



Services to Help You Understand the Behavior of Your Network

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Outline

- Background and motivation
- Specific services
 - Test Traffic Measurements
 - DNS MONitoring
 - Routing Information Service
- How can you participate
- Conclusions



Traditional view on RIPE NCC services (1)

- Membership services
 - Only available to paying customers
 - Resources (IPv4, IPv6, AS)
 - TTM (Test Traffic Measurements)
 - Training Courses
 - DNSMON
 - ...
- Community services
 - Available to everybody
 - K root server
 - Whois database
 - RIS
 - ...

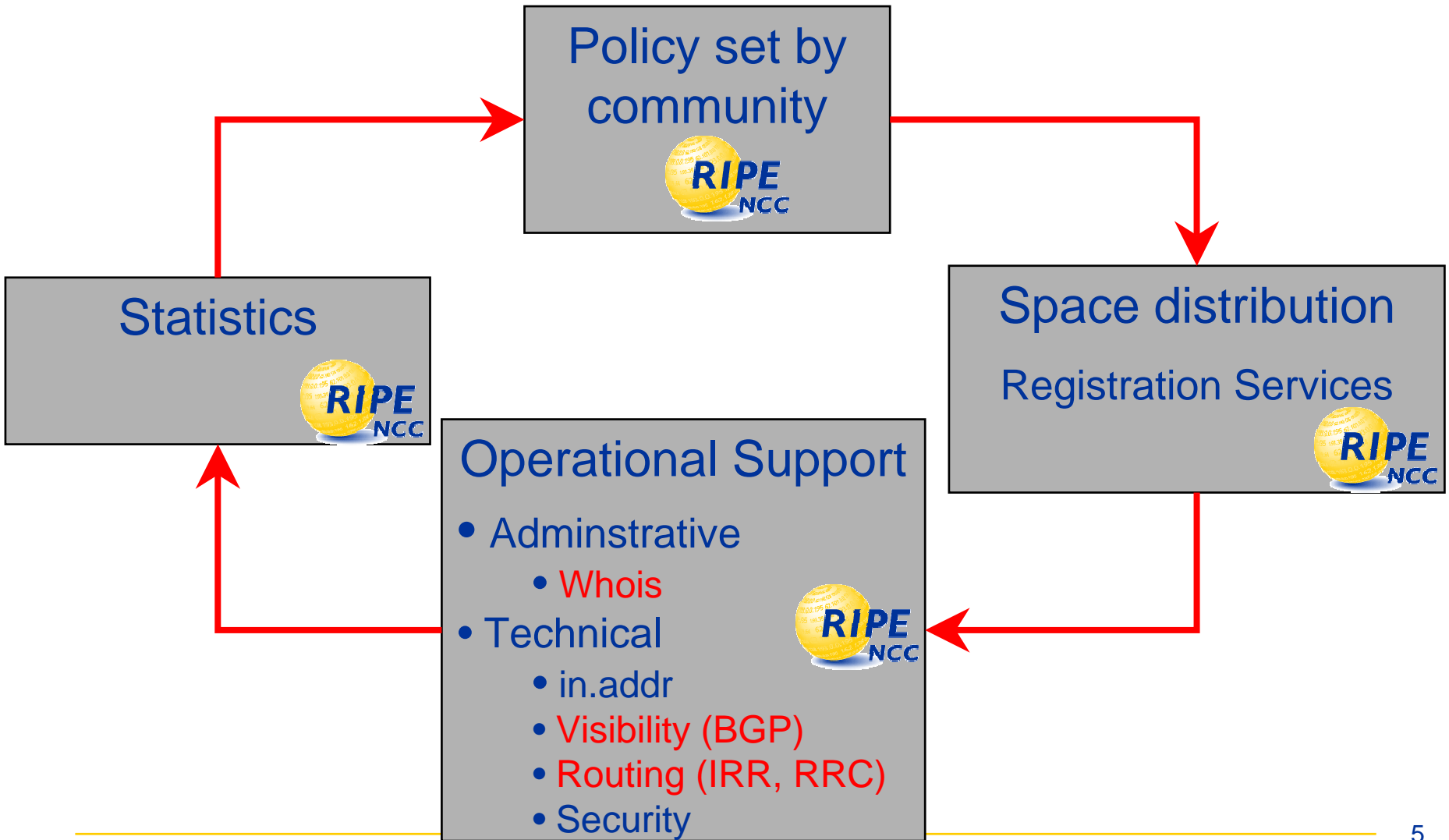


Traditional view on RIPE NCC services (2)

- Services are usually seen as separate
- This is not the full picture
- Services are highly related
- The NCC aims to offer a portfolio of related services that benefits its membership
 - Start from Internet resources (IP, AS)
 - Logical connection

