apparent to those skilled in the art, whereby it is to be understood that the foregoing descriptive matter to be implemented is illustrative and non-limiting.

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**We Claim:**

1. A method [400] for message routing management, the method [400] comprising:
   - sending, by a transceiver unit [304] via a client node [302] to a secondary node [306], a second connection request, in an event of a failure of connection establishment with a primary node [310];
   - determining, by a determination unit [308] via the client node [302], a first status of a connection with the secondary node [306], wherein the first status is one of a positive first connection establishment status and a negative first connection establishment status;
   - sending, by the transceiver unit [304] via the client node [302] to the secondary node [306], a message traffic, in an event of the determination of the positive first connection establishment status;
   - sending, by the transceiver unit [304] via the client node [302], to the primary node [310], a configurable number of ping requests,
     wherein the configurable number of ping requests are sent for establishing a connection with the primary node [310],
     and wherein the configurable number of ping requests are sent to the primary node [310] for a pre-defined number of times;
   - receiving, by the transceiver unit [304] via the client node [302] from the primary node [310], a positive feedback for at least a threshold number of the configurable number of ping requests,
     wherein the receipt of the positive feedback indicates a potential connection establishment between the client node [302] and the primary node [310]; and
   - switching, by the transceiver unit [304] via the client node [302], the message traffic back to the primary node [310].

2. The method [400] as claimed in claim 1, wherein prior to the sending, by the client node [302] to the secondary node [306], the second connection request, the method [400] comprises:
   - sending, by the transceiver unit [304] via the client node [302] to the primary node [310], a first connection request, based on a set of configurable counters,
     wherein the first connection request is sent by the client node [302] for a connection establishment with the primary node [310], for sending the message traffic to the primary node [310]; and
   - determining, by the determination unit [308] via the client node [302], a second status of a connection with the primary node [310], wherein the second status is one of a positive second connection establishment status, and a negative second connection establishment status,
     wherein the positive second connection establishment status is determined in an event a connection is established between the client node [302] and the primary node [310], and the negative second connection establishment status is determined in an event a connection is not

established between the client node [302] and the primary node [310], and wherein the determination of the negative second connection establishment status indicates the failure of connection establishment with the primary node [310].

3. The method [400] as claimed in claim 1, wherein the set of configurable counters comprises one or more of a connection refused parameter, a connection timeout parameter, and a request timeout parameter.

4. The method [400] as claimed in claim 1, wherein the configurable number of ping requests are sent by the client node [302] to the primary node [310] periodically at one of a regular configurable interval of time and an irregular interval of time.

5. The method [400] as claimed in claim 1, the method [400] further comprising:

- maintaining, by a database, a primary list of proxy addresses and a secondary list of proxy addresses;
- switching, by the transceiver unit [304], the message traffic, to one or more proxy addresses in the primary list of proxy addresses in an event at least one proxy address from the primary list of proxy addresses is available; and
- switching, by the transceiver unit [304], the message traffic, to one or more proxy addresses in the secondary list of proxy addresses in an event the at least one proxy address from the primary list of proxy addresses is unavailable.

6. A system [300] for message routing management, the system [300] is connected to a client node [302], the system [300] comprising:

- a transceiver unit [304] configured to:
    - o send to a secondary node [306], a second connection request, in an event of a failure of connection establishment with a primary node [310];
- a determination unit [308] connected at least to the transceiver unit [304], the determination unit [308] configured to:
    - o determine a first status of a connection with the secondary node [306], wherein the first status is one of a positive first connection establishment status, and a negative first connection establishment status;

wherein the transceiver unit [304] is further configured to:

- o send, to the secondary node [306], a message traffic, in an event of the determination of the positive first connection establishment status;
- o send, to the primary node [310], configurable number of ping requests,

wherein the configurable number of ping requests are sent for establishing a connection with the primary node [310],

and wherein the configurable number of ping requests are sent to the primary node [310] for a pre-defined number of times;

- receive, from the primary node [310], a positive feedback for at least a threshold number of the configurable number of ping requests,

wherein the receipt of the positive feedback indicates a potential connection establishment between the client node [302] and the primary node [310]; and

- switch the message traffic back to the primary node [310].

