GRA Signalling Protocol

(Generic Router Assist)

Tony Speakman and Lorenzo Vicisano

ftp://ftp-eng.cisco.com/speakman/draft-ietf-rmt-gra-signalling-00.{ps,txt}

(will be submitted as draft-ietf-rmt-bb-gra-signalling-00.{ps,txt} after this IETF)

Outline

☐ Applicability

☐ Headers

☐ Procedures

☐ IANA Considerations

Applicability

- GRA functions in some fraction of the routers in a source-specific multicast distribution tree

- Upstream GRA neighbours may be discovered through transport-session-specific announcements flowing down the distribution tree

- The source and receivers can direct GRA packets into the distribution tree

- GRA functions define a related group of GRA headers and associated services which together provide some feature to the session

This draft specifies only the mechanisms by which GRA headers are delivered to network-element-based GRA functions.

The specification of those functions will be in separate drafts.

Applicability

Essential to GRA is the mechanism for sending packets from a

receiver back to a source in reverse through the sequence of GRA

neighbours on the path from the source to the receiver.

☐ The direct path is defined to be the path taken by a packet from a source to a receiver as determined by IP routing.

☐ The reverse path is defined to be the path taken by a packet from a receiver to a source as it is forwarded through the sequence of upstream GRA neighbours between the receiver and the source.

Headers

Rationale for specific headers contents

Network-layer   indication of the presence of GRA
  □ a new IP GRA option
Transport-layer indication of the presence of GRA
  □ the G bit
Transport-session identification information (on reverse packets)
  □ IP address fields
Direct/Reverse discriminator
  □ the R bit
Fixed/Variable operand discriminator
  □ the V bit

Headers

GRA Header Format in the Context of UDP

IP HEADER including the IP GRA OPTION

UDP HEADER

```
...............................................
.     Source Port     .   Destination Port    .
...............................................
.     Check Sum       .     TPDU Length       .
...............................................
```

The common portion of the GRA header:

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|G|R|V| | | |VER| Header Length | Function ID   | Instance #   |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

... followed immediately, in reverse GRA packets only,
by transport-session-identifying IP address information:

```
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-...-+
|           Network Layer Source (IP) Address          ... |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-...-+
|  Network Layer Destination (IP Multicast Group) Address ... |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-...-+
```

... followed immediately by the GRA-function-specific
operand portion of the GRA header:

```
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-...-+
|                     Operands            ... |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-...-+
```
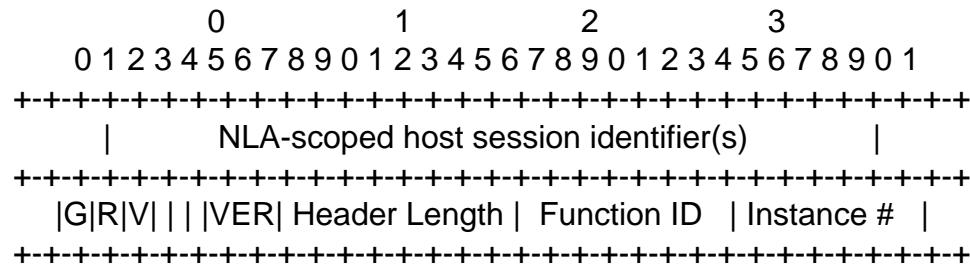
... followed immediately by the APDU.
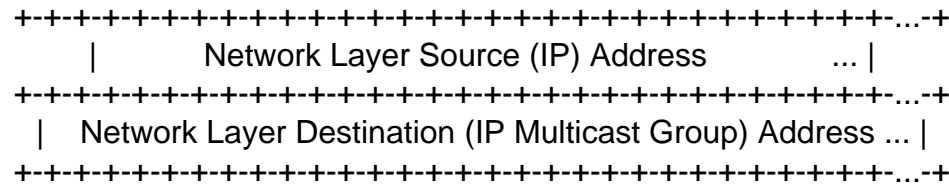
Headers

GRA Header Format in the Context of an RMT
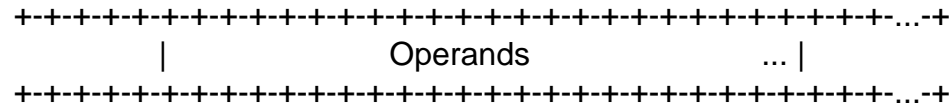
IP HEADER including the IP GRA OPTION

The common portion of the GRA header:

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|           NLA-scoped host session identifier(s)           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|G|R|V| | |VER| Header Length | Function ID   | Instance #   |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

```
      ... followed immediately, in reverse GRA packets only,
         by transport-session-identifying IP address information:
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-...-+
|              Network Layer Source (IP) Address          ... |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-...-+
|   Network Layer Destination (IP Multicast Group) Address ... |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-...-+
```

```
      ... followed immediately by the GRA-function-specific
            operand portion of the GRA header:
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-...-+
|                 Operands                  ... |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-...-+
```

... followed immediately by the TPDU.

Procedures

Network Elements

- ☐ detect the IP GRA option
- ☐ detect the G bit
- ☐ if reverse and addressed to the NE, correct for potential unicast routing asymmetries
- ☐ verify support for given version number and function id
- ☐ match source address, destination address, function id, and possibly incoming interface against access list
- ☐ lookup/create session/instance state
- ☐ hand packet and incoming interface to function

Procedures

End Systems (UDP applications or RMT stacks)

Transmission

☐ format GRA headers as specified here and in a function specification

☐ underlying network layer must be able selectively to add the IP GRA option

Receipt

☐ detect G bit

☐ verify support for given version number and function id

☐ lookup/create session/instance state

☐ hand packet to function

IANA Considerations

- request a new IP option type for the IP GRA option
- administration of the lower half of the Function ID space