

draft-ietf-ippm-6man-pdm-option-00

IPv6 PDM Destination Option

Nalini Elkins – Inside Products, Inc.

Mike Ackermann – BCBS Michigan

Rob Hamilton – Chemical Abstracts

Agenda

1. Combined layout with IPPM considerations
2. WG adoption call on list
3. Implementation on FreeBSD / Linux
4. Security considerations
5. Wireshark dissector (LUA)
6. IPSec testing

Implementation

- NETMAP / VALE
 - part of standard FreeBSD distributions
 - single, non intrusive kernel module
 - <http://info.iet.unipi.it/~luigi/netmap/>
- framework for high speed packet I/O. Implemented as a kernel module for FreeBSD and Linux, it supports access to network cards (NICs), host stack, virtual ports (the "VALE" switch), and "netmap pipes". netmap can easily do line rate on 10G NICs (14.88 Mpps), moves over 20 Mpps on **VALE** ports, and over 100 Mpps on netmap pipes.
- Using 0x1E option type (experimental)

Implementation Findings

- Possible issues with checksum offload. Testing.
- Need to check on fragmentation issues.
- Have tested with local FreeBSD machines. Started testing across Internet.
- Security considerations
 - Resource consumption attacks (SYN flood protection)
 - MITM considerations

PDM

- Performance and Diagnostic Metrics Destination Option (PDM) contains the following fields: (by 5-tuple)
- PSNTP : Packet Sequence Number This Packet
- PSNLR : Packet Sequence Number Last Received
- DELTALR : Delta Last Received
- DELTALS : Delta Last Sent
- TIMEBASE : Base timer unit
- SCALEDL : Scale for Delta Last Received
- SCALEDS : Scale for Delta Last Sent

Wireshark Dissector

No.	Time	Source	Destination
275	75.133884	2601:648:8600:6a39:7ae3:b5ff:fe7a:7886	2601:648:8600:6a39:67d:7bff:feb8:48c

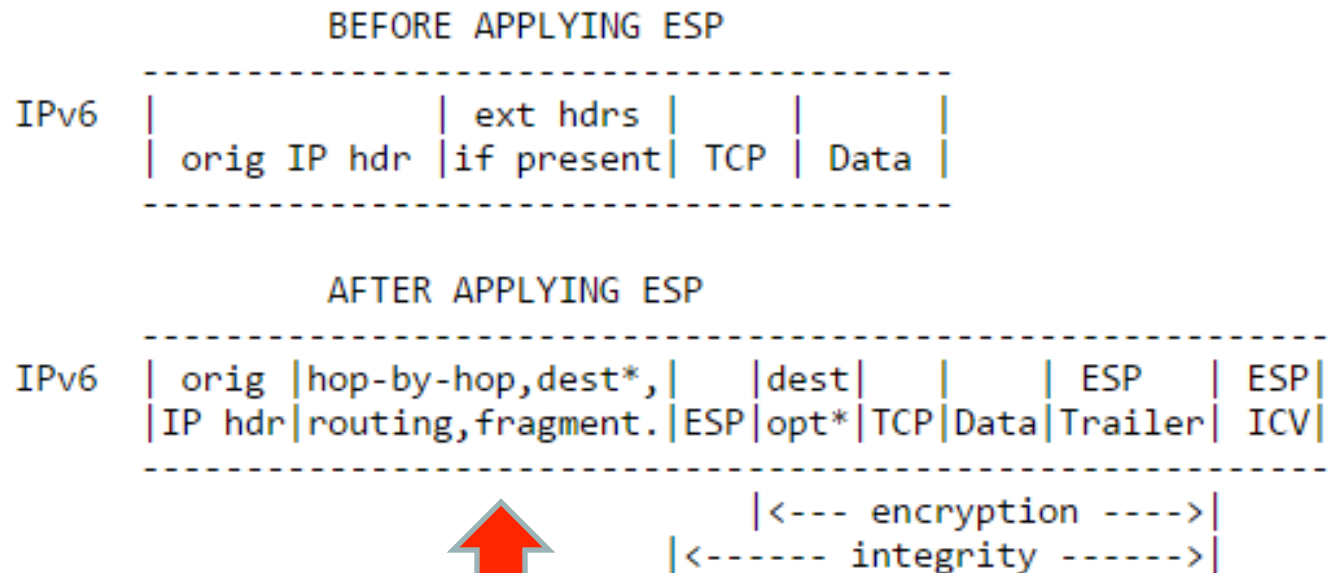
Frame 275: 162 bytes on wire (1296 bits), 162 bytes captured (1296 bits)