**7.** The system [300] as claimed in claim 6, wherein the transceiver unit [304], prior to sending to the secondary node [306], the second connection request, is configured to:

- send, to the primary node [310], a first connection request, based on a set of configurable counters,

wherein the first connection request is sent by the client node [302] for a connection establishment with the primary node [310], for sending the message traffic to the primary node [310].

**8.** The system [300] as claimed in claim 7, wherein the determination unit [308] post the transceiver unit [304] sending the first connection request, is configured to:

- determine a second status of a connection with the primary node [310], wherein the second status is one of a positive second connection establishment status, and a negative second connection establishment status,

wherein the positive second connection establishment status is determined in an event a connection is established between the client node [302] and the primary node [310], and the negative second connection establishment status is determined in an event a connection is not established between the client node [302] and the primary node [310], and wherein the determination of the negative second connection establishment status indicates the failure of connection establishment with the primary node [310].

**9.** The system [300] as claimed in claim 6, wherein the set of configurable counters comprises one or more of a connection refused parameter, a connection timeout parameter, and a request timeout parameter.

**10.** The system [300] as claimed in claim 6, wherein the configurable number of ping requests are sent by the transceiver unit [304] to the primary node [310] periodically at one of a regular configurable interval of time and an irregular interval of time.

**11.** The system [300] as claimed in claim 6, the system [300] further comprising a database, wherein the database is configured to:

- maintain a primary list of proxy addresses and a secondary list of proxy addresses; and wherein the transceiver unit [304] is configured to:
- switch the message traffic, to one or more proxy addresses in the primary list of proxy addresses in an event at least one proxy address from the primary list of proxy addresses is available, and
- switch the message traffic, to one or more proxy addresses in the secondary list of proxy addresses in an event the at least one proxy address from the primary list of proxy addresses is unavailable.

**12.** A non-transitory computer readable storage medium storing instructions for message routing management, the instructions include executable code which, when executed by a one or more units of a system [300], causes:

- a transceiver unit [304] to send to a secondary node [306], a second connection request, in an event of a failure of connection establishment with a primary node [310],
- a determination unit [308] to determine a first status of a connection with the secondary node [306] wherein the first status is one of a positive first connection establishment status, and a negative first connection establishment status,
- the transceiver unit [304] to send to a secondary node [306], a message traffic, in an event of the determination of the positive first connection establishment status,
- the transceiver unit [304] to send to the primary node [310], a configurable number of ping requests, wherein the configurable number of ping requests are sent for establishing a connection with the primary node [310], and wherein the configurable number of ping requests are sent to the primary node [310] for a pre-defined number of times, and
- the transceiver unit [304] to receive from the primary node [310], a positive feedback for at least a threshold number of the configurable number of ping requests, wherein the receipt of the positive feedback indicates a potential connection establishment between an user equipment and the primary node [310].

