

Introduction to the Routing Information Service (RIS)

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New Projects

Internal RIPE NCC, April 2004

RIS Overview & Background



Why the RIS?

- Many tools that debug Internet connectivity, e.g. ping, traceroute, protocol analysers, router debug commands...
- Major drawback – *No 'history'*
Only works with the current status and configuration
- Another drawback – *No perspective 'mobility'*
Looking Glasses are exceptions, but not all are available to the public, and they only provide information about the AS where they are installed

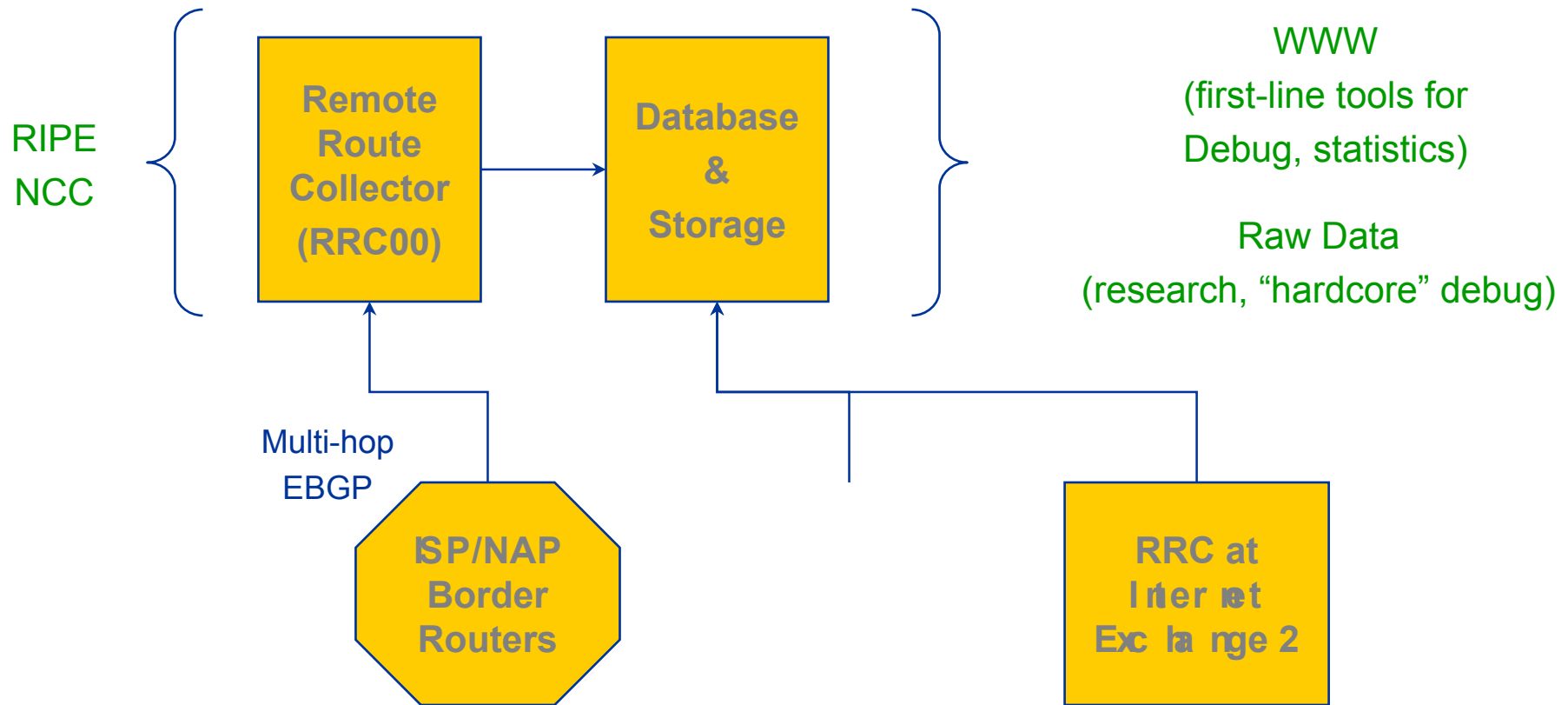


What is the RIS then?

From RIPE-200, Design Document (October 1999):

- Collects default-free BGP routing information between AS's (EBGP) from several locations and stores it as a function of time at RIPE NCC
- Allows service's users to see all routes anywhere on the Internet and their development over time
- Think of the RIS as a giant, integrated Looking Glass with historical information about the Internet's logical structure.
- BGP Updates kept in database for 3 months (disk space permitting)
- Raw data kept "forever"

Simple Graphical Overview

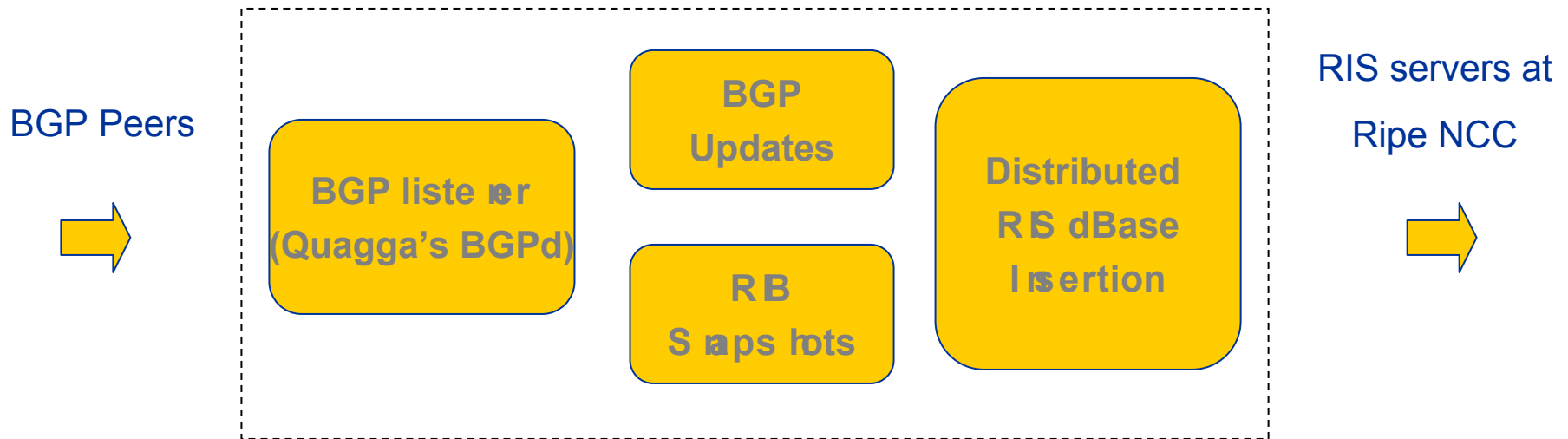


RRC:

RIS Data Collection Devices

RIS ASN: 12654

What is a RRC box?