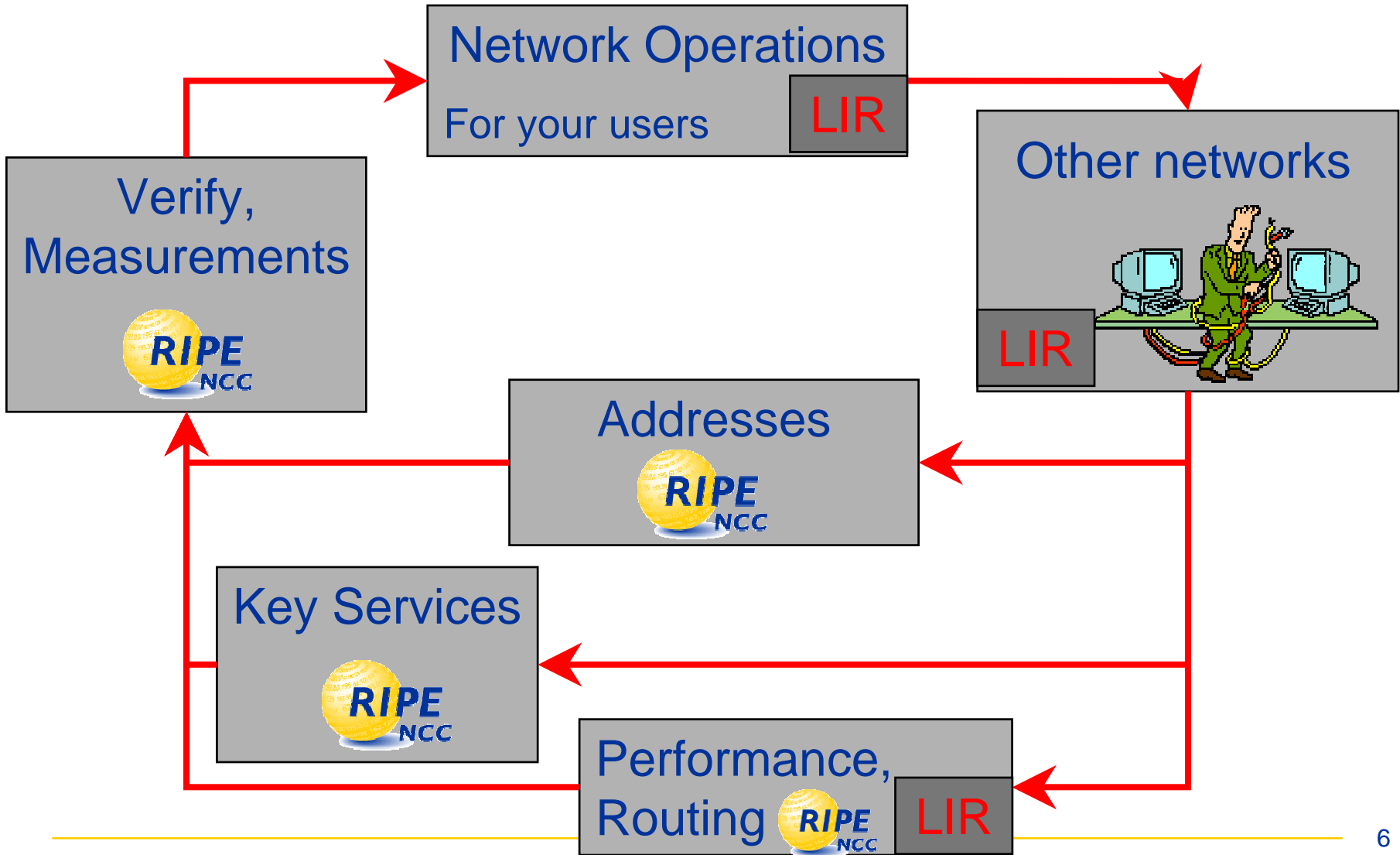


Example 1: IP/AS allocation





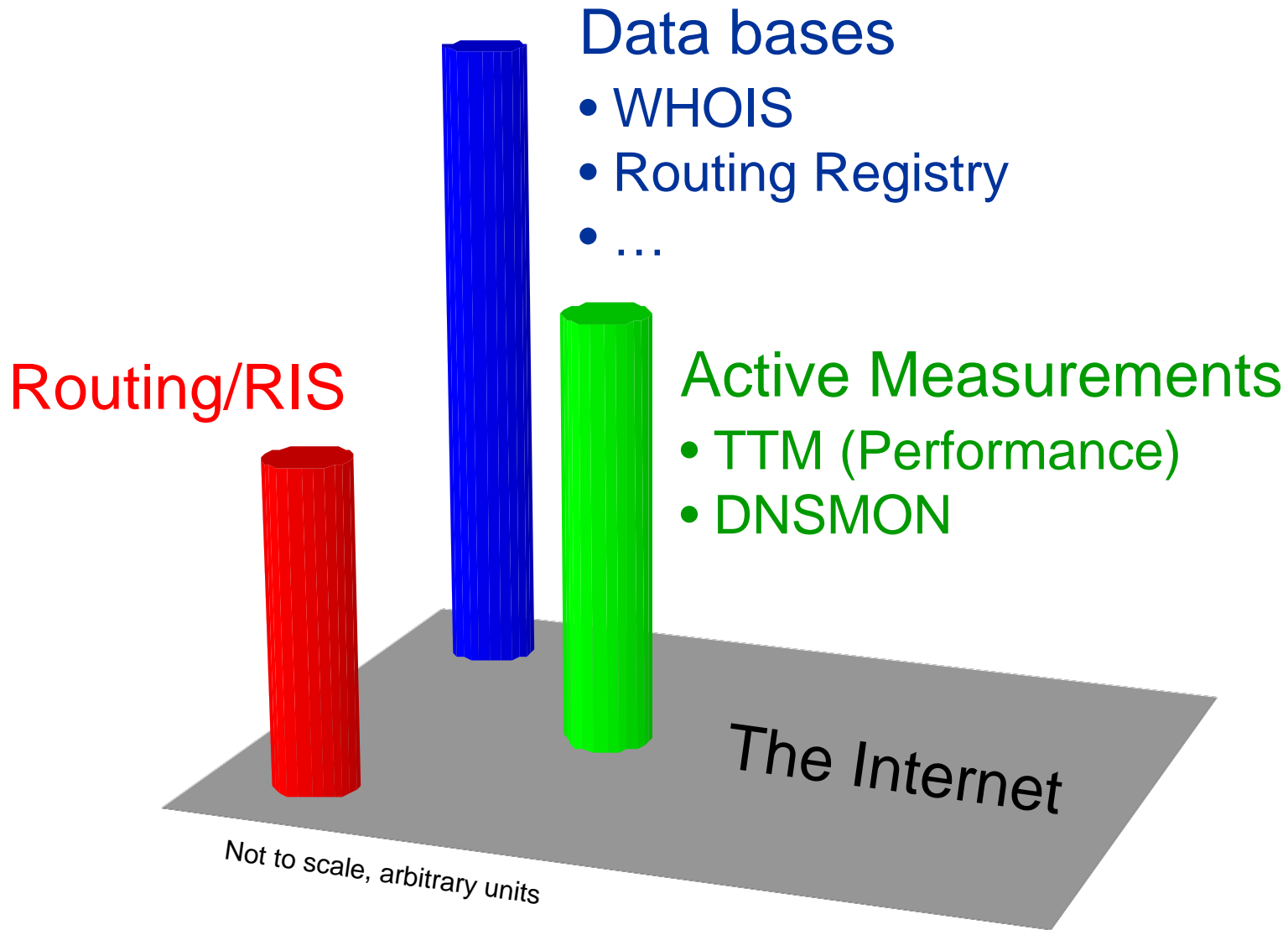
Example 2/Network operations



Data that can be collected

- Routing
 - AS level
 - IP level
- Performance:
 - Delay, Loss, Jitter
 - *Bandwidth: but how to measure that?*
- Services:
 - DNS
- Registration data
 - Allocations
 - Whois DB
 - Routing Registry
- Statistics:
 - Hostcount
 - Reports on specific topics
- ...

NCC facilities to collect data



Output

- Two basic output formats
 - Raw data
 - Products
- Raw data
 - You build your own tools on top
 - Share them if you like
- Products
 - Common applications of the data
 - Ready to use
 - Need community feedback to build and improve them

Intended Audience

- Operations:
 - ISP, TLD, ...
- Planning:
