New BGP analysis tools and a look at the AS9121 Incident

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New BGP analysis tools

- Merit is working to develop new tools for analysis of archived MRT data (such as from Routeviews and RIS)
- Using libbgpdump for initial processing and analysis
  - Reviewed libbgpdump code and made several fixes and performance improvements
- Examining mechanisms for efficient aggregation and archival of BGP Update data
- Using custom databases for optimized performance
- Tools targeted at both researchers and for practical application by network operators
  - Uses include examining hijackings, MOAS, flapping, martian/bogon announcements, etc.
  - Also reachability issues and outages
- Examining integration with Routing Registries for consistency checking and anomaly notification

Analyzing MRT Data

The Problem:

-Large volume of data

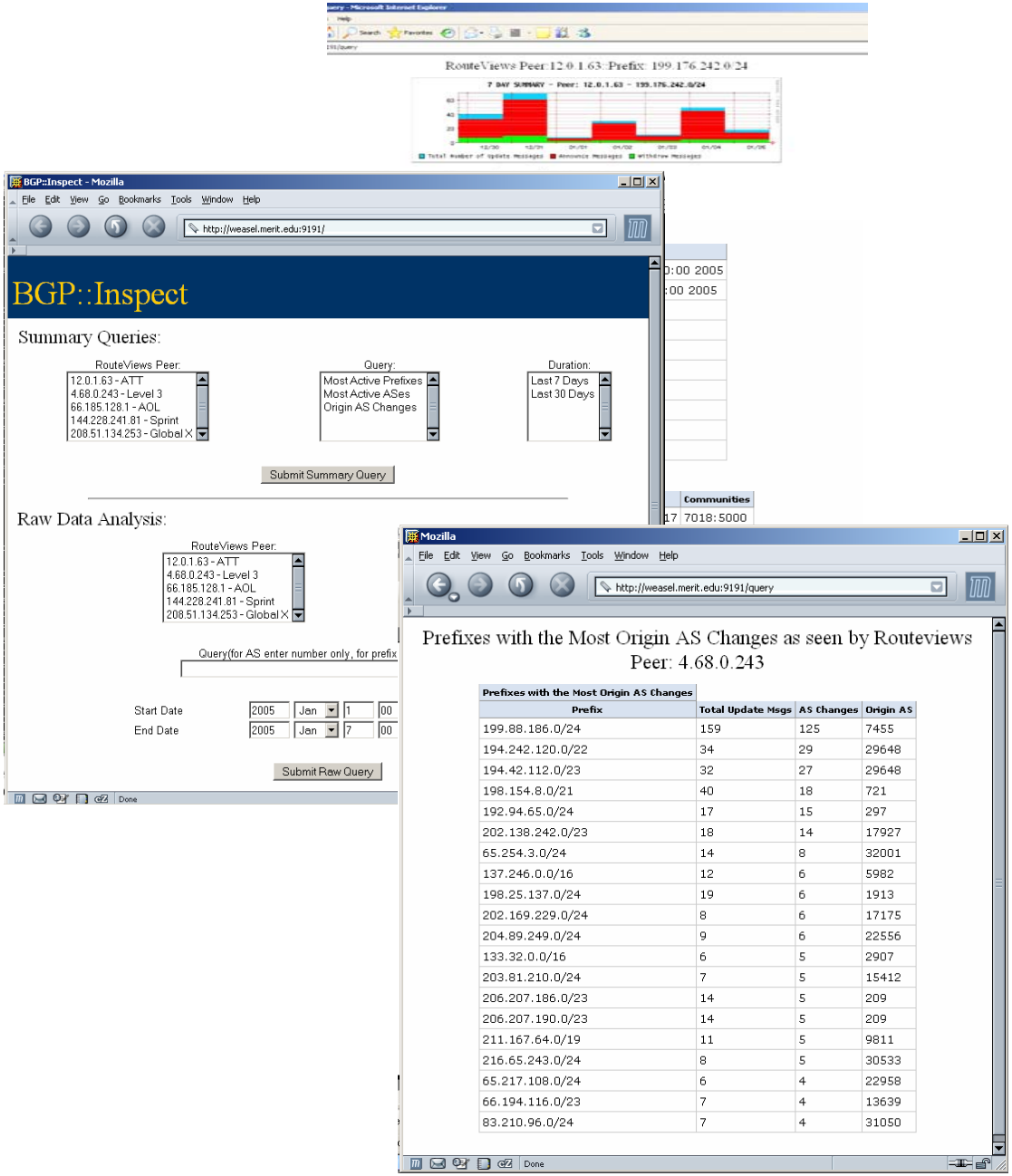
-Lots of data, little information (what does it all mean?)

