

TRAM

STUN Traceroute

draft-martinsen-tram-stuntrace-00

March 2015

IETF 92

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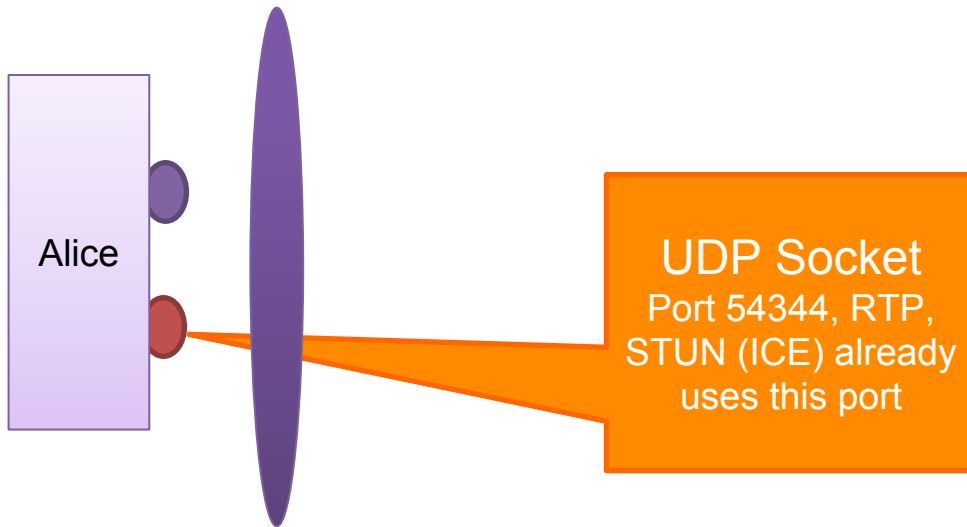
Intellectual Property Rights

- Cisco has declared IPR
(<https://datatracker.ietf.org/ipr/2544>)

