

QUIC in IPv4 and getting there via HTTP Alt-Svc and DNS HTTPS

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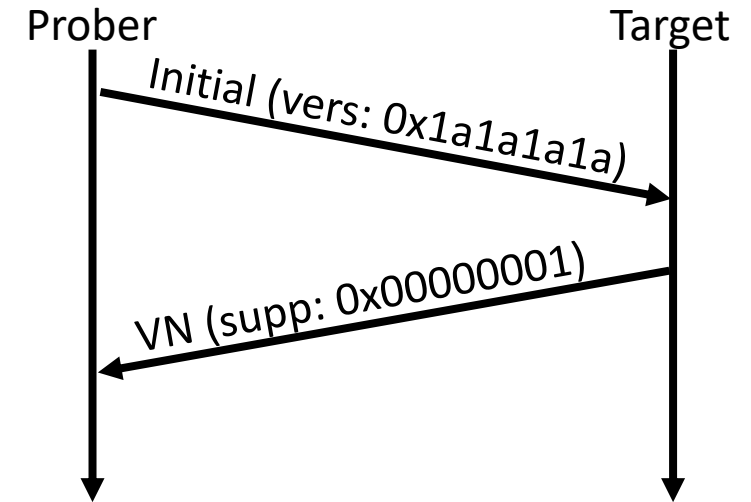
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