-Lack of easy to use processing tools (only useful to researchers?)

Our Approach--BGP::Inspect

-Build a generic tool to preprocess MRT data and make it easier to query by everyone.

-Implement common queries to be fast, but also allow detailed data analysis if requested.



BGP::Inspect

- Key Ideas:
  - Pre-process MRT data into easily query-able form
  - Eliminate redundant data
  - Use compression as necessary
  - Pre-compute and store commonly useful statistics at data load time not at query-time
- Current Status:
  - Beta release of the tool at the end of January, limited data set, clean user query interface, moderately scalable, lots of interest from the networking community
  - Next release scheduled for end of March, will include a more robust query front-end, a more scalable backend to allow large amounts of data to be pre-loaded, significantly faster and scalable query interface
  - Goal to be able to pre-process and make available 6-12 months of data from Routeviews
  - Release API to research community to allow direct queries to the pre-processed data in addition to the web-based query interface

MRTP

- Key Ideas:
  - Aggregate BGP UPDATE information from MRT data and generate RPSL-like output summary
  - By using RPSL-like format, output can readily be loaded into a RPSL based whois server such as IRRd
  - Record reachability times, collector peers, and upstream AS'es in “route:” objects
  - By using IRRd, several useful queries can be made – such as searches for more specifics, less specifics, and inverse queries based on origin AS
  - Create monthly archives to allow analysis of historical data
- Current Status:
  - MRTP largely complete, needs some clean up before release
  - Generated summaries for Routeviews data back to 2001
  - Working on ability to synchronize data in near real-time
  - Will be improving IRRd indexing memory utilization so that all db's can be loaded concurrently
    - Currently uses about 2GB of memory for 4 years of data

MRTP "object" examples

```
route:    0.0.0.0/7
origin:   AS13041
beginrch: 2004-12-13 00:57:53Z
endrch:   2004-12-13 01:39:58Z
beginrch: 2004-12-13 01:40:55Z
endrch:   2004-12-13 01:51:23Z
lastann:  2004-12-13 01:40:55Z
rcpeers:  33 (1)
uppeers:  AS4589
source:   RV00-200412


route:    35.0.0.0/8
origin:   AS237
beginrch: 2004-12-01 00:21:59Z
lastann:  2004-12-31 11:27:20Z
rcpeers:  1-39 41 (40)
uppeers:  AS174 AS209 AS3561 AS12956 AS6453 AS2914 AS11537 AS6539
AS3303 AS22335
source:   RV00-200412


peering-set: PRNG-RV00-200412-33
peering:     AS6895 193.149.1.1
updcount:    1525690
source:      RV00-200412
```

AS9121 – Brief facts

- AS9121 Turk Telekom – Turkish national telco
- Nominally originates about 200 prefixes
- Routeviews data shows 60+ AS'es transiting about 500 prefixes via AS9121
- Has registered routing policy in RIPE DB
  - AS-TTNET as-set in RIPE DB contains 119 AS'es
  - aut-num policy is also registered
  - import policy for customer peers is “accept ANY” - i.e., no filtering
- Major transit peers include
  - AS6762 Telecom Italia Sparkle SEA-BONE
  - AS1299 TeliaSonera
  - AS1239 Sprint
  - AS1273 C&W

