X-Bone Overlays and Key VNRRG Issues

Joe Touch, USC/ISI
Lars Eggert, Nokia
Yu-Shun Wang, Microsoft
X-Bone System View

Web GUI

Multiple views

X-Bone system

Automated monitoring
Creating a Ring Request

You are logged in with these credentials (taken from your X.509 certificate):

**Location**: Maxima del Rey, CA, US
**Organization**: isi, iti7
**User**: Yu-Shun Wang <yu-shunw@isi.edu>

This page allows you to create a new overlay. Please fill out all remaining red fields.

**Overlay Creator**

- **Creator Name**: Yu-Shun Wang
- **Creator E-Mail**: yu-shunw@isi.edu

**Overlay-Wide Properties**

- **Name**: (Name of the new overlay, Suffix .xbone.net will be added automatically)
- **Search Radius**: 30
- **Topology**: ring

These topologies are available for new overlays:

- Linear
- Ring
- Star

**Overlay Parameters**

- **Name**: Ring.xbone.net
- **Search Radius**: 30
- **Topology**: ring
- **Creator**: Yu-Shun Wang
  yu-shunw@isi.edu
- **Authentication**: yu-shunw@isi.edu (x509)

**Overlay Nodes**

<table>
<thead>
<tr>
<th>Role</th>
<th>Status</th>
<th>Links</th>
<th>Host</th>
<th>Operating System</th>
</tr>
</thead>
<tbody>
<tr>
<td>router</td>
<td>in</td>
<td>46</td>
<td>egli.s.edu 128.9.160.212</td>
<td>FreeBSD/KAME</td>
</tr>
<tr>
<td>host</td>
<td>in</td>
<td>998</td>
<td>sin.isi.edu 128.9.160.197</td>
<td>FreeBSD/KAME</td>
</tr>
<tr>
<td>router</td>
<td>in</td>
<td>46</td>
<td>divisi.s.edu 128.9.160.213</td>
<td>FreeBSD/KAME</td>
</tr>
<tr>
<td>host</td>
<td>in</td>
<td>48</td>
<td>sec.isi.edu 128.9.160.199</td>
<td>FreeBSD/KAME</td>
</tr>
<tr>
<td>router</td>
<td>in</td>
<td>44</td>
<td>cos.isi.edu 128.9.160.196</td>
<td>FreeBSD/KAME</td>
</tr>
<tr>
<td>host</td>
<td>in</td>
<td>1000</td>
<td>udelpc.caim.net 140.173.1.46</td>
<td>FreeBSD/KAME</td>
</tr>
<tr>
<td>host</td>
<td>in</td>
<td>1000</td>
<td>tbhpc.caim.net 140.173.1.49</td>
<td>FreeBSD/KAME</td>
</tr>
<tr>
<td>router</td>
<td>in</td>
<td>994</td>
<td>isiepc.caimnet 140.173.1.77</td>
<td>FreeBSD/KAME</td>
</tr>
</tbody>
</table>

**Skipped Candidates**

<table>
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<th>Status</th>
<th>Links</th>
<th>Host</th>
<th>Operating System</th>
</tr>
</thead>
<tbody>
<tr>
<td>router</td>
<td>out</td>
<td>46</td>
<td>addisi.s.edu 128.9.160.214</td>
<td>FreeBSD/KAME</td>
</tr>
<tr>
<td>router</td>
<td>out</td>
<td>50</td>
<td>subisi.s.edu 128.9.160.215</td>
<td>FreeBSD/KAME</td>
</tr>
<tr>
<td>host</td>
<td>out</td>
<td>50</td>
<td>tanisi.s.edu 128.9.160.198</td>
<td>FreeBSD/KAME</td>
</tr>
<tr>
<td>router</td>
<td>out</td>
<td>46</td>
<td>mulisi.s.edu 128.9.160.211</td>
<td>FreeBSD/KAME</td>
</tr>
</tbody>
</table>
Monitoring the Ring

Status

Ring Ovl.

Internet

sin

eql

div

cos

udel

sec

isipc2

bbn
Net vs. Host Virt.

- Network components:
  - Virt. Host ➔ hidden router
  - Virt. Link ➔ 2 layers (strong link, weak net), separate link from routing (RFC 3884)
  - Virt. Router ➔ partitioned forwarding (clonable stacks, now in FreeBSD)

- Capabilities:
  - Revisitation ➔ multihoming
  - Recursion ➔ router as network, “BARP” (LISP-like)
Hidden host router

- Apps can’t select source IP, no IP w/o NIC

RFC 1122/1123 Host
- IP address binds to one NIC

Multihomed Host
- IP address binds to each NIC
Recursion-as-Router

- Sub-overlays look like routers
  - L3 version of rbridges (IETF TRILL WG)
  - Similar to LISP
Questions

- Level of virtualization?
  - Per virtual interface
- Can single process be in multiple VNs?
  - Yes; verified over 800 (DynaBone striping)
  - “proactive/reactive mux” as multiVN router
- Host multiple times in a VN (recurrence)?
  - Yes (via double encapsulation)
More Questions

- How do we indicate VN?
  - Per-process default DNS suffixes, the suffix indicated the VN
  - The suffix translated to an IP address range
  - Similar to use of VN ID shim

- Anything else?
  - Also supported recursion (VNs in VNs)