- Software router using Quagga's BGP daemon
- BGP update dumps every 5 min
- RIB snapshots, i.e. the BGP table, every 8 hours
- UTC Time-stamps & NTP synchronization
- 'Raw data' in MRT binary format
- 'Routing Beacon' announcements/withdrawals
- RRC03: 'Debogon' prefixes



Twelve Data Collection Points

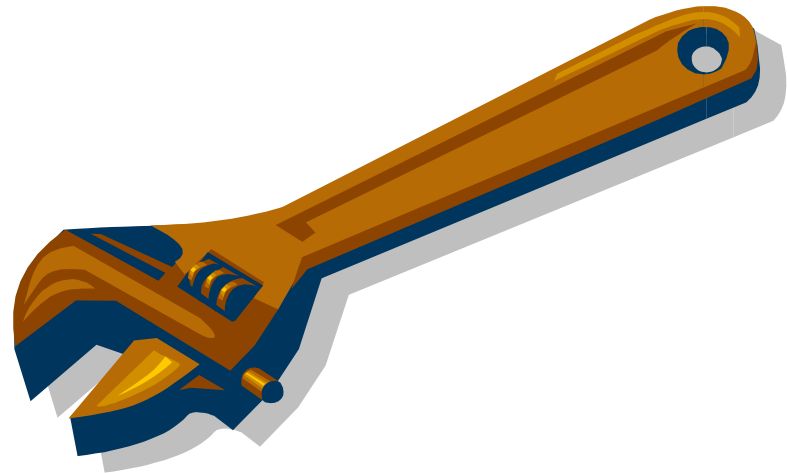
- RRC00 - RIPE NCC (Singel)
- RRC01 - London (LINX)
- RRC02 - Paris (SFINX)
- RRC03 - Amsterdam (AMS-IX)
- RRC04 - Geneva (CIXP)
- RRC05 - Vienna (VIX)
- RRC06 – Otemachi, Tokyo (NSPIXP2)
- RRC07 – Stockholm (Netnod-IX)
- RRC08 – San Jose, CA (MAE-West)
- RRC09/NRC01 – Zurich (TIX)
- RRC10 – Milano (MIX)
- RRC11 – New York (NYIIX)

RIS Timeline

- **July 1999:** Official start of the RIS Project
- **October 1999:** 'RIS Design Note' (RIPE-200) published
- **February 2000:** First RIS prototype (RRC00) presented at RIPE-35
- **May 2000:** Collected data stored in MySQL database
- **July 2000:** Second route collector (RRC01) at LINX
- **May 2002:** First RRC in North America (RRC08)
- **November 2002:** First IPv6 Peers at AMS-IX
- **July 2003:** 'Next generation' RIS brought into service; 'on-the-fly', distributed dBase insertion, IPv6 support etc
- **February 2004:** 'De-Bogonising New Address Blocks'
- **Today:**
 - 12 active route collectors on 3 continents
 - More than 300 IPv4 and IPv6 peers



RIS Tools

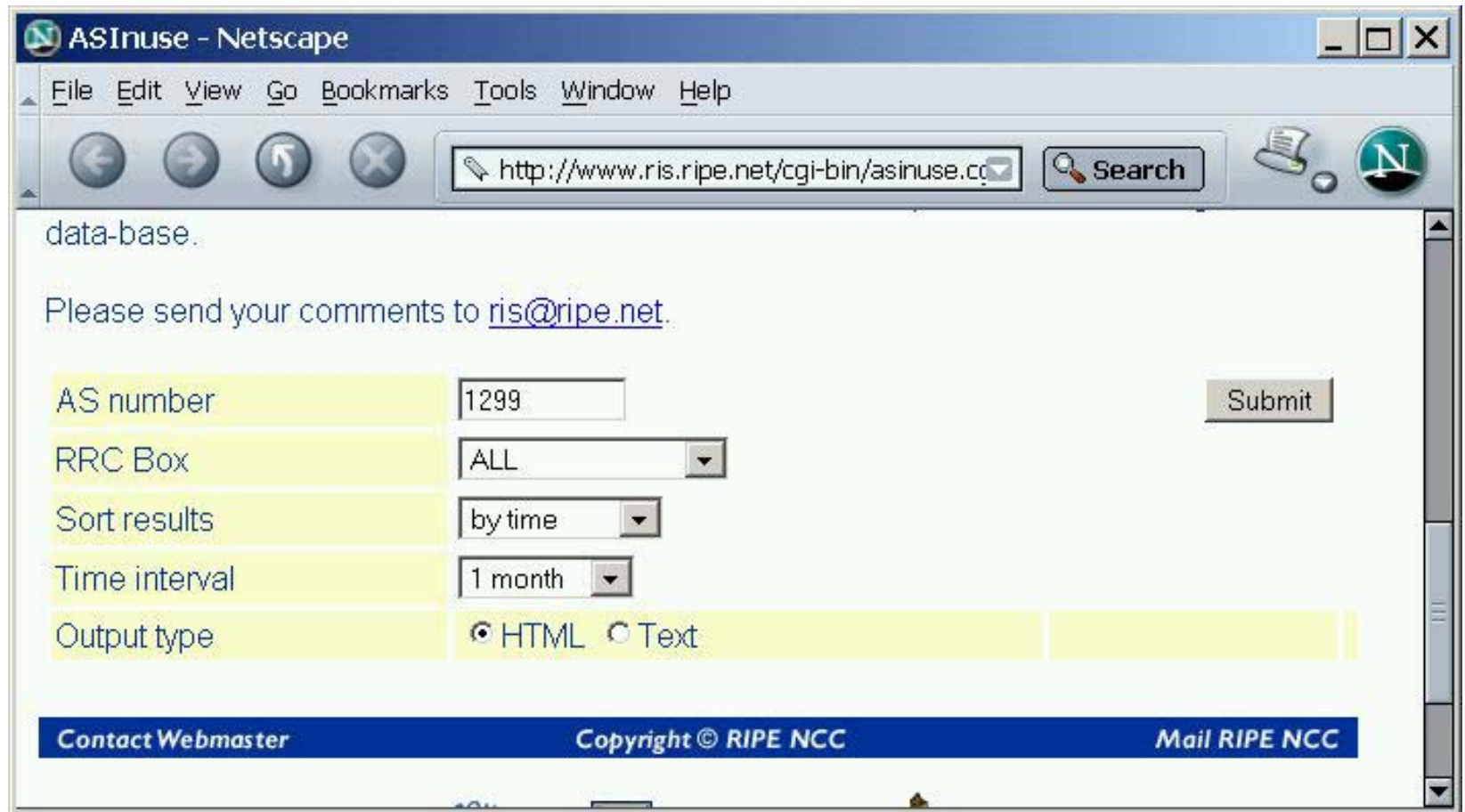


<http://www.ripe.net/ris/query.html>

RIS 'features'

- AS/Prefixinuse
 - Search RIS dBase by AS or Prefix
 - RIS BGP Routing Hot Spot Utility
 - RISreport
 - Agilent Labs' RIPE NCC Data Analysis Project
 - Routing Beacons
 - RISwhois
 - myASn
 - BGPlay (Uni Roma 3)
 - Various Reports
 - Martians
 - MOAS
 - Weekly RIS Statistics
 - Looking Glass
-
- Go to <http://www.ripe.net/ris/query.html>
and try them out

ASInuse



data-base.

Please send your comments to ris@ripe.net.

