

connection information. For communication networks that may span thousands or millions of computing devices over great distances, such detailed configuration that can require constant updating may be inefficient and unreliable.

Thus, there is a need for a technological solution to provide for efficient automatic configuration and self-healing of communication networks that do not require the use of hard-coded or manually entered communication addresses, where a device or system may be automatically connected into the network without the use of and previously identified communication addresses.

10 SUMMARY

The present disclosure provides a description of systems and methods for the automatic configuration of a communication network and configuration of a partition-resistant communication network.

In an aspect, the present disclosure refers to a method for configuration of a partition-resistant communication network, comprising: electronically transmitting, by a transmitting device of the processing server, a request message to a plurality of computing devices; receiving, by a receiving device of the processing server, a set of agreement messages, wherein each agreement message is received from one of the plurality of computing devices and includes at least a communication address associated with the respective computing device and a specified transmission control protocol (TCP) port; identifying, by a data identification module of the processing server, one distant computing device and at least one local computing device of the plurality of computing devices where from each an agreement message is received, wherein the distant computing device has a greater message transmission distance to the processing server than each of the at least one local computing devices, and a message transmission distance of the distant computing device to the processing server is at least a predetermined distance suitable to resist network partitioning due to physical intervention; and establishing, by a communications module of the processing server, a communication connection to the distant computing device and each of the at least one local computing devices using the specific TCP port included in the respective agreement message, wherein the request message is electronically transmitted as a broadcast message using a predefined user datagram protocol (UDP) port, the broadcast message is transmitted to the at least one local computing device with a first time to live, the broadcast message is transmitted to the distant computing

device with a second time to live, and the second time to live has a higher value than the first time to live.

In an aspect, the present disclosure refers to a system for configuration of a partition-resistance communication network, comprising: a processing device of a processing server configured to generate a request message, wherein the request message includes at least a communication address associated with the processing server; a transmitting device of the processing server configured to electronically transmit the generated request message to a plurality of computing devices; a receiving device of the processing server configured to receive a set of agreement messages, wherein each agreement message is received from one of the plurality of computing devices and includes at least a communication address associated with the respective computing device and a specified transmission control protocol (TCP) port; the processing device of the processing server is further configured to: identify one distant computing device and at least one local computing device of the plurality of computing devices where from each an agreement message is received, wherein the distant computing device has a greater message transmission distance to the processing server than each of the at least one local computing devices, and a message transmission distance of the distant computing device to the processing server is at least a predetermined distance suitable to resist network partitioning due to physical intervention; and establish a communication connection to the distant computing device and each of the at least one local computing devices using the specific TCP port included in the respective agreement message, wherein the generated request message is electronically transmitted as a broadcast message using a predefined user datagram protocol (UDP) port, the broadcast message is transmitted to the at least one local computing device with a first time to live, the broadcast message is transmitted to the distant computing device with a second time to live, and the second time to live has a higher value than the first time to live.

In an example, a method for automatic configuration of a communication network includes: generating, by a generation module of a processing server, a request message, wherein the request message includes at least a communication address associated with the processing server; electronically transmitting, by a transmitting device of the processing server, the generated request message as a broadcast message to a plurality of computing devices using a predefined user datagram protocol (UDP) port, wherein the broadcast message is transmitted with a predetermined time to live; receiving, by a receiving device of the processing server, one or more agreement messages, wherein each agreement

message is received from one of the plurality of computing devices, is transmitted by the respective computing device using the predefined UDP port, and includes at least a communication address associated with the respective computing device and a specified transmission control protocol (TCP) port; identifying, by a data identification module of the
5 processing server, at least one of the one or more agreement messages for establishment of communication; and establishing, by a communications module of the processing server, a communication connection to the computing device associated with each of the at least one identified agreement messages using the specific TCP port included in the respective agreement message.

