NAT64

draft-ietf-behave-v6v4-xlate-stateful-01

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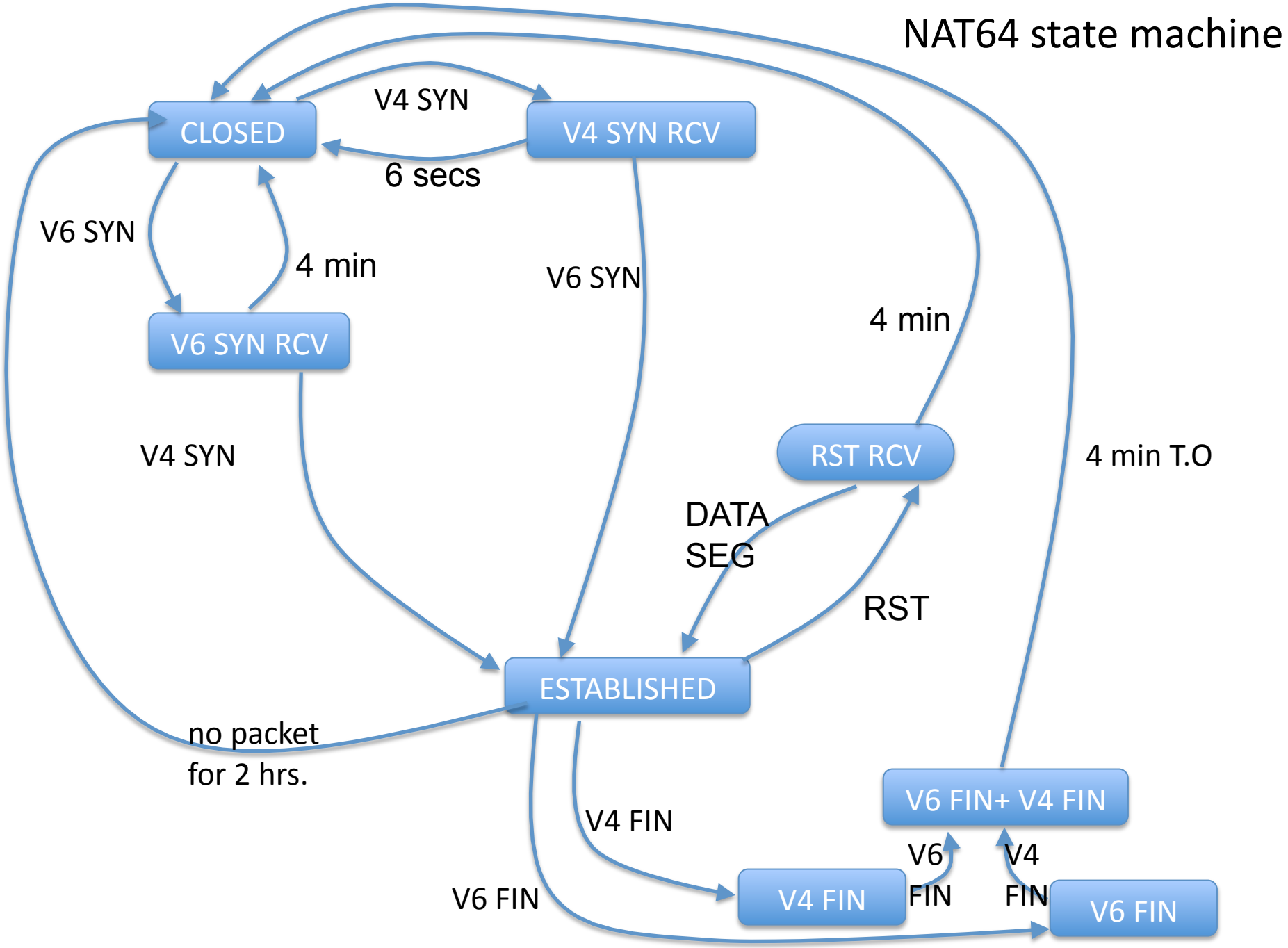
A couple of open issues to discuss

- Establishing and discarding TCP mappings
- Fragmentation and PMTUD

Managing TCP mappings

- No tracking of the sequence number
- See the next slide


NAT64 state machine
CLOSED
V4 SYN
V4 SYN RCV
6 secs
V6 SYN
4 min
V6 SYN RCV
V6 SYN
4 min
V4 SYN
RST RCV
4 min T.O
DATA
SEG
RST
ESTABLISHED
no packet
for 2 hrs.
V6 FIN+ V4 FIN
V4 FIN
V6
FIN
V4
FIN
V6 FIN
V4 FIN
V6 FIN

Receiving V4 SYN

- If a V4 SYN packet is received
  - silently drop if required by security policy requires, else,
  - If the destination transport address is not in TCP BIB, then the packet is discarded and ICMP error back
  - If the destination transport is in TCP BIB ,a new session table entry is created
    - The lifetime of the entry is set to 6 seconds as per [RFC5382].
    - The packet is discarded.

MTU and fragmentation

- IPv4-to-IPv6 path MTU discovery
- PMTUD on the IPv6 side
- The IPv4 identification field value
- Fragmentation handling

v4v6 PMTUD classic

- Issue: < 1280 MTU on the IPv4 side
- RFCs 2765 and 2460: IPv6 host sends 1280-byte packets with fragment header
- Translate v6 pkts with frag header to DF=0
- Can create a PMTUD blackhole if:
  - IPv6 host disables PMTUD by setting MTU=1280 and filtering "too big" msgs

v4v6 PMTUD in draft

- The fragment header provides no useful function, so:
- IPv4 "too big" msgs with < 1280 are translated into IPv6 "too big" with = 1280
- All IPv6 packets ≤ 1280 are translated to IPv4 with DF=0
- > 1280 translated to IPv4 with DF=1

Middle ground

- Stick to RFC 2765 / 2460 behavior by leaving too bigs intact
- But translate IPv6 packets ≤ 1280 DF=0
- > 1280 to DF=1
- This avoids the potential black hole

IPv6-to-IPv4 PMTUD

- Our draft: handle this locally in the NAT64:
  - NAT64 knows an IPv6 host has MTU x
  - IPv4 packets are translated, if larger than x the NAT64 fragments
- Other option: translate the "too big" msgs
  - but: many PMTUD black holes in IPv4

IPv4 identification

- Stateful translator can't copy (lower bits of) IPv6 identification field (if present):
- Multiple IPv6 host may use the same identification values
- So NAT64 must locally generate IPv4 identification values for ALL IPv4 packets

Translating fragments

- Reassemble and translate vs translating the fragments
- Latter is more efficient: no packet buffering in the (common) in-order case
- In IPv6-to-IPv4 direction fragments can be translated without matching session state if ID values are kept consistent (= per-packet translation state but no buffering)