

SCHC Applicability To IP in Deep Space

July 24th, 2025



Alexander PELOV

alexander.pelov@imt-atlantique.fr

Laurent TOUTAIN

laurent.toutain@imt-atlantique.fr

Pascal THUBERT

pascal.thubert@gmail.com

Internet Engineering Task Force

© 2022 IETF Trust

Production by Meetecho

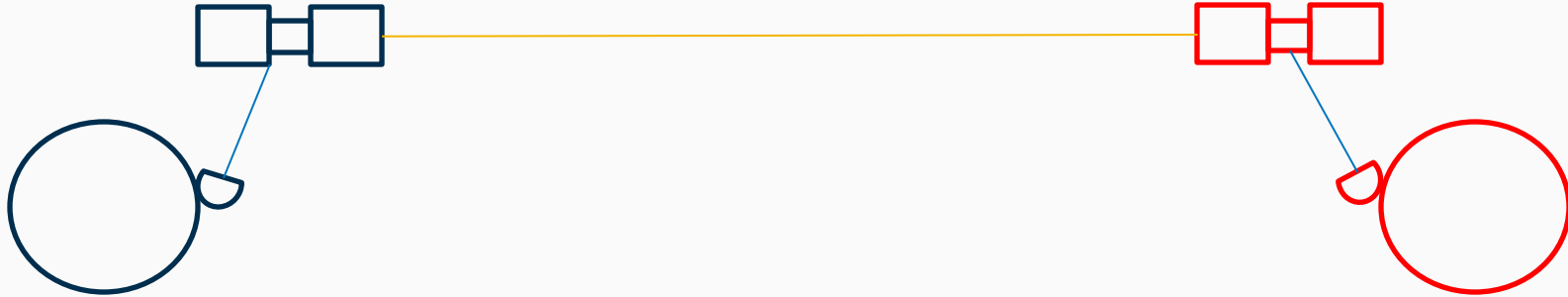


What is SCHC?

- Static Context Header Compression - A header compression & fragmentation framework - RFC8724
 - Adopted by several SDOs: DLMS, IEC, ISO, Lora Alliance
 - Several industrial and open-source implementations, deployed in critical infrastructure since 2021
- It's a framework
 - Generic, defined for highly asymmetric, constrained networks (4 different LPWAN tech)
 - Today, multiple applications: satellite, delay and disruption tolerant networks, energy-harvesting ambient IOT, underwater acoustic, ultra-low latency communications, PPP, IPsec, 6LO, etc.
- Stateless compression
 - Based on static contexts shared by communicating end-points
 - Datagram based - one lost datagram, or million lost datagrams, don't affect operation
 - RTT-agnostic
- Low computational complexity – could be applied to Tbps traffic

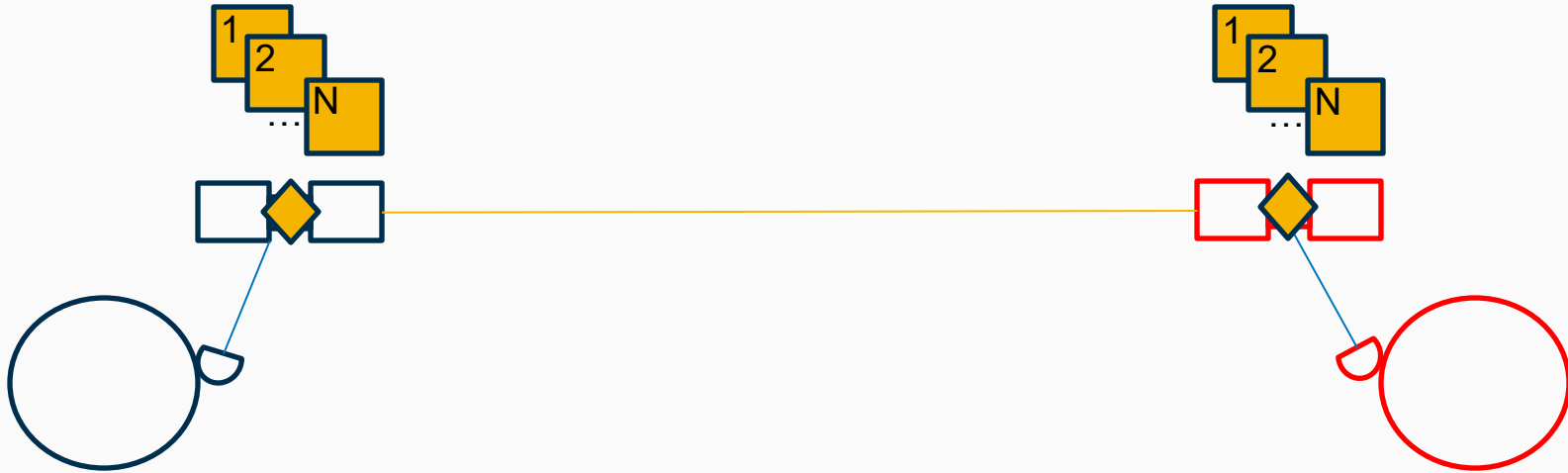


Illustration

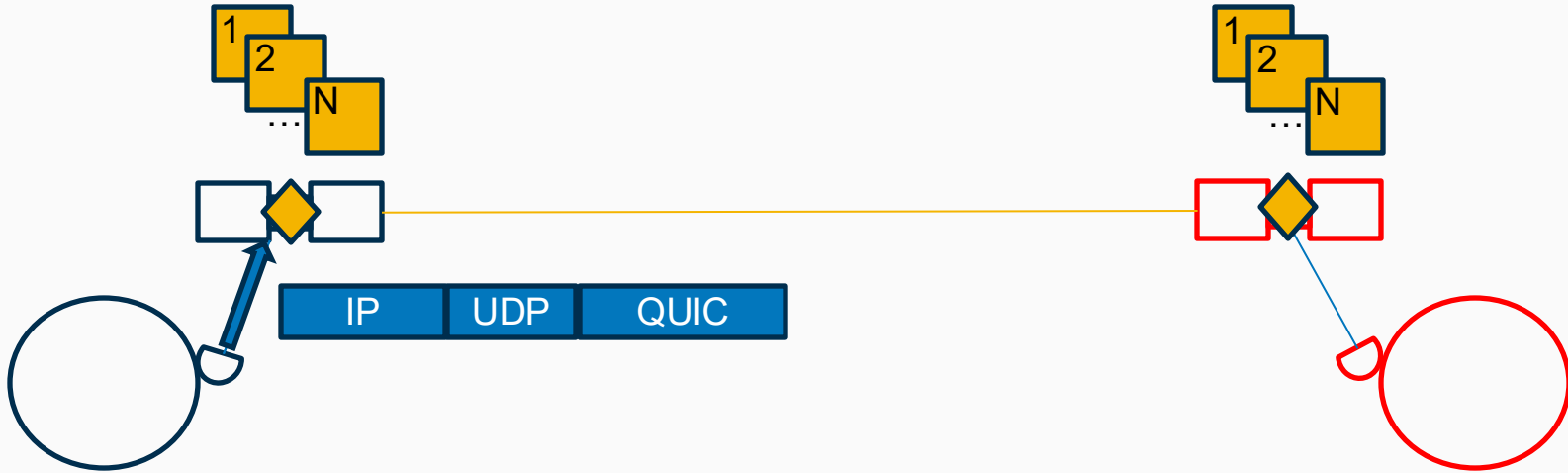


* Compression can happen on Earth, or any other place – this is just an illustration

