

IP routing work area
in TF-NGN
(activity 9.3)

Mauro.Campanella (a) garr.it

Why ? : Routing Status

The main characteristic of the routing topology are:

- each AS has multiple, often redundant, peerings to other AS
- full routing is (highly) dynamic. It keeps changing its state in term of links state, peerings and prefixes
- it is loosely hierarchical. Its topology is actually "scale-free" in terms of graph theory (at the router or AS level).
- the average AS-hop distance in the Internet is approximately 3.5 and the dispersion of its distance distribution is around 1
- There is a scaling problem pending since many years (routing table size)

Why ? : Challenges

- The increase abundance of the (owned) physical infrastructure. The latest developments in optical technology (more speed, more wavelengths for each fibre, simpler circuit switching). How use this multiplicity dynamically ?
- More meshing. (The level of meshing implies much more links per node, more routes available from the source to the destination. BGP, a protocol based on manually configured policies, does not scale easily above few links for each AS.)
- The GRID paradigm (lots of extended overlay networks). Virtual routers and more interdomain peerings (where?).
- New dynamic services (BoD, making the routing protocol aware of new possibilities, like establishing a new circuit)
- Simultaneous packet and circuit switched networks
- ASON/GMPLS routing, in particular interdomain, is it *THE* solution ?

Routing Task Force - How ?

- Understand interest and expectation from NRENs
- Prioritise research topics
- Gather participants
- Write a Term of Reference, followed by a realistic description of work (simple) with a timescale 2 years, then review

Keeping in mind:

- Leverage possibility of making real experiments
- Evaluation of tools
- Consider simulations
- Relationship/collaboration with other groups, activities, projects
- Have realistic expectation and produce useful results

List of topics (1st draft)

1. Status of routing (tools and data made available, focus on EU-NRENS)
2. Peering load balance (BGP - tools, analysis)
3. Full routing on dual stack (IPv4 and IPv6) routers
4. Traditional igp (ospf, is-is) behaviour, in particular on highly meshed infrastructure.
5. extensions to IGP protocols
6. Virtual routers testing/usage
7. Terabit routing
8. QoS routing
9. Dynamically circuit set-up and tear down (interaction with control plane unclear). Take full advantage out of combined packet and circuit switched network.
10. Dynamic reconfiguration of routing and services, allowing the users to act directly
11. (Many) overlay networks (VPNs) routing and interdomain communication as a function of physical topology (i.e. interdomain routing specification for AS distributed on large geographical areas)
12. New protocols ? (long term)

Collaboration

Collaboration/exchange of information with:

1. GN2 -JRA3
2. TF-NGN 9.4b (GMPLS), 9.7 (Router testing)
3. DRAGON project (NSF funded - NASA, MIT, Univ. of Southern California, other US Univ.,
4. MUPBED (IST project on GMPLS)
5. Ietf rtgwg, ccamp, ...
6. LASOR project (cisco, calient, JDS-Uniphase, Agility, Stanford, UC santa barbara)
7. ...

Suggestion, missing topics ?

More discussion in the workshop tomorrow, after the end of TF-NGN

Agenda

- | | | |
|-------------|--|--------------------------|
| 13:00 13:15 | Welcome and workshop goals | - Mauro Campanella |
| 13:15 13:50 | View on current routing status and issues | - Juniper, Jean-Marc Uze |
| 13:50 14:25 | Tales from the Bandwidth Broker Woods | - Cisco, Larry Dunn |
| 14:30 14:45 | break | |
| 14:45 15:25 | Status of routing research | - Olivier Bonaventure |
| 15:25 16:00 | Better IP routing | - Iljitsch van Beijnum |
| 16:00 16:30 | Panel among presenters and public and discussion about a term of reference for the TF-NGN activity | |

<http://www.cdt.luth.se/babylon/msrw/>

Starting pointers

Midnight sun routing workshop

<http://www.cdt.luth.se/babylon/msrw/>

RIPE IDRWS 2004 (InterDomain Routing Workshop)

<http://www.tm.uka.de/idrws/program.php?year=2004>

IETF routing area working groups

<http://www.ietf.org/html.charters/wg-dir.html#Routing%20Area>

IRTF routing research group (RRG) charter

<http://www.irtf.org/charters/routing.html>

NANOG meetings routing related presentations

<http://www.nanog.org/>

Comments

Produce something similar to

<http://abilene.internet2.edu/observatory/>

<http://totem.info.ucl.be/tools.html>