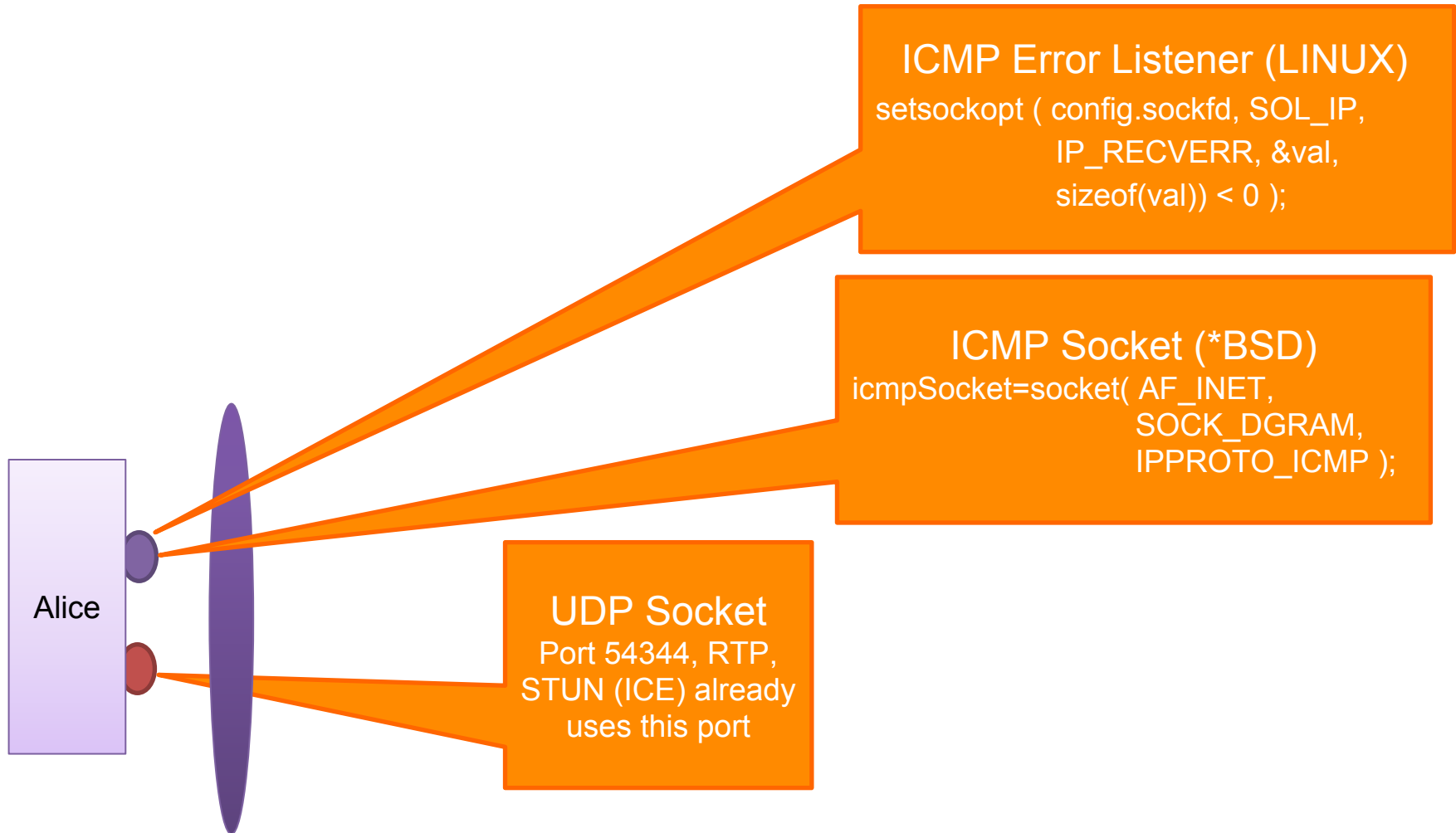
Why

- Accurate media path traceroute
 - Follows the same path as media ((S)RTP)
 - Makes debugging of network easier
- Without root privileges on OSX, iOS, Linux, Android (and Windows)
- Use STUN as it is already multiplexed on the mediapath
- Later: Enriched ICMP messages

