UDP Checksums for Tunneled Packets
`draft-ietf-6man-udpchecksums-01`

6Man IETF-82

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UDP Checksums = 0

- This is a change to RFC 2460 to allow for UDP Checksums = 0 under constrained circumstances
  - On the "Outer" UDP packet header of encapsulation protocols with complete "inner" packet header checksum.
  - The Inner packet MUST have a checksum.

What has changed in this version?

- General tightening of language appropriate to a standards track document.
  - Section #'s have been made more rational.
  - General wordsmithing - thanks Gorry and Magnus !
- This includes tightening of the language provided (in Section 5) for the updating of RFC 2460.
- Clarification of error messaging.
  - The previous version implied that Zero Checksum packets should never treated as being in error, which was unintended. (I.e., such packets might well have other errors.)

What has changed in this version?

- Added more text on Keep-alives

    - Keep-alive traffic SHOULD
      include both packets with tunnel
      checksums and packets with
      checksums equal to zero to enable
      the remote end to distinguish
      between path failures and the
      blockage of packets with checksum
      equal to zero.

Discussion on Mboned List

- This change was first motivated by AMT, which has been developed under Mboned.

- Thomas Morin raised some issues between our draft and the AMT draft.

- These may cause some small changes in AMT to align the two drafts.

- I think that this has more or less converged.

- This shouldn't affect any currently deployed AMT gateways.

In conclusion, a "modest proposal"

- This is a change of RFC2460..
- As RFC 2460 is a standards track document, this needs to be one as well.
- We would like for this to be go to Working Group Last Call.

Questions ?
Comments ?
Rotten fruit ?

Auxiliary Information

Why do we want to change IPv6 UDP?

- In IPv4, UDP checksums are not required.
- In IPv6, they are. RFC 2460 says

  —   `Unlike IPv4, when UDP packets are originated by an IPv6 node,`   `the UDP checksum is not optional.`

- This was done because the IPv6 IP header does not include a checksum.

  – And *that* was done to improve router efficiency.

- Why do we want to change this ?

  – To improve router efficiency.
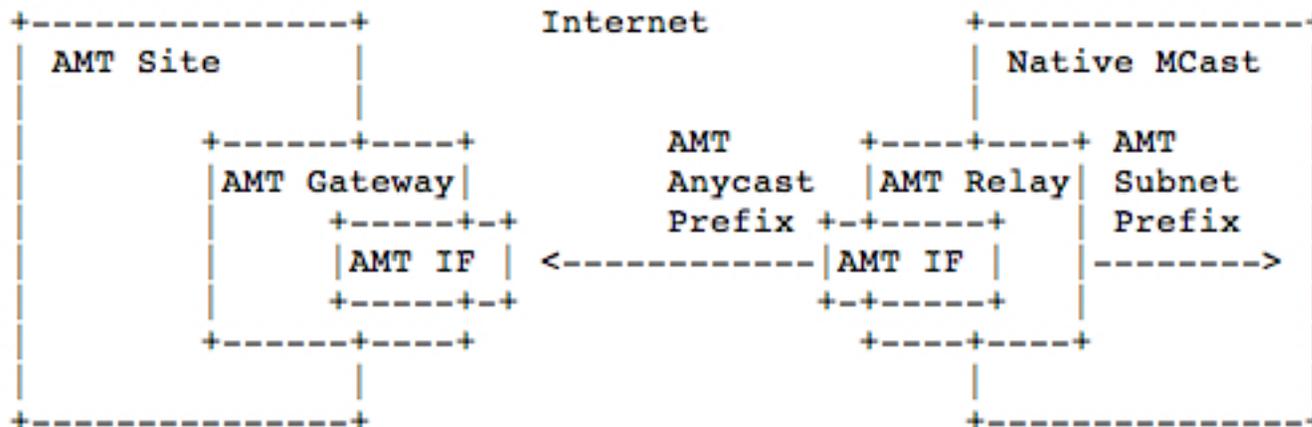
Tunnels have
Inner versus Outer checksums

- The difference between UDP tunnel packets and "regular" UDP packets is that tunnel packets encapsulate other packets.
- There is the "outer" packet header and checksum (for the encapsulating UDP packet) but also generally an "inner" packet header which also generally contains a checksum as well.
  - In other words, these packets have 2 headers and 2 checksums.
- We want to take advantage of this to improve the efficiency of tunnel protocols by relaxing RFC 2460 to allow for a zero checksum on the outer packet.
  - This is based on the conclusions of the consideration document
    - draft-ietf-6man-udpzero-02
- In other words, we propose allowing for packets with 2 headers, but only 1 checksum
- **This will be the first fundamental change to IPv6 / RFP2460 since its creation**.
  - We feel it is necessary, will be good for IPv6, and can be done safely.

What Protocols Need this ?

- We first became aware of this issue because of AMT, Automatic Multicast without Explicit Tunnels
  - draft-ietf-mboned-auto-multicast-10
- The Locator/ID Separation Protocol (LISP) has the same issue.
  - `draft-ietf-lisp-09`
- The state of the Internet means that there are highly likely to be more.
- Let's look briefly at AMT as an example.

AMT

- AMT uses tunneling to extend the multicast Internet to remote domains.
  - Could be just one node, or an entire network.

```
+----------------+          Internet        +----------------+
| AMT Site       |                          | Native MCast   |
|                |                          |                |
|   +------+-----+           AMT  +----+----+ AMT            |
|   |AMT Gateway|           Anycast |AMT Relay| Subnet       |
|   |     +-----+-+         Prefix +-+-----+  Prefix         |
|   |     |AMT IF | <------------|AMT IF |  |-------->        |
|   |     +-----+-+              +-+-----+  |                |
|   +------+-----+                   +----+----+             |
|          |                              |                 |
+----------+-----+                        +----------------+
```

AMT tunnels

- In AMT a relay takes a multicast packet (the "inner" packet), encapsulates it in UDP (creating the "outer" packet), and unicasts it to an AMT gateway, there to be de-encapsulated and placed on the local network.
  - These tunnels will generally not terminate in end-nodes, but inside the network.
  - The relay and gateway are likely to be routers, and the desire is to have these devices handle very high rate video.
  - Having these routers deal with UDP checksums is a big hit in their efficiency.
- We are referring to the data packet - other AMT packets, with checksums, deal with command and control