 - By an ISP
 - Where to put more capacity, routers, etc...
 - Policy groups
- Future:
 - R&D
 - The Internet is a complex system with no real design. Data is needed to understand and to improve it.



More about the services

- Active Measurements
 - Test Traffic Measurements or TTM
 - DNS Monitoring or DNSMON
 - Probes can be used for other measurements
- Routing Information Service
 - BGP



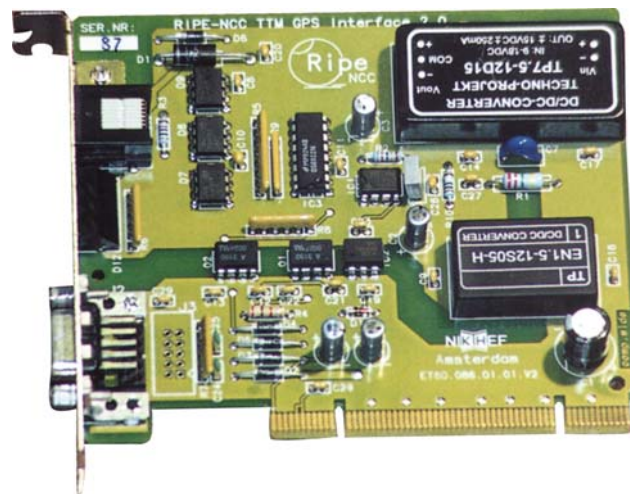
Active Measurements

TTM/Test Traffic Measurements

- Performance Measurements:
 - Delay, loss, jitter
 - IP Level Routing (“traceroute”).
- Active measurements
 - Probe to generate packets or “test traffic”
 - Independent of user traffic, no privacy issues
 - One-way measurements
- Follow applicable standards
 - RFC 2330, 2678-2681, 3393