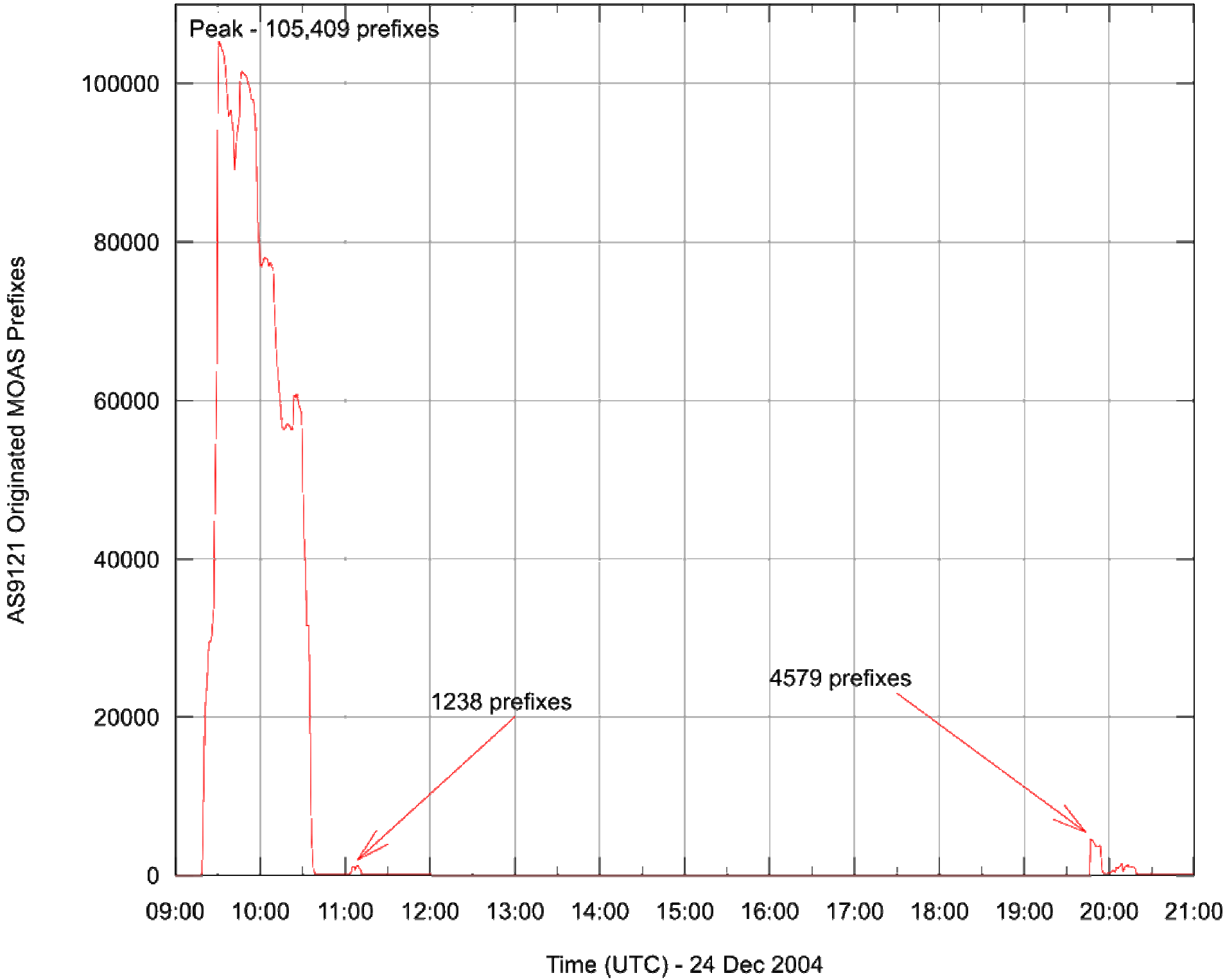
AS9121 incident on Dec 24 2004

At 09:19 UTC on Dec 24, 2004, AS9121 began re-originating a large number of globally routed prefixes
Peaked at 105,409 prefixes at 9:31 UTC
Lasted until 10:38 UTC – 1 hour, 19 minutes duration
Smaller secondary events also observed
- 11:03 UTC - peak 1238 prefixes - duration 10 minutes
- 19:47 UTC - peak 4579 prefixes - duration 35 minutes