10 In an example, a method for configuration of a partition-resistant communication network includes: generating, by a generation module of a processing server, a request message, wherein the request message includes at least a communication address

associated with the processing server; electronically transmitting, by a transmitting device of the processing server, the generated request message to a plurality of computing devices; receiving, by a receiving device of the processing server, a set of agreement messages, wherein each agreement message is received from one of the plurality of computing devices and
5 includes at least a communication address associated with the respective computing device and a specified transmission control protocol (TCP) port; identifying, by a data identification module of the processing server, one distant computing device and at least one local computing device of the plurality of computing devices where from each an agreement message is received, wherein the distant computing device has a greater geographic distance to the
10 processing server than each of the at least one local computing devices; and establishing, by a communications module of the processing server, a communication connection to the distant computing device and each of the at least one local computing devices using the specific TCP port included in the respective agreement message.

In an example, a system for automatic configuration of a communication
15 network includes: a generation module of a processing server configured to generate a request message, wherein the request message includes at least a communication address associated with the processing server; a transmitting device of the processing server configured to electronically transmit the generated request message as a broadcast message to a plurality of computing devices using a predefined user datagram protocol (UDP) port, wherein the
20 broadcast message is transmitted with a predetermined time to live; a receiving device of the processing server configured to receive one or more agreement messages, wherein each agreement message is received from one of the plurality of computing devices, is transmitted by the respective computing device using the predefined UDP port, and includes at least a communication address associated with the respective computing device and a specified
25 transmission control protocol (TCP) port; a data identification module of the processing server configured to identify at least one of the one or more agreement messages for establishment of communication; and a communications module of the processing server configured to establish a communication connection to the computing device associated with each of the at least one identified agreement messages using the specific TCP port included in the respective
30 agreement message.

In an example, a system for configuration of a partition-resistant communication network includes: a generation module of a processing server configured to generate a request message, wherein the request message includes at least a communication address associated with the processing server; a transmitting device of the processing server
5 configured to electronically transmit the generated request message to a plurality of computing devices; a receiving device of the processing server configured to receive a set of agreement messages, wherein each agreement message is received from one of the plurality of computing devices and includes at least a communication address associated with the respective computing device and a specified transmission control protocol (TCP) port; a data
10 identification module of the processing server configured to identify one distant computing device and at least one local computing device of the plurality of computing devices where from each an agreement message is received, wherein the distant computing device has a greater geographic distance to the processing server than each of the at least one local computing devices; and a communications module of the processing server configured to
15 establish a communication connection to the distant computing device and each of the at least one local computing devices using the specific TCP port included in the respective agreement message.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

20 The scope of the present disclosure is best understood from the following detailed description of exemplary embodiments when read in conjunction with the accompanying drawings. Included in the drawings are the following figures:

FIG. 1 is a block diagram illustrating a high level system architecture for the automatic configuration of a partition-resistant communication network in accordance with
25 exemplary embodiments.

FIG. 2 is a block diagram illustrating the processing server of FIG. 1 for the automatic configuration of a partition-resistant communication network in accordance with exemplary embodiments.

FIG. 3 is a flow diagram illustrating a process for the automatic connection of
30 the processing server of FIG. 2 to a computing device in a communication network using the system of FIG. 1 in accordance with exemplary embodiments.

CLAIMS

1. A method for configuration of a partition-resistant communication network,
comprising:

electronically transmitting, by a transmitting device of the processing server, a request
5 message to a plurality of computing devices;

receiving, by a receiving device of the processing server, a set of agreement messages,
wherein each agreement message is received from one of the plurality of computing devices
and includes at least a communication address associated with the respective computing
device and a specified transmission control protocol (TCP) port;

10 identifying, by a data identification module of the processing server, one distant
computing device and at least one local computing device of the plurality of computing
devices where from each an agreement message is received, wherein the distant computing
device has a greater message transmission distance to the processing server than each of the
at least one local computing devices, and a message transmission distance of the distant
15 computing device to the processing server is at least a predetermined distance suitable to
resist network partitioning due to physical intervention; and

establishing, by a communications module of the processing server, a communication
connection to the distant computing device and each of the at least one local computing
devices using the specific TCP port included in the respective agreement message, wherein

20 the request message is electronically transmitted as a broadcast message using a
predefined user datagram protocol (UDP) port,

the broadcast message is transmitted to the at least one local computing device with a
first time to live,

the broadcast message is transmitted to the distant computing device with a second
25 time to live, and

the second time to live has a higher value than the first time to live.