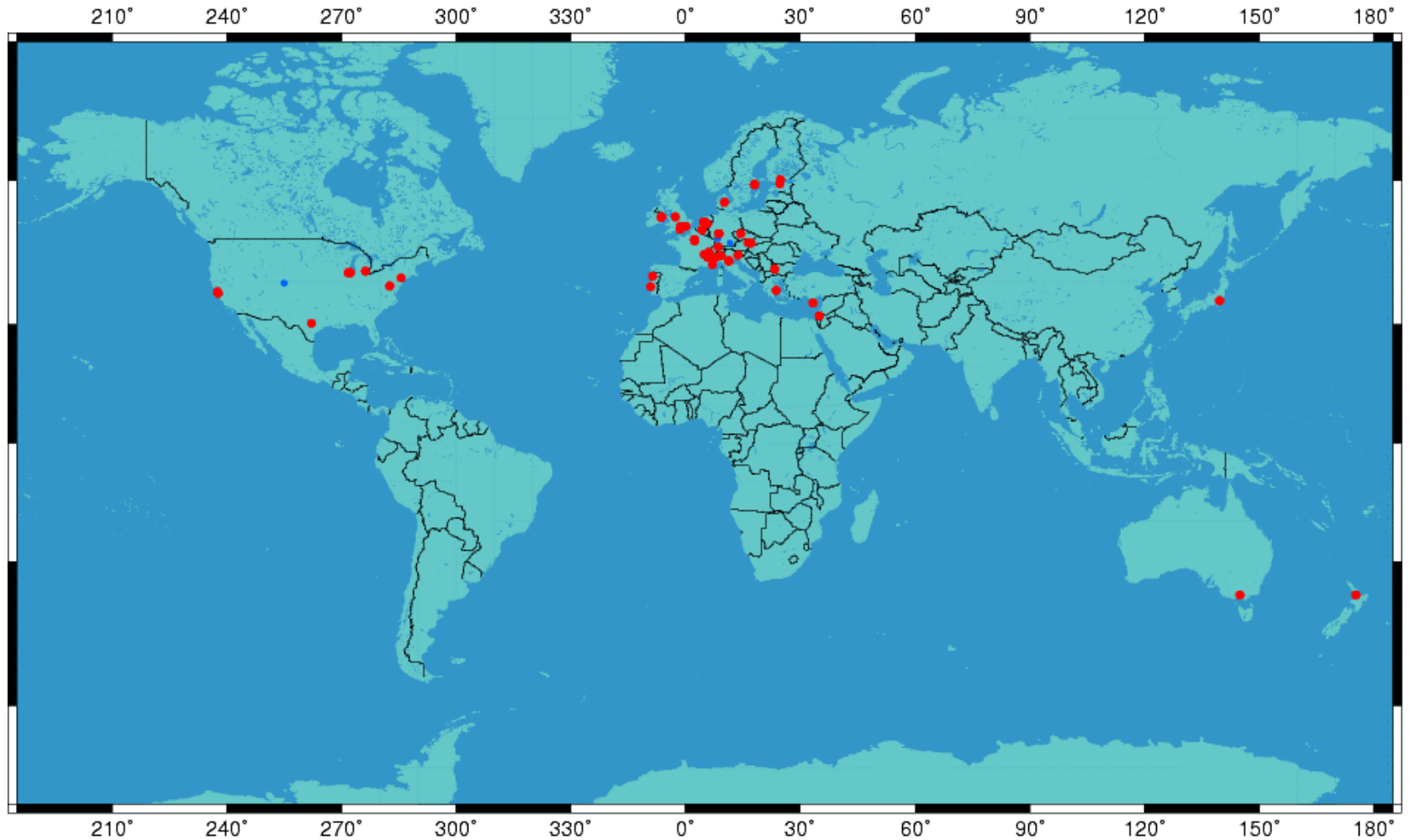
Our Implementation

- RIPE NCC Test Box
 - Measurement Probe
 - PC based hardware with GPS clock
 - Measurement software
 - User interface
 - NTP server
 - Can be used as a platform for other measurements
- Central machine for control and display





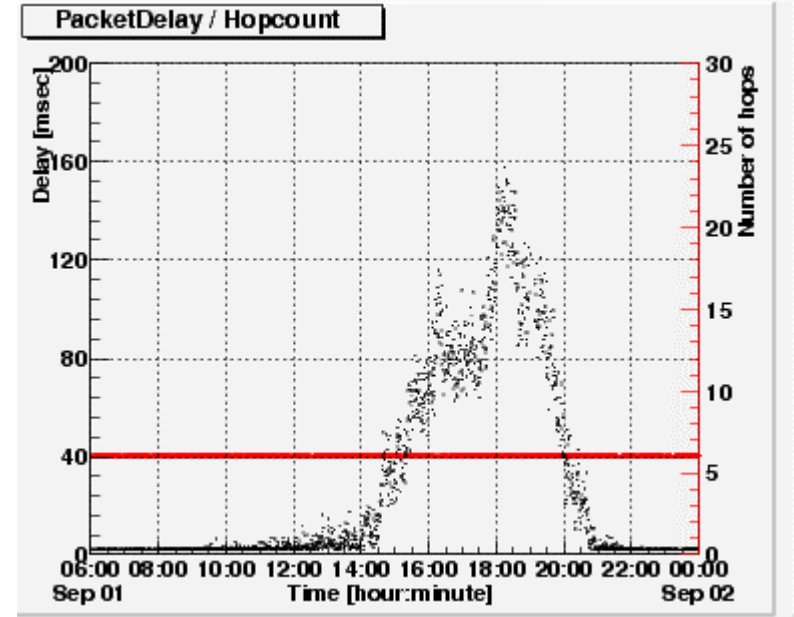
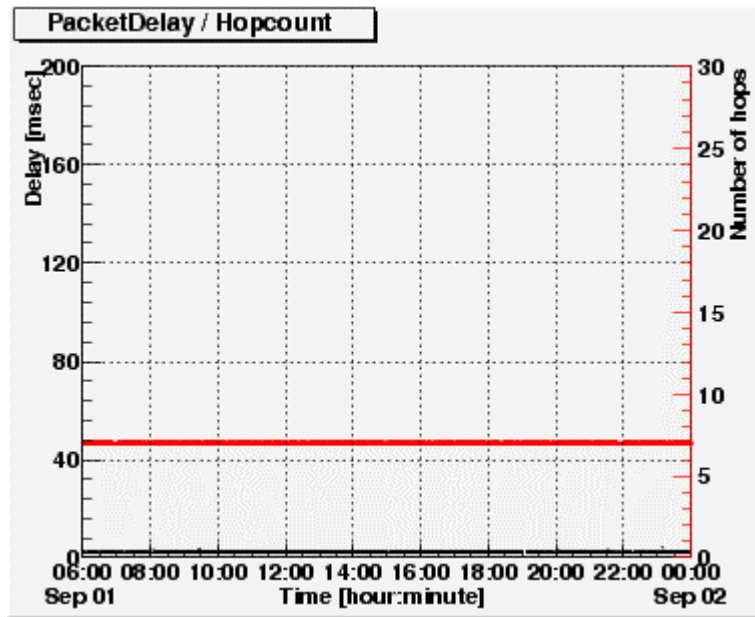
Measurement Network