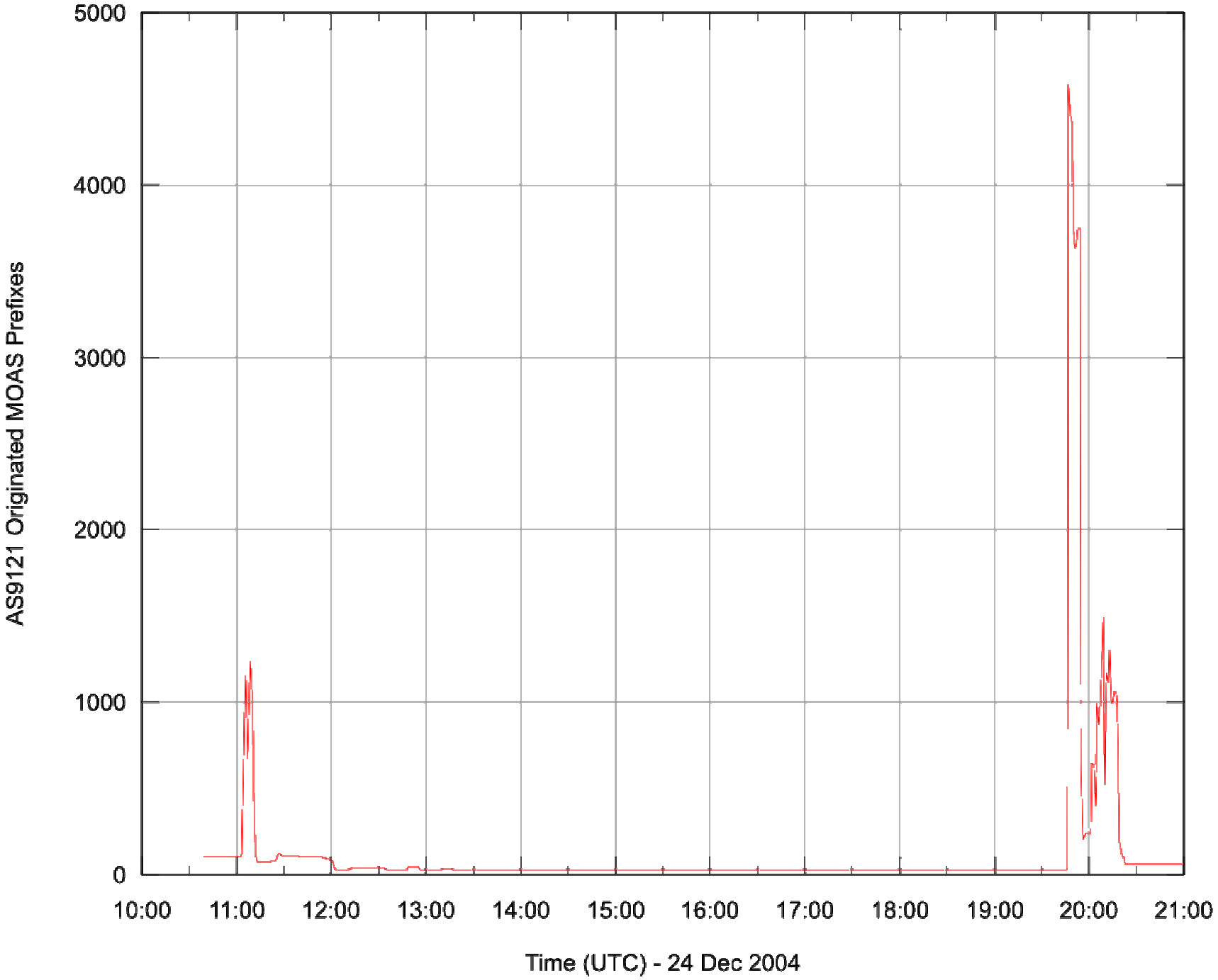
Redistributed primarily via AS6762 (Telecom Italia)
- 106439 unique prefixes seen via AS6762
- Appears they had no filters or prefix limits

Other upstreams had smaller roles
- AS1239 (Sprint) - 5174 prefixes - mostly during final event
- AS1299 (Telia) - 1796 prefixes - max prefix limit of 1000
- AS1273 (C&W) - 162 prefixes - filters?

