IPv6 Multicast Deployment Experience

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M6Bone

- First IPv6 multicast initiative
  - Driven by RENATER (French research network)
- Single PIM-SM domain
- Separate from IPv6 unicast topology
  - Tunnels (often IPv6 over IPv6) & separate LANs
  - RIPng for routing exchange
- BSR for RP discovery
- Routers mostly NetBSD + Cisco/6WIND/Juniper/Hitachi
- http://www.m6bone.net/
M6Bone
6NET

- Experimentation-oriented IPv6 (-only) network
- Sponsored by the European Union IST program

Participants
  - Many research networks in European countries (NRENs)
  - DANTE (operators of the GEANT backbone)
  - Cisco

Equipment used
  - Cisco 12400 GSR (core and some NRENs)
  - Cisco 7500/7200/... (NRENs)
  - Various types of hosts (Linux, BSD, Solaris, AIX, XP)
6NET Multicast Deployment

- PIM-SM
- MBGP (ipv6 multicast SAFI)

Various scopes:
- "B" (M6NET): map to M6NET RP (at SURFnet, NL)
- default: map to M6Bone RP
- intra-domain scopes

Embedded RP address
- not yet available on all 6NET routers

Debugging Tools
- Beacon, Looking Glass, e-mail, vic/rat
PIM upstream detection among multiple addresses

- **Problem**
  - PIM spec specifies that LL address be announced in Hellos
  - But the routing table may point to non-LL next-hop
  - This can cause RPF failures

- **Solution**
  - New PIM Hello option to announce all interface addrs

- **Experience**
  - Used both in M6Bone and in M6NET
  - Important for your own and your router config’s sanity
Still Missing

- Embedded RP
  - Still missing from the core as of today (July 15)
  - Some testing done between domains (NO/DK works)

- mtrace
  - Will become important in "real" inter-domain

- SSM testing
  - Lack of MLDv2 host support (or alternatives)

- Bi-dir PIM?

- MSDP?
  - Not really, but... intra-domain anycast RP would be useful
    (draft-farinacci-pim-anycast-rp-00?)
Helpful Hacks

- **pim6d modifications**
  - BSR boundary mechanism
    - Really want scoping support as in draft-ietf-pim-sm-bsr-xx
  - Embedded-RP

- **Reflector**
  - Can reflect IPv4 group to IPv6 group
  - (also works for unicast UDP streams)
  - Used to multicast this meeting to IPv6

- **IPv4-IPv6 Multicast Gateway**
  - draft-venaas-mboned-v4v6mcastgw-00.txt
  - Bridges entire IPv4 multicast to IPv6
Operational Observations

- Frequent RP address changes in M6Bone
  - No-brainer for BSR users
  - Breaks everything for statically configured domains
IPv6 Multicast at this IETF Meeting

- Local operator let us connect a multicast router
  - ...but only to terminal room wired LAN
  - Linked to Vienna (M)6NET node
- Mbone transmission reflected to IPv6
  - http://videolab.uoregon.edu/events/ietf/ietf57.html
- M6NET connectivity
- M6Bone connectivity
  - pending latest RP change in M6NET core
- Play with it in the terminal room!