AS number

RRC Box

Sort results

Time interval

Output type ☒ HTML ☐ Text

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- ASInuse will query the RIS dBase when a given AS Number was last seen and retrieve all AS Paths that contain the ASN.
- Used by RIPE NCC Registration Services to see if allocated ASN is announced on the Internet

ASInuse Query Result

ASInuse - Netscape

File Edit View Go Bookmarks Tools Window Help

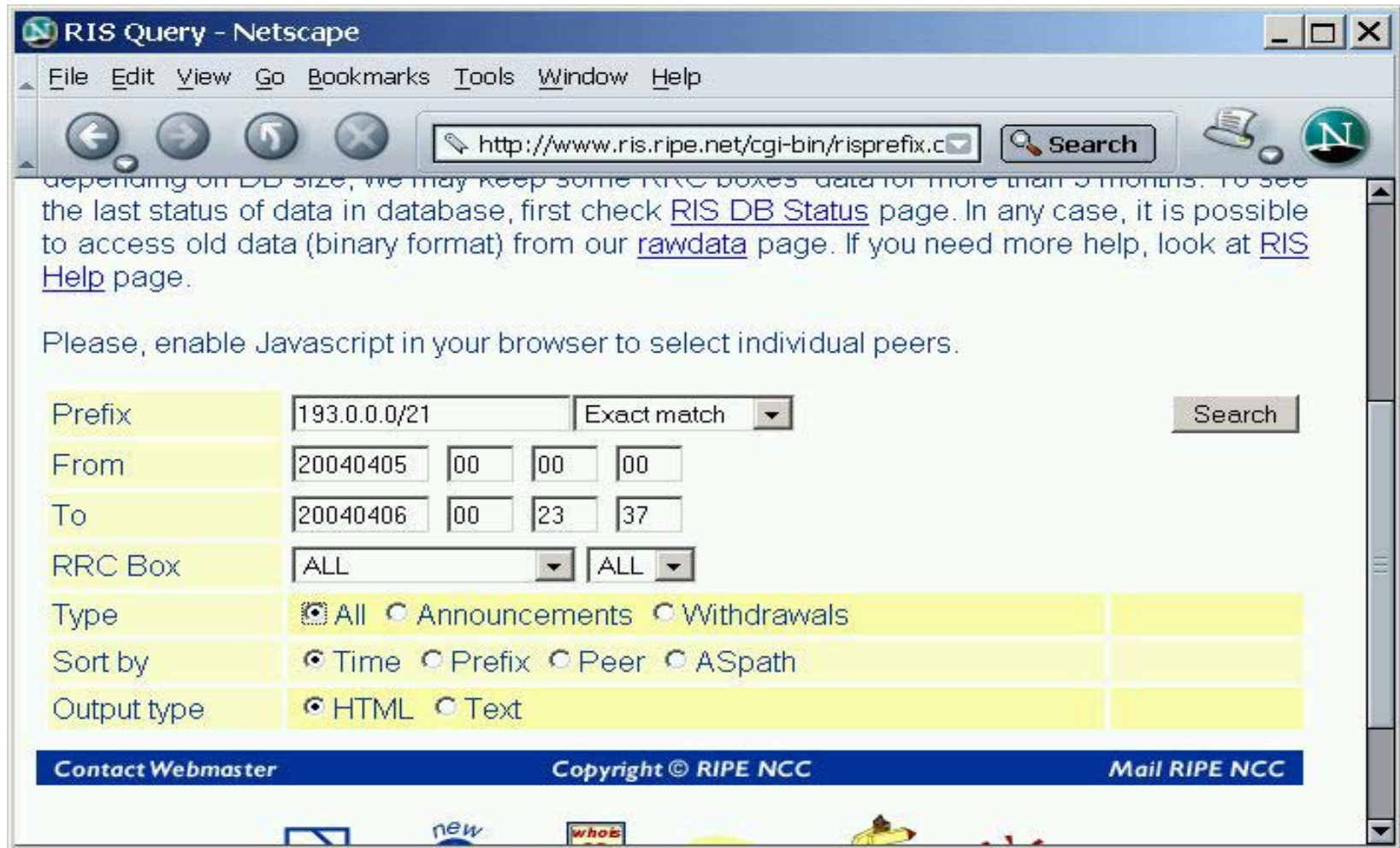
http://www.ris.ripe.net/cgi-bin/asinuse.cgi Search

The database contains data until 2004-04-05 23:20:00Z.

AS1299 was last announced on 2004-04-05 23:19:54Z. 258 peers are found for **AS1299**

2914	2004-04-05 23:19:54Z	2914 1299 20965 5408 5470
20965	2004-04-05 23:19:54Z	2914 1299 20965 5408 5470
3549	2004-04-05 23:19:39Z	3333 1103 3549 1299 20965 5408 12364
3320	2004-04-05 23:18:59Z	513 3320 1299 20965 5408 5489
6849	2004-04-05 23:18:39Z	3741 7018 1299 6849 13032 13032 13032 13032 13032 13032 29095
7018	2004-04-05 23:18:39Z	3741 7018 1299 6849 13032 13032 13032 13032 13032 13032 29095

Prefix Query



RIS Query - Netscape

File Edit View Go Bookmarks Tools Window Help

http://www.ripe.net/cgi-bin/risprefix.c Search

depending on DB size, we may keep some RRC boxes' data for more than 5 months. To see the last status of data in database, first check [RIS DB Status](#) page. In any case, it is possible to access old data (binary format) from our [rawdata](#) page. If you need more help, look at [RIS Help](#) page.

Please, enable Javascript in your browser to select individual peers.

Prefix: 193.0.0.0/21 Exact match Search

From: 20040405 00 00 00

To: 20040406 00 23 37

RRC Box: ALL ALL

Type: ☒ All ☐ Announcements ☐ Withdrawals

Sort by: ☒ Time ☐ Prefix ☐ Peer ☐ ASpath

Output type: ☒ HTML ☐ Text

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- Lists AS from which prefix originates and path to it from RRC

Prefix Query Result 1

RIS Query result: all - Netscape

File Edit View Go Bookmarks Tools Window Help

http://www.ris.ripe.net/cgi-bin/risprefix.cgi?net=193.0.0.0%2F21&preftype=amatch&action=Search Search

RIS DB query result for all RRC boxes. [Reset](#)

State of the local RIB on 20040405.

Prefix	Last update time	Peer	Next HOP	MED	Origin	AS path	Community	RRC ID
193.0.0.0/21	2003-12-15 22:13:58Z	194.153.154.35	194.153.154.35	0	IGP	20854 3333		AMSIX
193.0.0.0/21	2004-01-15 18:01:03Z	193.0.0.56	193.0.0.56	0	IGP	3333		RIPE NCC
193.0.0.0/21	2004-01-15 18:01:31Z	195.69.144.68	195.69.144.68	0	IGP	3333		AMSIX
193.0.0.0/21	2004-01-30 02:25:24Z	212.47.190.1	212.47.190.1	0	IGP	9177 3320 3333		RIPE NCC
193.0.0.0/21	2004-02-18 19:39:02Z	194.153.154.17	194.153.154.17	0	IGP	20562 12859 3333		AMSIX
193.0.0.0/21	2004-02-18 19:39:34Z	195.69.144.189	195.69.144.189	0	IGP	20562 12859 3333		AMSIX
193.0.0.0/21	2004-02-19 03:22:48Z	195.69.144.196	195.69.144.68	0	IGP	6762 3333		AMSIX
193.0.0.0/21	2004-03-05 11:23:52Z	202.249.2.20	202.249.2.169	0	IGP	4777 2497 3356 3333		NSP/XP2
193.0.0.0/21	2004-03-05 11:24:08Z	202.12.28.190	202.12.28.190	0	IGP	4777 2497 3356 3333		RIPE NCC
193.0.0.0/21	2004-03-08 04:46:13Z	194.68.128.66	194.68.128.66	0	IGP	8434 13237 12859 3333	8434:2000 8434:2010	Netnod
193.0.0.0/21	2004-03-09 06:24:34Z	193.203.0.1	193.203.0.1	0	IGP	1853 20965 1103 3333		VIX
193.0.0.0/21	2004-03-09 06:27:18Z	193.10.252.5	193.10.252.5	0	IGP	2603 20965 1103 3333	2603:222 2603:666 20965:0 20965:155	Netnod
193.0.0.0/21	2004-03-10 09:38:26Z	12.0.1.63	12.0.1.63	0	IGP	7018 3356 3333	7018:5000	RIPE NCC

