IPv6 implementation testing: Results from some TAHI tests

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Implementation Testing

- Goals
  - Contribute the quality improvement of the IPv6 implementation
  - Suggestion to avoid certain pitfalls in the configuration
  - Selection, which implementation use as IPv6 server
- Practical Tests
  - Conformance (TAHI, Packet Shell), Interoperability

FreeBSD 4.2/4.3

	Total	OK	WARN	FAIL	Overall
IPv6 spec	37	36/37	0/0	1/0	~/✓
ICMPv6	16	16/16	0/0	0/0	✓/✓
ND	58	31/53	1/2	26/3	×/~
Stateless AC	56/57	28/31	7/9	21/17	×/×
PMTU	4	0/3	0/1	4/0	×/✓
Tunnel	4	0/2	0/0	4/2	×/✓
Robustness	4	4/4	0/0	0/0	✓/✓
Summary					~/✓

- Be carefull with setting up default interface
- TAHI is fragile in stateless autoconfig tests
- KAME (ie. *BSD accept sometimes erroneus ND packets
- If you need some latest feature use KAME, but it is sometimes broken

Solaris 8

	Total	OK	WARN	FAIL	Overall
IPv6 spec	37	37	0	0	✓
ICMPv6	16	16	0	0	✓
ND	58	37	3	18	~
Stateless AC	56	1	14	41	×
PMTU	4	1	0	3	×
Tunnel	4	3	0	1	~
Robustness	4	4	0	0	✓
Summary					~

- RA, NS, RA problems patch 108528-6 cure them
- Basics are OK. Malformed messages not handled correctly.
- IPSec cannot be tested Solaris 8 does not support assymetrical IPSec config

Linux 2.2.19/2.4.3

	Total	OK	WARN	FAIL	Overall
IPv6 spec	37	26/33	0/0	11/4	~/✓
ICMPv6	16	4/15	0/0	12/1	×/✓
ND	58	6/8	0/2	52/48	×/×
Stateless AC	54	1/1	8/12	45/41	×/×
PMTU	4/2(rest is failed)	0/1	0/0	4/1	×/~
Tunnel	4	1/4	0/0	3/0	×/✓
Robustness	4	0/4	0/0	4/0	×/✓
Summary					×/~

- You should use the latest kernel (some bugs discovered fixed in 2.4.4)
- Fragmentation is not working well
- PathMTU not very well, Source address selection is not working.
- Worth looking at the USAGI patches

AIX 4.3.4 patchkit9

	Total	OK	WARN	FAIL	Overall
IPv6 spec	37	30	0	7	✓
ICMPv6	16	8	0	8	~
ND	58	10	0	48	×
Stateless AC	57	2	18	37	×
PMTU	4	1	0	3	×
Tunnel	4	1	0	3	×
Robustness	4	4	0	0	✓
Summary					~

- Neighdiscovery Cache is handled differently (sometimes does not send NS)
- Link local addresses not handled according the specification in some cases
- Some ICMP answer not expected by the TAHI
- Overall result strange comparing the original (INRIA IPv6 code)

Conclusion and Future

- TAHI
  - very picky, quite KAME specific
  - sometimes misses packets
  - stateless adress autoconfiguration testing is fragile
- Implementation:
  - progress to usable ->applications!
- Testing other platforms
  - W2K
  - Tru64 Unix
  - HP-UX