Data and tools

- “Passive”: user has to look
 - Standard Plots:
 - Delays, losses, jitter, ...
 - Online (5 minutes, limited analysis)
 - Offline (next morning)
 - MTU/Tunnels for IPv6
 - Trends over long time
 - IP Level routing
 - Data base with paths
 - Raw data
 - User specific analysis
- “Active”: we warn the user
 - Network alarms

Delays and hopcount



- One way delay between two boxes
- Forward path looks nice and stable
- Reverse path shows huge delays
- Paths differ, can pin-point specific equipment/routes

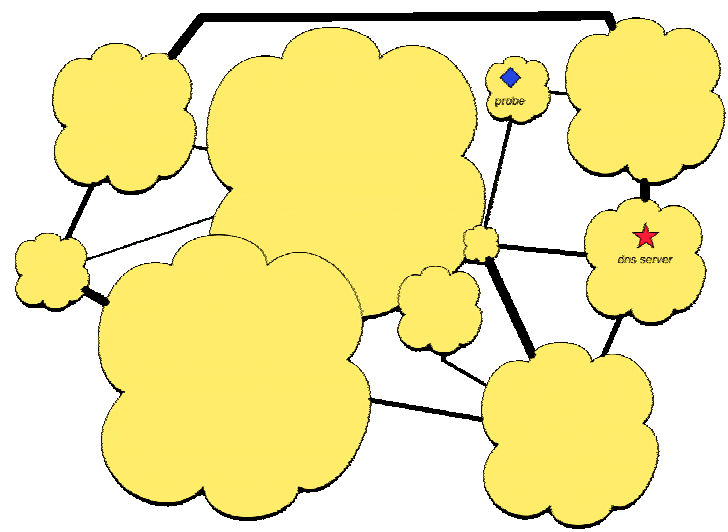
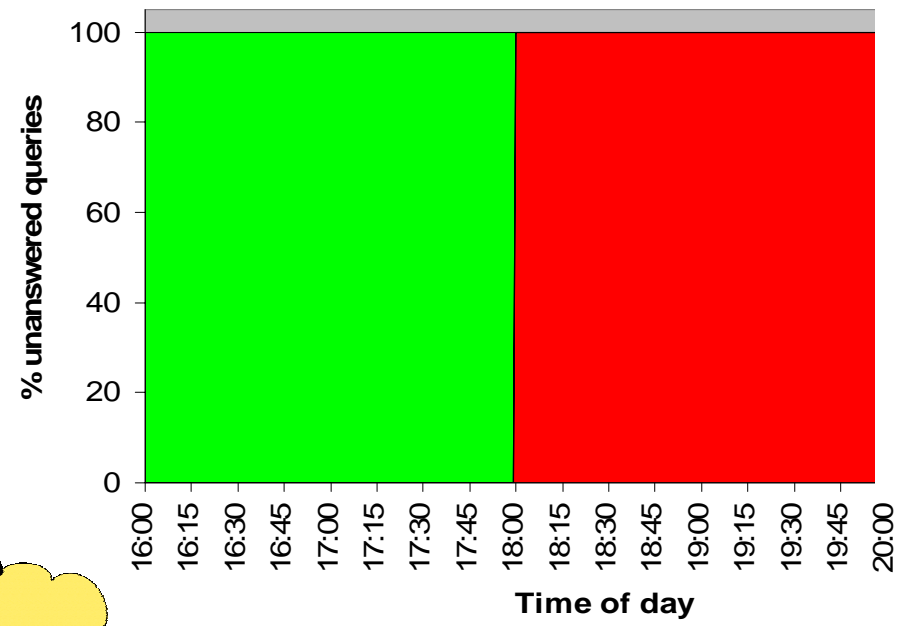


