

Bundle Protocol Version 7 Wireshark Dissectors

IETF 112 DTN WG

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Background

- Since early 2019 there has been a development version of TCPCLv4, BPv7, and (since late 2019) BPSec.
- These were used as both proof-of-concept and steering for TCPCL and as a framework for higher-level protocols:
 - ACME Node ID Validation
 - BPSec COSE context
- Recently these were integrated into wireshark main-branch dissectors for TCPCL and "bundle".
 - TCPCL uses explicit contact header version negotiation, v3 was pre-existing.
 - The "bundle" dissector (used by TCPCL, UDPCL, LTP) uses version introspection, v4-6 were pre-existing.

Current Behavior

- The dissectors use wireshark "dissector tables" to delegate handling:
 - TCPCLv4 session and transfer extension types
 - BPv7 block types (with all types from BPbis included)
 - BPv7 Administrative Record types (types from BPbis included)
 - BPv7 payload (based on IPN service number and DTN demux name)
 - BPSec per-context parameter types and result types (with default context included)
- The TCPCL dissector includes de-fragmentation and sequence analysis (time-for-full-transfer, time-to-ACK-segment, etc.).
 - Packet icons indicate segment ACK associations.
 - During integration this was applied to TCPCLv3 as well.
- The TCPCL dissector lost the ability to opportunistically dissect messages when contact headers are not captured.
- The BPv7 dissector includes de-fragmentation and sequence analysis (duplicate identity detection, status report cross-reference, etc.)
 - Packet icons indicate status subjects and bundle retransmits.
 - The block dissector is also BPSec-aware, indicating which blocks are BIB or BCB targets.



TCPCLv4 Example Capture

Example shows init/termination, segmented transfer, and message packing.

4 15:04:48.274251871 127.0.0.1 40684 127.0.0.1 4556 any TCPCL 74 Contact Header 6 15:04:48.276027279 127.0.0.1 4556 127.0.0.1 40684 any TCPCL 74 Contact Header 8 15:04:48.277206251 127.0.0.1 40684 127.0.0.1 4556 any TCPCL 93 SESS_INIT 10 15:04:48.278396815 127.0.0.1 40684 127.0.0.1 40684 any TCPCL 93 SESS_INIT 12 15:04:48.280187402 127.0.0.1 40684 127.0.0.1 40568 any TCPCL 203 XFER_SEGMENT 14 15:04:48.280654036 127.0.0.1 40684 127.0.0.1 4556 any TCPCL 203 XFER_SEGMENT 14 15:04:48.281442265 127.0.0.1 40684 127.0.0.1 4556 any TCPCL 203 XFER_SEGMENT 18 15:04:48.281456946 127.0.0.1 40684 127.0.0.1 4556 any TCPCL 203 XFER_SEGMENT 18 15:04:48.284374699 127.0.0.1 40684 127.0.0.1 4556 any TCPCL 203 XFER_SEGMENT 18 15:04:48.284374699 127.0.0.1 4566 127.0.0.1 4566 any TCPCL 122 XFER_ACK, XFER_ACK, XER_ACK, XER	t t	cpcl								X	
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 Transfer Flags: 0x02, START Transfer ID: 0x00000000000000001 Acknowledged Length: 100 octets [Expected Total Length: 199] [Related XFER_SEGMENT: 12] [Acknowledgment Time: 0.004187297 seconds] [Related XFER_SEGMENT start: 12] [Time since transfer Start: 0.004187297 seconds] TCPCLv4 Message: XFER_ACK, Xfer ID: 1, Flags: END 	*	5	- '	,	.ags: START						
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Acknowledged Length: 100 octets [Expected Total Length: 199] [Related XFER_SEGMENT: 12] [Acknowledgment Time: 0.004187297 seconds] [Related XFER_SEGMENT start: 12] [Time since transfer Start: 0.004187297 seconds] > TCPCLv4 Message: XFER_ACK, Xfer ID: 1, Flags: END											
<pre>[Expected Total Length: 199] [Related XFER_SEGMENT: 12] [Acknowledgment Time: 0.004187297 seconds] [Related XFER_SEGMENT start: 12] [Time since transfer Start: 0.004187297 seconds] > TCPCLv4 Message: XFER_ACK, Xfer ID: 1, Flags: END</pre>											
<pre>[Related XFER_SEGMENT: 12] [Acknowledgment Time: 0.004187297 seconds] [Related XFER_SEGMENT start: 12] [Time since transfer Start: 0.004187297 seconds] > TCPCLv4 Message: XFER_ACK, Xfer ID: 1, Flags: END</pre>											
[Acknowledgment Time: 0.004187297 seconds] [Related XFER_SEGMENT start: 12] [Time since transfer Start: 0.004187297 seconds] ▶ TCPCLv4 Message: XFER_ACK, Xfer ID: 1, Flags: END											
[Related XFER_SEGMENT start: 12] [Time since transfer Start: 0.004187297 seconds] ▶ TCPCLv4 Message: XFER_ACK, Xfer ID: 1, Flags: END											
[Time since transfer Start: 0.004187297 seconds] ▶ TCPCLv4 Message: XFER_ACK, Xfer ID: 1, Flags: END											
TCPCLv4 Message: XFER_ACK, Xfer ID: 1, Flags: END											
5 – 7 7 5		-			-						
		5	- ,	,	0						