- Entires in RIB tables collected during time interval

Prefix Query Result 2

http://www.ris.ripe.net/cgi-bin/risprefix.cgi?net=193.0.0.0%2F21&preftype=ematch&action=Search&startDay=20040405&startHour=00

Updates between 2004-04-05 00:00:00Z and 2004-04-05 23:59:59Z .

Type	Prefix	Time	Peer	Next HOP	MED	Origin	AS path	Community	RRC ID
A	193.0.0.0/21	2004-04-05 02:01:44Z	217.29.66.65	217.29.66.65	0	IGP	12779 1239 3291 3333	12779:1239	MIX
A	193.0.0.0/21	2004-04-05 06:09:14Z	193.203.0.1	193.203.0.1	0	IGP	1853 6461 12859 3333	-	VIX
A	193.0.0.0/21	2004-04-05 06:13:52Z	193.203.0.1	193.203.0.1	0	IGP	1853 20965 1103 3333	-	VIX
A	193.0.0.0/21	2004-04-05 10:52:13Z	213.190.160.193	213.190.160.193	0	IGP	1759 1299 3333	1299:20000 1299:20500 1299:20505 1759:10000 1759:10002 1759:10400 1759:10402	Netnod
A	193.0.0.0/21	2004-04-05 10:55:47Z	213.190.160.193	213.190.160.193	0	IGP	1759 1299 3333	1299:20000 1299:20500 1299:20505 1759:10000 1759:10002 1759:10400 1759:10402	Netnod
A	193.0.0.0/21	2004-04-05 11:38:25Z	192.65.185.130	192.65.185.130	0	IGP	559 20965 1103 3333	-	CIXP
A	193.0.0.0/21	2004-04-05 11:45:30Z	192.65.185.130	192.65.185.130	0	IGP	559 20965 1103 3333	-	CIXP
A	193.0.0.0/21	2004-04-05 13:16:31Z	193.203.0.7	193.203.0.7	0	IGP	12793 286 12859 3333	-	VIX
A	193.0.0.0/21	2004-04-05 13:23:56Z	193.203.0.7	193.203.0.7	0	IGP	12793 12859 3333	-	VIX
A	193.0.0.0/21	2004-04-05 15:40:04Z	195.69.144.178	195.69.144.178	0	IGP	6320 3333	6320:23000 6320:23020	AMSIX
A	193.0.0.0/21	2004-04-05 17:09:07Z	129.250.0.232	129.250.0.232	13	IGP	2914 3356 3333	2914:420 2914:2000 2914:3000 65504:3356	RIPE NCC
W	193.0.0.0/21	2004-04-05 20:11:03Z	198.32.200.125	-	0	IGP	-	-	MAE-West
A	193.0.0.0/21	2004-04-05 20:18:50Z	217.29.66.5	217.29.66.5	0	IGP	5392 3257 3333	-	MIX
		2004-04-05					297 174		

- Updates during time interval

Old Case Study

- RIS Looking Glass on RRC00
 - Best Path to 158.116.0.0/16:
 - 2914, 701, 18882
 - Best Path to 158.116.242.0/23:
 - 1103, 702

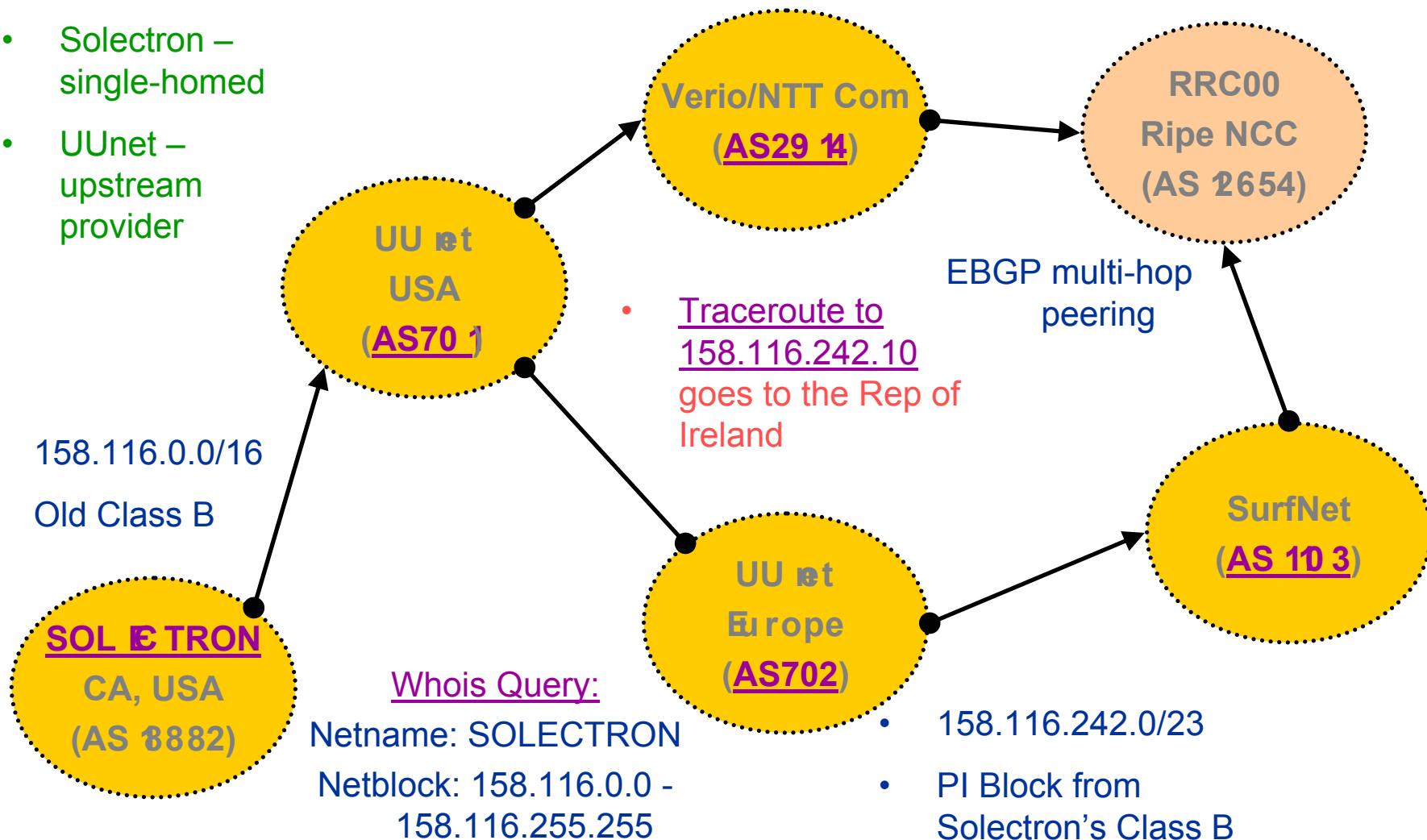


Logical View of Example, Dec' 2001

- Solectron – single-homed
- UUnet – upstream provider

- 158.116.0.0/16
- Old Class B

- Traceroute to 158.116.242.10 goes to the Rep of Ireland



“Historical” Aspect of the RIS

- **New** prefix queries on the 25th of April, **but** looking at the RIB dumps from RRC00 for the 29th of March, 2002 (0000h-0800h)
 - 158.116.0.0/16
 - 158.116.242.0/23
- Estimates of best paths based on AS_PATH length and timestamps (LOCAL_PREF not advertised to EBGP peers)