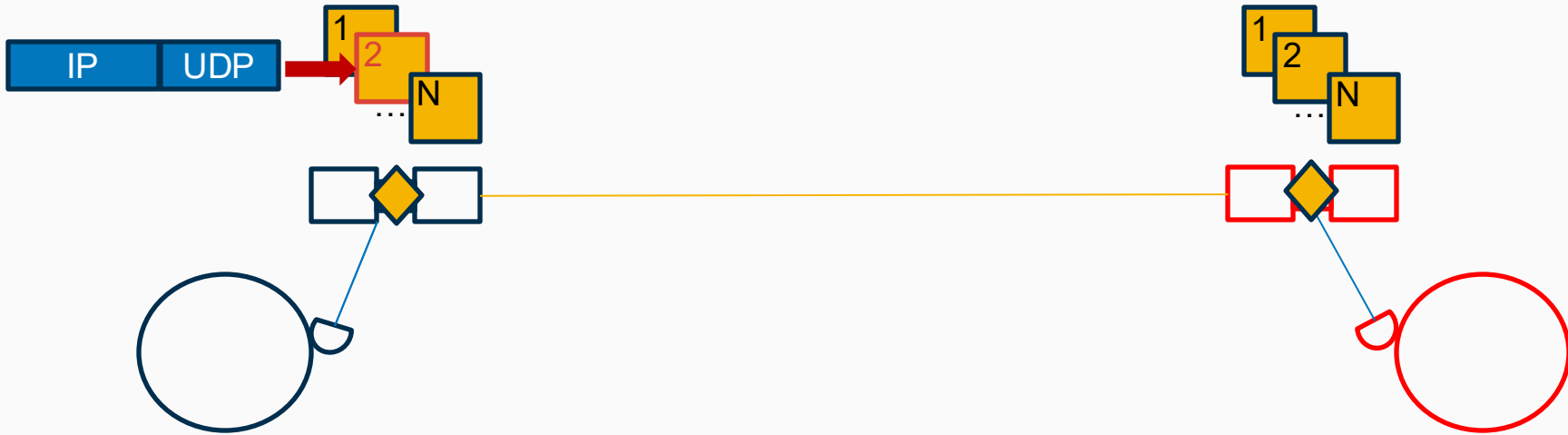
Illustration



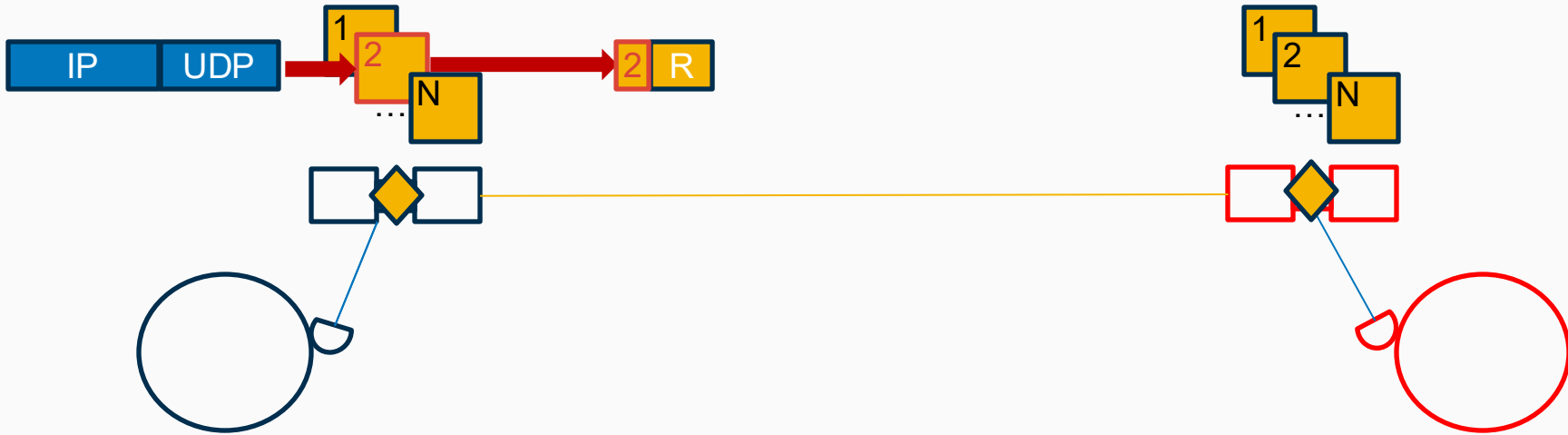
Illustration



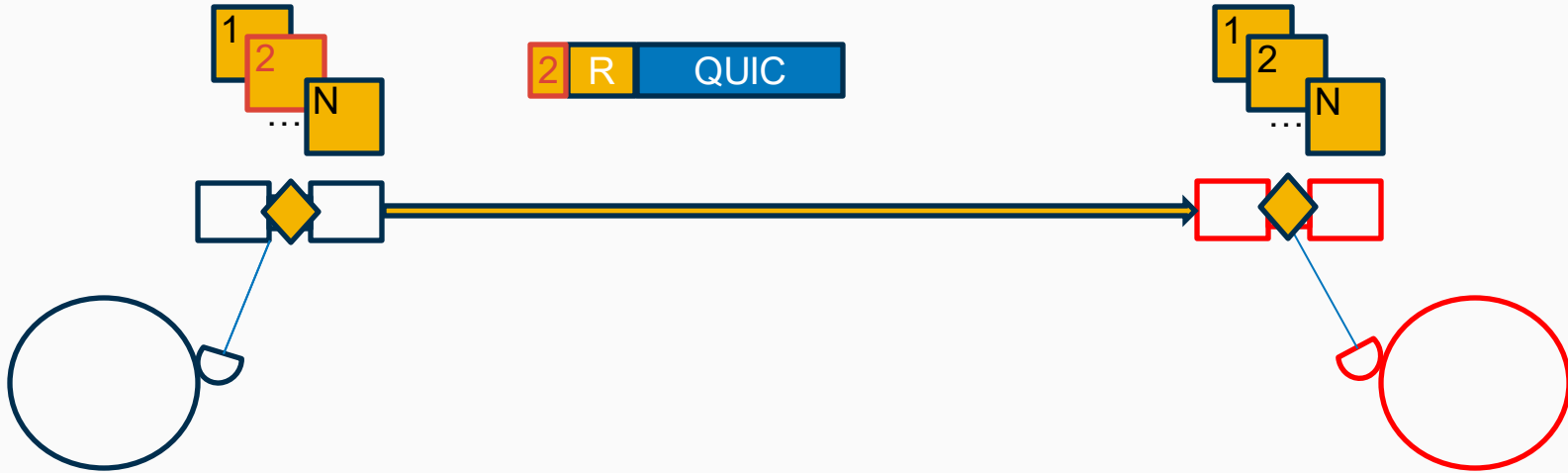
Illustration



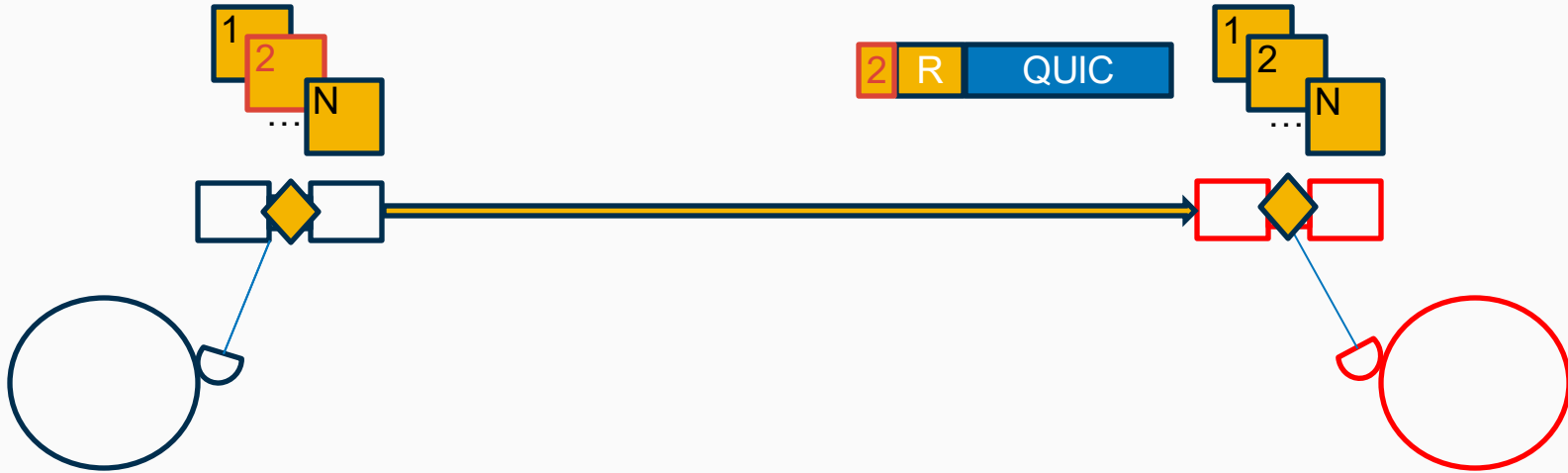
Illustration



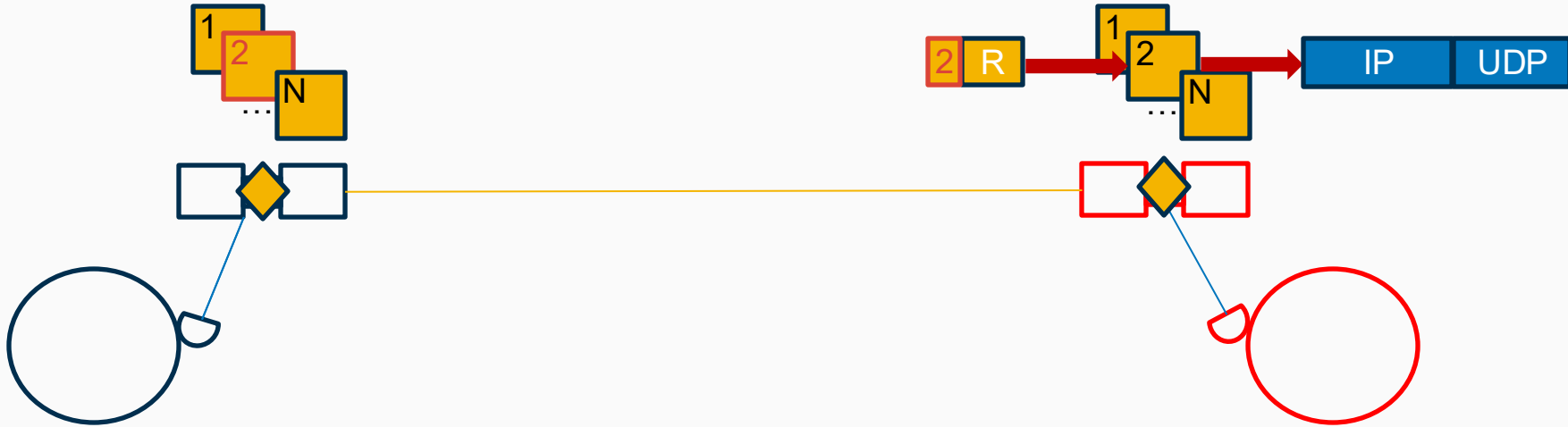
Illustration



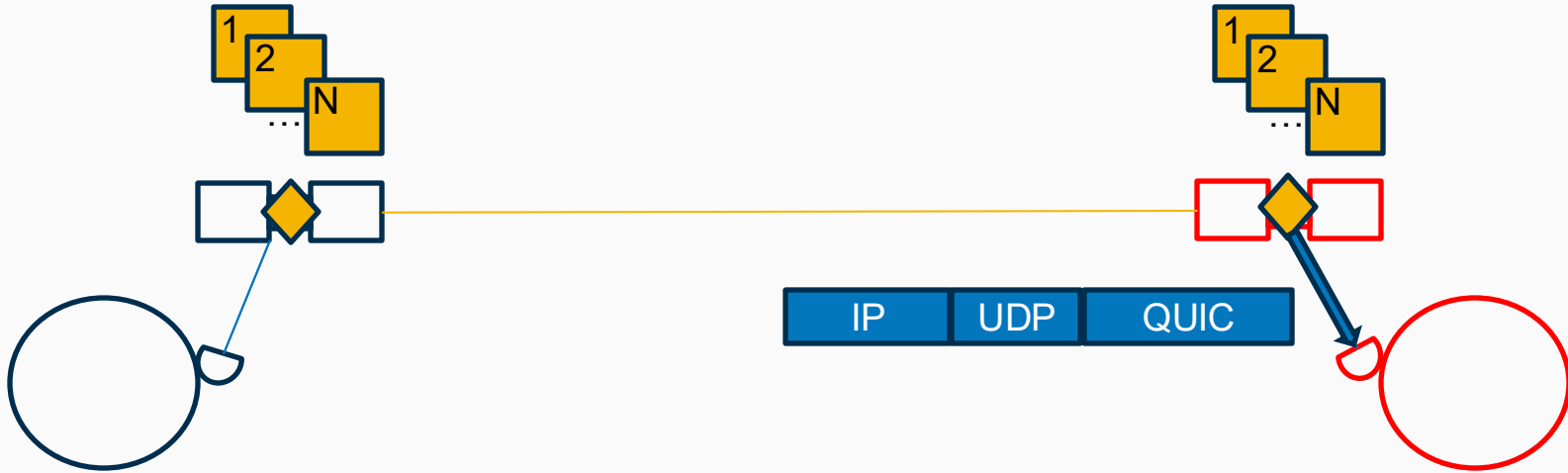
Illustration



Illustration



Illustration



Example of a rule used for selection, compression, and decompression



Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO	CDA
IPv6 Version	4	1	Bi	6	equal	not-sent
IPv6 Diffserv	8	1	Bi	0	equal	not-sent
IPv6 Flow Label	20	1	Bi	0	equal	not-sent
IPv6 Length	16	1	Bi		ignore	compute-*
IPv6 Next Header	8	1	Bi	17	equal	not-sent
IPv6 Hop Limit	8	1	Bi	64	equal	not-sent
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal	not-sent
IPv6 DevIID	64	1	Bi		ignore	sent
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal	not-sent
IPv6 AppIID	64	1	Bi	::1	equal	not-sent
UDP DevPort	16	1	Bi	49152	MSB(2)	LSB
UDP AppPort	16	1	Bi	443	equal	not-sent
UDP Length	16	1	Bi		ignore	compute-*
UDP Checksum	16	1	Bi		ignore	compute-*

FID = Field ID

FL = Field Length (bits); FP = Field Position (for IP/UDP always =1)

DI = Direction Indicator (Bidirectional, Up, Down)

MO = Matching Operator ; CDA = Compression/Decompression Action



Size of a rule: less than 50B

Why do it?