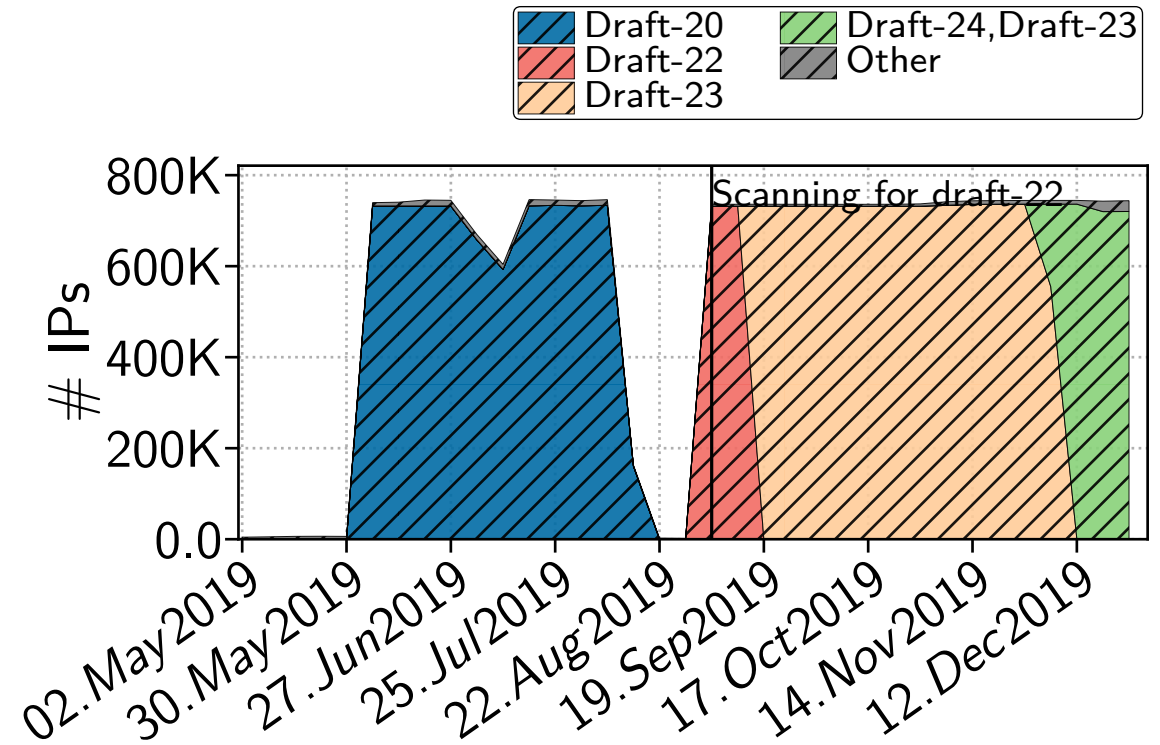
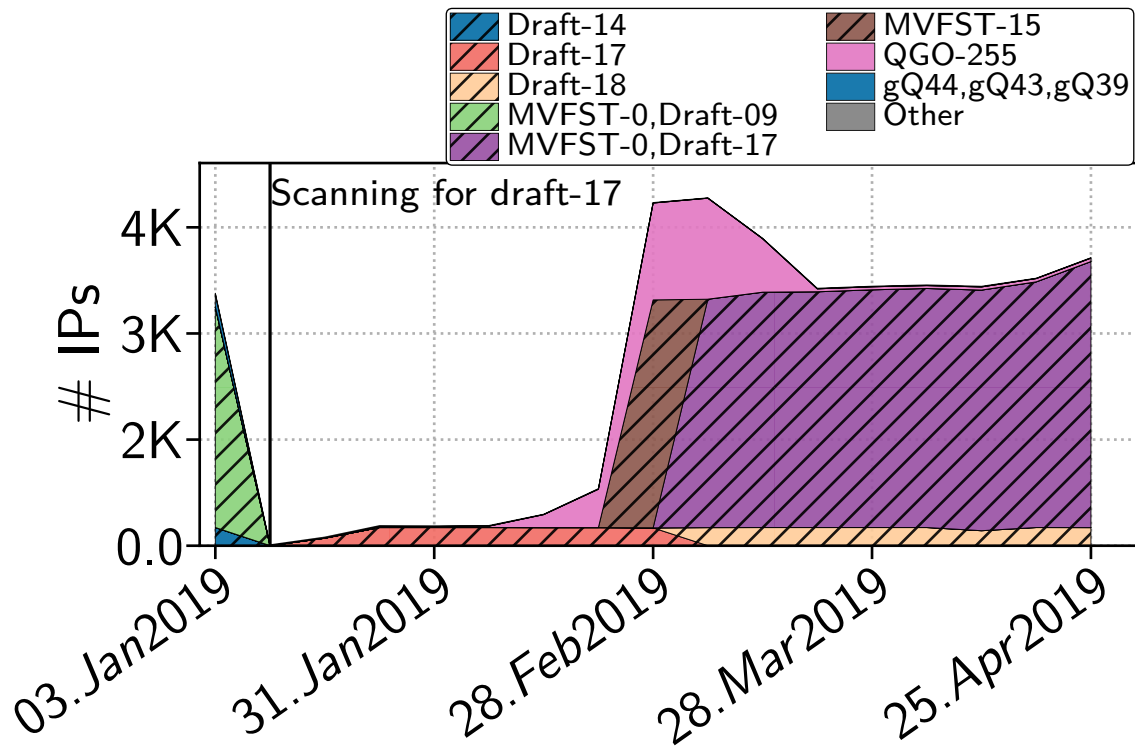
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QUIC Deployment in IPv4 on 443