Logical View of Example, Mar' 2002

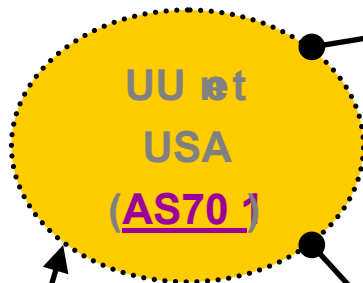
Different AS Paths!

- Solectron – still single-homed
- UUnet – still upstream provider

- 158.116.0.0/16
- Old Class B



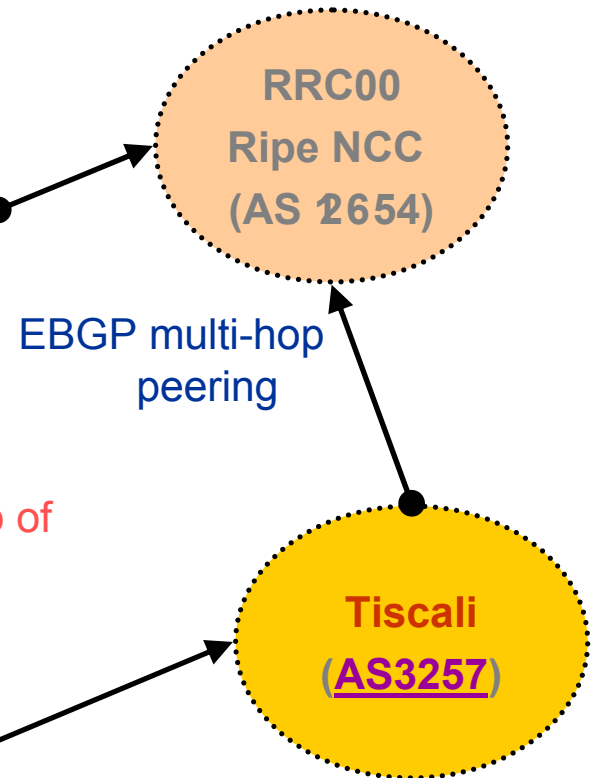
Whois Query:
Netname: SOLECTRON
Netblock: 158.116.0.0 -
158.116.255.255



- Traceroute to 158.116.242.10
goes to the Rep of Ireland



- 158.116.242.0/23
- PI Block from Solectron's Class B



AS Query

RIS Query - Netscape

File Edit View Go Bookmarks Tools Window Help

http://www.ripe.net/cgi-bin/risas.cgi Search

Please, enable Javascript in your browser to select individual peers.

Origin AS Search

From

To

RRC Box

Type ☒ Announcements

Output Format ☒ HTML ☐ Text ☐ Graphical

Sort data by ☒ Time ☐ Prefix ☐ Path

Plot Orientation ☐ West ☒ North ☐ East

Maximum Rank

Maximum Size

192.65.184.3, AS513

192.65.185.130, AS559

192.65.185.137, AS3303

192.65.185.143, AS2686

192.65.185.144, AS6893

192.65.185.151, AS8327

192.65.185.157, AS12350

192.65.185.33, AS789

(HTML/Text only)

(Graphical only)

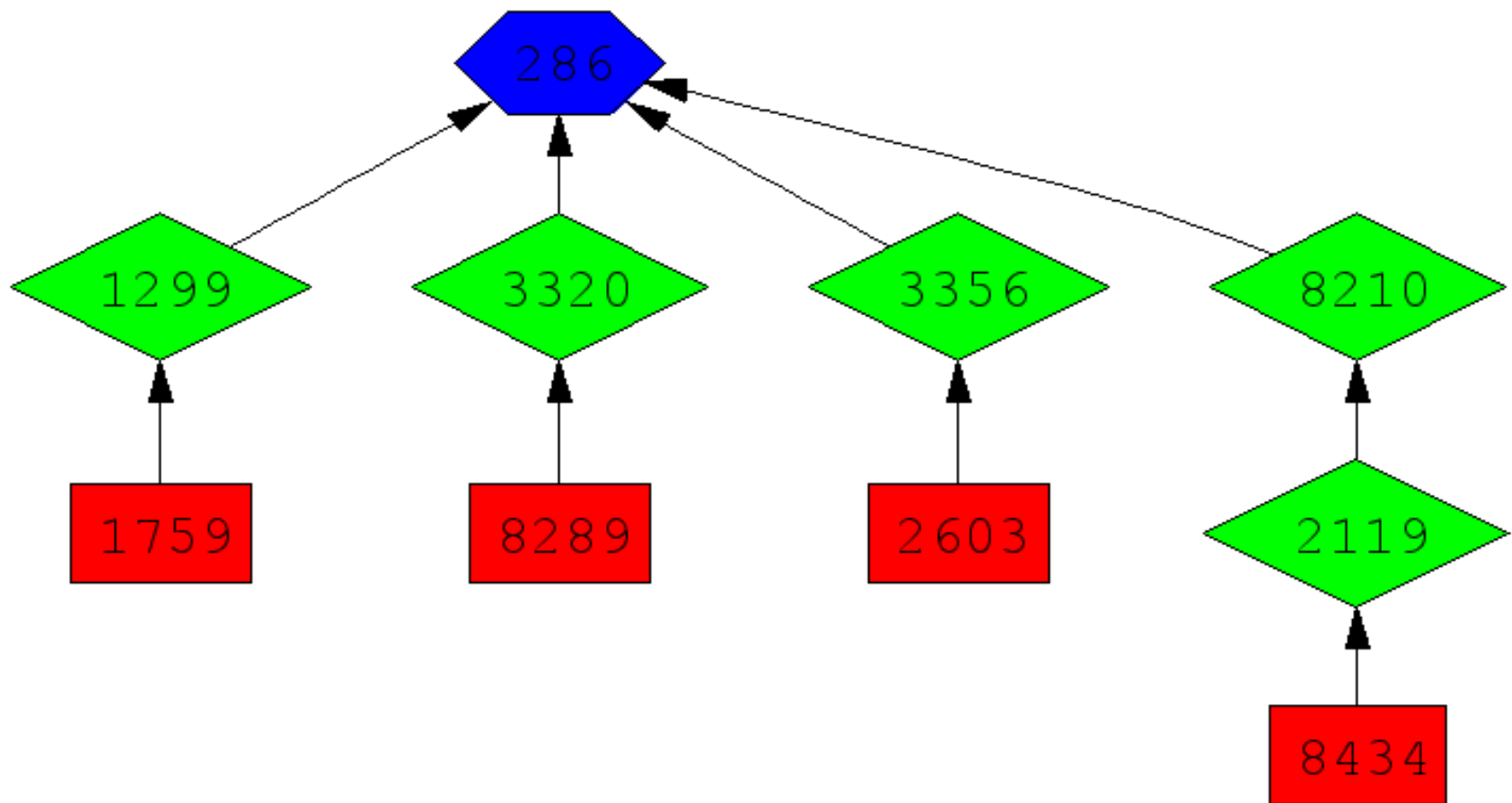
(Graphical only)