- Depending on traffic, expect 2%-10% gains
 - IPv6/UDP header (48B) can be compressed
 - Down to 1-2B, or 20B-30B in worst-case scenarios
 - IPv4/UDP header (28B) can be compressed
 - Down to 1-2B, or 15B-20B in worst-case scenarios
 - That is before FEC -> gains are bigger “on the wire”
 - If no compression rule exists for a traffic, it will be sent “as is”. That should be a rarity, but it means no service interruption or runtime complexity

It's not magic, depending on the flows, headers can be static by nature
(ex. 48B -> 1B ... 18B)

Source	Destination	Protocol	Length	Info
2001:db8:1::1	2606:4700:10::6816:826	QUIC	1292	Initial, DCID=203f9e9f68698274, PK
2606:4700:10::6816:826	2001:db8:1::1	QUIC	1262	Protected Payload (KP0)
2606:4700:10::6816:826	2001:db8:1::1	QUIC	1262	Protected Payload (KP0)
2606:4700:10::6816:826	2001:db8:1::1	QUIC	1262	Handshake, SCID=0130dfc5a047e6acd2
2606:4700:10::6816:826	2001:db8:1::1	QUIC	807	Handshake, SCID=0130dfc5a047e6acd2
2001:db8:1::1	2606:4700:10::6816:826	QUIC	115	Handshake, DCID=0130dfc5a047e6acd2
2001:db8:1::1	2606:4700:10::6816:826	QUIC	147	Handshake, DCID=0130dfc5a047e6acd2
2001:db8:1::1	2606:4700:10::6816:826	QUIC	143	Protected Payload (KP0), DCID=0130
2001:db8:1::1	2606:4700:10::6816:826	QUIC	540	Protected Payload (KP0), DCID=0130
2606:4700:10::6816:826	2001:db8:1::1	QUIC	648	Protected Payload (KP0)
2606:4700:10::6816:826	2001:db8:1::1	QUIC	86	Protected Payload (KP0)
2001:db8:1::1	2606:4700:10::6816:826	QUIC	107	Protected Payload (KP0), DCID=0130
2606:4700:10::6816:826	2001:db8:1::1	QUIC	86	Protected Payload (KP0)
2606:4700:10::6816:826	2001:db8:1::1	QUIC	111	Protected Payload (KP0)
2001:db8:1::1	2606:4700:10::6816:826	QUIC	109	Protected Payload (KP0), DCID=0130

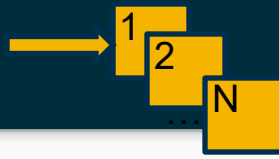
It's not magic, depending on the flows, headers can be static by nature (ex. 48B -> 1B ... 18B)

Source	Destination	Protocol	Length	Info
2001:db8:1::1	2606:4700:10::6816:826	QUIC	1292	Initial, DCID=203f9e9f68698274, PK
2606:4700:10::6816:826	2001:db8:1::1	QUIC	1262	Protected Payload (KP0)
2606:4700:10::6816:826	2001:db8:1::1	QUIC	1262	Protected Payload (KP0)
2606:4700:10::6816:826	2001:db8:1::1	QUIC	1262	Handshake, SCID=0130dfc5a047e6acd2
2606:4700:10::6816:826	Internet Protocol Version 6, Src: 2001:db8:1::1, Dst: 2606:4700:10::6816:826			
2001:db8:1::1	0110 = Version: 6			
2001:db8:1::1	▶ 0000 0000 = Traffic Class: 0x00 (DSCP: CS0)			
2001:db8:1::1	 0011 0000 0000 0000 0000 = Flow Label: 0x0000			
2001:db8:1::1	Payload Length: 486			
2001:db8:1::1	Next Header: UDP (17)			
2606:4700:10::6816:826	Hop Limit: 64			
2606:4700:10::6816:826	Source Address: 2001:db8:1::1			
2001:db8:1::1	Destination Address: 2606:4700:10::6816:826			
2606:4700:10::6816:826	▶ [Destination GeoIP: ASN 13335, CLOUDFLARENET]			
2606:4700:10::6816:826	User Datagram Protocol, Src Port: 50280, Dst Port: 443			
2606:4700:10::6816:826	Source Port: 50280			
2001:db8:1::1	Destination Port: 443			
2001:db8:1::1	Length: 486			
2001:db8:1::1	Checksum: 0x8df1 [unverified]			
2001:db8:1::1	[Checksum Status: Unverified]			
2001:db8:1::1	[Stream index: 0]			
2001:db8:1::1	▶ [Timestamps]			
2001:db8:1::1	UDP payload (478 bytes)			

60 00 00 00 01 e6 11 40 20 01 0d b8 00 01 00 00 00 00 00 00 00 01 26 06 47 00 00 10 00 00 00 00 00 68 16 08 26 c4 6801 bb 01 e6 8d f1



Example Matching



60 00 00 00 01 e6 11 40 20 01 0d b8 00 01 00 00 00 00 00 00 00 01 26 06 47 00 00 10 00 00 00 00 00 68 16 08 26 c4 6801 bb 01 e6 8d f1

Rule ID = 1, size 2 bits

FID	FL	FP	DI	TV	MO
IPv4 Version	4	1	Bi	4	equal
IPv4 IHL	4	1	Bi	5	equal
IPv4 DSCP	6	1	Bi	0	equal
IPv4 ECN	2	1	Bi	0	equal
IPv4 Total Length	16	1	Bi		ignore
IPv4 Identification	16	1	Bi		ignore
IPv4 Flags	3	1	Bi	0	equal
IPv4 FragmentOff	13	1	Bi	0	equal
IPv4 TTL	8	1	Bi	64	equal
IPv4 Protocol	8	1	Bi	17	equal
IPv4 Header Checksum	16	1	Bi		ignore
IPv4 DevAddress	32	1	Bi	192.0.2.1	equal
IPv4 AppAddress	32	1	Bi	192.0.2.100	equal
UDP DevPort	16	1	Bi	49152	MSB(2)
UDP AppPort	16	1	Bi	443	equal
UDP Length	16	1	Bi		ignore
UDP Checksum	16	1	Bi		ignore

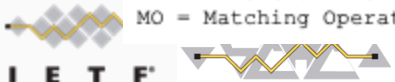
X

FID = Field ID

FL = Field Length (bits); FP = Field Position (for IP/UDP always =1)

DI = Direction Indicator (Bidirectional, Up, Down)

MO = Matching Operator ; CDA = Compression/Decompression Action



Example Matching



60 00 00 00 01 e6 11 40 20 01 0d b8 00 01 00 00 00 00 00 00 00 01 26 06 47 00 00 10 00 00 00 00 00 68 16 08 26 c4 6801 bb 01 e6 8d f1

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO
IPv6 Version	4	1	Bi	6	equal
IPv6 Diffserv	8	1	Bi	0	equal
IPv6 Flow Label	20	1	Bi	0	equal
IPv6 Length	16	1	Bi		ignore
IPv6 Next Header	8	1	Bi	17	equal
IPv6 Hop Limit	8	1	Bi	64	equal
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal
IPv6 DevIID	64	1	Bi		ignore
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal
IPv6 AppIID	64	1	Bi	::1	equal
UDP DevPort	16	1	Bi	49152	MSB(2)
UDP AppPort	16	1	Bi	443	equal
UDP Length	16	1	Bi		ignore
UDP Checksum	16	1	Bi		ignore



FID = Field ID

FL = Field Length (bits); FP = Field Position (for IP/UDP al

DI = Direction Indicator (Bidirectional, Up, Down)

MO = Matching Operator ; CDA = Compression/Decompression Act

Example Matching



60 00 00 00 01 e6 11 40 20 01 0d b8 00 01 00 00 00 00 00 00 00 01 26 06 47 00 00 10 00 00 00 00 00 68 16 08 26 c4 6801 bb 01 e6 8d f1