Survey about IPv6 ready applications and patches

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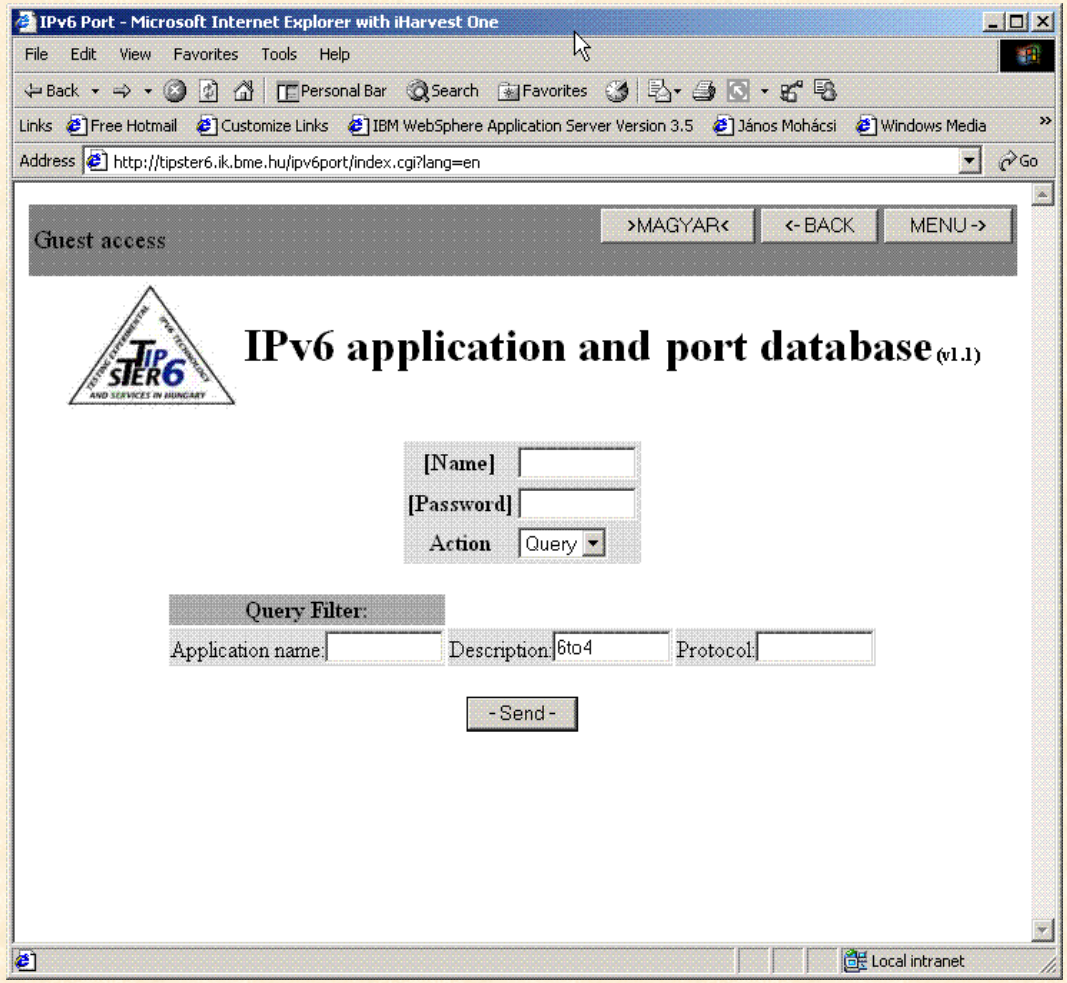
IPv6 application and patch database

- Goal:
  - IPv6 application information in one place
  - Searchable
  - Easily extendable
  - Have an overview
- Solution:
  - Perl scripts, MySQL, Web interface

IPv6 application database



Overview of packages

- Total: 216 package (as 13/06/2001)
  - Native support: 123 (57%)
  - Patch only: 93 (43%)
    - older then the current release:41 (19%)
    - sync with the current release: 52 (24%)

Overview of packages /2

- Operating system support
  - UNIX: 162 (75%)
  - Windows: 45 (21%)
  - Linux: 172 (80 %)
  - *BSD: 178 (82 %)
  - Solaris only: 2 (1 %)
- Tested?

Overview packages

- ftp: 27
- irc: 13
- news: 7
- mail: 19
- mbone: 7
- multimedia: 11
- devel:14
- sysutils: 34
- games:12
- www: 34
- testing: 22
- X: 5
- remote login: 8
- editor: 9
- misc: 29
- DNS: 6
- transition: 8
- routing:6

Conclusion

- Database
  - working, usable, not very polished yet
    - http://tipster6.ik.bme.hu/ipv6port/index.cgi?lang=en
  - not flexible enough in the input
  - RFC/protocol info missing
  - e-mail contact sometimes missing (URL always there)
- Next Steps
  - new search options (by category)
  - any new requirements?

