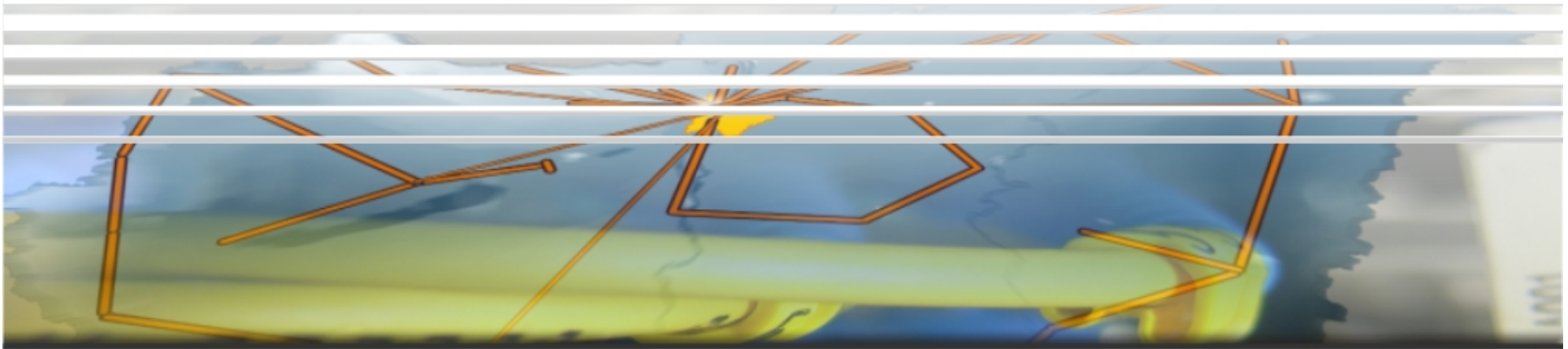


World IPv6 day tapasztalatok

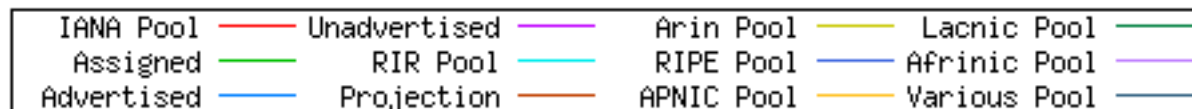
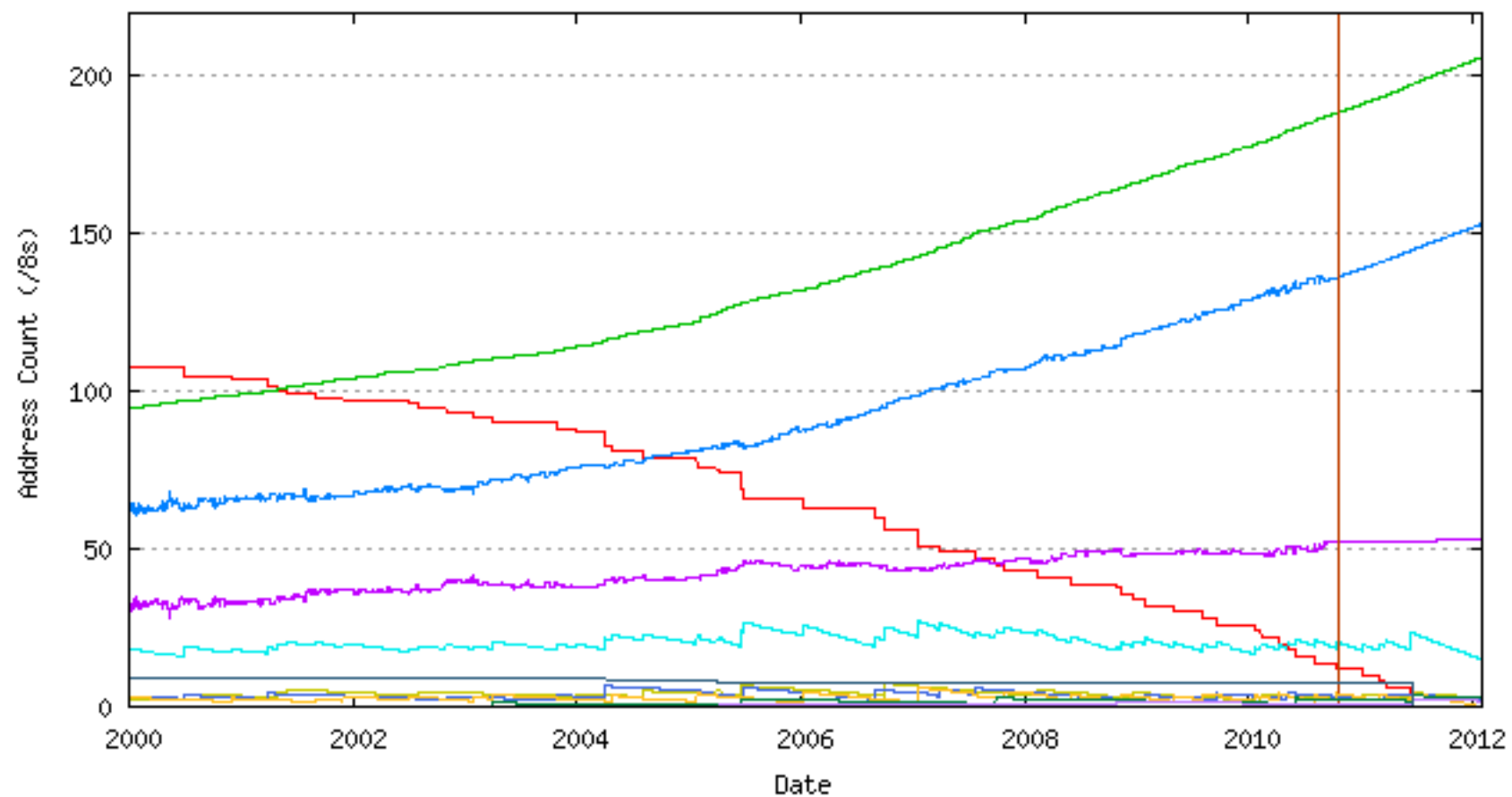