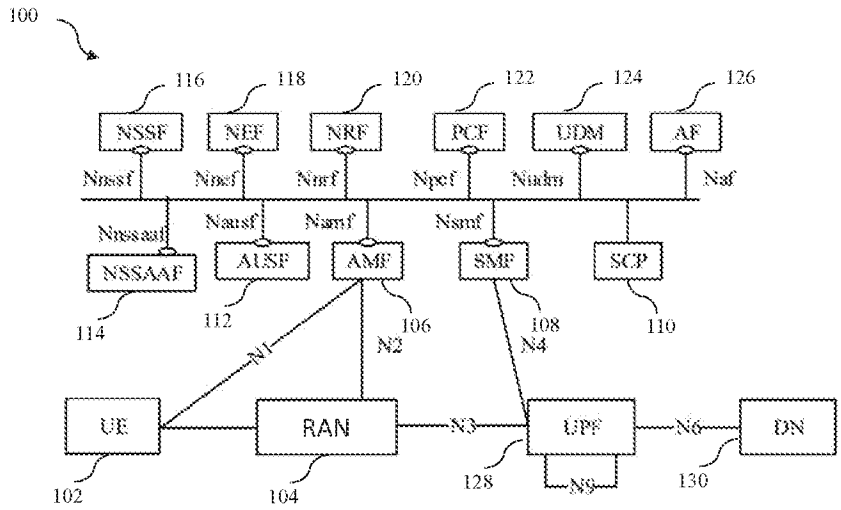
100
116
118
120
122
124
126
NSSF
NEF
NRF
PCF
UDM
AF
Nnssf
Nnef
Nnrf
Npcf
Nudm
Naf
Nnssaaf
Nausf
Namf
Nsmf
NSSAAF
AUSF
AMF
SMF
SCP
114
112
106
108
110
N1
N2
N4
UE
RAN
N3
UPF
N6
DN
102
104
128
N9
130

FIG. 1

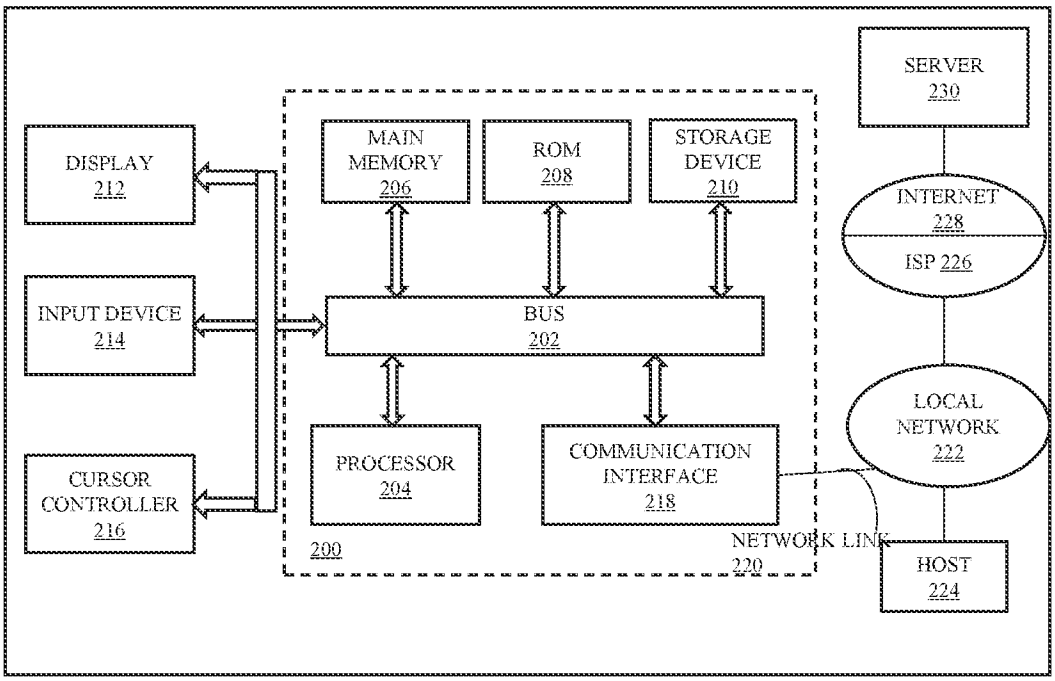
SERVER
230
DISPLAY
212
MAIN
MEMORY
206
ROM
208
STORAGE
DEVICE
210
INTERNET
228
ISP 226
INPUT DEVICE
214
BUS
202
LOCAL
NETWORK
222
CURSOR
CONTROLLER
216
PROCESSOR
204
COMMUNICATION
INTERFACE
218
200
NETWORK LINK
220
HOST
224

