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(54) Title: METHODS, SYSTEMS, AND COMPUTER READABLE MEDIA FOR ROUTING DIAMETER MESSAGES AT A DIAMETER SIGNALING ROUTER

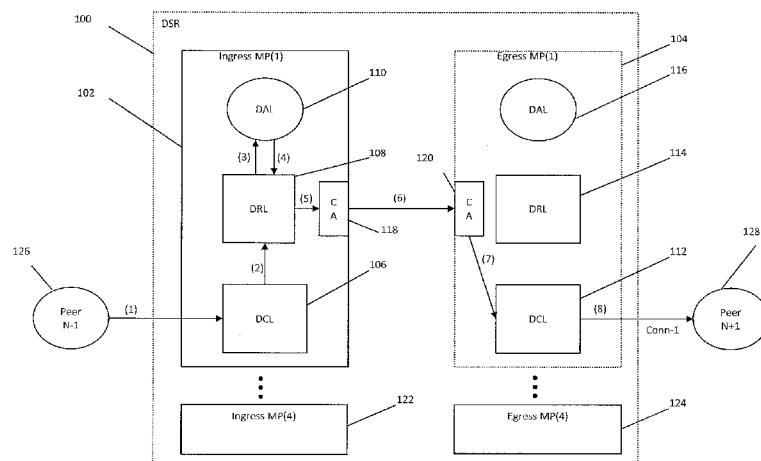


FIG. 1

(57) Abstract: According to one aspect, the subject matter described herein includes a method for routing Diameter messages. The method includes steps occurring at a Diameter signaling router (DSR) comprising a plurality of Diameter message processors. The method includes receiving a Diameter request message. The method further includes generating a hop-by-hop identifier for identifying a first Diameter message processor of the plurality of Diameter message processors. The method further includes incorporating the hop-by-hop identifier into the Diameter request message. The method further includes routing the Diameter request message to a first Diameter node.

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AMENDED CLAIMS
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What is claimed is:

1. A method for routing Diameter messages, the method comprising:
at a Diameter signaling router (DSR) comprising a plurality of Diameter message processors:
receiving, from a first Diameter node, a Diameter request message;
generating a hop-by-hop identifier for identifying a first Diameter message processor of the plurality of Diameter message processors and for identifying a pending transaction manager associated with the first Diameter message processor;
incorporating the hop-by-hop identifier into the Diameter request message; and
routing the Diameter request message to a second Diameter node.
2. The method of claim 1 comprising:
receiving, from the second Diameter node, a Diameter answer message associated with the Diameter request message, wherein the Diameter answer message includes the hop-by-hop identifier;
determining, using the hop-by-hop identifier, that the first Diameter message processor is associated with the Diameter answer message; and
communicating the Diameter answer message to the first Diameter message processor for processing.
3. The method of claim 1 wherein the hop-by-hop identifier is used for identifying a Diameter transaction between the DSR and the second Diameter node.
4. The method of claim 1 wherein each of the plurality of Diameter message processors includes or accesses a peer routing table.
5. The method of claim 1 wherein the hop-by-hop identifier includes a Diameter connection identifier for identifying a Diameter connection usable for transmitting or receiving the Diameter request message.
6. The method of claim 1 wherein the first Diameter message processor comprises one of:

a distinct message processing module of a distributed computing platform;

a computing blade in a blade-based distributed computing platform;

a processing core element associated with a single or multi-core computing device; and

a virtual node instantiated on a single physical message processing or computing device.

7. A system for routing Diameter messages, the system comprising:

a Diameter signaling router (DSR) comprising:

a first Diameter message processor of a plurality of Diameter message processors, wherein the first Diameter message processor is configured to:

receive, from a first Diameter node, a Diameter request message;

generate a hop-by-hop identifier for identifying the first Diameter message processor of the plurality of Diameter message processors and for identifying a pending transaction manager associated with the first Diameter message processor;

incorporate the hop-by-hop identifier into the Diameter request message; and

route the Diameter request message to a second Diameter node.

8. The system of claim 7 comprising:

a second Diameter message processor of the plurality of Diameter message processors, wherein the second Diameter message processor is configured to:

receive, from the second Diameter node, a Diameter answer message associated with the Diameter request message, wherein the Diameter answer message includes the hop-by-hop identifier;

determine, using the hop-by-hop identifier, that the first Diameter message processor is associated with the Diameter answer message; and

communicate the Diameter answer message to the first Diameter message processor for processing.