DNSMON: DNS Monitoring

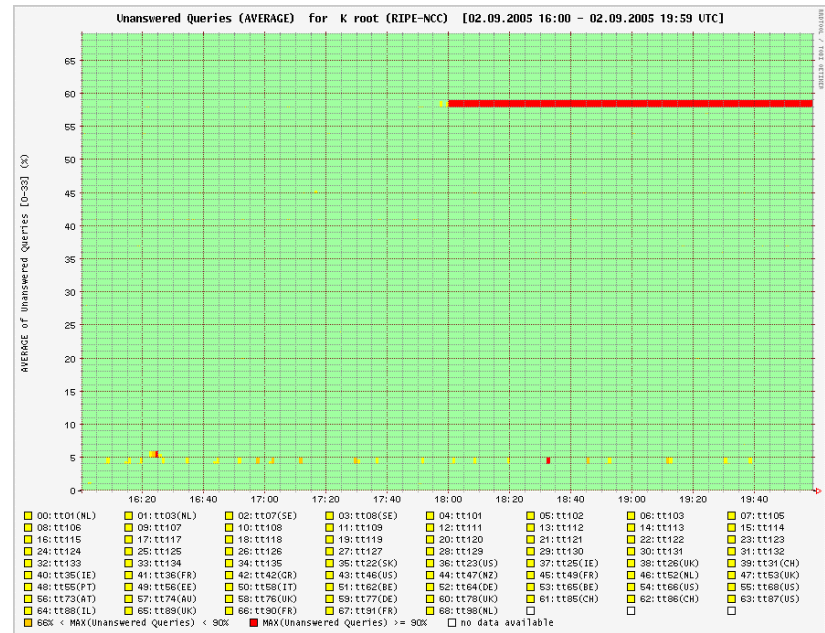
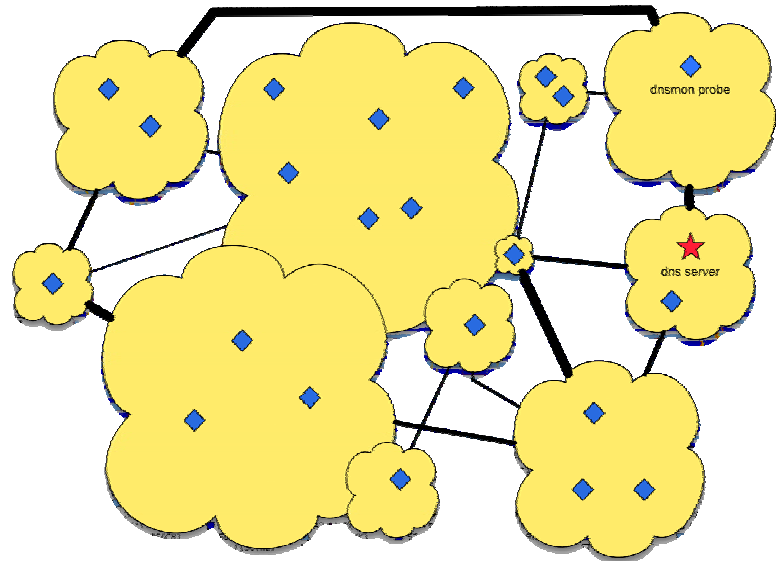
- DNS service is important
- Measure performance
 - There are lots of bad measurements out there!
- Better Measurements
 - From multiple points
 - Real DNS traffic
- Interactive and better presentation
 - Stacked plots allow people to easily see trends

Example

- User queries a root server
 - From his home machine
 - 100% loss after 18:00
 - Where is the problem?
- What he did:



Measure from multiple locations

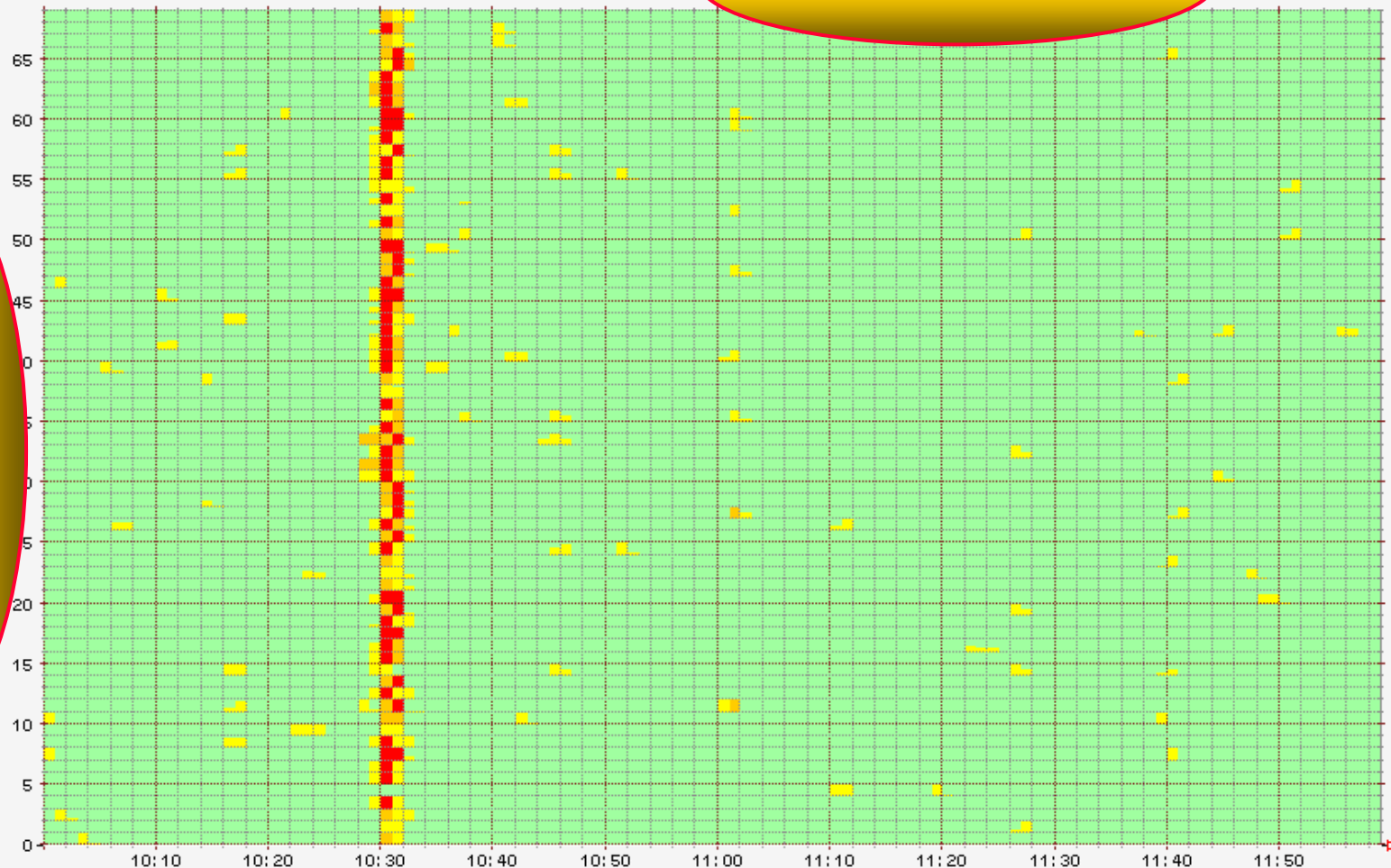


- Test from 100 sites
- Stack the plots
- This is clearly a local problem
- Counter example on the next slide



