

QUIC

Deployment Experience @Google

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Weird things the network does

Large Scale(ie: >100 packets) reordering

- Small Packets race ahead of large packets

Frequency: Extremely common

- Reordering of slightly over 1RTT in the worst case.
- Larger packets almost never arrive more than a few packets earlier than smaller packets.

Solution: Time based loss detection (aka RACK)

- Allows unlimited reordering in packet number space

Weird things the network does

Rapid (<15 second) NAT rebinding

- Port rebinding is more common than IP

Frequency: Fairly common

- Largely isolated to a small fraction of networks.

Solution: Connection ID based routing

- From server to client, ensure a given connection ID always arrives at the same server.
- Allows connections to continue despite rapid NAT rebinds.

Weird things the network does

Packet misrouting

- Packets end up at a server that doesn't own the IP
- Unstable routing or packet duplication

Frequency: Surprisingly common

- Some portion of the network is always broken

Solution: Better monitoring on servers

Weird things the network does

UDP rate limiting

- Network drops UDP packets above a threshold.

Frequency: Fairly uncommon

- 2/3rds less common than it was 12 months ago

Solution: Disable QUIC for the worst affected users. Contact the ISP.

Weird things the network does

Sudden blackholing of packets partway into a connection

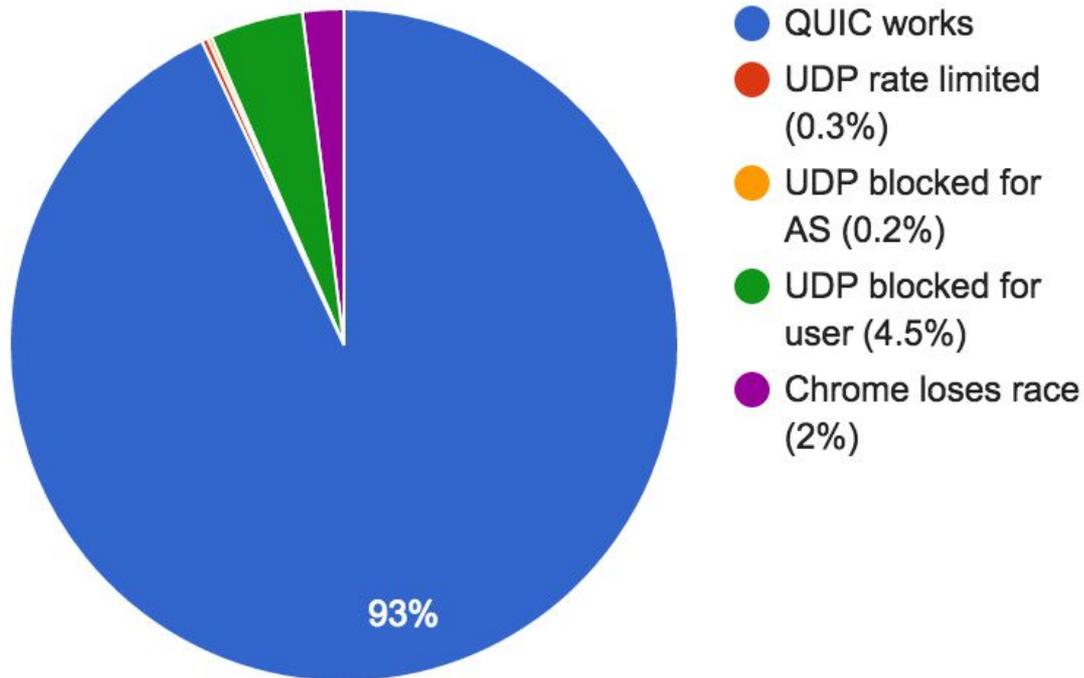
- Client to server or server to client

Frequency: Unicorn

- Seen in one case, now fixed

Solution: Contact the owner

QUIC: Does it work?



Since Initial Launch, UDP rate limiting has decreased by 2/3rds

QUIC

Source: [QUIC in Chromium](#)

Page: www.chromium.org/quic

IETF Mailing List: quic@ietf.org