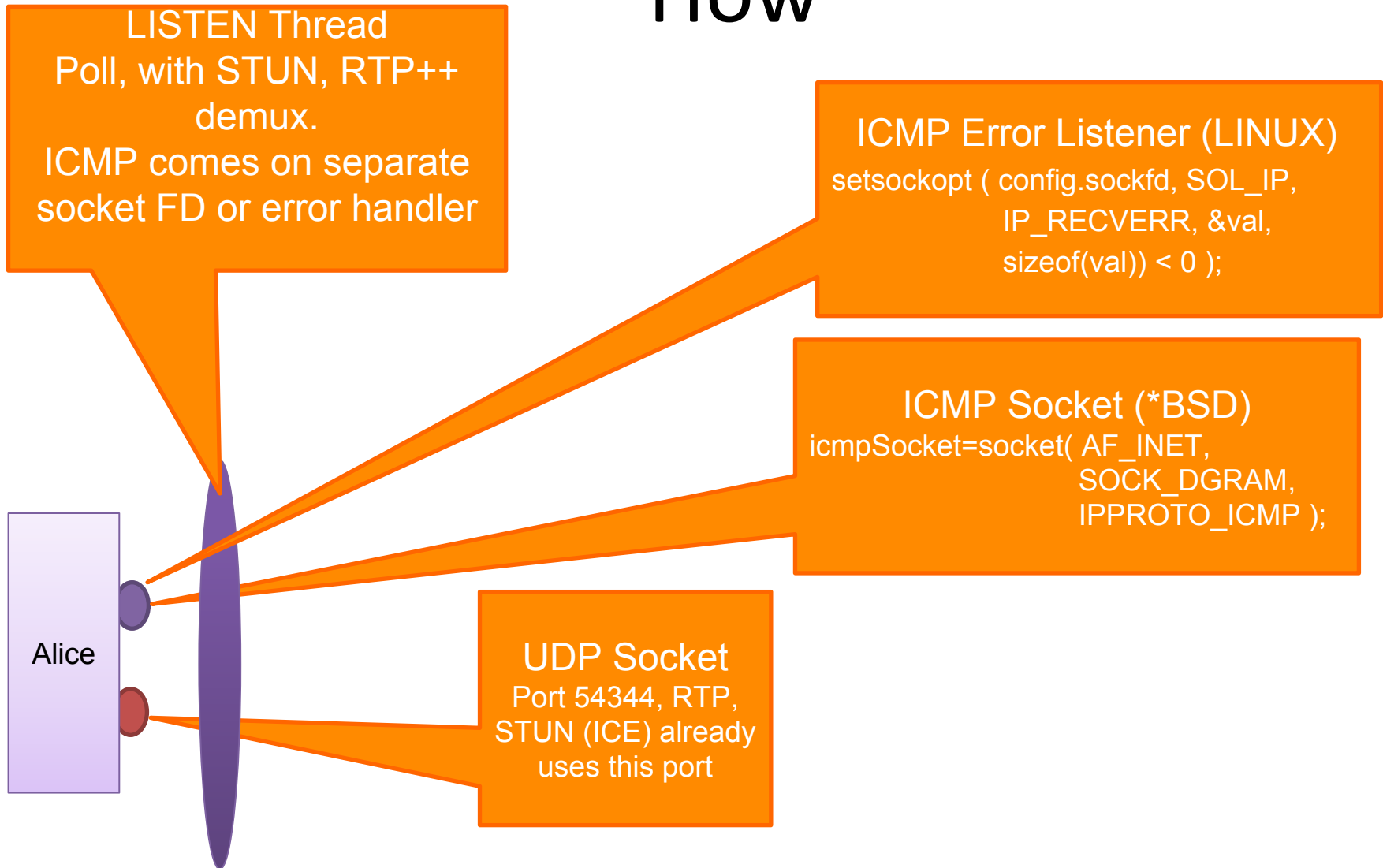
How



How

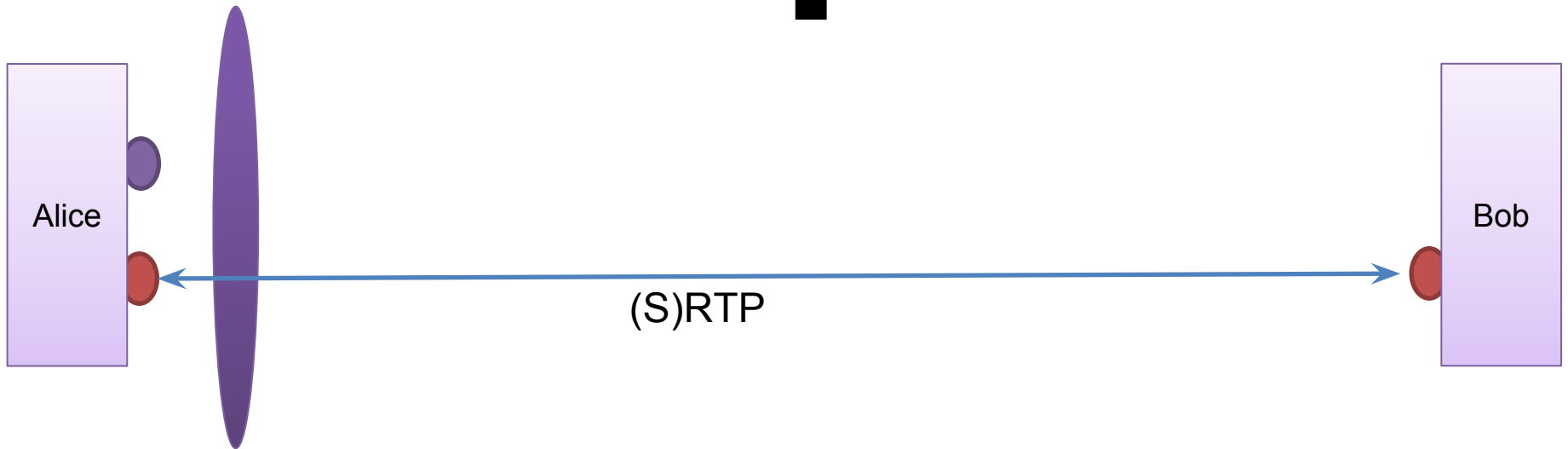


How



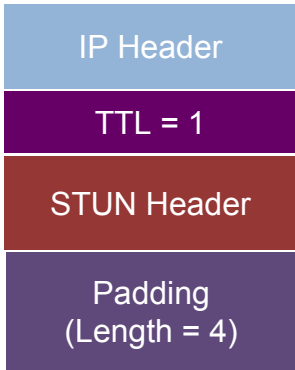
How

?



How

```
setsockopt( sockHandle,  
           IPPROTO_IP,  
           IP_TTL,  
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           sizeof(sock_ttl) );
```

