UDP Checksum for Tunneled Packets

6Man IETF-74

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Why do we want to change v6 UDP ?

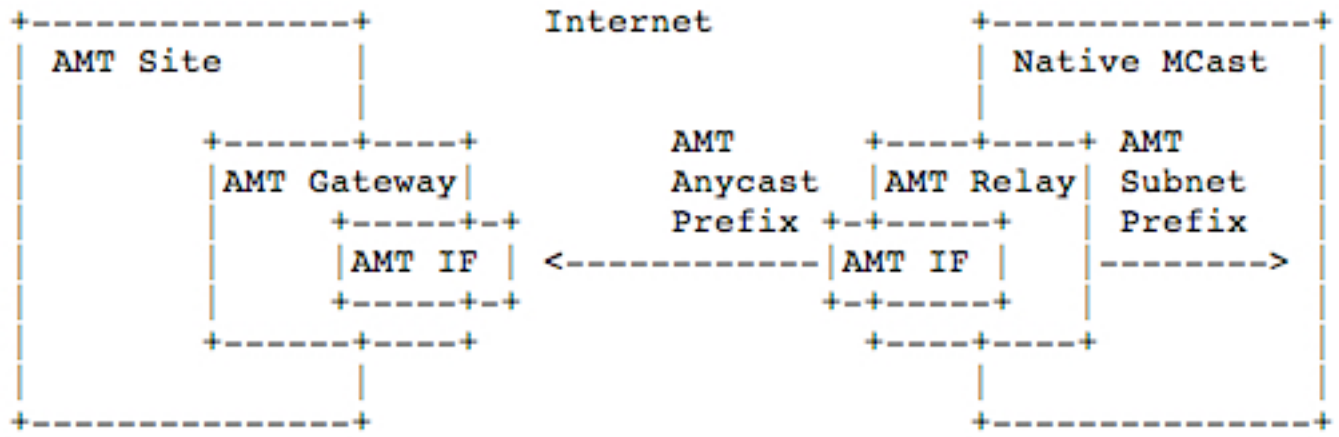
- In IPv4, UDP checksums are not required.
- In IPv6, they are. In RFC 2460
  - `Unlike IPv4, when UDP packets are originated by an IPv6 node, the UDP checksum is not optional.`
- This was done because the IPv6 IP header does not include a checksum.
- Why do we want to change this ?

Motivation for relaxing 2460

- The specific motivation for this work is AMT, Automatic IP Multicast Without Explicit Tunnels
  - draft-ietf-mboned-auto-multicast-09
- However, consider this (from 2460)
  - `IPv6 receivers must discard UDP packets containing a zero checksum, and should log the error.`
- That's fine for receivers, but what about tunneling ?
  - Tunneling is becoming increasingly common to do routing
  - Tunneling protocols may require routers to manipulate packets. .
  - Tunnel protocols increasingly use UDP to get through firewalls.
  - So, AMT is certainly not the only case…

AMT

- AMT uses tunneling to extend the multicast Internet to remote domains.



AMT tunnels

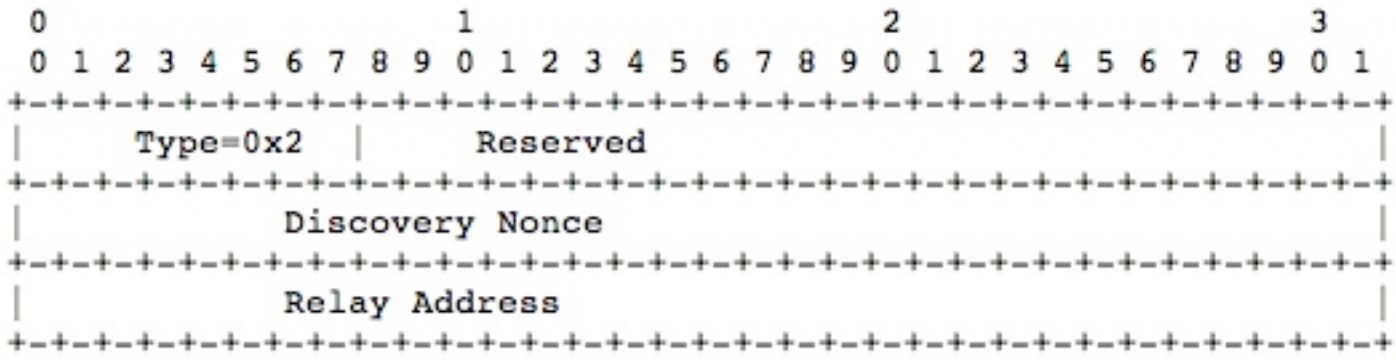
- In AMT a relay takes a multicast packet (the "inner" packet), encapsulates it in UDP (creating the "outer" packet), and unicasts it to an AMT gateway, there to be de-encapsulated and placed on the local network.
  - The relay and gateway could be routers, and the desire is to have these devices handle very high rate video.

Inner versus Outer checksums

- The desire is that the relay and gateway middleware **not** deal with checksums, to save CPU cycles there.
  - In a router scenario, this might involve the difference between a “fast track” and CPU calls.
- The inner packet MUST have a checksum (in our draft). If it does, what does the outer packet checksum buy you ?

Outer packet checksum

The payload of the UDP packet contains the following fields.



- In AMT, that outer packet checksum does not protect much - the outer IP & UDP header, a type code, and a Nonce.
  - This is for the data packet - other AMT packets, with checksums, deal with command and control.

So, what do you loose ?

- We tried hard to think of an attack vector here, without success.
  - We would like to hear of any ideas.
- Bit errors could
  - Cause the packet to go in the wrong direction, or on the wrong port.
    - Such packets should be discarded.
  - Cause the inner packet to become corrupted.
    - Such packets should be discarded.
  - Cause the Nonce to be corrupted
    - Again, leading to discarding of the packet.

Potential Problems

- Without a checksum on the outer packet, they might go astray.
  - I think that this is not as much of a worry now as some year ago, but it is still a worry.
- IPv6 aware middleware and firewalls may automatically drop zero checksums.
  - We would be glad to know of any cases of this.
  - It may still be early enough to prevent this from becoming common.

In conclusion, a modest proposal

- We propose that the checksum be not required :
  - On the “Outer” UDP packet header of encapsulation protocols with complete “inner packets.”
  - The Inner packet MUST have a checksum.
- The protocol MUST NOT send command and control information in any header attached to the Inner packet.
  - As this will not be protected.
- We think that other protocols will use this.
  - The LISP proposal uses it now.

Questions ?
Comments ?
Rotten fruit ?