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO
IPv6 Version	4	1	Bi	6	equal
IPv6 Diffserv	8	1	Bi	0	equal
IPv6 Flow Label	20	1	Bi	0	equal
IPv6 Length	16	1	Bi		ignore
IPv6 Next Header	8	1	Bi	17	equal
IPv6 Hop Limit	8	1	Bi	64	equal
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal
IPv6 DevIID	64	1	Bi		ignore
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal
IPv6 AppIID	64	1	Bi	::1	equal
UDP DevPort	16	1	Bi	49152	MSB(2)
UDP AppPort	16	1	Bi	443	equal
UDP Length	16	1	Bi		ignore
UDP Checksum	16	1	Bi		ignore



FID = Field ID

FL = Field Length (bits); FP = Field Position (for IP/UDP al

DI = Direction Indicator (Bidirectional, Up, Down)

MO = Matching Operator ; CDA = Compression/Decompression Act

Example Matching



60 00 00 00 01 e6 11 40 20 01 0d b8 00 01 00 00 00 00 00 00 00 01 26 06 47 00 00 10 00 00 00 00 00 68 16 08 26 c4 6801 bb 01 e6 8d f1

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO
IPv6 Version	4	1	Bi	6	equal
IPv6 Diffserv	8	1	Bi	0	equal
IPv6 Flow Label	20	1	Bi	0	equal
IPv6 Length	16	1	Bi		ignore
IPv6 Next Header	8	1	Bi	17	equal
IPv6 Hop Limit	8	1	Bi	64	equal
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal
IPv6 DevIID	64	1	Bi		ignore
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal
IPv6 AppIID	64	1	Bi	::1	equal
UDP DevPort	16	1	Bi	49152	MSB(2)
UDP AppPort	16	1	Bi	443	equal
UDP Length	16	1	Bi		ignore
UDP Checksum	16	1	Bi		ignore



FID = Field ID

FL = Field Length (bits); FP = Field Position (for IP/UDP al

DI = Direction Indicator (Bidirectional, Up, Down)

MO = Matching Operator ; CDA = Compression/Decompression Act

Example Matching



~~60 00 00 00~~ 01 e6 11 40 20 01 0d b8 00 01 00 00 00 00 00 00 00 01 26 06 47 00 00 10 00 00 00 00 00 68 16 08 26 c4 68 01 bb 01 e6 8d f1

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO
IPv6 Version	4	1	Bi	6	equal
IPv6 Diffserv	8	1	Bi	0	equal
IPv6 Flow Label	20	1	Bi	0	equal
IPv6 Length	16	1	Bi		ignore
IPv6 Next Header	8	1	Bi	17	equal
IPv6 Hop Limit	8	1	Bi	64	equal
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal
IPv6 DevIID	64	1	Bi		ignore
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal
IPv6 AppIID	64	1	Bi	::1	equal
UDP DevPort	16	1	Bi	49152	MSB(2)
UDP AppPort	16	1	Bi	443	equal
UDP Length	16	1	Bi		ignore
UDP Checksum	16	1	Bi		ignore



FID = Field ID

FL = Field Length (bits); FP = Field Position (for IP/UDP al

DI = Direction Indicator (Bidirectional, Up, Down)

MO = Matching Operator ; CDA = Compression/Decompression Act

Example Matching



60 00 00 00 04 e6 11 40 20 01 0d b8 00 01 00 00 00 00 00 00 00 01 26 06 47 00 00 10 00 00 00 00 00 68 16 08 26 c4 6801 bb 01 e6 8d f1

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO
IPv6 Version	4	1	Bi	6	equal
IPv6 Diffserv	8	1	Bi	0	equal
IPv6 Flow Label	20	1	Bi	0	equal
IPv6 Length	16	1	Bi		ignore
IPv6 Next Header	8	1	Bi	17	equal
IPv6 Hop Limit	8	1	Bi	64	equal
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal
IPv6 DevIID	64	1	Bi		ignore
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal
IPv6 AppIID	64	1	Bi	::1	equal
UDP DevPort	16	1	Bi	49152	MSB(2)
UDP AppPort	16	1	Bi	443	equal
UDP Length	16	1	Bi		ignore
UDP Checksum	16	1	Bi		ignore



FID = Field ID

FL = Field Length (bits); FP = Field Position (for IP/UDP al

DI = Direction Indicator (Bidirectional, Up, Down)

MO = Matching Operator ; CDA = Compression/Decompression Act

Example Matching



60 00 00 00 01 e6 11 40 20 01 0d b8 00 01 00 00 00 00 00 00 00 00 01 26 06 47 00 00 10 00 00 00 00 00 68 16 08 26 c4 68 01 bb 01 e6 8d f1

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO
IPv6 Version	4	1	Bi	6	equal
IPv6 Diffserv	8	1	Bi	0	equal
IPv6 Flow Label	20	1	Bi	0	equal
IPv6 Length	16	1	Bi		ignore
IPv6 Next Header	8	1	Bi	17	equal
IPv6 Hop Limit	8	1	Bi	64	equal
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal
IPv6 DevIID	64	1	Bi		ignore
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal
IPv6 AppIID	64	1	Bi	::1	equal
UDP DevPort	16	1	Bi	49152	MSB(2)
UDP AppPort	16	1	Bi	443	equal
UDP Length	16	1	Bi		ignore
UDP Checksum	16	1	Bi		ignore



FID = Field ID

FL = Field Length (bits); FP = Field Position (for IP/UDP al

DI = Direction Indicator (Bidirectional, Up, Down)

MO = Matching Operator ; CDA = Compression/Decompression Act

Example Matching



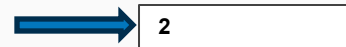
60 00 00 00 01 c6 11 40 20 01 0d b8 00 01 00 00 00 00 00 00 00 00 01 26 06 47 00 00 10 00 00 00 00 00 68 16 08 26 c4 68 01 bb 01 c6 8d f1

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO
IPv6 Version	4	1	Bi	6	equal
IPv6 Diffserv	8	1	Bi	0	equal
IPv6 Flow Label	20	1	Bi	0	equal
IPv6 Length	16	1	Bi		ignore
IPv6 Next Header	8	1	Bi	17	equal
IPv6 Hop Limit	8	1	Bi	64	equal
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal
IPv6 DevIID	64	1	Bi		ignore
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal
IPv6 AppIID	64	1	Bi	::1	equal
UDP DevPort	16	1	Bi	49152	MSB(2)
UDP AppPort	16	1	Bi	443	equal
UDP Length	16	1	Bi		ignore
UDP Checksum	16	1	Bi		ignore



Rule Nr 2 matches this packet!
Use it for compression!



FID = Field ID

FL = Field Length (bits); FP = Field Position (for IP/UDP al

DI = Direction Indicator (Bidirectional, Up, Down)

MO = Matching Operator ; CDA = Compression/Decompression Act

Example Compression



69 00 00 00 01 e6 11 40 20 01 0d b8 00 01 00 00 00 00 00 00 00 01 26 06 47 00 00 10 00 00 00 00 00 68 16 08 26 c4 68 01 bb 01 e6 8d f1

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO	CDA	Sent [bits]
IPv6 Version	4	1	Bi	6	equal	not-sent	0
IPv6 Diffserv	8	1	Bi	0	equal	not-sent	0
IPv6 Flow Label	20	1	Bi	0	equal	not-sent	0
IPv6 Length	16	1	Bi		ignore	compute-*	0
IPv6 Next Header	8	1	Bi	17	equal	not-sent	0
IPv6 Hop Limit	8	1	Bi	64	equal	not-sent	0
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal	not-sent	0
IPv6 DevIID	64	1	Bi		ignore	sent	64
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal	not-sent	0
IPv6 AppIID	64	1	Bi	::1	equal	not-sent	0
UDP DevPort	16	1	Bi	49152	MSB(2)	LSB	14
UDP AppPort	16	1	Bi	443	equal	not-sent	0
UDP Length	16	1	Bi		ignore	compute-*	0
UDP Checksum	16	1	Bi		ignore	compute-*	0

