# Transparent Rate Adaptation Indications for Networks

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# Problem

Networks deploy rate limiters

These can intercept TCP

These can only **damage** QUIC

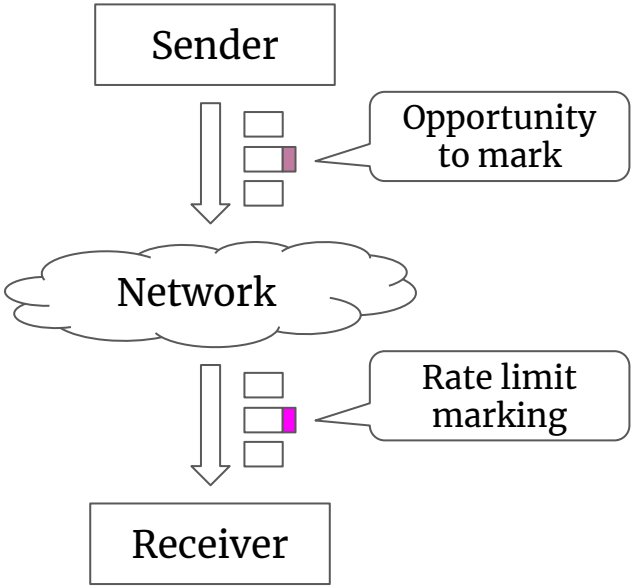
# SCONE Approach

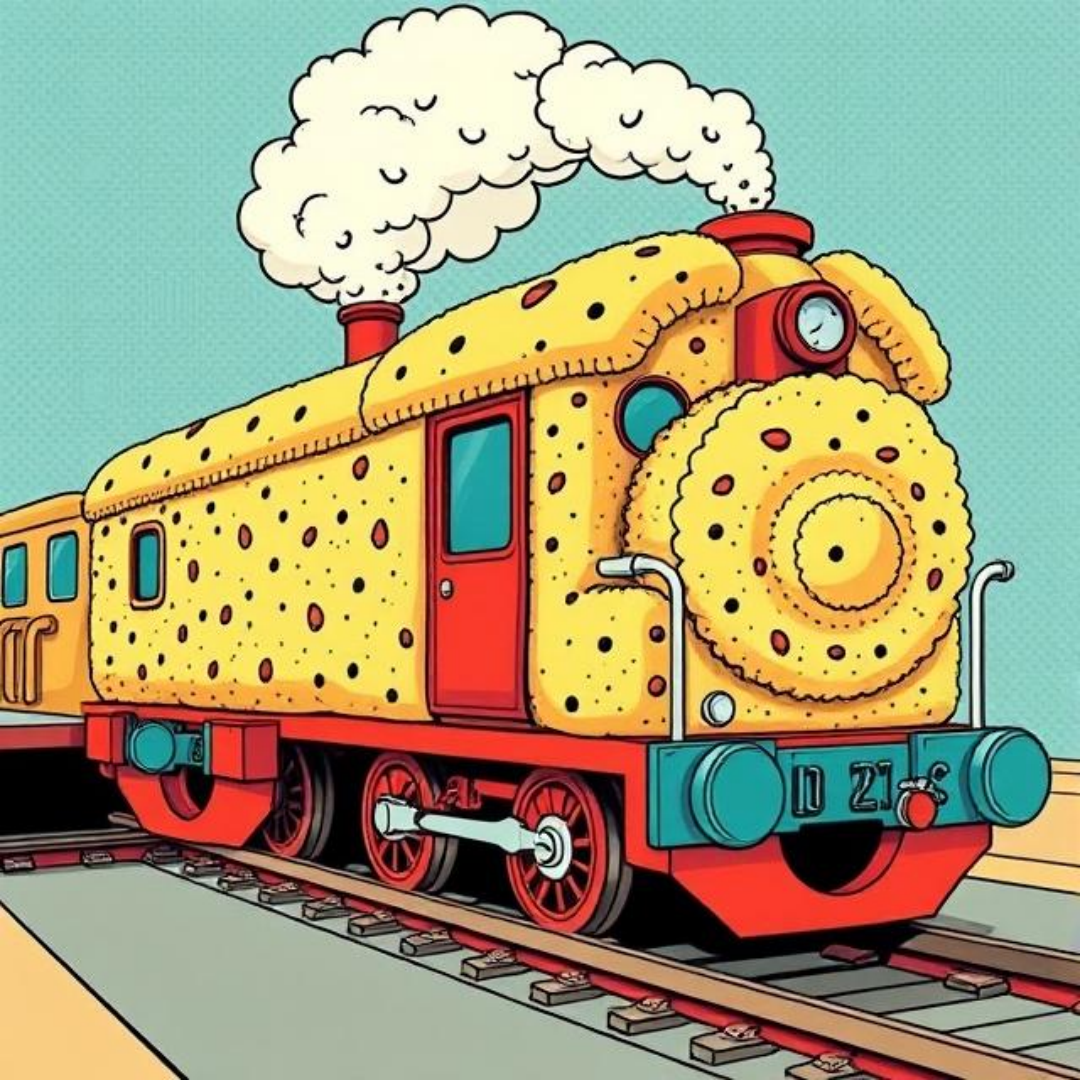
Network indications

Attach to a flow

Scope of true rate limits is probably wider

# Idea


Sender
Opportunity to mark
Network
Rate limit marking
Receiver



# TRAIN Solution

Special QUIC version

Packets in that version

- carry rate limit signal
- added to datagram
- ahead of normal packets

QUIC transport parameter

- to signal support
- in proper QUIC versions

# Details

| 1 | ? | signal | train version (32) |
|---|---|---|---|
| dcid len | | | dcid ... |
| scid len | | | scid ... |
| QUIC v1 or v2 packet | | | |


# Network Elements

Rewrite packets
to reduce the limit

Leave packets alone
if the limit is low enough

Signal is in the first byte
of the UDP payload
so it is easy to rewrite

# What Signal?

Six bits to encode send rate

Need help picking values

How?

- Common rate limits?
- Or common usages?
- Or mix both?

Token buckets

- Many rates at fixed depth?
- Or at multiple depths?

# Security

# Signal availability

Signal only available if

- peer signals support
- endpoint sends packet

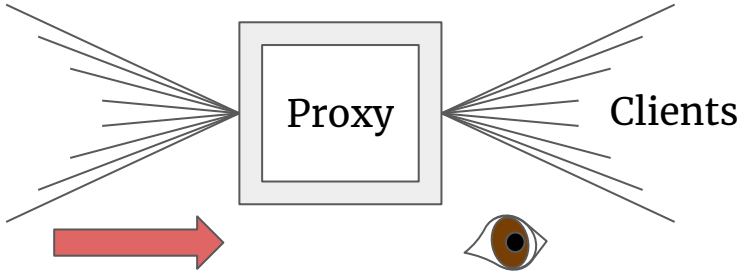
Signal only consumed if

- real packet is accepted

Two party agreement required

# Proxies

Changing send rate leaks into send rate side channel




Inject fake signal, look for change

Same as ECN or packet dropping

# Sticking Out

If few clients deploy this

those few who do stick out

# Good Solution?

Good enough
to develop further?