Automatic Multicast Tunneling
draft-ietf-mboned-auto-multicast-12

IETF 83 – Paris, France

Summary

- Document Status

- Document Changes

- Protocol Changes

- Outstanding Issues

- Next Steps

Document Status

- Document reorganized, reformatted, re-worded, rewritten and expanded.

- Document distributed for a pre-submission review.

- Document updated to reflect feedback.

- Submitted for publication as Draft 12 in February.

Document Changes

- Primary rationale for changes:
  - To satisfy current IETF Editor guidelines and current practice, with the goal of ensure smooth passage through the RFC approval process.
  - To shift focus of document to that of implementation.
  - To add informative content to provide a context for describing normative requirements.
  - Provide greater detail as required to eliminate ambiguities and and address those areas that were lacking definition.
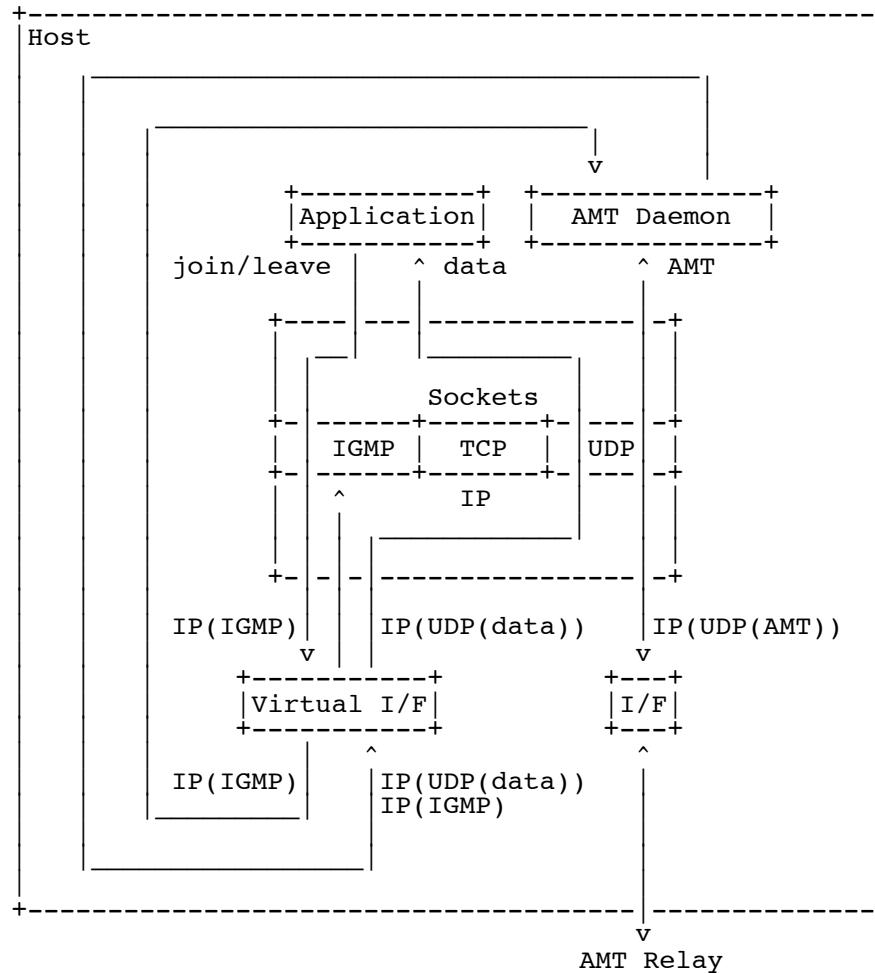
Document Changes (cont)

- Document split into informative and normative sections.
- High-level Organization:
  - Protocol Overview (Informative)
    - General Architecture
    - General Operation
  - Protocol Description (Normative)
    - Message Formats
    - Gateway Operation
    - Relay Operation

Document Changes (cont)

- Renewed emphasis on AMT as a simple encapsulation protocol for exchanging IGMP/MLD messages and multicast data generated "outside" of the protocol.

- Group subscription management and multicast forwarding are considered external activities that feed into AMT.

- These activities are governed by the IGMPv3 and MLDv2 specifications.

- The Request->Membership Query exchange is a mechanism for generating general queries.