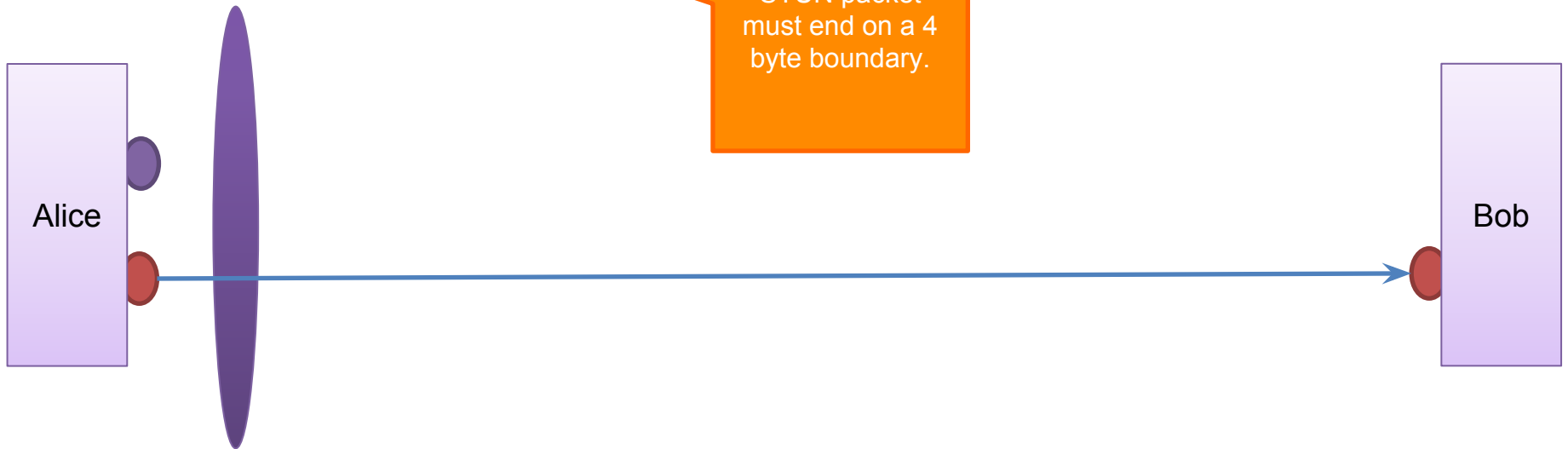


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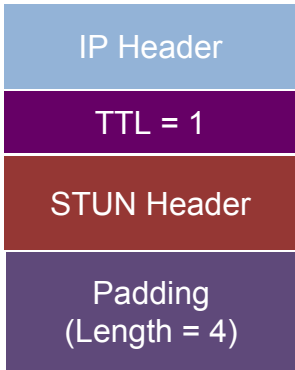
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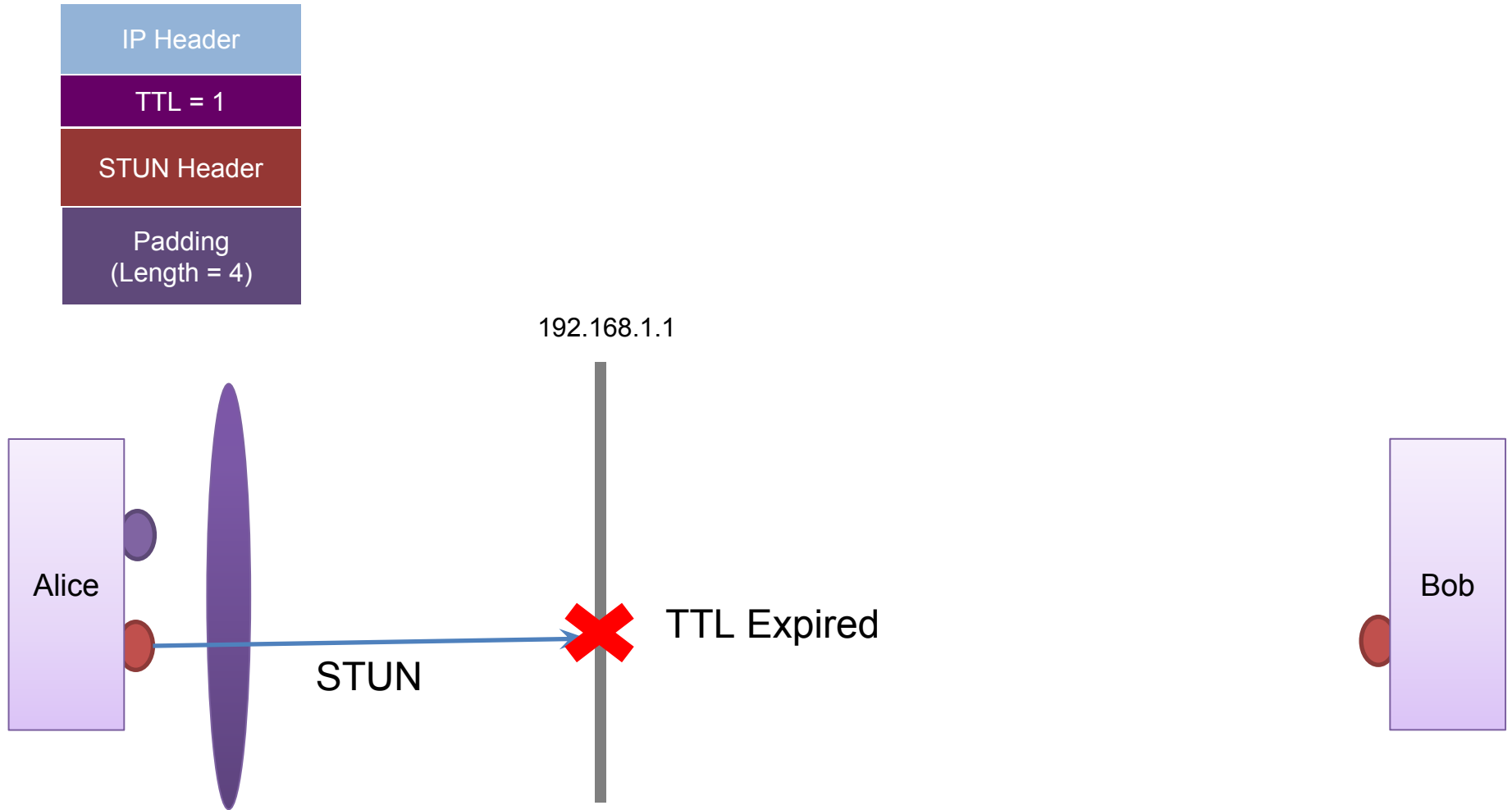
STUN packet
must end on a 4
byte boundary.



