NETFLIX

IPv6 – Content Provider and Enterprise Challenges

NANOG46 – June 2009

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Where we came from

- 1997: Netflix.com is launched as a DVD sales and pay per rental operation
- 1999: Netflix launches DVD by mail subscription service
- 2002: Netflix IPO
- 2003: Netflix becomes profitable
- 2007: Netflix launches streaming service
- 2009: Netflix has nearly 10% of all US households as customers
- 2009: http://ipv6.netflix.com soft launches!

Setting trends

- Evolution of service:
  - Netflix had issues with the reliability of DVDs
    - Studios modified the physical production of DVDs to make them more resilient
  - Netflix decided to no longer carry HD-DVDs
    - Within days, the remaining player manufacturers shut down production and studios ceased releasing to the HD-DVD format

Can we help for IPv6?

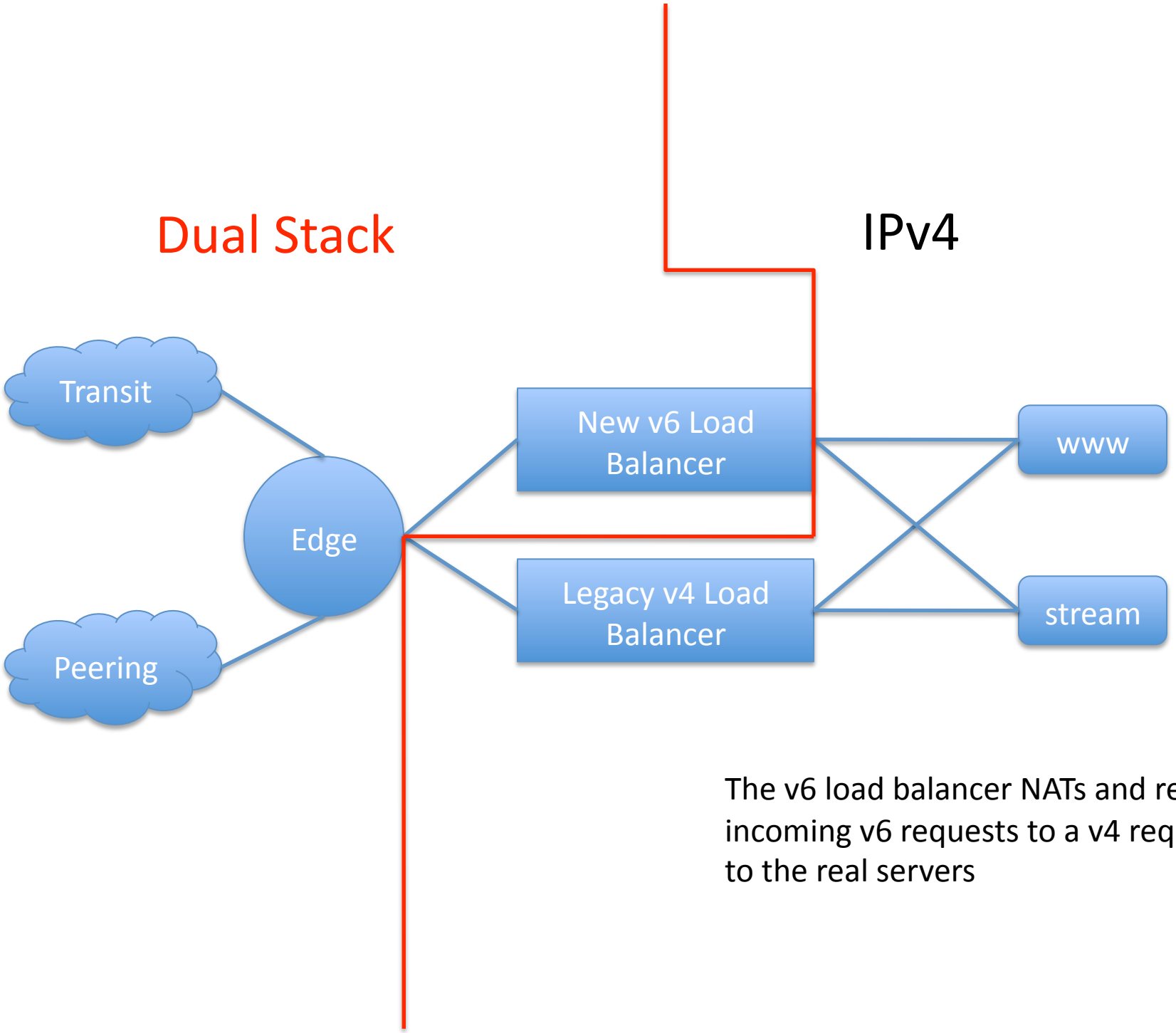
- Most of our streaming today is done via CDN
  - For the most part CDN's have a sad story to share about IPv6. Many are years away from real support
  - Limelight is the exception; our streaming over v6 today is carried by 22822
- Our website and streaming control are IPv6 enabled
  - We were able to do this in less than a months time
- We have millions of customers using streaming on a regular basis using hundreds of gigabits of bandwidth