FIG. 2

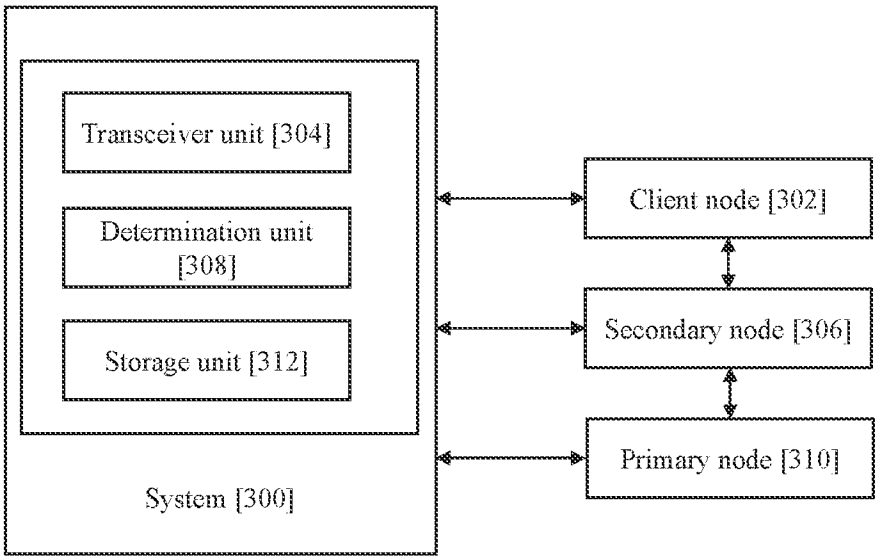
Transceiver unit [304]
Determination unit [308]
Storage unit [312]
System [300]
Client node [302]
Secondary node [306]
Primary node [310]