(Graphical only)

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- Lists all prefixes that originate from specified AS and paths back to it from RRC's perspective ('view')

Graphical AS Query Result



AS286 at 20040405 00:00:00 seen from RRC07, peer SELECT PEER

Textual AS Query Output

RIS Query result for mc07 - Netscape

File Edit View Go Bookmarks Tools Window Help

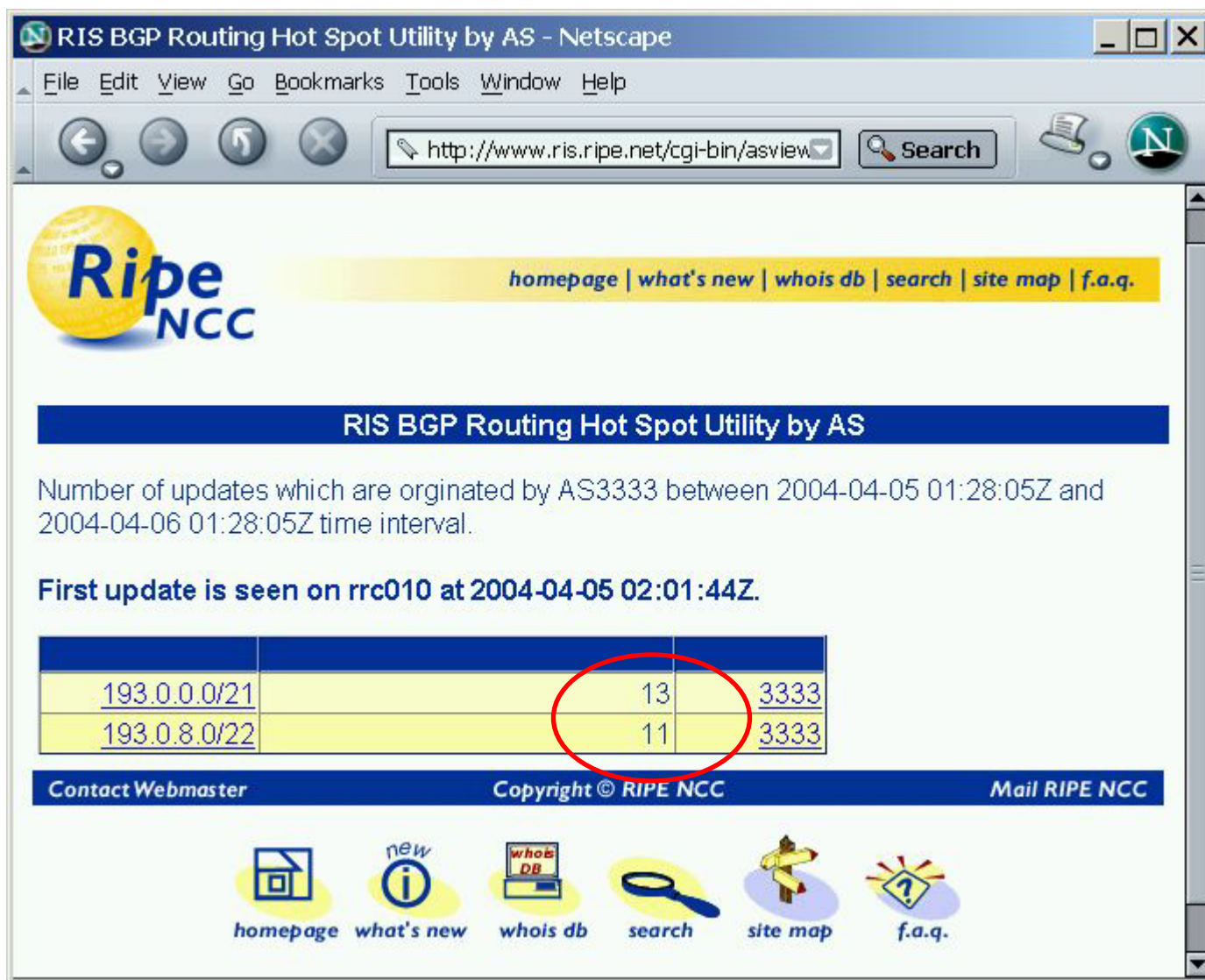
http://www.ripe.net/cgi-bin/risas.cgi?as=286&action=Search&startDay=20040405&startHour=

Search

Updates between 2004-04-05 00:00:00Z and 2004-04-05 23:28:01Z.

Type	Prefix	Time	Peer	Next HOP	MED	Origin	AS path	Community	RRC ID
A	198.184.231.0/24	2004-04-05 09:51:25Z	213.190.160.193	213.190.160.193	0	IGP	1759.1299.286	286.286.286.3049 1299.20000 1299.20500 1759.10000 1759.10002 1759.10400 1759.10402	Netnod
A	198.184.231.0/24	2004-04-05 09:53:23Z	213.190.160.193	213.190.160.193	0	IGP	1759.1299.286	286.286.286.3031 1299.20000 1299.20500 1759.10000 1759.10002 1759.10400 1759.10402	Netnod
A	198.184.231.0/24	2004-04-05 09:56:35Z	194.68.128.66	194.68.128.66	0	IGP	8434.2119.8210.286	2119.401 8210.203	Netnod
A	198.184.231.0/24	2004-04-05 09:56:38Z	194.68.128.66	194.68.128.66	0	IGP	8434.3257.286	3257.4010 3257.5049	Netnod
A	198.184.231.0/24	2004-04-05 09:56:56Z	194.68.128.66	194.68.128.66	0	IGP	8434.2119.8210.286	2119.401 8210.209	Netnod
A	198.184.231.0/24	2004-04-05 10:02:52Z	193.10.252.5	193.10.252.5	0	IGP	2603.3356.286	2603.666 3356.2 3356.86 3356.500 3356.666 3356.2064 65000.64990	Netnod
A	198.184.231.0/24	2004-04-05 10:03:51Z	193.10.252.5	193.10.252.5	0	IGP	2603.3356.286	2603.666 3356.2 3356.86 3356.500 3356.666 3356.2064 65000.64990	Netnod
A	198.184.231.0/24	2004-04-05 10:48:09Z	193.10.252.5	193.10.252.5	0	IGP	2603.3356.286	2603.666 3356.2 3356.86 3356.501 3356.666 3356.2065 65000.64990	Netnod
A	212.165.64.0/18	2004-04-05 10:49:11Z	213.190.160.193	213.190.160.193	0	IGP	1759.1299.286	286.286 1299.20000 1299.20500 1759.10000 1759.10002 1759.10400 1759.10402	Netnod
A	212.165.110.0/24	2004-04-05 10:49:11Z	213.190.160.193	213.190.160.193	0	IGP	1759.1299.286	286.286 1299.20000 1299.20500 1759.10000 1759.10002	Netnod

RIS BGP Routing Hot Spot Utility by AS



RIS BGP Routing Hot Spot Utility by AS - Netscape

File Edit View Go Bookmarks Tools Window Help

http://www.ris.ripe.net/cgi-bin/asview Search

homepage | what's new | whois db | search | site map | f.a.q.