2. The method of claim 1, further comprising:

storing, in a location database of the processing server, a plurality of location profiles, wherein each location profile includes at least a geographic location and an associated

5 communication address designator; and

executing, by a querying module of the processing server, a query on the location database to identify a location profile for the distant computing device and each of the at least one local computing devices where the included communication address designator corresponds to the communication address associated with the respective computing device,

10 wherein

the greater geographic distance is based on the geographic location included in each of the identified location profiles and a geographic location of the processing server.

3. The method of claim 1, wherein

the request message further includes a blockchain network address derived using a
15 public key associated with the processing server, and

each of the one or more agreement messages further includes a blockchain network address derived using a public key associated with the respective computing device.

4. The method of claim 3, wherein transmissions made by the processing server using the established communication channel are signed using the blockchain network address
20 derived using the public key associated with the processing server.

5. The method of claim 1, including:

repeating the electronically transmitting, by the transmitting device of the processing server, the request message to the plurality of computing devices a plurality of times, each of the plurality of request messages having a request message time to live, each of the plurality
25 of request message times to live having an increasingly longer time to live;

wherein the set of agreement messages includes an agreement message received in response to each of the plurality of request messages; and

wherein identifying the one distant computing device is based on the agreement message received in response to the request message with the longest time to live.

5 6. A system for configuration of a partition-resistance communication network, comprising:

a processing device of a processing server configured to generate a request message, wherein the request message includes at least a communication address associated with the processing server;

10 a transmitting device of the processing server configured to electronically transmit the generated request message to a plurality of computing devices;

a receiving device of the processing server configured to receive a set of agreement messages, wherein each agreement message is received from one of the plurality of computing devices and includes at least a communication address associated with the

15 respective computing device and a specified transmission control protocol (TCP) port;

the processing device of the processing server is further configured to:

identify one distant computing device and at least one local computing device of the plurality of computing devices where from each an agreement message is received, wherein the distant computing device has a greater message transmission distance to the processing server than each of the at least one local computing devices, and a message transmission distance of the distant computing device to the processing server is at least a predetermined distance suitable to resist network partitioning due to physical intervention; and

20 establish a communication connection to the distant computing device and each of the at least one local computing devices using the specific TCP port included in the respective
25 agreement message, wherein

the generated request message is electronically transmitted as a broadcast message using a predefined user datagram protocol (UDP) port,

the broadcast message is transmitted to the at least one local computing device with a first time to live,

5 the broadcast message is transmitted to the distant computing device with a second time to live, and

the second time to live has a higher value than the first time to live.

7. The system of claim 6, further comprising:

a location database of the processing server configured to store a plurality of location
10 profiles, wherein each location profile includes at least a geographic location and an associated communication address designator; and

the processing device of the processing server configured to execute a query on the location database to identify a location profile for the distant computing device and each of the at least one local computing devices where the included communication address
15 designator corresponds to the communication address associated with the respective computing device, wherein

the greater geographic distance is based on the geographic location included in each of the identified location profiles and a geographic location of the processing server.

8. The system of claim 6, wherein

20 the request message further includes a blockchain network address derived using a public key associated with the processing server, and

each of the one or more agreement messages further includes a blockchain network address derived using a public key associated with the respective computing device.

9. The system of claim 8, wherein transmissions made by the processing server using the established communication channel are signed using the blockchain network address derived using the public key associated with the processing server.

10. The system of claim 8, including:

5 repeating the electronically transmitting, by the transmitting device of the processing server, the request message to the plurality of computing devices a plurality of times, each of the plurality of request messages having a request message time to live, each of the plurality of request message times to live having an increasingly longer time to live;

 wherein the set of agreement messages includes an agreement message received in
10 response to each of the plurality of request messages; and

 wherein identifying the one distant computing device is based on the agreement message received in response to the request message with the longest time to live.