Unanswered Queries (AVERAGE) for ns.ripe.net

RRDTOOL / TOOL OUTPUT



- | | | | | | | | |
|----------------|--------------|--------------|--------------|--------------|--------------|---------------|--------------|
| 00: jordan(NL) | 01: tt01(NL) | 02: tt03(NL) | 03: tt08(SE) | 04: tt100 | 05: tt101 | 06: tt102 | 07: tt103 |
| 08: tt105 | 09: tt106 | 10: tt107 | 11: tt108 | 12: tt109 | 13: tt110 | 14: tt111 | 15: tt112 |
| 16: tt113 | 17: tt114 | 18: tt115 | 19: tt117 | 20: tt125 | 21: tt126 | 22: tt113(NL) | 23: tt25(IE) |
| 24: tt27(US) | 25: tt28(US) | 26: tt31(CH) | 27: tt32(IT) | 28: tt34(FI) | 29: tt35(IE) | 30: tt36(FR) | 31: tt40(BU) |
| 32: tt42(GR) | 33: tt46(US) | 34: tt47(NZ) | 35: tt49(FR) | 36: tt52(NL) | 37: tt53(UK) | 38: tt54(UK) | 39: tt55(PT) |
| 40: tt56(EE) | 41: tt57(FR) | 42: tt58(IT) | 43: tt59(NL) | 44: tt62(BE) | 45: tt66(US) | 46: tt68(US) | 47: tt69(BE) |
| 48: tt71(IT) | 49: tt72(PT) | 50: tt73(AT) | 51: tt74(AU) | 52: tt76(UK) | 53: tt77(DE) | 54: tt78(UK) | 55: tt80(JP) |
| 56: tt81(NL) | 57: tt82(US) | 58: tt84(US) | 59: tt85(CH) | 60: tt86(CH) | 61: tt87(US) | 62: tt88(IL) | 63: tt89(UK) |
| 64: tt90(FR) | 65: tt93(FR) | 66: tt94(NL) | 67: tt97(NL) | 68: tt98(NL) | | | |
- 66% < MAX(Unanswered Queries) < 90% ■ MAX(Unanswered Queries) >= 90% □ no data available



What is Measured

- Real DNS queries
- Poisson distributed, ~60/hour/server/probe
- From 70+ probes around the world

- Response time
- Server instance ID (anycast, load balancing)
- SOA version number
- Server software version



Routing Information Service

- Understanding routing can be very difficult
 - 20000 active ASN
 - Looking glass on router has limited functionality
- Build a device that collects BGP information at multiple points on the Internet
 - Include history information
 - Available to the entire community
 - Set of tools to access the information suited to various audiences
- Routing Information Service or RIS

RIS Location

- Data collection:
 - 14 collection points
 - >350 peering sessions in total, v4 and v6
 - Includes MSK-IX
 - Data that is being collected:
 - RIB: 3 times a day
 - All BGP updates
 - Storage:
 - MySQL DB for 3 months
 - Raw data
- LINX, London, UK
 - SFINX, Paris, FR
 - AMS-IX, Amsterdam, NL
 - CIXP, Geneva, CH
 - VIX, Vienna, AT
 - NSPIXP2, Othemachi, JP
 - NETNOD, Stockholm, SE
 - MIX, Milan, IT
 - NYIIX, New York, USA
 - DECIX, Frankfurt, DE
 - **MSK-IX, Moscow, RU**
 - PAIX, Palo Alto, USA
 - RIPE NCC, Amsterdam, NL