RIS BGP Routing Hot Spot Utility by AS

Number of updates which are originated by AS3333 between 2004-04-05 01:28:05Z and 2004-04-06 01:28:05Z time interval.

First update is seen on rrc010 at 2004-04-05 02:01:44Z.

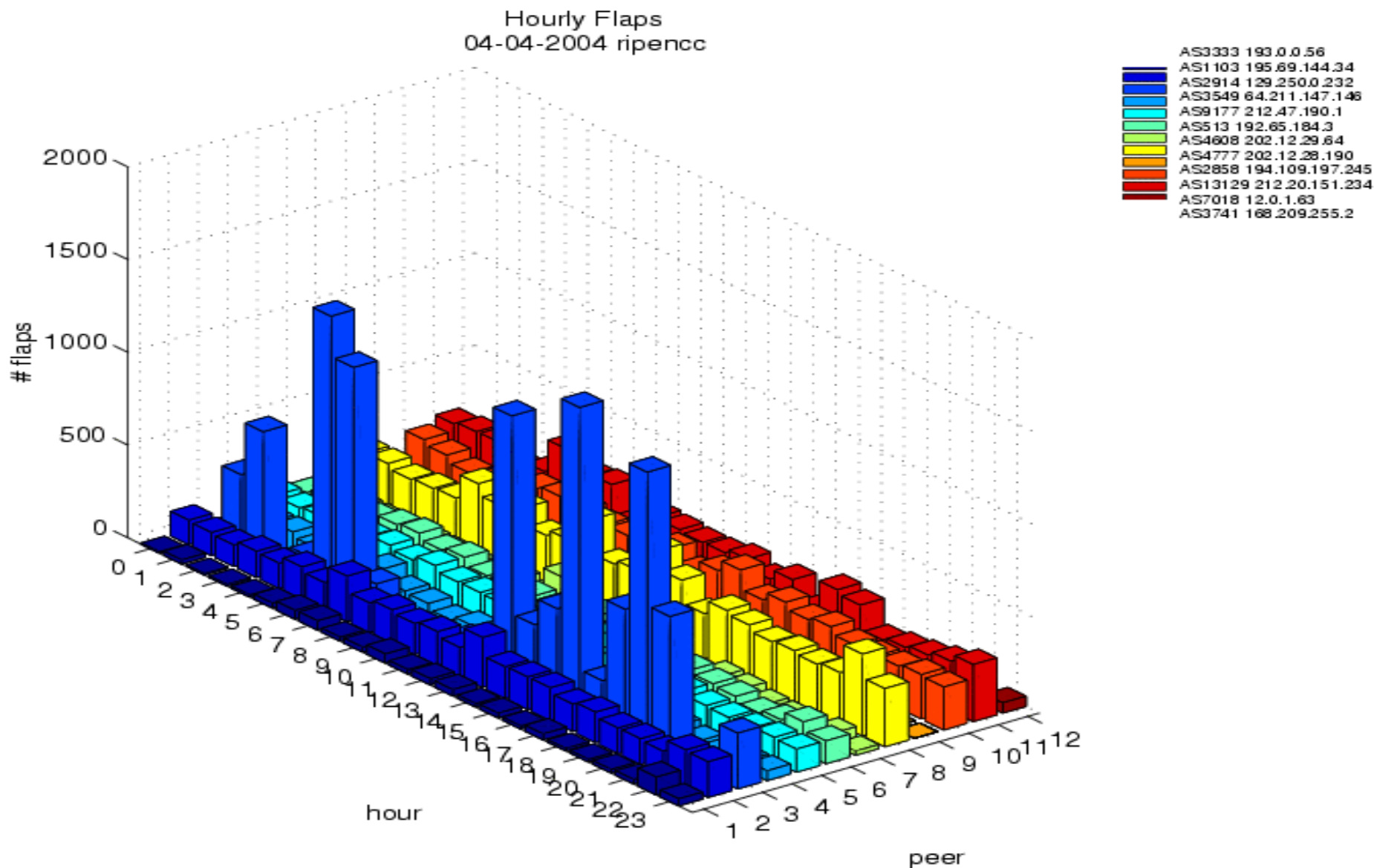
193.0.0.0/21	13	3333
193.0.8.0/22	11	3333

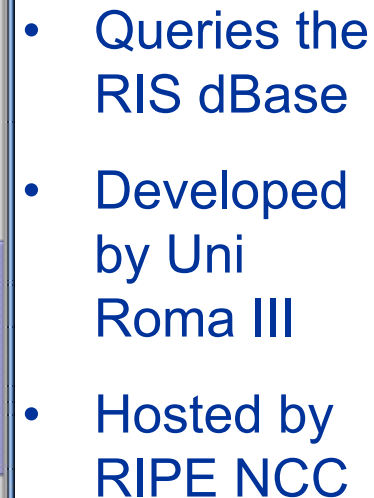
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homepage what's new whois db search site map f.a.q.

- High count could indicate a problem somewhere
- The next step would be using the Prefix Query to locate flaps and pathological updates

Agilent Labs' RIPE NCC Data Analysis project





Talks Later

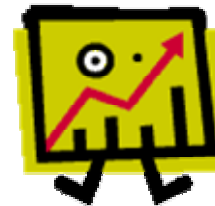
- **RISwhois**
 - IP to ASN mapping using the RIS RIB dumps and more
- **myASn**
 - Detection of 'unexpected' BGP routing information

Querying the RIS dBase

- ASinuse
- Prefix Query
- AS Query
- Hotspot Utility



And the...