FIG. 3

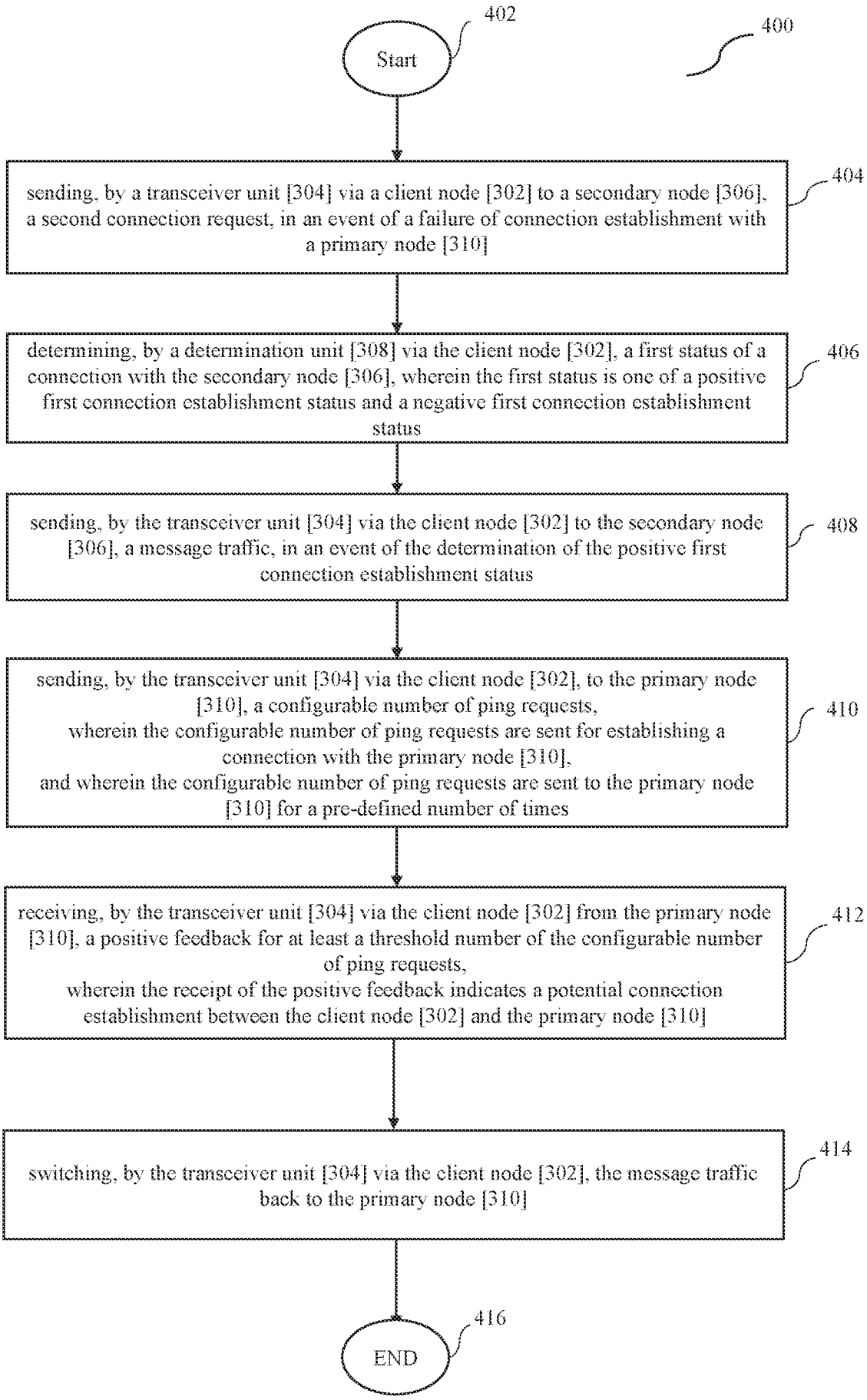
400
402
Start
404
sending, by a transceiver unit [304] via a client node [302] to a secondary node [306], a second connection request, in an event of a failure of connection establishment with a primary node [310]
406
determining, by a determination unit [308] via the client node [302], a first status of a connection with the secondary node [306], wherein the first status is one of a positive first connection establishment status and a negative first connection establishment status
408
sending, by the transceiver unit [304] via the client node [302] to the secondary node [306], a message traffic, in an event of the determination of the positive first connection establishment status
410
sending, by the transceiver unit [304] via the client node [302], to the primary node [310], a configurable number of ping requests,
wherein the configurable number of ping requests are sent for establishing a connection with the primary node [310],
and wherein the configurable number of ping requests are sent to the primary node [310] for a pre-defined number of times
412
receiving, by the transceiver unit [304] via the client node [302] from the primary node [310], a positive feedback for at least a threshold number of the configurable number of ping requests,
wherein the receipt of the positive feedback indicates a potential connection establishment between the client node [302] and the primary node [310]
414
switching, by the transceiver unit [304] via the client node [302], the message traffic back to the primary node [310]
416
END

FIG. 4

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN2024/050916

A. CLASSIFICATION OF SUBJECT MATTER
H04L45/28,H04L43/0811,H04L45/24 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)

H04L

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
Keywords:Message/traffic,route,primary,secondary,node,client,failure,ping

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| Y | US10445197B1 [AMAZON TECH INC]<br>15 October 2019 (15-10-2019)<br>Whole Document. | 1-12 |
| Y | US20210410038A1 [UBER TECHNOLOGIES INC]<br>30 December 2021 (30-12-2021)<br>Abstract; claims 1-20. | 1-12 |
| Y | US6173411B1 [FOXBORO CO]<br>09 January 2001 (09-01-2001)<br>Abstract. | 1-12 |
| A | JP2003234749A [OKI ELECTRIC IND CO LTD]<br>22 August 2003 (22-08-2003) (English translation from Google Patents)<br>Abstract. | 1-12 |

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

* Special categories of cited documents:
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"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 |
|---|---|
| 28-10-2024 | 28-10-2024 |
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