FID = Field ID

FL = Field Length (bits); FP = Field Position (for IP/UDP always =1)

DI = Direction Indicator (Bidirectional, Up, Down)

MO = Matching Operator ; CDA = Compression/Decompression Action

2

Example Compression



60 00 00 00 01 e6 11 40 20 01 0d b8 00 01 00 00 00 00 00 00 00 01 26 06 47 00 00 10 00 00 00 00 00 68 16 08 26 c4 68 01 bb 01 e6 8d f1

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO	CDA	Sent [bits]
IPv6 Version	4	1	Bi	6	equal	not-sent	0
IPv6 Diffserv	8	1	Bi	0	equal	not-sent	0
IPv6 Flow Label	20	1	Bi	0	equal	not-sent	0
IPv6 Length	16	1	Bi		ignore	compute-*	0
IPv6 Next Header	8	1	Bi	17	equal	not-sent	0
IPv6 Hop Limit	8	1	Bi	64	equal	not-sent	0
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal	not-sent	0
IPv6 DevIID	64	1	Bi		ignore	sent	64
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal	not-sent	0
IPv6 AppIID	64	1	Bi	::1	equal	not-sent	0
UDP DevPort	16	1	Bi	49152	MSB(2)	LSB	14
UDP AppPort	16	1	Bi	443	equal	not-sent	0
UDP Length	16	1	Bi		ignore	compute-*	0
UDP Checksum	16	1	Bi		ignore	compute-*	0

FID = Field ID

FL = Field Length (bits); FP = Field Position (for IP/UDP always =1)

DI = Direction Indicator (Bidirectional, Up, Down)

MO = Matching Operator ; CDA = Compression/Decompression Action

2

Example Compression



60 00 00 00 01 e6 11 40 20 01 0d b8 00 01 00 00 00 00 00 00 00 01 26 06 47 00 00 10 00 00 00 00 00 68 16 08 26 c4 68 01 bb 01 e6 8d f1

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO	CDA	Sent [bits]
IPv6 Version	4	1	Bi	6	equal	not-sent	0
IPv6 Diffserv	8	1	Bi	0	equal	not-sent	0
IPv6 Flow Label	20	1	Bi	0	equal	not-sent	0
IPv6 Length	16	1	Bi		ignore	compute-*	0
IPv6 Next Header	8	1	Bi	17	equal	not-sent	0
IPv6 Hop Limit	8	1	Bi	64	equal	not-sent	0
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal	not-sent	0
IPv6 DevIID	64	1	Bi		ignore	sent	64
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal	not-sent	0
IPv6 AppIID	64	1	Bi	::1	equal	not-sent	0
UDP DevPort	16	1	Bi	49152	MSB(2)	LSB	14
UDP AppPort	16	1	Bi	443	equal	not-sent	0
UDP Length	16	1	Bi		ignore	compute-*	0
UDP Checksum	16	1	Bi		ignore	compute-*	0

FID = Field ID

FL = Field Length (bits); FP = Field Position (for IP/UDP always =1)

DI = Direction Indicator (Bidirectional, Up, Down)

MO = Matching Operator ; CDA = Compression/Decompression Action

2

Example Compression



~~60 00 00 00~~ 01 e6 11 40 20 01 0d b8 00 01 00 00 00 00 00 00 00 01 26 06 47 00 00 10 00 00 00 00 00 68 16 08 26 c4 68 01 bb 01 e6 8d f1

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO	CDA	Sent [bits]
IPv6 Version	4	1	Bi	6	equal	not-sent	0
IPv6 Diffserv	8	1	Bi	0	equal	not-sent	0
IPv6 Flow Label	20	1	Bi	0	equal	not-sent	0
IPv6 Length	16	1	Bi		ignore	compute-*	0
IPv6 Next Header	8	1	Bi	17	equal	not-sent	0
IPv6 Hop Limit	8	1	Bi	64	equal	not-sent	0
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal	not-sent	0
IPv6 DevIID	64	1	Bi		ignore	sent	64
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal	not-sent	0
IPv6 AppIID	64	1	Bi	::1	equal	not-sent	0
UDP DevPort	16	1	Bi	49152	MSB(2)	LSB	14
UDP AppPort	16	1	Bi	443	equal	not-sent	0
UDP Length	16	1	Bi		ignore	compute-*	0
UDP Checksum	16	1	Bi		ignore	compute-*	0

FID = Field ID

FL = Field Length (bits); FP = Field Position (for IP/UDP always =1)

DI = Direction Indicator (Bidirectional, Up, Down)

MO = Matching Operator ; CDA = Compression/Decompression Action

2

Example Compression



60 00 00 00 01 e6 11 40 20 01 0d b8 00 01 00 00 00 00 00 00 00 01 26 06 47 00 00 10 00 00 00 00 00 68 16 08 26 c4 68 01 bb 01 e6 8d f1

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO	CDA	Sent [bits]
IPv6 Version	4	1	Bi	6	equal	not-sent	0
IPv6 Diffserv	8	1	Bi	0	equal	not-sent	0
IPv6 Flow Label	20	1	Bi	0	equal	not-sent	0
IPv6 Length	16	1	Bi		ignore	compute-*	0
IPv6 Next Header	8	1	Bi	17	equal	not-sent	0
IPv6 Hop Limit	8	1	Bi	64	equal	not-sent	0
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal	not-sent	0
IPv6 DevIID	64	1	Bi		ignore	sent	64
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal	not-sent	0
IPv6 AppIID	64	1	Bi	::1	equal	not-sent	0
UDP DevPort	16	1	Bi	49152	MSB(2)	LSB	14
UDP AppPort	16	1	Bi	443	equal	not-sent	0
UDP Length	16	1	Bi		ignore	compute-*	0
UDP Checksum	16	1	Bi		ignore	compute-*	0

FID = Field ID

FL = Field Length (bits); FP = Field Position (for IP/UDP always =1)

DI = Direction Indicator (Bidirectional, Up, Down)

MO = Matching Operator ; CDA = Compression/Decompression Action

80 00 00 00 1A 05 82 09 00

First two bits are 10 == 2
0x8 = 1000

Example Compression



60 00 00 00 01 e6 11 40 20 01 0d b8 00 01 00 00 00 00 00 00 00 00 01 26 06 47 00 00 10 00 00 00 00 00 68 16 08 26 c4 68 01 bb 01 e6 8d f1

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO	CDA	Sent [bits]
IPv6 Version	4	1	Bi	6	equal	not-sent	0
IPv6 Diffserv	8	1	Bi	0	equal	not-sent	0
IPv6 Flow Label	20	1	Bi	0	equal	not-sent	0
IPv6 Length	16	1	Bi		ignore	compute-*	0
IPv6 Next Header	8	1	Bi	17	equal	not-sent	0
IPv6 Hop Limit	8	1	Bi	64	equal	not-sent	0
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal	not-sent	0
IPv6 DevIID	64	1	Bi		ignore	sent	64
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal	not-sent	0
IPv6 AppIID	64	1	Bi	::1	equal	not-sent	0
UDP DevPort	16	1	Bi	49152	MSB(2)	LSB	14
UDP AppPort	16	1	Bi	443	equal	not-sent	0
UDP Length	16	1	Bi		ignore	compute-*	0
UDP Checksum	16	1	Bi		ignore	compute-*	0

80 00 00 00 1A 05 82 09 11 A8

FID = Field ID

FL = Field Length (bits); FP = Field Position (for IP/UDP always =1)