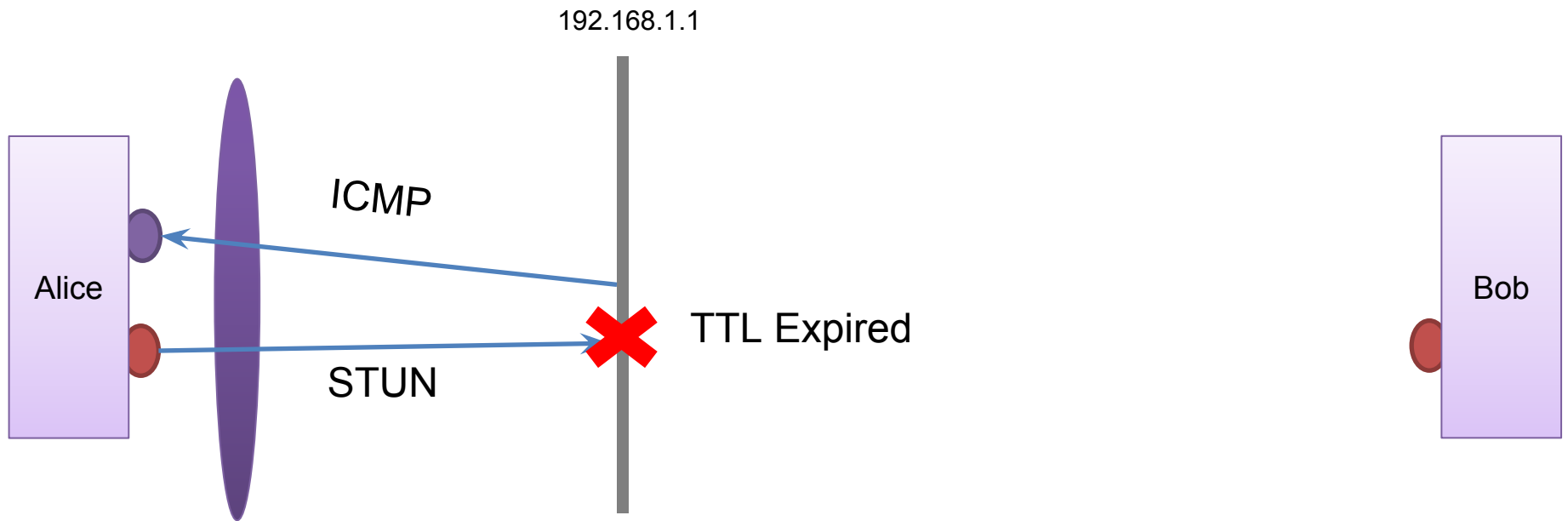
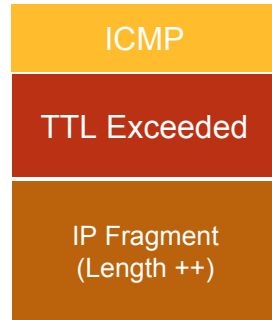
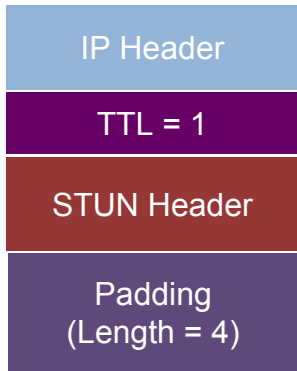
How



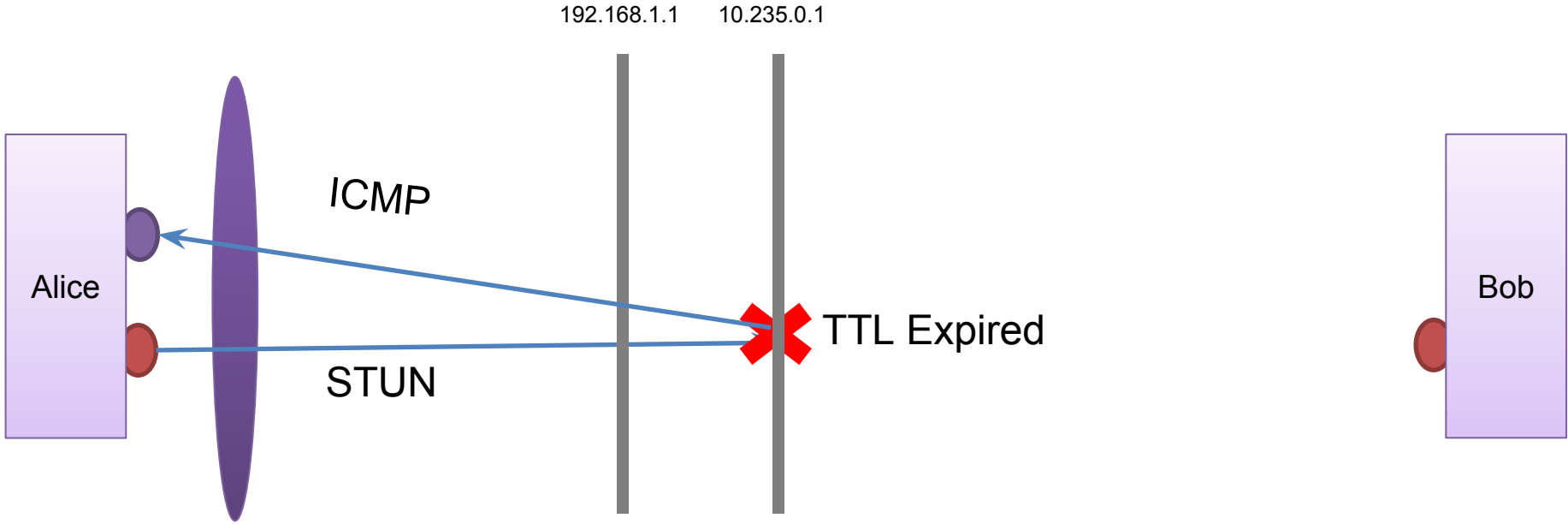
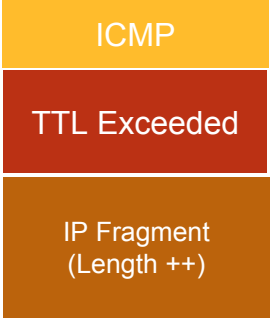
How