IPv6 infrastructure testing

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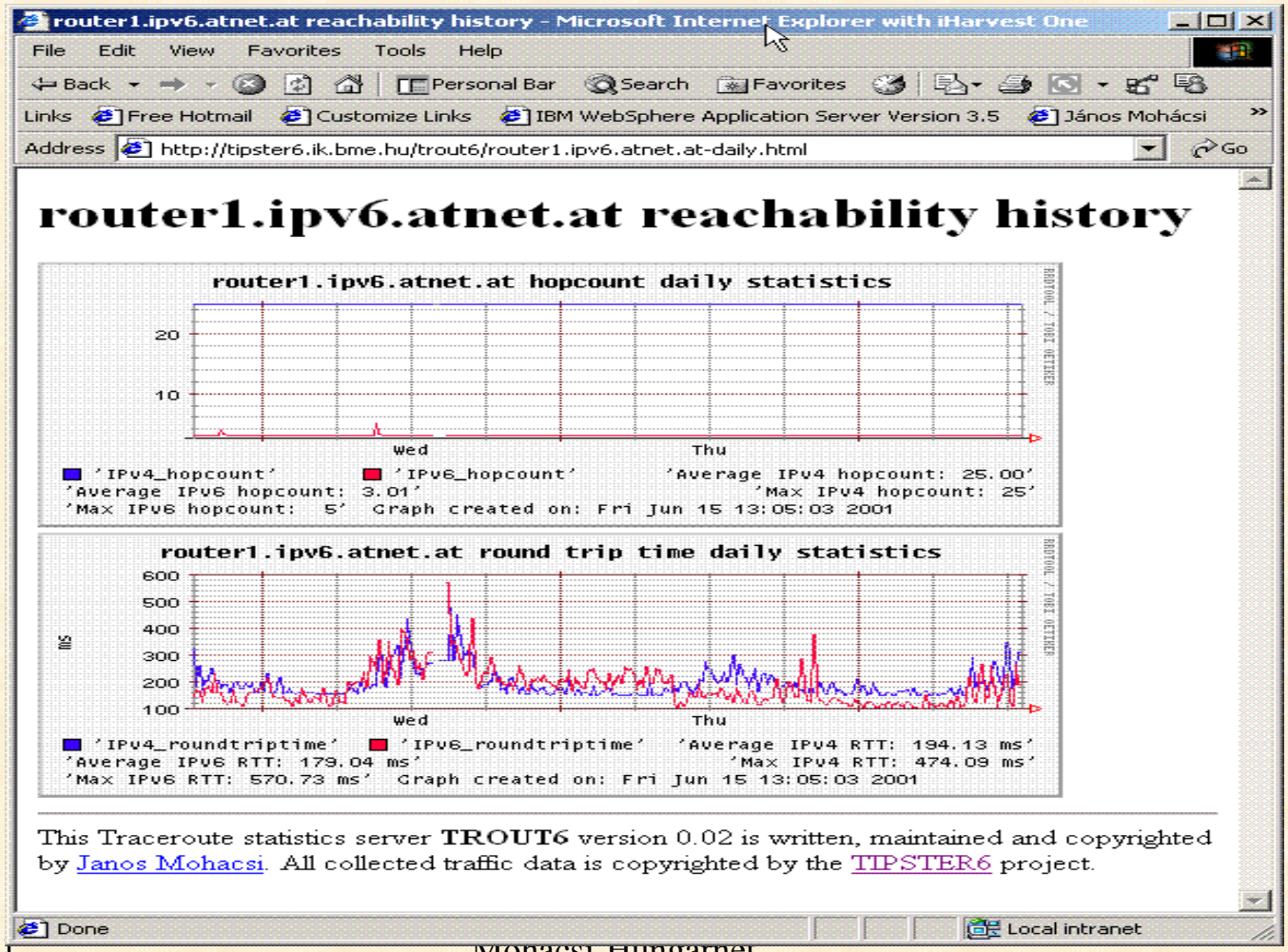
6Bone statistic tools at TIPSTER6

- Existing Tools (http://tipster6.ik.bme.hu/statistics.html)
  - Ping statistics (Pinger-BME)
  - AS-Path statistics (CSELT-IT)
  - Traffic statistics on Tunnels (MRTG)
- New Tool
  - Based on traceroute (hop/RTT statistics possible)
  - To understand IPv6 routing/stability
  - Understand IPv6-over-IPv4tunneling

TROUT6

- Now:
  - Perl scripts with RRD backend
  - Some preselected sites
  - Traceroute statistics for IPv6 and IPv4 for every 15 minutes (maybe it is impolite)
- Future:
  - Clickable image to see what happened
  - Check the corelation with BGP flapping
  - Alarm thresholds?