DI = Direction Indicator (Bidirectional, Up, Down)

MO = Matching Operator ; CDA = Compression/Decompression Action

Example Compression



~~60 00 00 00 01 c6 11 40 20 01 0d b8 00 01 00 00 00 00 00 00 00 00 01 26 06 47 00 00 10 00 00 00 00 00 00 68 16 08 26 c4 68 01 bb 01 c6 8d f1~~

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO	CDA	Sent [bits]
IPv6 Version	4	1	Bi	6	equal	not-sent	0
IPv6 Diffserv	8	1	Bi	0	equal	not-sent	0
IPv6 Flow Label	20	1	Bi	0	equal	not-sent	0
IPv6 Length	16	1	Bi		ignore	compute-*	0
IPv6 Next Header	8	1	Bi	17	equal	not-sent	0
IPv6 Hop Limit	8	1	Bi	64	equal	not-sent	0
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal	not-sent	0
IPv6 DevIID	64	1	Bi		ignore	sent	64
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal	not-sent	0
IPv6 AppIID	64	1	Bi	::1	equal	not-sent	0
UDP DevPort	16	1	Bi	49152	MSB(2)	LSB	14
UDP AppPort	16	1	Bi	443	equal	not-sent	0
UDP Length	16	1	Bi		ignore	compute-*	0
UDP Checksum	16	1	Bi		ignore	compute-*	0

FID = Field ID

FL = Field Length (bits); FP = Field Position (for IP/UDP always =1)

DI = Direction Indicator (Bidirectional, Up, Down)

MO = Matching Operator ; CDA = Compression/Decompression Action

48B

10B

80 00 00 00 1A 05 82 09 11 A8

Compressed SCHC datagram

Example Decompression

80 00 00 00 1A 05 82 09 11 A8

RuleID = 2 (size 2 bits)

00 00 00 00 68 16 08 24 46 A0

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO	CDA	Sent [bits]
IPv6 Version	4	1	Bi	6	equal	not-sent	0
IPv6 Diffserv	8	1	Bi	0	equal	not-sent	0
IPv6 Flow Label	20	1	Bi	0	equal	not-sent	0
IPv6 Length	16	1	Bi		ignore	compute-*	0
IPv6 Next Header	8	1	Bi	17	equal	not-sent	0
IPv6 Hop Limit	8	1	Bi	64	equal	not-sent	0
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal	not-sent	0
IPv6 DevIID	64	1	Bi		ignore	sent	64
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal	not-sent	0
IPv6 AppIID	64	1	Bi	::1	equal	not-sent	0
UDP DevPort	16	1	Bi	49152	MSB(2)	LSB	14
UDP AppPort	16	1	Bi	443	equal	not-sent	0
UDP Length	16	1	Bi		ignore	compute-*	0
UDP Checksum	16	1	Bi		ignore	compute-*	0

6



Example Decompression

80 00 00 00 1A 05 82 09 11 A8

RuleID = 2 (size 2 bits)

00 00 00 00 68 16 08 24 46 A0

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO	CDA	Sent [bits]
IPv6 Version	4	1	Bi	6	equal	not-sent	0
IPv6 Diffserv	8	1	Bi	0	equal	not-sent	0
IPv6 Flow Label	20	1	Bi	0	equal	not-sent	0
IPv6 Length	16	1	Bi		ignore	compute-*	0
IPv6 Next Header	8	1	Bi	17	equal	not-sent	0
IPv6 Hop Limit	8	1	Bi	64	equal	not-sent	0
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal	not-sent	0
IPv6 DevIID	64	1	Bi		ignore	sent	64
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal	not-sent	0
IPv6 AppIID	64	1	Bi	::1	equal	not-sent	0
UDP DevPort	16	1	Bi	49152	MSB(2)	LSB	14
UDP AppPort	16	1	Bi	443	equal	not-sent	0
UDP Length	16	1	Bi		ignore	compute-*	0
UDP Checksum	16	1	Bi		ignore	compute-*	0

60 0



Example - decompression

80 00 00 00 1A 05 82 09 11 A8

RuleD = 2 (size 2 bits)

Rule ID = 2, size 2 bits

00 00 00 00 68 16 08 24 46 A0

FID	FL	FP	DI	TV	MO	CDA	Sent [bits]
IPv6 Version	4	1	Bi	6	equal	not-sent	0
IPv6 Diffserv	8	1	Bi	0	equal	not-sent	0
IPv6 Flow Label	20	1	Bi	0	equal	not-sent	0
IPv6 Length	16	1	Bi		ignore	compute-*	0
IPv6 Next Header	8	1	Bi	17	equal	not-sent	0
IPv6 Hop Limit	8	1	Bi	64	equal	not-sent	0
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal	not-sent	0
IPv6 DevIID	64	1	Bi		ignore	sent	64
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal	not-sent	0
IPv6 AppIID	64	1	Bi	::1	equal	not-sent	0
UDP DevPort	16	1	Bi	49152	MSB(2)	LSB	14
UDP AppPort	16	1	Bi	443	equal	not-sent	0
UDP Length	16	1	Bi		ignore	compute-*	0
UDP Checksum	16	1	Bi		ignore	compute-*	0

60 00 00 00

Example - decompression

80 00 00 00 1A 05 82 09 11 A8

RuleID = 2 (size 2 bits)

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO	CDA	Sent [bits]
IPv6 Version	4	1	Bi	6	equal	not-sent	0
IPv6 Diffserv	8	1	Bi	0	equal	not-sent	0
IPv6 Flow Label	20	1	Bi	0	equal	not-sent	0
IPv6 Length	16	1	Bi		ignore	compute-*	0
IPv6 Next Header	8	1	Bi	17	equal	not-sent	0
IPv6 Hop Limit	8	1	Bi	64	equal	not-sent	0
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal	not-sent	0
IPv6 DevIID	64	1	Bi		ignore	sent	64
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal	not-sent	0
IPv6 AppIID	64	1	Bi	::1	equal	not-sent	0
UDP DevPort	16	1	Bi	49152	MSB(2)	LSB	14
UDP AppPort	16	1	Bi	443	equal	not-sent	0
UDP Length	16	1	Bi		ignore	compute-*	0
UDP Checksum	16	1	Bi		ignore	compute-*	0

00 00 00 00 68 16 08 24 46 A0

60 00 00 00 01 e6



Example - decompression

80 00 00 00 1A 05 82 09 11 A8

RuleID = 2 (size 2 bits)

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO	CDA	Sent [bits]
IPv6 Version	4	1	Bi	6	equal	not-sent	0
IPv6 Diffserv	8	1	Bi	0	equal	not-sent	0
IPv6 Flow Label	20	1	Bi	0	equal	not-sent	0
IPv6 Length	16	1	Bi		ignore	compute-*	0
IPv6 Next Header	8	1	Bi	17	equal	not-sent	0
IPv6 Hop Limit	8	1	Bi	64	equal	not-sent	0
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal	not-sent	0
IPv6 DevIID	64	1	Bi		ignore	sent	64
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal	not-sent	0
IPv6 AppIID	64	1	Bi	::1	equal	not-sent	0
UDP DevPort	16	1	Bi	49152	MSB(2)	LSB	14
UDP AppPort	16	1	Bi	443	equal	not-sent	0
UDP Length	16	1	Bi		ignore	compute-*	0
UDP Checksum	16	1	Bi		ignore	compute-*	0

00 00 00 00 68 16 08 24 46 A0

60 00 00 00 01 e6 11

Example - decompression

80 00 00 00 1A 05 82 09 11 A8

RuleID = 2 (size 2 bits)