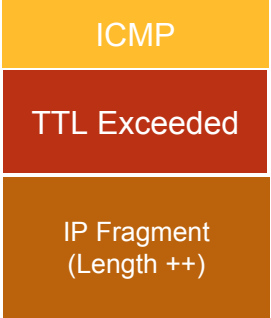
How



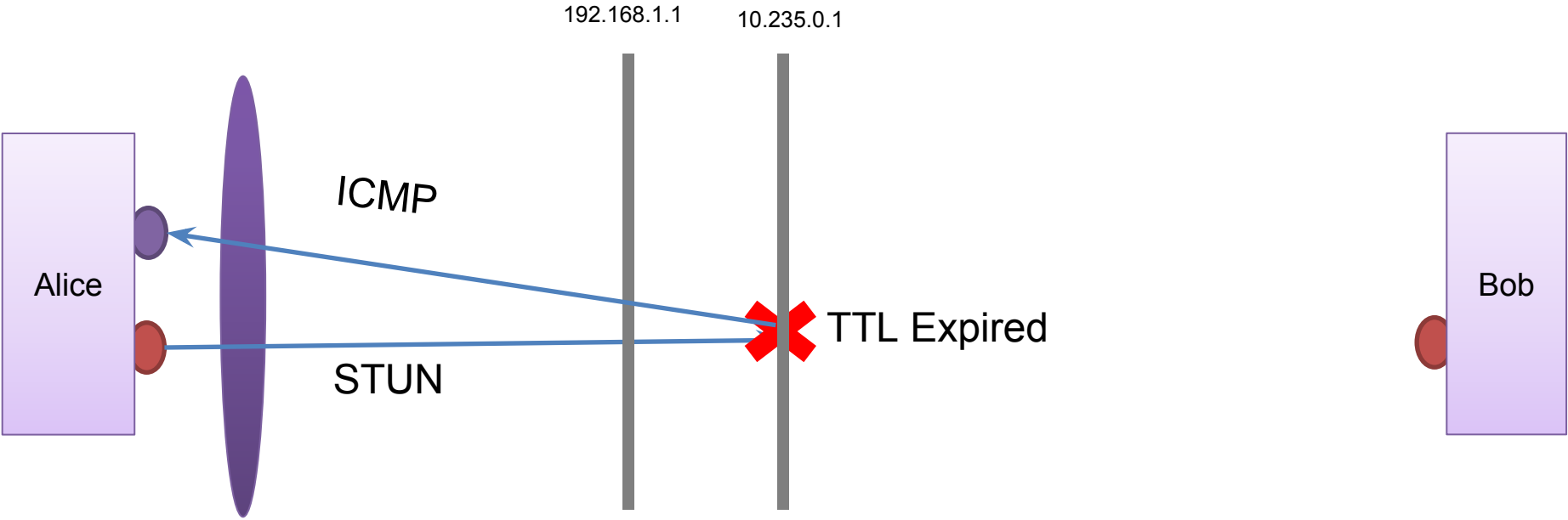
How



How



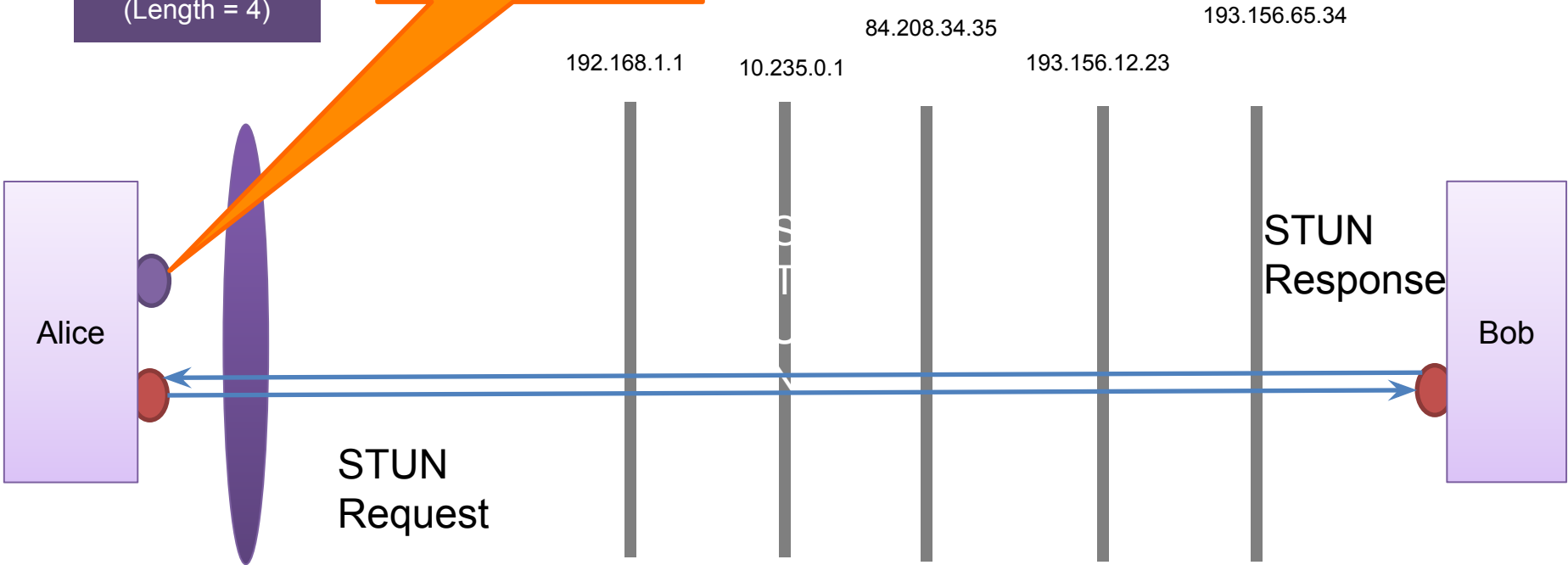
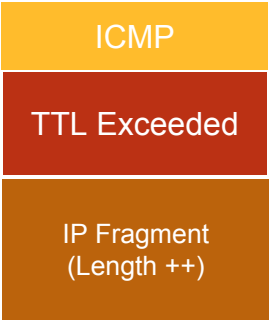
Client can calculate what TTL this is the response to

