

# QUIC Updates

Spring 2019 Summit

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# Agenda

- IETF-QUIC
- ATS QUIC Project
- Interop Session Report
- Development Notes
- Open Issues
- Future Plans

# IETF-QUIC

Since the last ATS Fall 2018 Summit...

- 5 draft series (15 - 19) were published ( 03 - 07 for QPACK)
  - Rename HTTP over QUIC to HTTP/3
- Milestone is changed
- The bar of design changes is raised
  - Late-Stage Process
    - Invariants, Transport, and TLS
  - Early-Stage Process ( Still changing aggressively)
    - HTTP/3, QPACK, and Recovery

Date	↕ Milestone
May 2020	Multipath extension document to IESG
Dec 2019	Working group adoption of Multipath extension document
Jul 2019	QPACK: Header Compression for HTTP over QUIC to IESG <a href="#">draft-ietf-quick-qpack</a>
Jul 2019	Header Compression for HTTP over QUIC to IESG <a href="#">draft-ietf-quick-qcram</a>
Jul 2019	Version-Independent Properties of QUIC to IESG <a href="#">draft-thomson-quick-invariants</a>
Jul 2019	QUIC Applicability and Manageability Statement to IESG <a href="#">draft-ietf-quick-applicability</a> <a href="#">draft-ietf-quick-manageability</a>
Jul 2019	HTTP/2 mapping document to IESG <a href="#">draft-ietf-quick-http</a>
Jul 2019	TLS 1.3 Mapping document to IESG <a href="#">draft-ietf-quick-tls</a>
Jul 2019	Loss detection and Congestion Control document to IESG <a href="#">draft-ietf-quick-recovery</a>
Jul 2019	Core Protocol document to IESG <a href="#">draft-ietf-quick-transport</a>



# ATS QUIC Project

- Nov. 2018 :
  - IETF 103 / QUIC Interop Session
  - ATS QUIC Hackathon
- Jan. 2019 :
  - QUIC Interim Meeting / Interop Session
- Mar. 2019 :
  - QUIC Virtual Interop Session (online)
  - IETF 104 / QUIC Interop Session

# Criteria to merge quic-latest

- TARGET : ATS 9.0.\* (*not changed*)
- MERGING : Before 9.0.\* branching with one commit (*not changed*)
- CRITERIA
  - QUIC module is buildable on every supported platforms (✓ *ok*)
    - Ubuntu (18.04), CentOS (7), FreeBSD (12) and macOS (10.14) ... ( more platforms should be tested )
  - Pure OpenSSL (✗ *blocker*)
    - OpenSSL (master nor 1.1.1\*) still doesn't support APIs for QUIC
  - HTTP/QUIC is available (✓ *ok*)
    - ATS supports HTTP/3

# QUIC WG Interop Session

client ↓	h2o/quicly	quant	ngtcp2	mvfst	picoQUIC	winquic	f5	ATS	quiche	lsquic	ngx_quic	AppleQUIC	quic-go	Quinn
h2o/quicly	VHDCRZS 3	VHDCRZ	VHDCRZS	HDC 3	VHDCRZS 3	HDC	VHDCRS 3	VHDCRZS	VHDCS 3				VHDCS	
quant	VHDCRZ	VHDCRZS MBUPE	VHDCRZS MBU	VHDCRZ 3	VHDCRZS MBU3P	VHDCRZS P3	VHDCRS U3E	VHDCRZS M3	VHDCRS 3	VHDCRZS M3PE	VHDCR 3	VHDC M	VHDCRS	VHDCRZS MBUPE
ngtcp2	VHDCRZS	VHDCRZS U	VHDCRZS MBU	VHDCRZ	VHDCRZS MBU	VHDCRZS	VHDCRS U	VHDCRZS MB	VHDCRS	VHDCS	VHDC			VHDCRZS MBU
mvfst		HDC	VHDCRZ	VHDCRZ 3	VHDCRZ 3	VHDCRZ 3	HDC 3	VHDCRZ 3		VHDCRZ 3	HDC 3			HDC
picoQUIC	VHDCRZS 3	VHDCRZS MBUP	VHDCRZS MBU	VHDCRZ	VHDCRZS MBU3P	VHDCRZS P	VHDCRS U3	VHDCRZS MB3	VHDCRS 3	VHDCRZS MB3	VHDCRZ 3	VHDC	VHDCS	VHDCRS MBUP
winquic		VHDCRZS	VHDCRZS	VHDCRZ	VHDCRZS	VHDCRZS P	VHDCS	VHDCRZS	VHDCRS	VHS	VH	VHDC		VHDCRS
f5	HDCS	HDCS E	HDCS	HDC	HDCS	HDCS	HDCS E	HDCS	HDCS	HCS E	HDC E	HDC		HDCS E
ATS	VHDCRS 3	VHDCRS M	VHDCRS M	VHDCR 3	VHDCRS M3	VHDCRS 3	VHDCRS 3	VHDCRS M3	VHDCRS 3	VHDCRS 3	VHDCR 3	VHDC		VHDCRS M
quiche	VHDCS 3	VHDCS	VHDCS	VHDCS 3	VHDCS 3	VHDCS 3	VHDCS 3	VHDCS 3	VHDCS 3	VHDCS 3	VHDCS 3		VHDCS 3	VHDCS
lsquic				VHDCS 3	VHDCRS 3P	VHDCS 3P	VHDCRS 3	VHDCRS 3		VHDCRS 3PE	VHDC 3			
ngx_quic	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AppleQUIC		VHDCS	VHDCS	VHDC 3	VHDCS 3	VHDCS	VHDCS 3	VHDCS 3	VHDCS	VHDCS 3		VHDCS		VHDCS
quic-go	VHD				VHDCS		VHDCS							
Quinn		VHDCRZS U	VHDCRZS BU		VHDCRZS BU	VHDCRZS	VHDCS	VHDCRZS 3		VHS				VHDCRZS BUP
Pandora		VHDC												
f5_test		VHDCS B	VHDCS B		VHDCS 3	V	VHDCS B	VHDCS B3	VHDCS	VHDCS B3				V
~gQUIC	H	H	H	H	H	H	HC	X	X	H	H	H	VHDC	X