2011. Június 9.

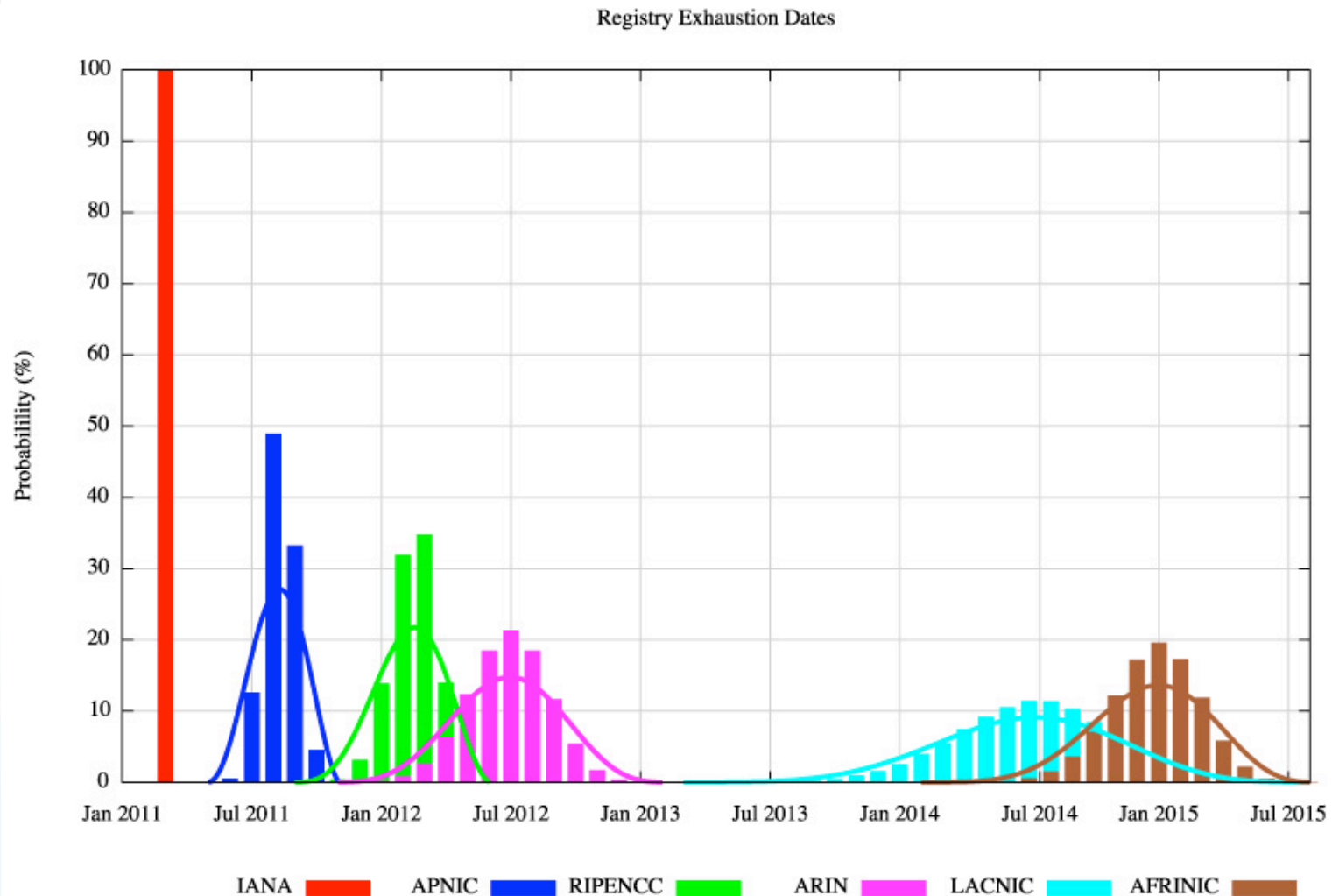
Mohácsi János
NIIF Intézet



IP címek elfogyás – Geoff Huston

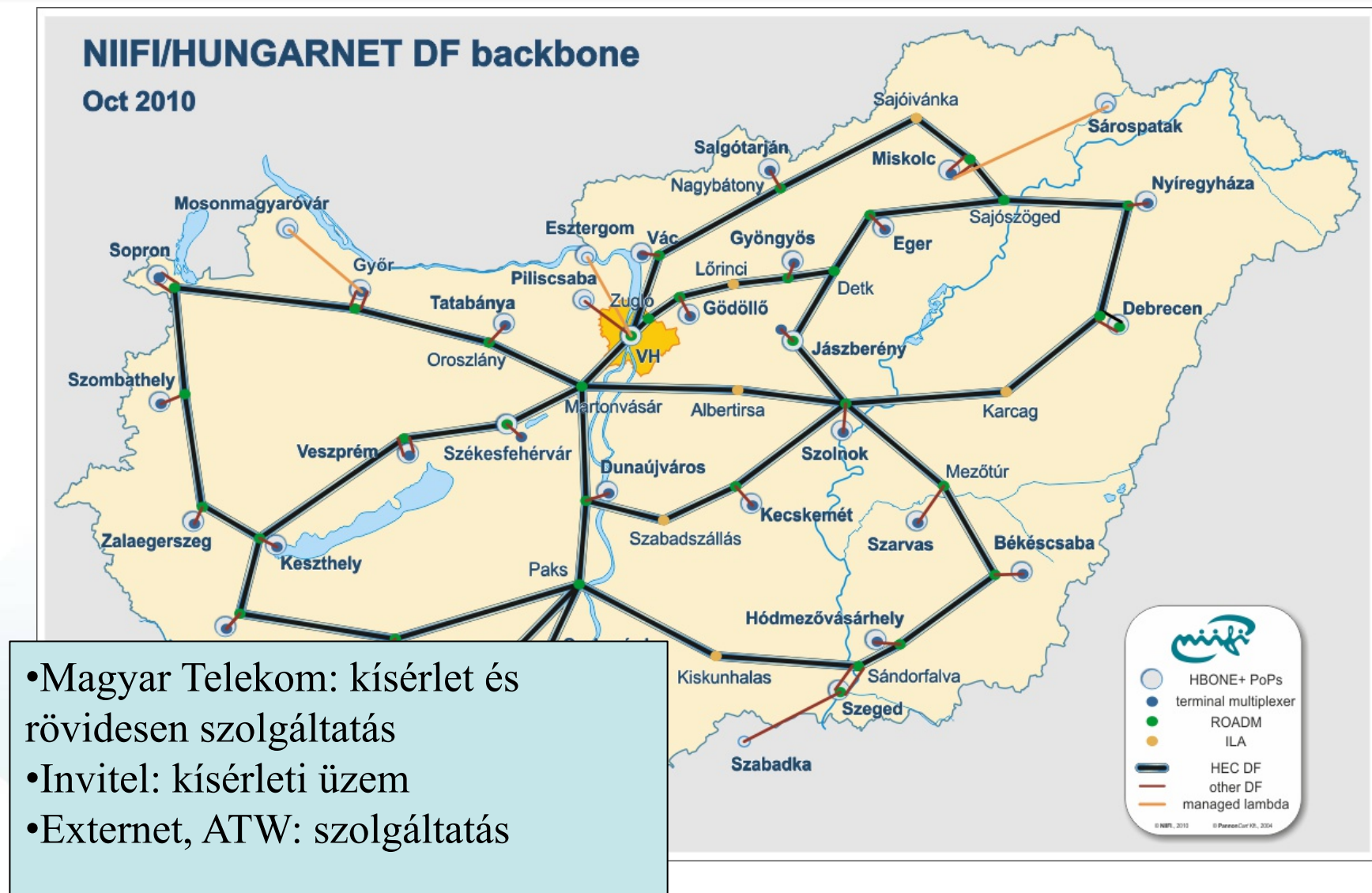


Cím elfogyás – dátum /2



Forrás: Geoff Huston – 2011

NIIF Hungarnet IPv6 topológia - 2011



IPv6 elterjedtség - forgalom

SixXS - IPv6 Deployment & Tunnel Broker :: Ghost Route Hunter : IPv6 DFP visibility : All

http://www.sixxs.net/tools/grh/dfp/all/?sort=country

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1Password Use Wallet Use Identity Fill (none) Save... Generate Password 1Password v3.5.4 (build 30852)

LG	3ffe:2f00::/24		BME-FSZ/HU		2547	C	1998-09-08		0%	2006-06-21 09:02:20
LG	2001:738::/32		HU-HUNGARNET-2001071...	HungarNet	1955	A	2001-07-17		100%	2011-02-10 15:02:57
LG	3ffe:401c::/32		T-NET	T-NET IPv6 Project	29657	C	2001-11-24	2003-11-25 12:11:22	0%	2006-06-06 16:17:21
LG	2001:1aa0::/32		HU-PANTEL-20040317	PanTel Telecommunications...	12301	A	2004-03-17	2008-01-17 16:17:27	100%	2011-02-10 15:02:57
LG	2001:4c48::/32		HU-HTC-20050420	Hungarian Telecom MATAV	5483	A	2005-04-20	2009-02-11 21:02:27	100%	2011-02-10 15:02:57
LG	2001:7f8:35::/48		BIX-20050905	Council of Hungarian Inte...		A	2005-09-05	2008-04-23 18:17:28	0%	2011-02-10 15:02:57
LG	2a01:1f0::/32		HU-COVYSOFT-20060927	CovySoft Networks Co.		A	2006-09-27		0%	never