$$TTL = (\text{length} - (\text{STUN_HDR} + \text{attributes})) / 4$$


How



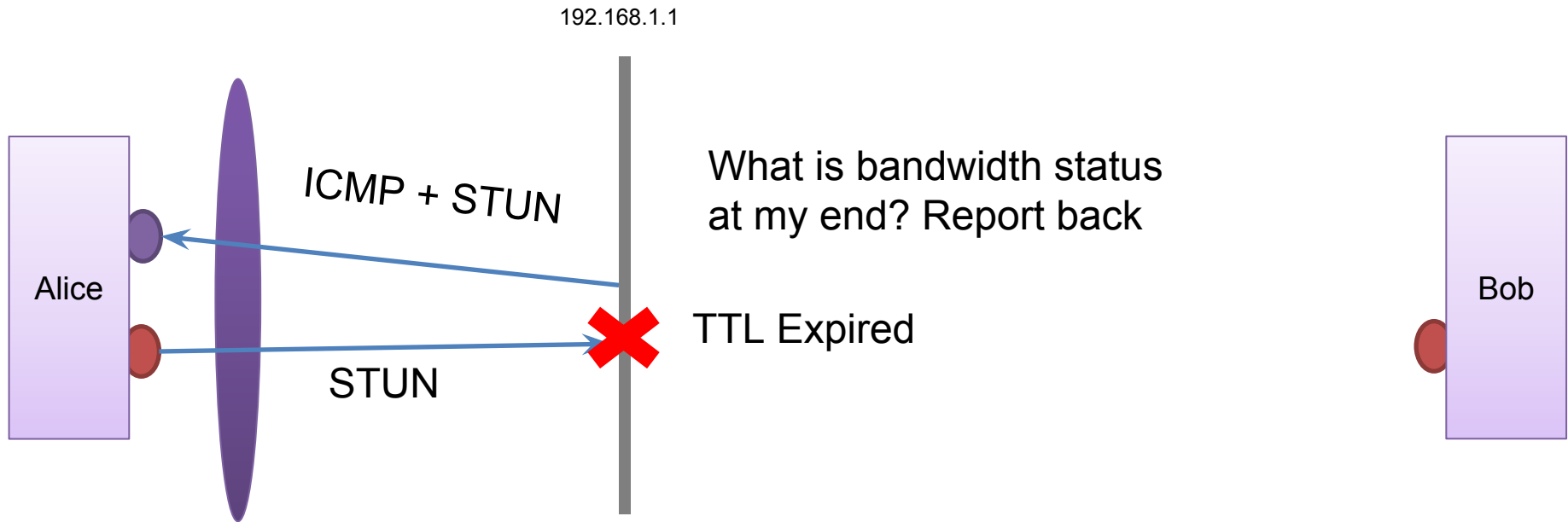
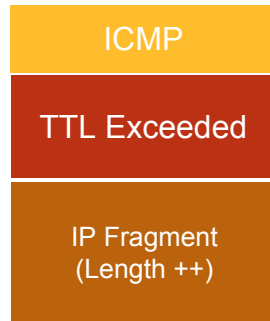
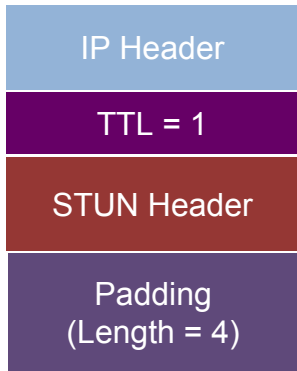
Client receives a STUN Response, Reaches the far end (Remote RFLX addr) or a ICMP port unreachable message at the end of the path.