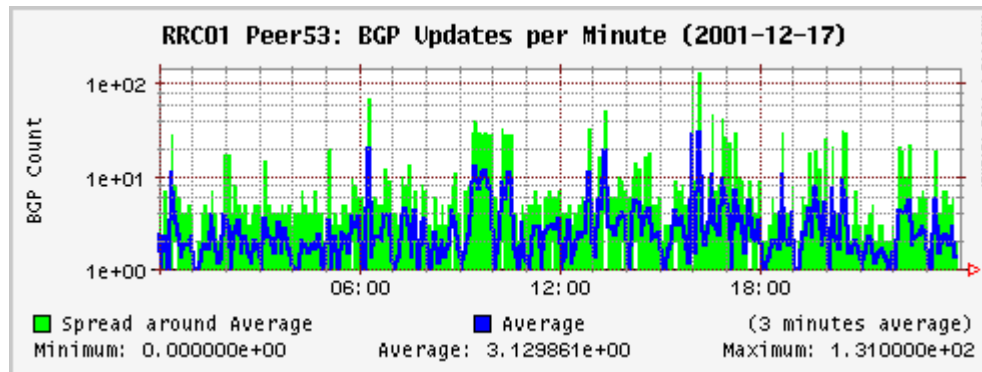
The RIS^{report}

Creating graphical representations of
RIS data using RRD tool

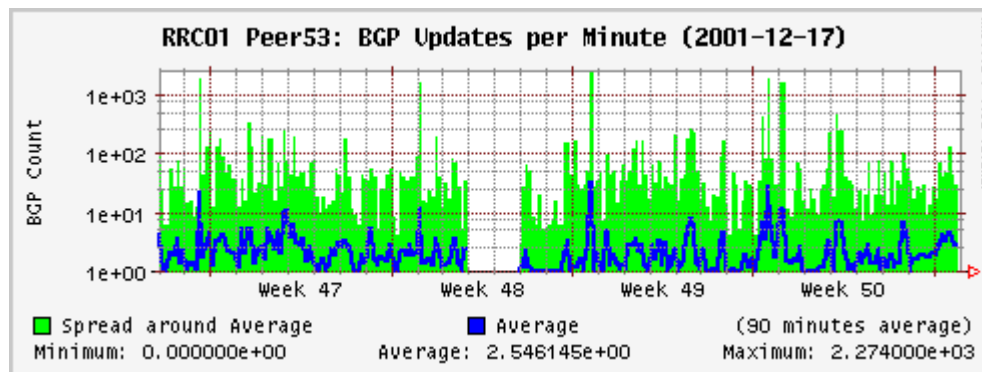
T. Franchetti's Master's Thesis
"Internet Routing Analysis Provided by the
RIS^{report}"
(May 2001)

<http://www.ripe.net/ris/analysis.html>

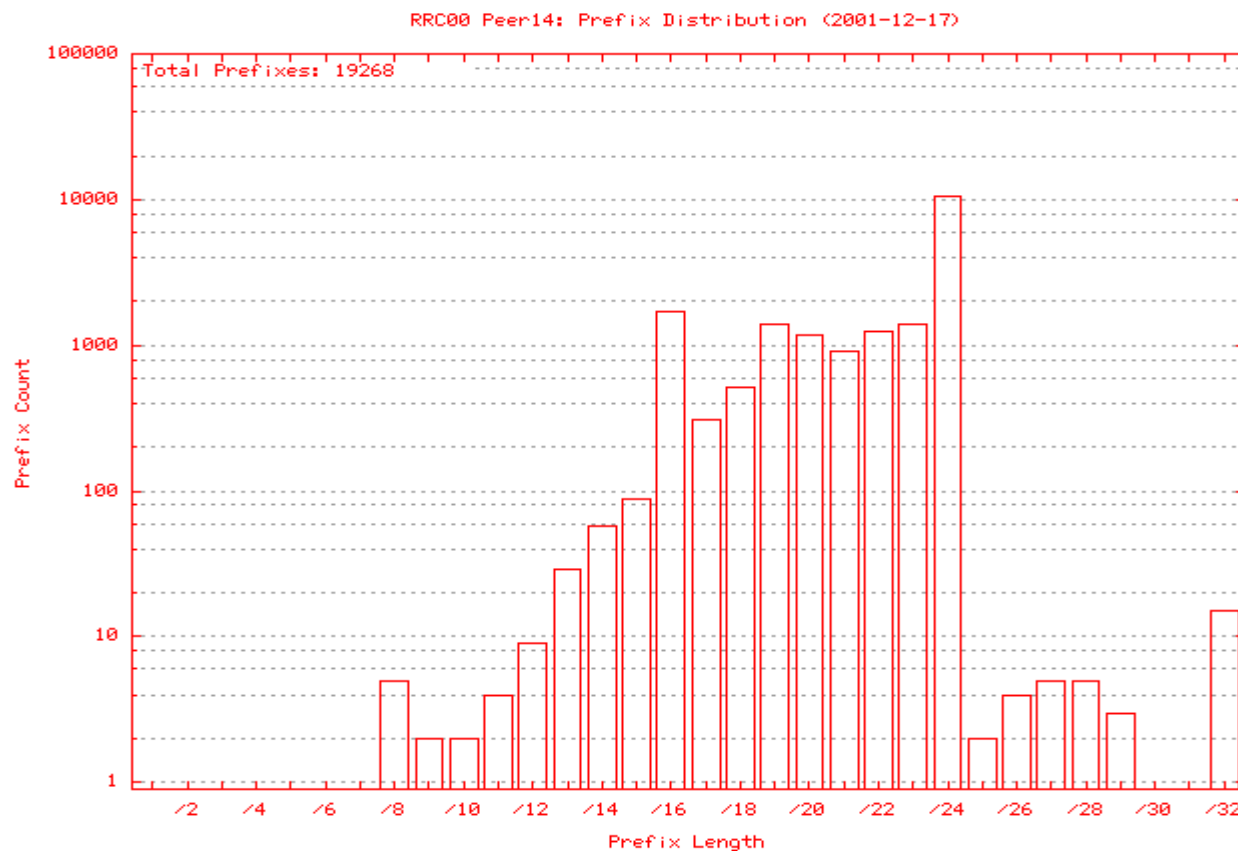
BGP Count



- TeliaNet AS1299 (Peer 53 – RRC01: 195.66.224.48)
- Quickly home in on BGP routing instabilities / flaps – who is at fault and where is it happening?

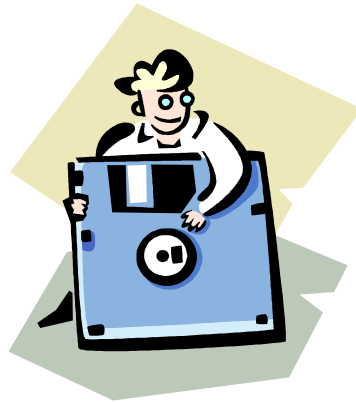


Prefix Distribution



- AS286 – KPNQuest (Peer 14 – RRC00: 134.222.87.12)
- Examples: verify that filters are working properly; graphical representation of Route Aggregation

RIS Raw Data



Since September '99

<http://data.ris.ripe.net>

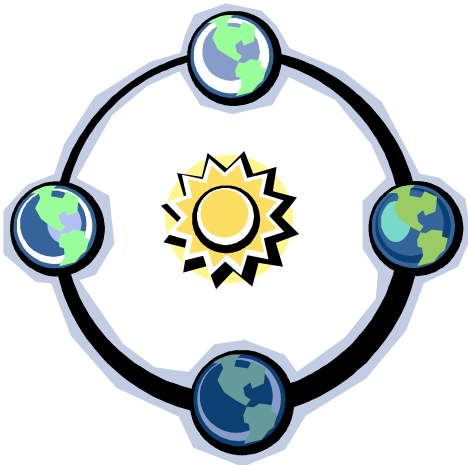
Raw Data

<i>BGP routing table dumps:</i>	<i>bview.<date>.<time></i>
<i>BGP updates:</i>	<i>update.<date>.<time></i>

- Mainly used for research, “hardcore” debug
- Binary MRT format
- Route_Btoa tool from the Multi-Threaded Routing Toolkit (or bgpdump/libbgpdump) converts the data to AS*Cii*

Routing Information Service

Summary



Summary

- Routing Information Service
 - Giant Looking Glass with history information about Internet's logical structure
 - Allows user's to look at the Internet from many different angles
- Data Collection
 - Inserted into and stored up to 3 months in RIS dBase
 - Raw Data since Sept, 1999
- RIS Tools
 - Ideas on how to use RIS queries
- Please comments to: ris@ripe.net

Questions, Discussion