LG	2a01:270::/32		HU-ATW-20061219	ATW Internet Kft.	41075	A	2006-12-19	2006-12-21 11:32:22	100%	2011-02-10 15:02:58
LG	2a01:368::/32		HU-HDSNET-20070518	Egyesult Magyar Kabeltele...	20845	A	2007-05-18	2009-07-17 13:17:32	100%	2011-02-10 15:02:58
LG	2a01:5d0::/32		HU-TARR-20071108	Tarr Kft.	8462	A	2007-11-08	2009-09-24 03:47:31	100%	2011-02-10 15:02:58
LG	2a02:558::/32		HU-EXTERNET-20080626	Externet Kft.	12594	A	2008-06-26	2009-05-18 14:17:30	100%	2011-02-10 15:02:58
LG	2a02:738::/32		HU-INTERWARE-2008090...	InterWare Ltd.		A	2008-09-01	2008-11-06 14:02:37	0%	2010-08-17 02:47:43
LG	2a02:730::/32		HU-DENINET-20080901	Deninet KFT	29278	A	2008-09-01	2009-05-27 06:17:31	100%	2011-02-10 15:02:58
LG	2a02:780::/32		HU-HOFF-20080910	HostOffice Informatikai S...	47885	A	2008-09-10	2008-09-17 02:18:01	96%	2011-02-10 15:02:58
LG	2001:950::/32		HU-JASMIN-20080926	Jasmin Media Group zRt.		A	2008-09-26		0%	never
LG	2a02:808::/32		HU-PRTELECOM-2008121...	PR-TELECOM Rt.	35311	A	2008-12-17		0%	never
LG	2a02:a50::/32		HU-AHOL-20090217	HunNet Kft	20742	A	2009-02-17	2010-03-12 08:02:38	100%	2011-02-10 15:02:58
LG	2a00:10b8::/32		HU-IPPARK-20090707	IP-Park Kft.		A	2009-07-07	2010-01-22 16:17:36	0%	2011-02-04 14:32:54
LG	2a00:10d0::/32		HU-DATANET-20090709	GTS - DataNet Telecommuni...		A	2009-07-09		0%	never
LG	2a00:1110::/32		HU-WESTEL900-2009071...	T-Mobile Hungary Telecomm...	5513	A	2009-07-16	2009-10-02 14:02:33	100%	2011-02-10 15:02:58