- 17 implementations joined
- More HTTP/3 this time



# QUIC WG Interop Session

Version Negotiation	<b>V</b>	A version negotiation response is elicited and acted on
Handshake	<b>H</b>	The handshake completes successfully
Stream Data	<b>D</b>	Stream data is being exchanged and ACK'ed
Connection Close	<b>C</b>	The connection close procedure completes w/a zero error code
Resumption	<b>R</b>	Connection is established using TLS Resume Ticket
0-RTT	<b>Z</b>	0-RTT data is being sent and acted on
Stateless Retry	<b>S</b>	A handshake that includes a Retry packet completes successfully
Migration	<b>M</b>	A new CID is offered to the peer, and it migrates the connection to it
N/A	<b>-</b>	
Rebinding	<b>B</b>	The client moves to a different port, and the server migrates to it
Key Update	<b>U</b>	One endpoint can update keys and its peer responds correctly
H3	<b>3</b>	An H3 transaction succeeded
Spin	<b>P</b>	A connection with the spin bit succeeds and spins can be correctly read the bit is spinning
ECN	<b>E</b>	Set ECT(0) on outgoing packets and verify that ACK frames with ECN information are received. (Note: test can fail if path bleaches ECN.)
Known broken	<b>X</b>	

# QUIC WG Interop Session

- Server side
  - VHDCRZM → VHDCRZ**SMB3**
  - Missing: Key Update (U), Spin (P) and ECN (E)
- Client side
  - VHDC → VHDC**RSM3**
  - Missing: 0-RTT (Z), NAT Rebinding (B), Key Update (U), Spin (P) and ECN (E)
  - Should be integrated with HTTP/2 origin connection support



# Development Notes

- (Hackathon Topic) Bad Performance Issue (#3552)
  - #4628, #4629 by @scw00 (now, 9x faster)
- (Hackathon Topic) Less copy with IOBufferBlock
  - Remove unnecessary Class Allocators (#4621)
  - #4739 by @scw00
  - #5124, #5125, #5144, #5166... by @maskit (still going on...)
- Unidirectional Stream
  - #5100, #5260 by @scw00
- Cleanup loading certs from ssl\_multicert.config (#2358)
  - #5037 by @masaori335

# Open Issues: quic-latest review

- How do we review quic-latest before merging it?
  - Add basic support of IETF QUIC (#2342)
    - 234 files changed, +43,897 -413 lines, 1300 commits
  - New code in iocore/net/quic/ and proxy/http3/
  - Other changes should be reviewed
    - e.g. extending UnixNetVConnection

# Future Plans

Date	Event	Note
May. 2019	QUIC WG Interim Meeting	
Jun. 2019		
Jul. 2019	IETF 105	Milestone dates on QUIC WG charter
Aug. 2019		
Set. 2019		
Oct. 2019	ATS Fall Summit (?)	
Nov. 2019	IETF 106	

# Thanks

- Project on GitHub
  - <https://github.com/apache/trafficserver/projects/8>
- Code
  - <https://github.com/apache/trafficserver/tree/quic-latest>
- Documentations & Links
  - <https://cwiki.apache.org/confluence/display/TS/QUIC>
- Questions?
  - List: [dev@trafficserver.apache.org](mailto:dev@trafficserver.apache.org)
  - Slack: #traffic-server on [the-asf.slack.com](https://the-asf.slack.com)