- Ethernet II, Src: Hewlett-_7a:78:86 (78:e3:b5:7a:78:86), Dst: QuantaCo_b8:04:8c (04:7d:7b:b8:04:8c)
- Internet Protocol Version 6, Src: 2601:648:8600:6a39:7ae3:b5ff:fe7a:7886 (2601:648:8600:6a39:7ae3:b5ff:fe7a:7886), Dst: 2601:648:8600:6a39:67d:7bff:feb8:48c (2601:648:8600:6a39:67d:7bff:feb8:48c)
 - 0110 = Version: 6
 - 0000 0000 = Traffic class: 0x00000000
 - 0000 0000 0000 0000 = Flowlabel: 0x00000000
 - Payload length: 108
 - Next header: IPv6 destination option (60)
 - Hop limit: 64
 - Source: 2601:648:8600:6a39:7ae3:b5ff:fe7a:7886 (2601:648:8600:6a39:7ae3:b5ff:fe7a:7886)
 - [Source SA MAC: Hewlett-_7a:78:86 (78:e3:b5:7a:78:86)]
 - Destination: 2601:648:8600:6a39:67d:7bff:feb8:48c (2601:648:8600:6a39:67d:7bff:feb8:48c)
 - [Destination SA MAC: QuantaCo_b8:04:8c (04:7d:7b:b8:04:8c)]
 - [Source GeoIP: Unknown]
 - [Destination GeoIP: Unknown]
 - IPv6 Destination Option Header
 - Next option: 50
 - Option Header Length: 16
 - Performance and Diagnostic Metrics protocol
 - Option Type: 30
 - Option Payload Length: 12
 - 10.. = Time Base: nanoseconds (0x02)
 - ..00 0111 0... = Scale of Delta Time Last Received: 14
 -000 0011 = Scale of Delta Time Last Sent: 3
 - Packet Sequence Number This Packet: 16419
 - Packet Sequence Number Last Received: 4686
 - Delta Time Last Received: 0xf46d (scaled = 1025196032 nanoseconds)
 - Delta Time Last Sent: 0x9152 (scaled = 297616 nanoseconds)
 - Padding: 0000

- Using LUA (interpreted script)
- Will convert to dissector
- In touch w/WS developer community

IPSec Testing

- Will PDM be available under ESP?
- From RFC4303 : IP Encapsulating Security Payload (ESP) section 3.1.1 Transport Mode processing



* = if present, could be before ESP, after ESP, or both

ESP Packet

No.	Time	Source	Destination
275	75.133884	2601:648:8600:6a39:7ae3:b5ff:fe7a:7886	2601:648:8600:6a39:67d:7bff:feb8:48c

Frame 275: 162 bytes on wire (1296 bits), 162 bytes captured (1296 bits)	
Ethernet II, Src: Hewlett-_7a:78:86 (78:e3:b5:7a:78:86), Dst: QuantaCo_b8:04:8c (04:7d:7b:b8:04:8c)	
Internet Protocol Version 6, Src: 2601:648:8600:6a39:7ae3:b5ff:fe7a:7886 (2601:648:8600:6a39:7ae3:b5ff:fe7a:7886), 0110 = Version: 6 0000 0000 = Traffic class: 0x00000000 0000 0000 0000 0000 0000 = Flowlabel: 0x00000000 Payload length: 108 Next header: IPv6 destination option (60) Hop limit: 64 Source: 2601:648:8600:6a39:7ae3:b5ff:fe7a:7886 (2601:648:8600:6a39:7ae3:b5ff:fe7a:7886) [Source SA MAC: Hewlett-_7a:78:86 (78:e3:b5:7a:78:86)] Destination: 2601:648:8600:6a39:67d:7bff:feb8:48c (2601:648:8600:6a39:67d:7bff:feb8:48c) [Destination SA MAC: QuantaCo_b8:04:8c (04:7d:7b:b8:04:8c)] [Source GeoIP: Unknown] [Destination GeoIP: Unknown]	
IPv6 Destination Option Header	Next option: 50 Option Header Length: 16
Performance and Diagnostic Metrics protocol	Option Type: 30 Option Payload Length: 12 10.. = Time Base: nanoseconds (0x02) ..00 0111 0... = Scale of Delta Time Last Received: 14000 0011 = Scale of Delta Time Last Sent: 3 Packet Sequence Number This Packet: 16419 Packet Sequence Number Last Received: 4686 Delta Time Last Received: 0xf46d (scaled = 1025196032 nanoseconds) Delta Time Last Sent: 0x9152 (scaled = 297616 nanoseconds) Padding: 0000
Encapsulating Security Payload	ESP SPI: 0x0e4ac4ae (239781038) ESP Sequence: 14

- Next Header 50 = ESP
- PDM passes in the clear

What does this buy us?

- Packet loss (is other side getting what we are sending)
- Out-of-order segments
- Hangs (can be deduced by exponential backoff)
- Timing

To Do

- Clean implementation
- Windows? IBM mainframe? Cell phones?
- Better analysis (pattern of flow)

Comments?

- Thoughts?
- Issues?
- Questions?