LG	2a00:1530::/32		HU-BUSINESSSTEL-20091...	Business Telecom Kft.		A	2009-10-22		0%	never
LG	2a00:15f0::/32		HU-AZONNAL-20091105	Azonnal Kft.		A	2009-11-05		0%	never
LG	2a00:1770::/32		HU-SZABINET-20091130	UPC Magyarorszag Kft.	6830	A	2009-11-30		0%	never
LG	2a00:1878::/32		HU-PANNON-20091215	Pannon GSM Telecommunicat...		A	2009-12-15		0%	never
LG	2a00:1b90::/32		HU-MAGIC-20100217	RLAN96 Tavkozlesi Szolgal...		A	2010-02-17		0%	never
LG	2a00:1f40::/32		HU-GIGANET-20100415	Giganet Internet Szolgalt...	42864	A	2010-04-15	2010-05-07 12:02:40	100%	2011-02-10 15:02:58
LG	2a02:2950::/32		HU-INFOTECHNA-201011...	Infotechna Ltd.	15566	A	2010-11-12		0%	never
LG	2a02:2a98::/32		HU-UUNET-20101024	Verizon Hungary, Internet...	702	A	2010-11-24	2011-01-07 03:02:50	100%	2011-02-10 15:02:59
LG	2a01:9200::/32		HU-FIBERNET-20110201	FiberNet Communication Co...		A	2011-02-01		0%	never
LG	2a01:be00::/32		HU-DRAVANET-PECS-201...	Dravanet Co Ltd.	21229	A	2011-02-02	2011-02-05 17:47:52	97%	2011-02-10 15:02:58
LG	2a03:da00::/32		HU-DATATRANS-2011020...	Datatrans Internet Ltd		A	2011-02-08		0%	never
LG	2001:1a98::/32		IS-ICENET-20040312	Iceland Telecom	6677	A	2004-03-12	2004-09-17 18:17:15	100%	2011-02-10 15:02:57
LG	2a01:528::/32		IS-ICECELLEHF-200710...	IceCell ehf	44432	A	2007-10-22		0%	never