Netflix Ready Devices

- We have nearly 15 million “Netflix Ready” devices deployed in the United States (Xbox 360, Roku, LG, Samsung, etc.). In a 3 month period there were 1.5 billion minutes watched
- Getting these to support IPv6 will potentially be the hardest nut to crack. Getting PC and Mac to stream over v6 was easy because we control the software and the stack is known

How did we roll out IPv6 so quickly?

- The corporate network is easy
  - Support has been there for years in the network devices
  - Use RA/autoconfig for address assignments. Infrastructure isn't v6 anyways, so no immediate need for DHCPv6 while we remain dual stack
- The production network wasn't much harder
  - No one expects v4 to go away anytime soon on the backend
  - Developer interest was strong; some were happy to turn IPv6 into a "hobby" project, which is how we got the Silverlight client deployed so quickly
  - Load Balancers are easy
  - Partners such as HE, nLayer, and Limelight were big helps



The v6 load balancer NATs and re-writes incoming v6 requests to a v4 requests to the real servers

Putting it all together

- We need the ability to support a v6 client, a v6 VIP, and a v4 real server
  - Multiple load balancers support this today: Citrix Netscaler, A10, F5, etc
- We need the same kind of insight that we have today
  - Logging needs to be standardized
    - Luckily we were already using varchar for our source IP field
  - We need GeoIP location services
    - No major GeoIP vendor has released a full IPv6 product, for now we can filter on ARIN-issued space, but this is not reliable

Dual stack load balancing

- Traffic can originate from the client as v4 or v6
- VIPs can be both v4 and v6, however they are usually configured separately
- Back-end servers can be both v4 and v6, and depending on the vendor can be in the same VIP
- If your application already supports full in-line load balancing (proxy based) with header insertion IPv6 is easy!

Netscaler Configuration Example

```
add ns ip6 FC00:00FC:1:2::/64 -type NSIP
add server real1.example.com 192.168.1.1
add server real2.example.com 192.168.1.2
add service real1 real1.example.com
add service real2 real2.example.com
add lb vserver ”ipv6-v6" HTTP FC00:00FC:
  1:2::1 80
bind lb vserver ipv6 real1.example.com
bind lb vserver ipv6 real2.example.com
```

Voila, you have a v6-v4 proxy/load balancer!

But wait!

What's that you say? Your website has absolute links and redirects that will bring the traffic back to v4?

```
add rewrite action replace_www replace_all
  "HTTP.RES.BODY(150000)" "\"ipv6.example.com
  \"" -pattern www.example.com
add rewrite policy replace_www_pol TRUE
  replace_www
bind lb vserver ipv6 -policyName
  replace_www_pol
```

If we solve the AAAA before A problem you won't need this stuff!

What next?

- We need better CDN adoption
  - Don’t make us do this ourselves!
- We don’t want to deal with CGN
  - The complexities introduced by CGN are not attractive and are a positive driver towards v6 adoption

Why can't I just turn it on tomorrow for www.netflix.com?

- The AAAA problem is very real
  - Too many "island" IPv6 networks that are asking for AAAA's via their resolvers but have no end to end v6 connectivity
  - Vista at least doesn't ask for AAAA records unless you have a global v6 address
    - This doesn't help most of the world
  - We can't chance a 20 second timeout period before reaching our side for users with an improperly configured (or improperly designed!) home network

Our business

- Streaming is increasing and for the first time this past quarter we've seen it make a direct impact on DVD shipments
- New device support
- New content
- Drive for higher video quality

All equal:

More bandwidth, more infrastructure, more customers,

MORE ADDRESSES USED!

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Questions?

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