Trout6 in operation



Summary

- Available:
  - http://tipster6.ik.bme.hu/trout6/
- Comments?
- Any desired functionality?
- Contribute GÉANT IPv6 monitoring?
- In the near future:
  - Flowtype traffic monitoring in the Hungarian 6bone

Linux Netfilter

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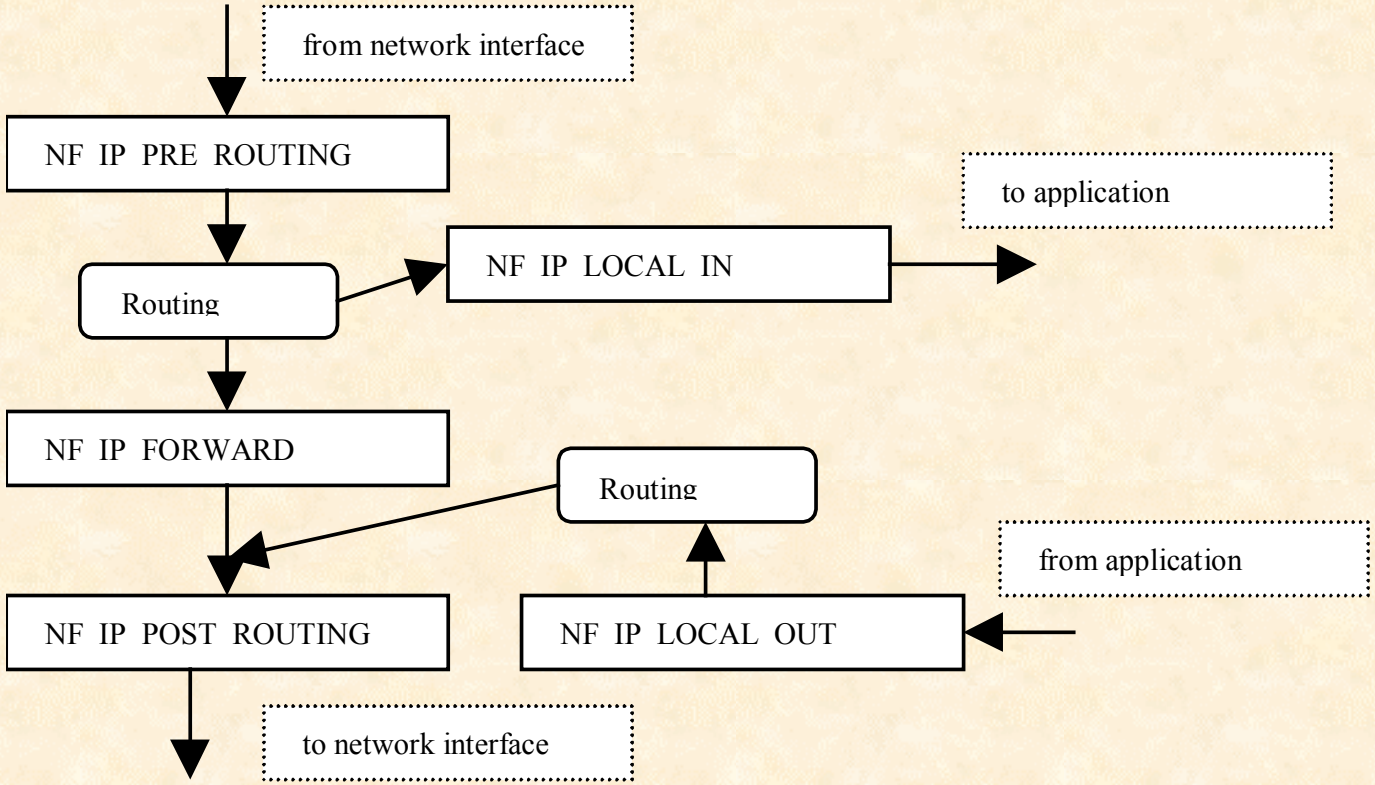
Linux Netfilter

- Architecture
  - Netfilter 1.x.x for Linux 2.3.x and 2.4.x
  - IPv6 was just a programming study, seamlessly copied IPv4 code segments:
    - wildcard address: 0.0.0.0 instead of ::
  - Stateful inspection
  - in 2.5.x kernel will be IPv6 based, IPv4 is implemented as mapped address
  - Netfilter in Kernel, iptables (libs+userspace programs)

Netfilter hooks



NetFilter user interface

- Work in our project:
  - First attempt: ip6tables save and ip6tables restore
  - Second attempt: unified iptable interface
  - Addition:
    - aggregattion matching kernel filter
  - Testing system in progress:
    - Unfortunately glibc>2.1 specific - low level socket handling changed

Summary

- More information about the TIPSTER6 project:
  - http://tipster6.ik.bme.hu
- HUNGARNET is actively involved in GÉANT program