Enriched ICMP response

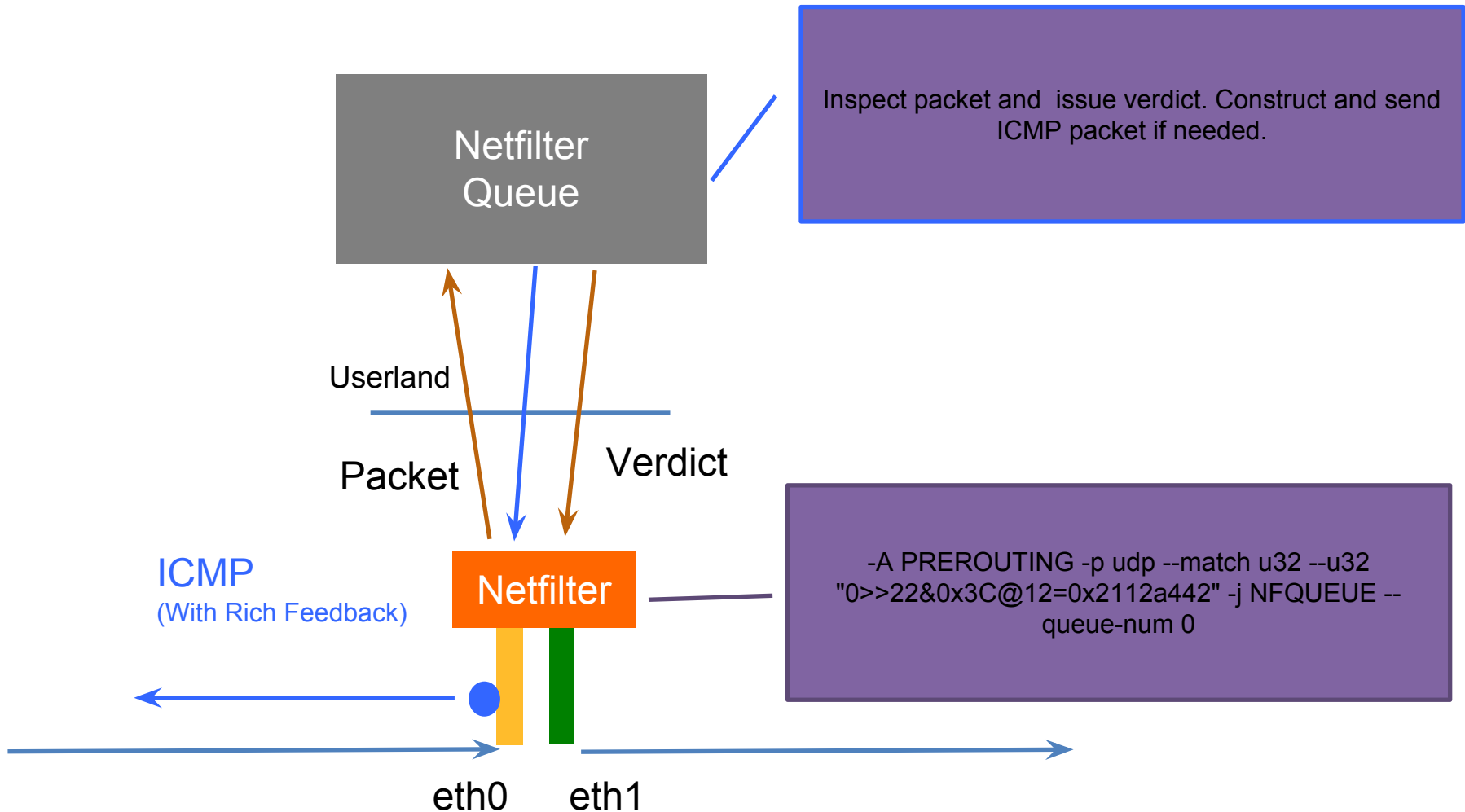
- RFC 4884 allows for more details in the ICMP reply
- ICMP can reply with a send STUN Response
- e.g., STUN DISCUSS attributes can be added to exchange detailed information between endpoint and network.
(<http://tools.ietf.org/html/draft-martinsen-tram-discuss>)

Operation Overview



Running Code

(Raspberry PI Setup)



STUN Traceroute Prototype

RTT to hop

Number of parallel transactions

```
STUNTrace — bash — 86x16
palmarti $ src/stuntrace -i en4 -j 8 158.38.48.10
Starting stuntrace from: '192.168.50.106:0'to: '158.38.48.10:3478'
 1 192.168.50.1 14.442ms (0) [-> 200 <- 100 (1)]
 2 192.168.1.1 16.576ms (0)
 9 128.39.254.50 21.518ms (0)
10 128.39.47.30 15.365ms (0)
11 158.38.1.254 16.932ms (0)
 3 10.235.0.1 9.56ms (1)
 4 84.208.41.54 12.697ms (1)
 5 193.156.90.70 13.462ms (1)
 6 193.156.90.1 15.321ms (1)
 7 128.39.255.86 20.197ms (1)
 8 128.39.255.166 26.398ms (1)
13 158.38.48.10 19.304ms (0)
Time spent: 129.832ms
palmarti $
```

Node supports extended DISCUSS
Data in ICMP reply
(Up/down Bandwidth)

STUN retransmits
(packet loss indication)

Total time spent doing complete path-trace
(Try timing normal traceroute..)

STUN Traceroute Summary

- Works without admin privileges
`icmpSocket=socket(AF_INET, SOCK_DGRAM, IPPROTO_ICMP);`
- Follows the EXACT media path
- Gives RTT for each hop
Accuracy can be improved, but requires more chatter
- Crude packet loss indication
Based on STUN transactions retransmits
- Helps STUN based information exchange between endpoints and network
TTL expired packets are already punted to the router CPU, further processing is cheap. ICMP can be extended to contain a STUN response.