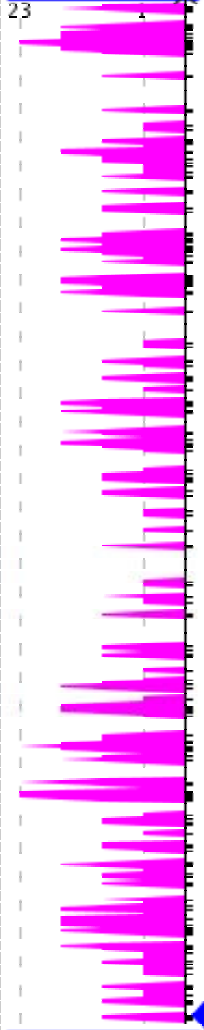


RIS applications

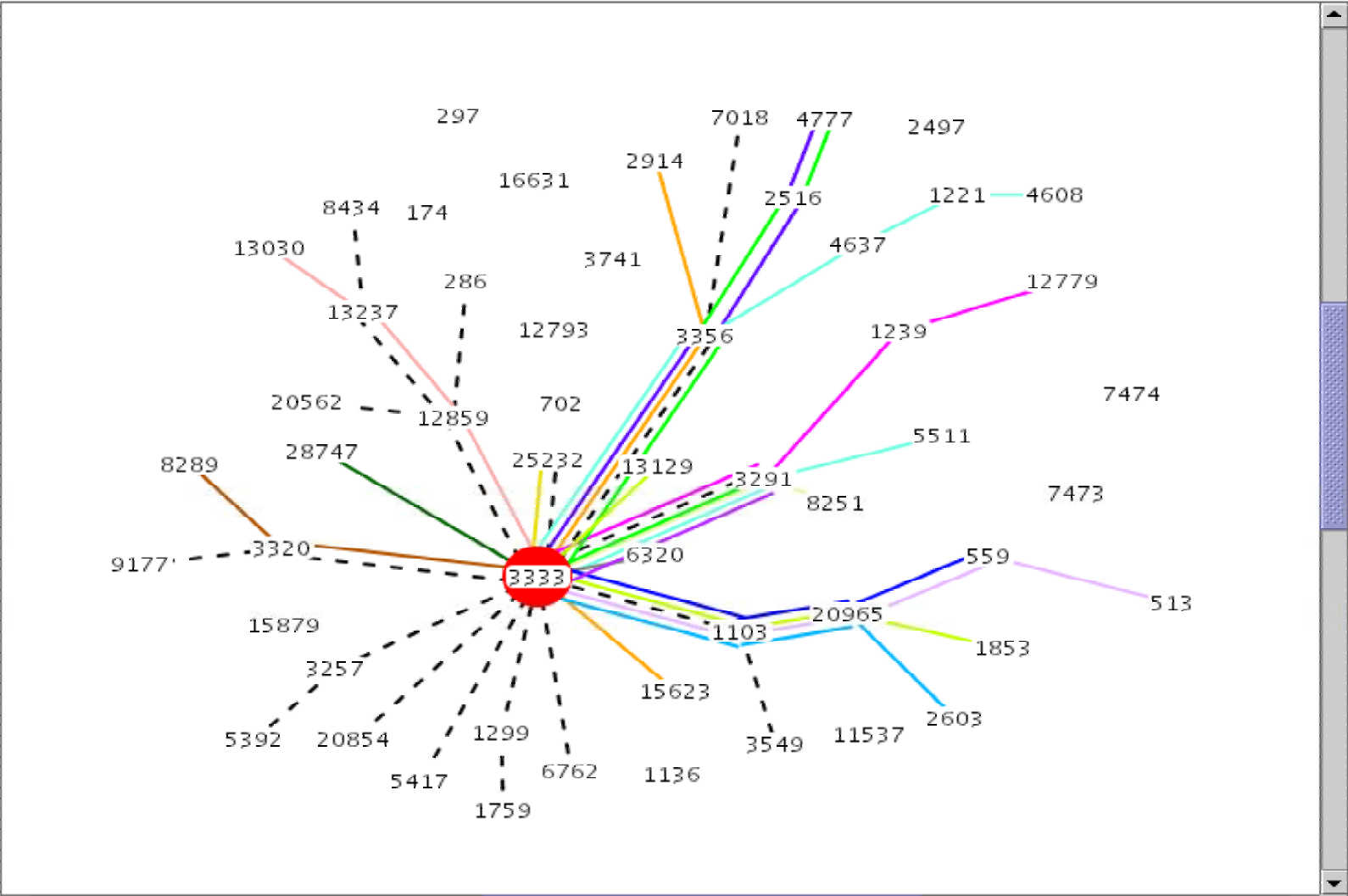
- **mySQL queries**
 - See what happened
- **Reports**
 - Martians, black-holes, illegal announcements, activity, Routing Registry Consistency, ...
- **Visualization**
 - Static graphs
 - Dynamic graph with BGP play
- **Warnings**
 - myASN service to warn you about unusual BGP events

3/399 rrc03 Path Change 2004.03.01 05:38:26 from 28747 12859 3333
195.69.144.63 to 28747 3333
AS297 NASA National Aeronautics and Space Administration

2004.03.31 12:00:00



2004.03.01 00:00:00



Navigation controls: |< < step step > >| Redraw Skip Reannouncements New Query



Why should the NCC collect data?

- Activity that benefits the entire community
 - The NCC was set up to do that
- Neutral & Impartial
 - No commercial bias
 - Results that reflect reality
- Access to networks operated by others
- AUP to protect sensitive data
 - Active measurements wherever possible
 - Restrictions on publication

Funding Model

- Data collection benefits all.
 - Part of the membership fee is used for this
- Some will benefit more than others:
 - Examples:
 - Measurement probe at your site
 - Measurements on the TLD that you operate
 - Data about your specific situation, rather than the average
 - Pay extra



Participate?

- Active Measurements
 - TTM:
 - Buy and install a probe
 - RIPE 297 explains the details
 - DNSMON
 - Comes with TTM for ISP's
 - TLD operators: RIPE 342 explains all details
- RIS:
 - Set up a peering session at any of our locations
 - Contact ris@ripe.net

Conclusions

- The RIPE NCC tries to offer a complete service portfolio for its members
- 3 Services aimed at collecting data on the Internet
 - Routing Information Service (RIS)
 - Active Measurements
 - Test Traffic Measurements (TTM)
 - DNS Monitoring (DNSMON)
- You encouraged to use them to your benefit

URL's, email

- Handout in registration pack
- TTM
 - <http://www.ripe.net/ttm>
 - ttm@ripe.net: TTM crew @ NCC
 - tt-wg@ripe.net: RIPE working group
- DNSMON:
 - <http://dnsmon.ripe.net>
 - dnsmon@ripe.net: DNSMON crew @ NCC
 - dns-wg@ripe.net: RIPE working group
- RIS
 - <http://www.ripe.net/ris>
 - ris@ripe.net: RIS crew @ NCC
 - routing-wg@ripe.net: WG

Questions, Discussion

