Introducing OpenBFDD

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“Uptime is the Bottom Line”
Bidirectional Forwarding Detection

• BFD - RFC 5880
• Used to trigger more timely reconvergence for routing protocols running across shared media paths
• Can be pinned under OSPF, BGP, and other routing protocols and used as a trigger
Routing / Forwarding with BFP

- iBGP
- BFD
- PHY

180s Keepalive

<1s Keepalive
Routing / Forwarding with BFP
A Novel Use Case

• Anycast can be used within the datacenter for low latency, low cost load balancing
• To accomplish this, we use an IGP + ECMP
• IGP running on application servers signals next hop availability to router
• Router sees multiple paths of same cost and load balances to them use L4 hashing
OSPF + ECMP

• Router speaking OSPF to internal network
• Quagga + OSPFD running on every box
• Service VIP is on loopback, announced into OSPF
• Router sees equal cost paths to next-hops, and load shares
• Routers can be configured to hash on 2-tuple (src / dst IP) or 4-tuple (IPs + Ports)
• If something goes wrong on a box, shut down quagga
tom@core-01-ewr> show route 208.78.70.1 extensive
{...}
208.78.70.0/26 (1 entry, 1 announced)
TSI:
KRT in-kernel 208.78.70.0/26 -> {204.13.248.140, 204.13.248.141}
Scaling OSPF

- OSPF got too heavy 16-way (or 64-way) ECMP
- Service daemon crashes or machine failures result in OSPF topology changes
- Topology changes cause undue strain on router CPU
- Needed a new way to enumerate available next hops for ECMP
Enter OpenBFDD

- Open Source implementation of the BFD protocol for FreeBSD
- Used to enumerate next-hop availability between DC edge routers and internal service machines.
tom@core-01-pao.dyndns.com> show bfd session

<table>
<thead>
<tr>
<th>Address</th>
<th>State</th>
<th>Interface</th>
<th>Time</th>
<th>Interval</th>
<th>Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>208.78.69.140</td>
<td>Up</td>
<td>ge-1/3/0.20</td>
<td>1.500</td>
<td>0.500</td>
<td>3</td>
</tr>
<tr>
<td>208.78.69.141</td>
<td>Up</td>
<td>ge-1/3/0.20</td>
<td>1.500</td>
<td>0.500</td>
<td>3</td>
</tr>
</tbody>
</table>

2 sessions, 2 clients
Cumulative transmit rate 6.0 pps, cumulative receive rate 6.0 pps
tom@core-01-pao.dyndns.com> show route 208.78.70.1

{...

208.78.70.0/26  *[Static/5] 5d 22:09:55
   to 208.78.69.140 via ge-1/3/0.20
   > to 208.78.69.141 via ge-1/3/0.20
Current Status

- bfd-beacon: Able to negotiate and turn up an asynchronous BFD session.
- Swapping out event libraries to support other operating systems (currently kevent)
- Future support for Demand Mode and Echo
http://github.com/dyninc/OpenBFDD