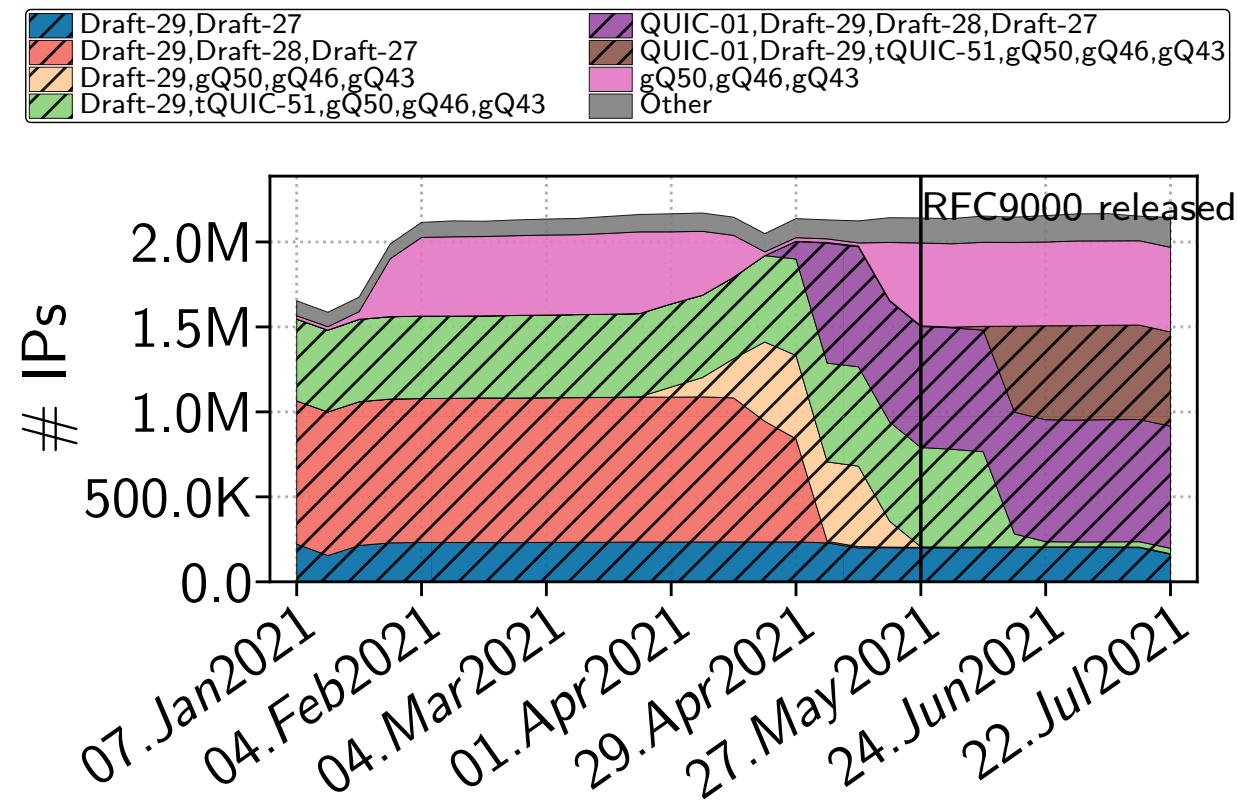
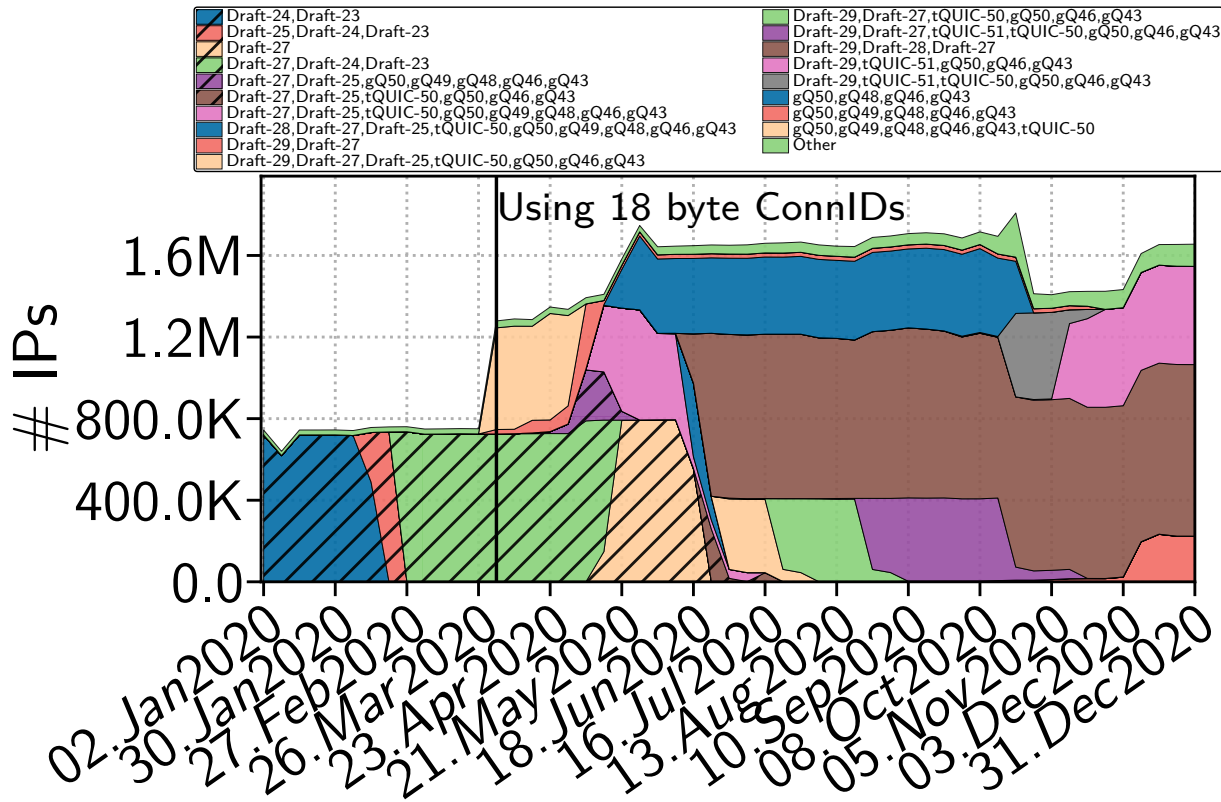
- zmap to /0 on UDP port 443 every week on Thursdays
 - QUIC Initial packet with version: 0x?a?a?a?a
 - triggers version negotiation
- Monitoring drafts since 2018 till today
 - Continually updated scanner to latest draft



