Abstract

In PIM-SM networks PIM registers are sent from the first hop router to the RP (Rendezvous Point) to signal the presence of Multicast source in the network. There are periodic PIM Null registers sent from first hop router to the RP to keep the state alive at the RP as long as the source is active. The PIM Null register packet carries information about a single Multicast source and group. This document defines a standard to send multiple Multicast source and group information in a single pim Null register packet and the interoperability between the PIM routers which do not understand the packet format with multiple Multicast source and group details.

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PIM Null registers are sent by First hop routers periodically for Multicast streams to keep the states active on the RP as long as the Multicast source is alive. As the number of multicast sources increases, the number of PIM Null register packets that are sent increases at a given time. This results in more PIM packet processing at RP and FHR. The control plane policing (COPP), monitors the packets that gets processed by the control plane. Due to the high rate at which Null registers are received at the RP, this can lead to COPP drops of Multicast PIM Null register packets. This draft proposes a method to efficiently pack multiple PIM Null registers and register stop into a single message as these packets anyway don’t contain data. The draft also proposes interoperability with the routers that do not understand the new packet format.

1.1. Conventions Used in This Document

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].
1.2. Terminology

RP: Rendezvous Point

RPF: Reverse Path Forwarding

SPT: Shortest Path Tree

FHR: First Hop Router, directly connected to the source

LHR: Last Hop Router, directly connected to the receiver

2. PIM Register Stop format with capability option

A router (FHR) can decide to pack multiple Null registers based on the capability received from the RP as part of Register Stop. This ensures compatibility with routers that don’t support processing of the new format. The capability information can be indicated by the RP via the PIM register stop message sent to the FHR. Thus a FHR will switch to the new format only when it learns RP is capable of handling the packed Null register messages. Conversely, a FHR that doesn’t support the new format can continue generating the PIM Null register the current way. To exchange the capability information in the Register Stop message, the "reserved" field can be used to indicate this capability in those register stop messages. One bit of the reserved field is used to indicate the "packing" capability (P bit). The rest of the bits in the "Reserved" field will be retained for future use.

Figure 1: PIM Register Stop message with capability option

<table>
<thead>
<tr>
<th>PIM Version</th>
<th>Reserved</th>
<th>Type</th>
<th>P</th>
<th>Checksum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Address (Encoded-Group format)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source Address (Encoded-Unicast format)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

P  Capability bit used to indicate support for Packed Null Register
3. New PIM Null register message

New PIM Null register message format includes a count to indicate the number of Null register records in the message.

Figure 2: New PIM Null Register message format

<table>
<thead>
<tr>
<th>PIM Ver</th>
<th>Type</th>
<th>SubType</th>
<th>Rsvd</th>
<th>Checksum</th>
</tr>
</thead>
<tbody>
<tr>
<td>count</td>
<td></td>
<td>Reserved2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group Address[1] (Encoded-Group format)</td>
<td>Source Address[1] (Encoded-Unicast format)</td>
<td></td>
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<td>N</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Group Address[N]</td>
<td>Source Address[N]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PIM Version, Reserved, Checksum
Same as RFC 7761 (Section 4.9.3)

Type, SubType
The new packed Null Register Type and SubType values TBD

count
The count of the number of packed Null register records.
A record consists of Group and Source Address

Group Address
IP address of the Multicast Group

Source Address
IP Address of the Multicast Source

4. New PIM Register Stop message format

The new PIM register stop message includes a count to indicate the number of records that are present in the message.
Figure 3: New PIM Register Stop message format

<table>
<thead>
<tr>
<th>PIM Ver</th>
<th>Type</th>
<th>SubType</th>
<th>Rsvd</th>
<th>Checksum</th>
</tr>
</thead>
<tbody>
<tr>
<td>count</td>
<td>reserved2</td>
<td>Reserved2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group Address[1] (Encoded-Group format)</td>
<td>Source Address[1] (Encoded-Unicast format)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Group Address[N]</td>
<td>Source Address[N]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PIM Version, Reserved, Checksum
Same as RFC 7761 (Section 4.9.3)

Type
The new Register Stop Type and SubType values TBD

Record count
The count of the number of packed register stop records.
A record consists of Group and Source Address

Group Address
IP address of the Multicast Group

Source Address
IP address of the Multicast Source

5. Protocol operation
The following combinations exist -
FHR and RP both support the new PIM Register formats -
a. FHR sends the PIM register towards the RP when a new source is detected
b. RP sends a modified register stop towards the FHR that includes capability information by setting the P bit (Figure 2)
c. Based on the receipt of new Register Stop, FHR will start packing of Null registers using the new packed register format (Figure 1)
d. RP processes the new Null register message and can generate new register Stop messages by packing multiple S,Gs towards the same FHR (Figure 3)

FHR supports but RP doesn’t support new PIM Register formats -
a. FHR sends the PIM register towards the RP
b. RP sends a normal register stop without any capability information
c. FHR then sends Null registers in the old format

RP supports but FHR doesn’t support the new PIM Register formats -
a. FHR sends the PIM register towards the RP
b. RP sends a modified register stop towards the FHR that includes capability information
c. Since FHR doesn’t support the new format, it sends Null registers in the old format

6. PIM Anycast RP considerations

The new PIM register format should be enabled only if its supported by all PIM anycast RP members in the RP set for the RP address.

7. PIM RP router version downgrade

Consider a PIM RP router that downgrades to a software version which does not support the PIM register packing and was previously supporting the PIM register packing. The FHR that sends the packed PIM register message will not get a PIM register stop message back. In such scenarios the FHR can send an unpacked PIM register and check the PIM register stop to see if the capability option for packed register is set or not. If its not set then the FHR will continue sending unpacked PIM register messages.

8. IANA Considerations

This document requires the assignment of 2 new PIM message types for the packed pim register and pim register stop.
9. Acknowledgments

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10. References

10.1. Normative References


10.2. Informative References


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