9. The system of claim 7 wherein the hop-by-hop identifier is used for identifying a Diameter transaction between the DSR and the second Diameter node.
10. The system of claim 7 wherein each of the plurality of Diameter message processors includes or accesses a peer routing table.
11. The system of claim 7 wherein the hop-by-hop identifier includes a Diameter connection identifier for identifying a Diameter connection usable for transmitting or receiving the Diameter request message.
12. The system of claim 7 wherein the first Diameter message processor comprises one of:
 - a distinct message processing module of a distributed computing platform;
 - a computing blade in a blade-based distributed computing platform;
 - a processing core element associated with a single or multi-core computing device; and
 - a virtual node instantiated on a single physical message processing or computing device.
13. A non-transitory computer readable medium comprising computer executable instructions that when executed by a processor of a computer control the computer to perform steps comprising:
 - at a Diameter signaling router (DSR) comprising a plurality of Diameter message processors:
 - receiving, from a first Diameter node, a Diameter request message;
 - generating a hop-by-hop identifier for identifying a first Diameter message processor of the plurality of Diameter message processors and for identifying a pending transaction manager associated with the first Diameter message processor;

incorporating the hop-by-hop identifier into the Diameter request message; and

routing the Diameter request message to a second Diameter node.

14. A method for routing Diameter messages, the method comprising:
at a first Diameter message processor in a Diameter signaling router (DSR):
 - receiving, from a first Diameter node, a Diameter message;
 - assigning priority levels (PL) to a plurality of Diameter connections; and
 - selecting a first Diameter connection associated with a first priority level that corresponds to a message priority value associated with the Diameter message.
15. The method of claim 14 wherein the message priority value is determined by the DSR or the first Diameter node.
16. The method of claim 14 wherein the message priority value is based on a Diameter message type.
17. The method of claim 14 wherein the message priority value is stored as a portion of a hop-by-hop identifier within the Diameter message.
18. The method of claim 14 wherein the first priority level is a single normalized value computed using status information associated with the first message processor, status information associated with a communications bus or network within the DSR, and status information associated with the first Diameter connection.
19. The method of claim 18 wherein the status information associated with the first Diameter connection includes an operational status, a remote busy status, an egress transport status, or an egress message throttling status, wherein the status information associated with a communications bus or network within the DSR includes an operational status or a routing congestion level, and wherein the status information associated with the first Diameter message processor includes a process status.
20. The method of claim 14 wherein the first priority level is less than or equal to the message priority value.

21. The method of claim 14 wherein the first Diameter message processor comprises one of:
 - a distinct message processing module of a distributed computing platform;
 - a computing blade in a blade-based distributed computing platform;
 - a processing core element associated with a single or multi-core computing device; and
 - a virtual node instantiated on a single physical message processing or computing device.
22. A system for routing Diameter messages, the system comprising:
 - a Diameter signaling router (DSR) comprising:
 - a first Diameter message processor, wherein the first Diameter message processor is configured to:
 - receive, from a Diameter node, a Diameter message;
 - assign priority levels to a plurality of Diameter connections; and
 - select a first Diameter connection associated with a first priority level that corresponds to a message priority value associated with the Diameter message.
23. The system of claim 22 wherein the message priority value is determined by the DSR or the first Diameter node.
24. The system of claim 22 wherein the message priority value is based on a Diameter message type.
25. The system of claim 22 wherein the message priority value is stored as a portion of a hop-by-hop identifier within the Diameter message.
26. The system of claim 22 wherein the first priority level is a single normalized value computed using status information associated with the first message processor, status information associated with a communications bus or network within the DSR, and status information associated with the first Diameter connection.
27. The system of claim 22 wherein the status information associated with the first Diameter connection includes an operational status, a remote busy status, an egress transport status, or an egress message

- throttling status, wherein the status information associated with a communications bus or network within the DSR includes an operational status or a routing congestion level, and wherein the status information associated with the first Diameter message processor includes a process status.
28. The system of claim 22 wherein the first priority level is less than or equal to the message priority value.
29. The system of claim 22 wherein the first Diameter message processor comprises one of:
- a distinct message processing module of a distributed computing platform;
 - a computing blade in a blade-based distributed computing platform;
 - a processing core element associated with a single or multi-core computing device; and
 - a virtual node instantiated on a single physical message processing or computing device.
30. A non-transitory computer readable medium comprising computer executable instructions that when executed by a processor of a computer control the computer to perform steps comprising:
- at a first Diameter message processor in a Diameter signaling router (DSR):
- receiving, from a first Diameter node, a Diameter message;
 - assigning priority levels to a plurality of Diameter connections;
- and
- selecting a first Diameter connection associated with a first priority level that corresponds to a message priority value associated with the Diameter message.