QUIC in IPv4 on 443 in 2019



QUIC in IPv4 on 443 in 2020 and 2021



Who is using QUIC?

- Which autonomous systems are involved (2021-07-21)?

# of IPs	AS Number	Name
683,223	13335	CLOUDFLARENET
495,598	15169	GOOGLE
330,919	20940	AKAMAI-ASN1
206,695	54113	FASTLY
24,250	209242	CLOUDFLARESPECTRUM Cloudflare, Inc.
22,546	4837	CHINA169-BACKBONE CHINA UNICOM
21,039	15133	EDGECAST
18,478	16509	AMAZON-02
17,166	4134	CHINANET-BACKBONE No.31
13,392	396982	GOOGLE-PRIVATE-CLOUD

Use of Alt-Svc Header

- Domains from .net/.org/.com zonefiles on 30th June, 2021
 - GET / using zgrab at www.DOMAIN.tld

	.net	.org	.com
#Domains	13,339,176	10,424,223	155,126,816
#HTTP Success	4,349,222	3,925,768	57,824,633
#Alt-Svc Header	363,910	319,449	5,622,051

- 8.3% to 9.7% of reachable sites use Alt-Svc

Use of Alt-Svc Header

- What is being signaled?
 - At the example of .org

Count	Protocol/Port
263,842	h3-27=":443"
236,722	h3-29=":443"
223,514	h3=":443"
185,231	h3-28=":443"
118,308	h3-Q046=":443"

Count	Protocol/Port
118,300	h3-Q043=":443"
117,081	h3-Q050=":443"
110,165	quic=":443"; v="43,46"
66,905	h3-25=":443"
10,869	h3-34=":443"

Use of DNS HTTPS (draft-ietf-dnsop-svcb-https)

- Domains from .net/.org/.com zonefiles on 30th June, 2021
 - zdns for HTTPS DNS record of www.DOMAIN.tld

	.net	.org	.com
#Domains	13,339,176	10,424,223	155,126,816
#HTTPS DNS Records	(2.3%) 303,053	(2.6%) 268,784	(2.7%) 4,238,103
#Having ALPN	302,613	268,553	4,231,730
ALPN "h2"	99%	99%	99%
ALPN "h3-29"	59%	58%	55%
ALPN "h3-28"	59%	58%	55%
ALPN "h3-27"	59%	58%	55%
#Having ipv4hint	303,037	268,770	4,238,015
#Having ipv6hint	283,342	251,441	3,950,735

1 ALPN "h3"



Conclusion

- QUIC has been developed and experimented with on the Internet
 - We also find different implementations
 - Continuously rising deployment over the past years
- More parties involved than with gQUIC
- Use of via Alt-Svc header: roughly 8 – 10% of investigated domains
- Use of DNS HTTPS record: roughly 2 – 3% of investigated domains