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO	CDA	Sent [bits]
IPv6 Version	4	1	Bi	6	equal	not-sent	0
IPv6 Diffserv	8	1	Bi	0	equal	not-sent	0
IPv6 Flow Label	20	1	Bi	0	equal	not-sent	0
IPv6 Length	16	1	Bi		ignore	compute-*	0
IPv6 Next Header	8	1	Bi	17	equal	not-sent	0
IPv6 Hop Limit	8	1	Bi	64	equal	not-sent	0
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal	not-sent	0
IPv6 DevIID	64	1	Bi		ignore	sent	64
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal	not-sent	0
IPv6 AppIID	64	1	Bi	::1	equal	not-sent	0
UDP DevPort	16	1	Bi	49152	MSB(2)	LSB	14
UDP AppPort	16	1	Bi	443	equal	not-sent	0
UDP Length	16	1	Bi		ignore	compute-*	0
UDP Checksum	16	1	Bi		ignore	compute-*	0

00 00 00 00 68 16 08 24 46 A0

60 00 00 00 01 e6 11 40 20 01 0d b8 00 01 00 00

Example - decompression

80 00 00 00 1A 05 82 09 11 A8

RuleID = 2 (size 2 bits)

Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO	CDA	Sent [bits]
IPv6 Version	4	1	Bi	6	equal	not-sent	0
IPv6 Diffserv	8	1	Bi	0	equal	not-sent	0
IPv6 Flow Label	20	1	Bi	0	equal	not-sent	0
IPv6 Length	16	1	Bi		ignore	compute-*	0
IPv6 Next Header	8	1	Bi	17	equal	not-sent	0
IPv6 Hop Limit	8	1	Bi	64	equal	not-sent	0
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal	not-sent	0
IPv6 DevIID	64	1	Bi		ignore	sent	64
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal	not-sent	0
IPv6 AppIID	64	1	Bi	::1	equal	not-sent	0
UDP DevPort	16	1	Bi	49152	MSB(2)	LSB	14
UDP AppPort	16	1	Bi	443	equal	not-sent	0
UDP Length	16	1	Bi		ignore	compute-*	0
UDP Checksum	16	1	Bi		ignore	compute-*	0

00 00 00 00 68 16 08 24 46 A0

60 00 00 00 01 e6 11 40 20 01 0d b8 00 01 00 00 00 00 00 00 00 01 26 06 47 00 00 10 00 00 00 00 00 68 16 08

Example - decompression

80 00 00 00 1A 05 82 09 11 A8

RuleID = 2 (size 2 bits)

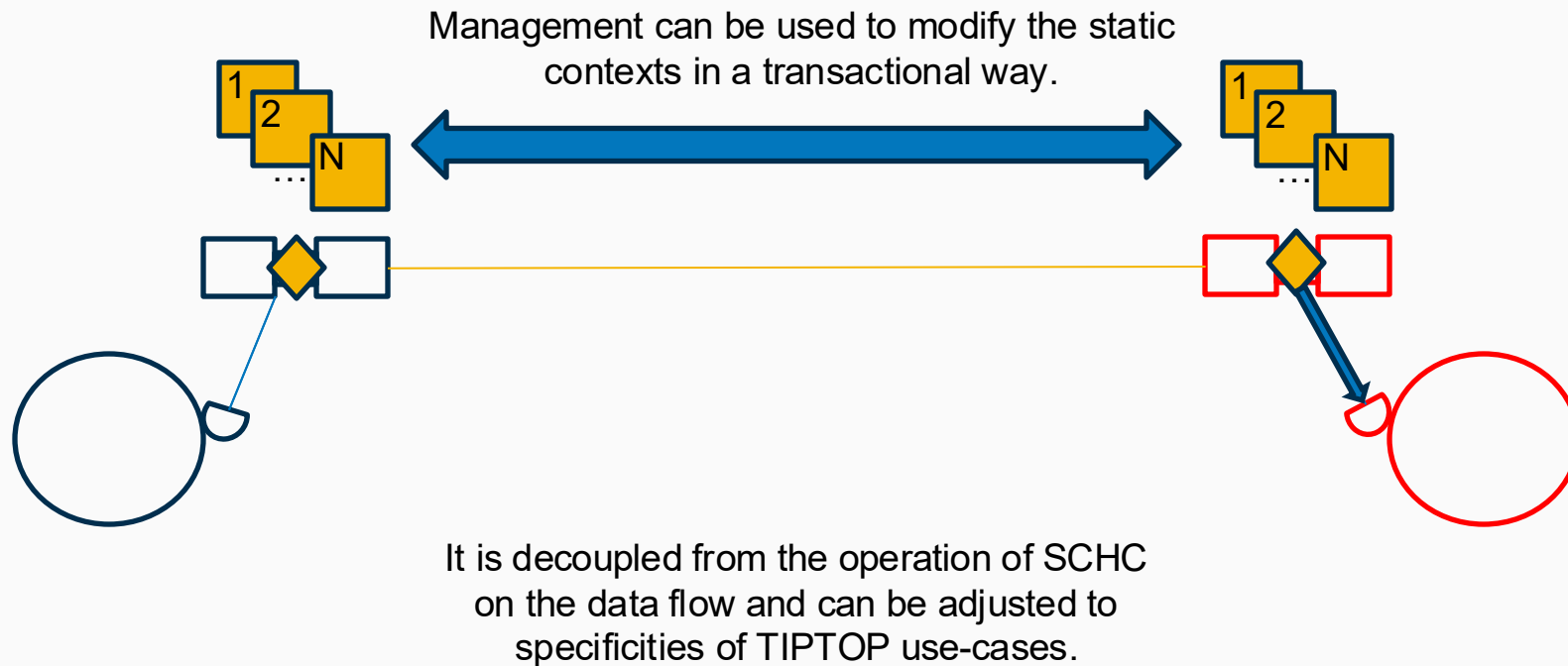
Rule ID = 2, size 2 bits

FID	FL	FP	DI	TV	MO	CDA	Sent [bits]
IPv6 Version	4	1	Bi	6	equal	not-sent	0
IPv6 Diffserv	8	1	Bi	0	equal	not-sent	0
IPv6 Flow Label	20	1	Bi	0	equal	not-sent	0
IPv6 Length	16	1	Bi		ignore	compute-*	0
IPv6 Next Header	8	1	Bi	17	equal	not-sent	0
IPv6 Hop Limit	8	1	Bi	64	equal	not-sent	0
IPv6 DevPrefix	64	1	Bi	2606:4700:10::/64	equal	not-sent	0
IPv6 DevIID	64	1	Bi		ignore	sent	64
IPv6 AppPrefix	64	1	Bi	2001:db8:1::/64	equal	not-sent	0
IPv6 AppIID	64	1	Bi	::1	equal	not-sent	0
UDP DevPort	16	1	Bi	49152	MSB(2)	LSB	14
UDP AppPort	16	1	Bi	443	equal	not-sent	0
UDP Length	16	1	Bi		ignore	compute-*	0
UDP Checksum	16	1	Bi		ignore	compute-*	0

60 00 00 00 01 e6 11 40 20 01 0d b8 00 01 00 00 00 00 00 00 00 01 26 06 47 00 00 10 00 00 00 00 00 68 16 08 26 c4 68 01 bb 01 e6 8d f1

Uncompressed packet

From baseline operation to more advanced operation



Next steps

- If interest – work on a profile for SCHC for TIPTOP
 - As it is a Framework, we can optimize for requirements coming from TIPTOP (e.g. implementation complexity, features, ...)
 - Work on quantifying expected gains (e.g. for TIPTOP traffic)
 - Having traffic traces (e.g. QUIC) from simulations would be great resource
 - Specify how SCHC is integrated in the TIPTOP framework
- Questions? Interest?