BPv7 Example Capture

Example shows Admin status record with BIB covering payload data.

📕 tcpcl 🛛 🖂 👻										
No.	Time	Source	Src Port	Destination	Dst Port	lface	Protocol	Length	Info	
	4 15:04:48.274251871	127.0.0.1	40684	127.0.0.1	4556	-	TCPCL		4 Contact He	
	6 15:04:48.276027279	127.0.0.1	. 4556	127.0.0.1	40684	any	TCPCL	74	4 Contact He	eader
	8 15:04:48.277206251			127.0.0.1	4556	~	TCPCL		3 SESS_INIT	
	10 15:04:48.278396815			127.0.0.1	40684	~	TCPCL		3 SESS_INIT	
	12 15:04:48.280187402			127.0.0.1	4556		TCPCL		3 XFER_SEGM	
-	14 15:04:48.280654036			127.0.0.1	4556	~	BPv7 Admin			7390 → ipn:26
+	16 15:04:48.281442265			127.0.0.1	4556		TCPCL		3 XFER_SEGM	
+	18 15:04:48.281856946			127.0.0.1	4556		BPv7 Admin			7390 → ipn:26
	20 15:04:48.284374699			127.0.0.1	40684	~	TCPCL		- ,	XFER_ACK, XFI
+	22 15:04:48.285651434			127.0.0.1	40684		TCPCL		5 XFER_ACK	
	24 15:04:48.381340849			127.0.0.1	4556	~	TCPCL		L SESS_TERM	
	25 15:04:48.383546235	127.0.0.1	. 4556	127.0.0.1	40684	any	TCPCL	7:	L SESS_TERM	
4										•
- I	TN Bundle Protocol Ve	rsion 7, A	DMIN, Paylo	ad-Size: 52,	Blocks: 5, D	st: :	ipn:26622.12070), Src: ip	n:5279.739	0, Time: 810📤
	Indefinite Array: 9f									
	Primary Block, CRC T	ype: CRC-1	.6							
	[Bundle Identity: Source: ipn:5279.7390, DTN Time: 81089243, Seq: 993]									
	[First Seen: 14]	[First Seen: 14]								
	[Seen Time: 0.001202910 seconds]									
	Canonical Block: Bun									
	Canonical Block: Hop									
	Canonical Block: Blo				/ //	lone				
	Canonical Block: Pay		:k Num: 1, C	RC Type: Non	e					
	Type Code: Payload	(1)								
Block Number: 1										
Block Flags: 0x00000000000000003, Status bundle if not processed, Replicate block in fragment										
CRC Type: None (0)										
Block Type-Specific Data: 52 octets [Expert Info (Comment/Comment): Block is targed by BIB block number 25]										
	Indefinite Break: ff		IC): BIOCK I	is carged by	PIP DIOCK UN	liber	20]			
	inderinite Break: TT									Ŧ

Future and Maintenance

- The BPv7 dissector, without enhancements, is in the 3.6 release branch.
- The TCPCLv4 dissector and some BPv7 related enhancements (fall-through heuristic BTSD dissection) will likely be in 3.8 release.
- The current bundle version introspection logic is not based on any documented standard.
 - There is a similar logic proposed as a part of <u>draft-sipos-dtn-udpcl</u>, and could be extracted as a separate short document.
- TCPCL opportunistic message dissection could be added.
 - This could be done with known-message-type header detection, and some assumptions (i.e. check v4 types first, then v3)
- Now that the dissectors are in the upstream Wireshark project, proposed and future extensions can use this as a basis for experimentation and analysis.
 - The Wireshark project <u>issue tracker</u> is the right place for identifying defects and enhancements.

