IPv6 Addressing case study
RENATER

Rabat, Maroc
28 - 30 Mars 2007

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Rabat, Maroc – Mars 2007

Agenda

• Renater’s topology
  – National links
  – International links
  – Regionals / MANs connected
• Renater’s IPv6 services
• IPv6 addressing scheme
• Conclusion

Renater : national backbone

Renater: national backbone

IP transit connectivity

2x2.5 Gbit/s

IP transit connectivity

2x10 Gbit/s

Geant-2
European research networks, with extensions to America, North Africa, and Asia
1x10 Gbit/s (IP service)
2x10 Gbit/s (projects)

SFINX (Global Internet eXchange)
2x10 Gbit/s

Overseas Territories

Ile de La Réunion
Martinique
Guadeloupe
Guyane

Mayotte
Nouvelle Calédonie
Polynésie

Leased line
(2.5 Gbit/s)

Dark fibre
RENATER’s Production IPv6 service

- Why a production-like IPv6 service?
  - ATM removed ...
    - Move all network services on a unique topology
    - Do we want to forget about IPv6, IPv4 multicast ... ?
- Needs for an IPv6 transport
  - Research projects using IPv6
  - Sites with native IPv6 network
    - install a native IPv6 core
    - run both versions of IP on the same equipments
- Monitor the IPv6 service in the same operational way than IPv4
Renater 4 : IPv6 Native support

- 2.5 Gbits/s backbone
- 30 Regional Nodes (NR)
- Native IPv6 on all regional nodes
  - Dual stack backbone → IPv4 and IPv6
- Global IP Service
  - IPv4 unicast and multicast
  - IPv6 unicast (multicast is being deployed)
  - IPv6 and IPv4 carried without any distinction
- Goal: achieve for both versions of IP an equal level of
  - Performance
  - Availability
  - Management
  - Support

Addressing

- Hierarchical addressing
- Renater
  - Prefix = 2001:0660::/32
  - Allocated by the RIR (RIPE NCC)
- Regional Nodes
  - POP-ID =2001:0660:xy::/40
- Site
  - Site-ID: a /48
    - from RN’s prefix (/40) it’s connected to
  - Site-IDs allocated by Renater (LIR)
  - 16 bits are available for the site topology
### Addressing

<table>
<thead>
<tr>
<th>/32</th>
<th>/48</th>
<th>/64</th>
</tr>
</thead>
<tbody>
<tr>
<td>RIR</td>
<td>LIR</td>
<td>Site sn</td>
</tr>
</tbody>
</table>

**2001:0660:**

- **POP-ID**
  - 8 bits
- **Site-ID**
  - 8 bits

- 2001:0660:3000::/40 Paris NRI
- 2001:0660:3300::/40 Paris Jussieu RI
- 2001:0660:4400::/40 Lille RI
- 2001:0660:5400::/40 Marseille RI

- 2001:0660:300x::/48

### Example

<table>
<thead>
<tr>
<th>Renater’s prefix</th>
<th>2001:0660::/32</th>
</tr>
</thead>
<tbody>
<tr>
<td>POP-ID Strasbourg</td>
<td>2001:0660:4700::/40</td>
</tr>
<tr>
<td>Sites connected to Strasbourg’s RI</td>
<td>2001:0660:4701::/48</td>
</tr>
<tr>
<td></td>
<td>2001:0660:4702::/48</td>
</tr>
<tr>
<td></td>
<td>...</td>
</tr>
</tbody>
</table>
Regional Nets Addressing

- Two possibilities
  - Uses its own prefix (Commercial ISP)
  - Uses Renater’s address space
    - 2001:0660:2---::/48
  - In both cases
    - Sites are addressed in Renater’s prefix
      - 2001:0660:{3-F}---::/48
    - Interco Network (site – Regional / MAN)
      - First /64 prefix of the Site-ID allocated

Addressing scheme
Conclusion

• Preparing an IPv6 plan is a bit complex
• Plan it in advance …
  – Not forgetting your PoPs equipment (loopbacks, admin LANs, interconnects …)
  • Renater’s internal BB equipment addressing plan is 15+ pages!
• Draw benefit from aggregation
  – Smaller routing tables to manage (even in the core)
  – Less prefixes to advertise to BGP peers
• Lot of people have an experience yet …
  – Not necessary to reinvent the wheel ;)