Relationship to Host IP Stack

```
+----------------------------------------------------------------+
|Host                                                            |
|    +----------------------------------------------------+      |
|    |   +------------------------------------+           |      |
|    |   |                          v         |           |      |
|    |   |          +-----------+ +--------------+         |      |
|    |   |          |Application| |  AMT Daemon  |         |      |
|    |   |          +-----------+ +--------------+         |      |
|    |   | join/leave    ^ data        ^ AMT             |      |
|    |   |  +----- --- ------------- -- -+               |      |
|    |   |  |       |        |           |               |      |
|    |   |  |          Sockets           |               |      |
|    |   |  +- ------+-------+- --- -+   |               |      |
|    |   |  | IGMP  |  TCP   | UDP  |   |               |      |
|    |   |  +- ------+-------+- --- -+   |               |      |
|    |   |  |  ^        IP              |               |      |
|    |   |  |  |  ------------- -       |               |      |
|    |   |  +- - | - ---------------- -+               |      |
|    |   |IP(IGMP)|   IP(UDP(data))     IP(UDP(AMT))   |      |
|    |   |     v  | |                     v            |      |
|    |   |  +-----------+            +---+             |      |
|    |   |  |Virtual I/F|            |I/F|             |      |
|    |   |  +-----------+            +---+             |      |
|    |   |IP(IGMP)|  |IP(UDP(data))     ^              |      |
|    |   |        |  |IP(IGMP)          |              |      |
|    |   |_____|  |                  |              |      |
|    |_____|                  |              |      |
+----------------------------------------------------------------+
                                       v
                                   AMT Relay
```

Document Changes (cont)

- Treat relay discovery as a distinct feature of the protocol.
    - Use of the discovery mechanism is optional.
    - Gateway implementations may use alternative methods for discovery.
    - Mention possible requirement for source-specific discovery. Use of global anycast address may return relay without multicast connectivity to desired sources.

Protocol Changes

- Backwards compatible.
- Request "Protocol" or "P" flag
  - Indicate to relay whether it should return IGMPv3 or MLDv2 general query in Membership Query message.
- Membership Query "Limit" or "L" flag
  - Notifies gateway that the relay is NOT accepting Membership Update messages from **new** gateway tunnel endpoints.
  - Typically set when anycast address prefix advertisement has been withdrawn (if applicable).

Outstanding Issues

- Source address in IGMP/MLD packet headers.
- UDP Checksums in outer-headers.
- Global Anycast Address Prefix Allocation

Source Address in IGMP/MLD Packets

- Both protocols expect link-local addresses.

- IGMP allows for use of the unspecified (0.0.0.0) address as a source address. Hosts and routers accept these messages.

- MLD Does not! Hosts and routers must ignore MLD packets that carry an unspecified source address.

Link-Local Addresses for IGMP/MLD

- If MLD does not allow use of an unspecified source address, what should gateways and relay insert into the message headers?

- Does implementation rely on existing host IP/MLD stack for message processing?
  - If no, then just ignore it.
  - If yes, then
    - Spec simply indicates that recipient may need to regenerate message with valid link-local address.
    - Where does that come from? Assign special prefix and addresses for AMT virtual/pseudo interfaces?

UDP Checksum Issue

- Overview
  - AMT uses UDP encapsulation.
  - Relays will use existing functionality to encapsulate multicast packets into Multicast Data messages.
  - The encapsulation functionality provided by many platforms cannot generate a valid UDP checksum for the outer UDP header.
  - Workaround for IPv4 is to set checksum to zero.
  - This will not work for current IPv6 as that protocol specification explicitly prohibits the use of zero-checksums.
  - Workaround for IPv6 is to relax requirements.

- Detailed description of problem may be found in:
  - draft-ietf-6man-udpchecksums
  - draft-ietf-6man-udpzero

UDP Checksums and AMT

- Control messages are not a problem.

- Data messages are.

- What impact does this have on AMT?
  - Gateway that relies on host IP stack stack implementation cannot control handling unless API is provided.
  - Gateway that operates below or bypasses the IP stack MUST accept Multicast Data messages with zero UDP checksums.

UDP Checksums and AMT (cont)

- How to detect when zero-checksum packets are dropped?
  - Add some form of Keep-Alive/Beacon functionality. Relay periodically sends packets with and without zero-checksums.

UDP Checksums and AMT (cont)

- Use different discovery address to locate nearest relay that does compute checksums.

    - Result may reduce/eliminate benefits provided by AMT does compute checksums.
        - Switch to IPv4 encapsulation if possible.
    - Result may reduce/eliminate benefits provided by

    - Flags may be added to Relay Discovery and Relay Addvertisementgatewaysges Pvegotiaterswityh to IPv4.
    - Flags may be added to Relay Discovery and Relay Advertisement message to negotiate switch to IPv4.

Next Steps

are required, complete those ASAP (like next week).

- Review changes. Enlist reviewers today.
- Submit Draft 13.

- Start process of advancing the document through the RFC approval process (chairs an AD)