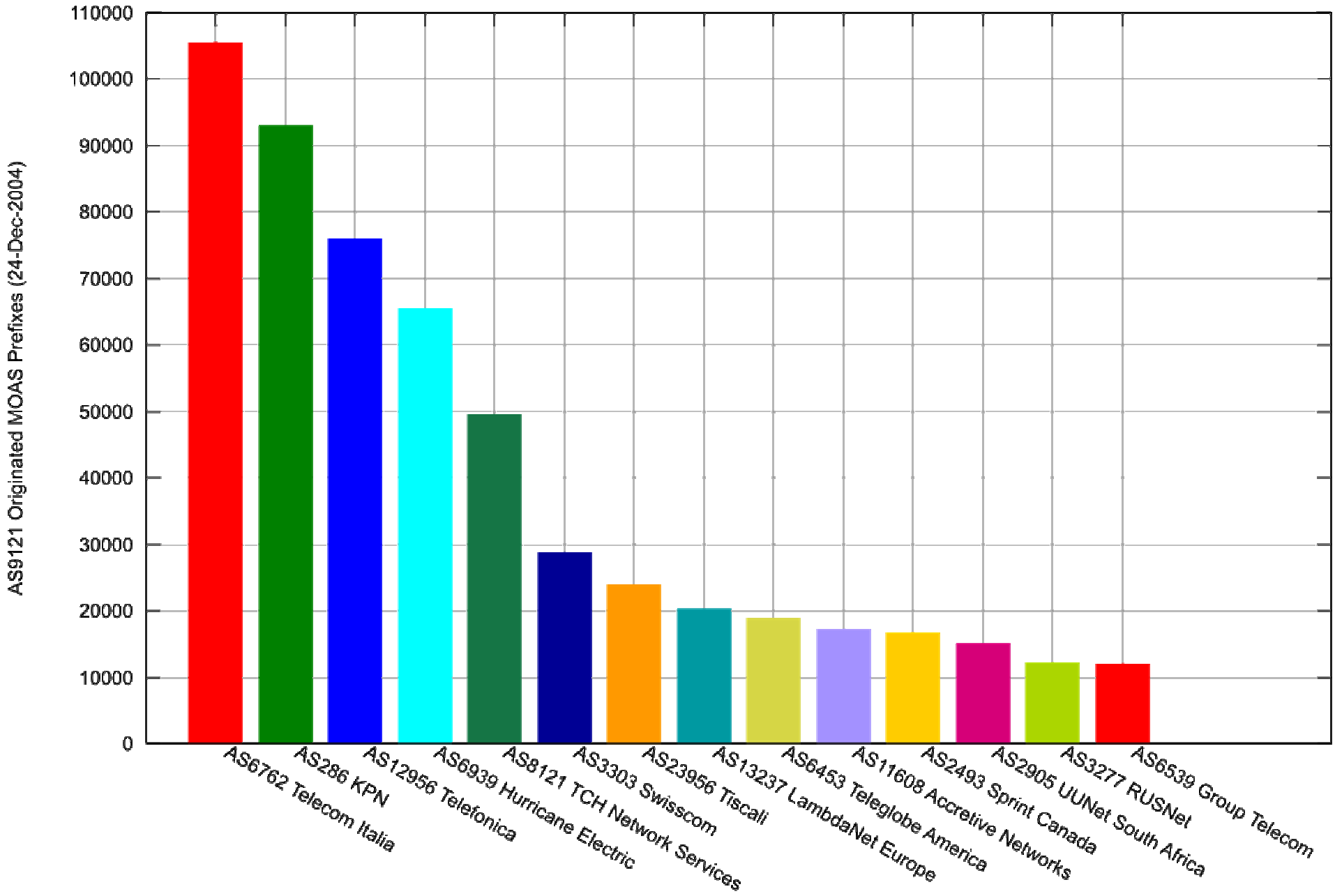
Total unique prefixes from all peers - 106722


Peak - 105,409 prefixes
1238 prefixes
4579 prefixes
AS9121 Originated MOAS Prefixes
100000
80000
60000
40000
20000
0
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
Time (UTC) - 24 Dec 2004

Secondary events (closer look)



View from Routeviews peers



View from Routeviews peers (con'd)