## draft-ietf-ippm-6man-pdm-option-00 IPv6 PDM Destination Option

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## 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 5tuple)
- 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	Dest	stination
27	5 75.133884	2601:648:8600:6a39:7ae3:b5	ff:fe7a:7886 260	01:648:8600:6a39:67d:7bff:feb8:48c
€				
⊞ F	rame 275: 162 by	vtes on wire (1296 bits). 162 bvtes car	otured (1296 bits)	
÷Ε	thernet II, Src	: Hewlett7a:78:86 (78:e3:b5:7a:78:86)	, Dst: QuantaCo_b8:04:8	8c (04:7d:7b:b8:04:8c)
- I	nternet Protoco	l Version 6, Src: 2601:648:8600:6a39:7a	ae3:b5ff:fe7a:7886 (2601	1:648:8600:6a39:7ae3:b5ff:fe7a:7886),
÷	0110 = Ver	rsion: 6		
÷	0000 0000	= Traffic cla	ass: 0x0000000	
		0000 0000 0000 0000 0000 = Flowlabel:	0x0000000	
	Payload length:	: 108		
	Hop limit: 64	vo descritacion operon (60)		
	Source: 2601:64	48:8600:6a39:7ae3:b5ff:fe7a:7886 (2601)	648:8600:6a39:7ae3:b5ff	f:fe7a:7886)
	[Source SA MAC:	: Hewlett7a:78:86 (78:e3:b5:7a:78:86)	]	
	Destination: 20	501:648:8600:6a39:67d:7bff:feb8:48c (20	01:648:8600:6a39:67d:7b	bff:feb8:48c)
	[Destination S/	A MAC: QuantaCo_b8:04:8c (04:7d:7b:b8:0	04:8c)]	
	[Source GeoIP:	Unknown]		
	[Destination Ge	eoIP: Unknown]		Using LUA
E	IPv6 Destinatio	on Option Header		(interpreted corint)
	Next Option:	50 s Longthu 16		(interpreted script)
	Performance :	and Diagnostic Metrics protocol		Will convert to
	Option Type			
	Option Pay	load Length: 12		dissector
	10	= Time Base: nanoseconds (0x02)		• In touch $w/MS$
	00 0111 (	) = Scale of Delta Time Last Re	eceived: 14	
		.000 0011 = Scale of Delta Time Last Se	ent: 3	developer
	Packet Sequ	Jence Number This Packet: 16419		aammunity
	Packet Sequ	Jence Number Last Received: 4686	(6022 papaceconds)	community
	Delta lime	Last Received: $0x1400$ (Scaled = $102519$ ) last Sent: $0x0152$ (scaled = $207616$ par	noseconds)	
	Padding: 0000	$\frac{1}{2}$	ioseconds)	

## **IPSec Testing**

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



#### **ESP** Packet

۱o.	Time	Source	Destination			
27	75 75.133884	2601:648:8600:6a39:7ae3:b5ff:fe7a:7886	2601:648:8600:6a39:67d:7bff:feb8:48c			
<						
	rame 275: 162 bytes on wire	(1206 hits) 162 bytes captured (1206 hit	-)			
	thernet II Src: Hewlett- 7	(1290 DTCS), 102 Dytes Captured (1290 DTC	b8:04:8c (04:7d:7b:b8:04:8c)			
	Internet Protocol Version 6	src: 2601:648:8600:6330:7363:h5ff:fe7a:78	86 (2601.648.8600.6330.7363.h5ff.fe7a.7886)			
	$\sim$ 0110 - Version: 6	SIC. 2001.040.0000.0435.7465.0511.1674.700	50 (2001.040.0000.0a35./ae5.b5/1.1e/a./000,	<i>'</i> ,		
		= Traffic class: 0x0000000				
		0000 0000 0000 = Flowlabel: 0x00000000				
	Pavload length: 108					
	Next header: TPv6 destinat	ion 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: Hew]ett7a:78:86 (78:e3:b5:7a:78:86)]						
[Destination SA MAC: QuantaCo_b8:04:8c (04:7d:7b:b8:04:8c)]						
	[Source GeoIP: Unknown]					
	[Destination GeoIP: Unknow	/n]				
E	IPv6 Destination Option He	ader 🗧	Next Header 50 = ESP			
	Next Option: 50 🛛 📥 📥	·				
	Option Header Length: 16	j				
	Performance and Diagnost	ic Metrics protocol	• DDM passage in the closer			
	Option Type: 30		• PDIVI passes in the clear			
	Option Payload Length:	12				
	10 = Time Base:	nanoseconds (0x02)				
	00 0111 0 =	Scale of Delta Time Last Received: 14				
		SCALE OF DELTA TIME LAST SENT: 3				
	Packet Sequence Number	Inis Packet: 10419				
	Packet Sequence Number	adi Oxf46d (scaled - 1025106022 papersond	- )			
	Delta Time Last Receiv	Peq: 0x1400 (Scaled = 1025190032 hanoseconds)	5)			
	Delta Time Last Sent.	0x9152 (scaled = 29/010 Hallosecollos)				
	ncansulating Security Paylo	ber				
	ESP SPT: 0x0e4ac4ae (22078	21038)				
	ESP Sequence: 14					
	as sequences as					

## 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?