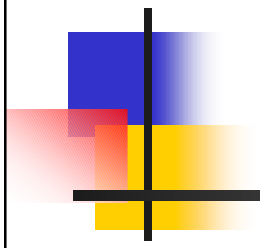

AMPATH & IPv6 Practices and Experiences

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Dia Virtual CUDI

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AMPATH / SFG Peers

- AMPATH Peers
  - Brazil (FAPESP / RNP)
  - Chile (REUNA)
  - Argentina (RETINA)
  - Puerto Rico (UPR)
  - Venezuela (REACCIUN - CNTI)
- SFG Peers
  - New World Symphony
  - Florida International University
  - AURA / Gemini Observatory (Chile)

IPv6 is Native at AMPATH

- GSR 12012
  - IOS Release 12.0(22)S5
  - Main router for AMPATH.
  - Location:
    - 36 N.E 2nd Street (Old GX Telehouse)
- Juniper M10
  - JunOS Release 6.1 (Release 1.4)
  - Main AMPATH Peering point @ NAP.
  - Tier 1 NAP in downtown Miami

AMPATH v6 Upstreams

- Abilene / StarLight
  - Abilene via OC-12 (Atlanta)
    - GSR Interface v6 address 2001:468:FF:E47::2/64
  - StarLight (Chicago) via GigE (MPLS)
    - GSR Interface v6 address 2001:468:700:1808::1/64

AMPATH v6 Address Scheme

- 2001:0468:0700::/40 - AMPATH Assigned
- Groups of aggregatable subnets are assigned to each router for Peer to Peer links
  - 2001:0468:0700:1800::/58 is assigned to GSR
  - 2001:0468:0700:1400::/58 is assigned to Juniper
- Peers:
  - 2001:0468:0700:1809::/64 - OC-12
    - (M10 to GSR Link)
  - 2001:0468:0700:1400::/64 - NAP Rack LAN

AMPATH v6 Peers (cont.)

- *FIU - (Campus wide - if OS supports it)*
  - 2001:0468:0700:1800::/64 - Tunnel to FIU from GSR.
  - My Mac has inet6 addr: 2001:468:701:3801:203:47ff:fe88:4c1e/64
- *Interface on GSR:*

```
description IPV6 tunnel to FIU
 no ip address
 no ip redirects
 no ip directed-broadcast
 no ip proxy-arp
 ipv6 address 2001:468:700:1800::1/64
 tunnel source 198.32.252.33
 tunnel destination 131.94.134.130
 tunnel mode ipv6ip
```

AMPATH v6 Peers (cont.)

- IPv6 @ FIU
  - Working to monitor v6 usage.
  - Provide addressing out of AMPATH address space to campus and meetings/conferences.
  - I2 v6 WG Meeting this February ‘03.

SFG and Latin America

- V6 BGP Snapshot this morning

2001:468:FF:E47::1
4 11537 11983 12042 1267683 0 0 3d00h 460
2001:468:700:1800::2
4 3681 233488 1103478 1267683 0 0 1d12h 1
2001:468:700:1801::2
4 20080 645416 1832665 1267683 0 0 13w4d 6
2001:468:700:1803::2
4 1916 355341 437708 1267683 0 0 6d22h 442
2001:468:700:1804::2
4 11340 387618 1378804 1267683 0 0 2d14h 2
2001:468:700:1805::2
4 3597 76072 234421 0 0 0 1w6d Active
2001:468:700:1808::2
4 10764 1422544 1697893 1267683 0 0 1w1d 393

- AMPATH GSR, Juniper on next slide…

SFG and Latin America

- AS Breakdown for GSR:
  - 11537 - Received 460 routes (Abilene)
  - 3681 - Received 1 route (FIU)
  - 20080 - Received 6 routes (AMPATH M10)
  - 1916 - Received 442 Routes (RNP - Brazil)
  - 11340 - Received 2 routes (REUNA - Chile)
  - 3597 - RETINA - IOS Issues! (Argentina)
  - 10764 - Received 393 routes (StarLight)

A typical configuration

- **On Cisco IOS:**

```
interface ATM3/0.4 point-to-point
 description DS3 to Argintina (RETINA)
 mtu 1500
 ip address 198.32.252.233 255.255.255.252
 no ip directed-broadcast
 ip pim bsr-border
 ip pim sparse-mode
 ip multicast boundary multicast-boundary
 no atm enable-ilmi-trap
 pvc RETINA 0/104
  oam-pvc manage 60
  encapsulation aal5snap
 !
 ipv6 address 2001:468:700:1805::1/64
 ipv6 mtu 4470
```

A typical configuration (cont.)

- ***On any interface, a sub-interface that says: (I.e.)***

```
unit 2 {
        description "PVC to UPR (OC3)";
        encapsulation atm-snap;
        point-to-point;
        vci 0.109;
        family inet {
            address 198.32.252.209/30;
        }
        family inet6 {
            address 2001:0468:0700:1802::1/64;
        }
    }
```

BGP for v6

- ***BGP configuration*:**

```
group UPR-v6 {
        type external;
        local-address 2001:0468:0700:1802::1;
        import UPR-V6-IN;
        family inet6 {
            any;
        }
        peer-as 5786;
        neighbor 2001:0468:0700:1802::2;
    }
```

Stateless Autoconfiguration

- Only on our Juniper, which connects to a Catalyst 3524 with servers, misc. hosts… (see NOTA Rack LAN)

```
router-advertisement {
        interface ge-1/2/0.0 {

            prefix 2001:0468:0700:1400::/64;
```

AMPATH v6 Future

- What can we expect?
  - IPv6 is already native @ AMPATH but big push for peers to have v6 native on their networks. New peers should see this as a requirement.
  - As more and more peers connect up to us, v6 will become widely available throughout Latin America.

Some things to work on…

- Would like to propose to NSF a white paper to study IPv6 usage (traffic analysis, no Layer 7 yet…) throughout AMPATH peers.
- Develop a comprehensive monitoring utility in-house to monitoring v6
- MRTG?

Conclusions

- We are bringing this IP next generation technology to multiple countries and feel a strong, stable infrastructure is in place.
- As future applications are developed to work both on v4 and v6 AMPATH peers will be ready…

Questions?

- Thank you!
- For further information please visit:
  - http://www.ampath.net

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SFG and Latin America

- 2001:468:700:1801::1 20080 545289 273937 0 0 13w4d3h Established -
- ***Total Routes advertised from our AS 461!***
- 2001:468:700:1802::2 5786 273771 435732 0 10 2w6d7h Established
- ***From AS 5786 - 2/2/0***
- 2001:468:700:1401::2 236 14810 33453 0 26 2w0d20h Active
- ***None received from AS 236***
  - AS 236 - NANOG 30 Conference - No show = no routes.
  - AS 20080 - AMPATH
  - AS 5786 - UPR