Find: 2001:738 Next Previous Highlight all Match case

Done

IPv6 elterjedtség - forgalom

SixXS - IPv6 Deployment & Tunnel Broker :: Ghost Route Hunter : IPv6 DFP visibility : All

http://www.sixxs.net/tools/grh/dfp/all/?sort=country

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1Password Use Wallet Use Identity Fill (none) Save... Generate Password 1Password v3.5.4 (build 30852)

LG	3ffe:2f00::/24		BME-FSZ/HU		2547	C	1998-09-08		0%	2006-06-21 09:02:20
LG	2001:738::/32		HU-HUNGARNET-2001071...	HungarNet	1955	A	2001-07-17		100%	2011-02-10 15:02:57
LG	3ffe:401c::/32		T-NET	T-NET IPv6 Project	29657	C	2001-11-24	2003-11-25 12:11:22	0%	2006-06-06 16:17:21
LG	2001:1aa0::/32		HU-PANTEL-20040317	PanTel Telecommunications...	12301	A	2004-03-17	2008-01-17 16:17:27	100%	2011-02-10 15:02:57
LG	2001:4c48::/32		HU-HTC-20050420	Hungarian Telecom MATAV	5483	A	2005-04-20	2009-02-11 21:02:27	100%	2011-02-10 15:02:57
LG	2001:7f8:35::/48		BIX-20050905	Council of Hungarian Inte...		A	2005-09-05	2008-04-23 18:17:28	0%	2011-02-10 15:02:57
LG	2a01:1f0::/32		HU-COVYSOFT-20060927	CovySoft Networks Co.		A	2006-09-27		0%	never
LG	2a01:270::/32		HU-ATW-20061219	ATW Internet Kft.	41075	A	2006-12-19	2006-12-21 11:32:22	100%	2011-02-10 15:02:58
LG	2a01:368::/32		HU-HDSNET-20070518	Egyesult Magyar Kabeltele...	20845	A	2007-05-18	2009-07-17 13:17:32	100%	2011-02-10 15:02:58
LG	2a01:5d0::/32		HU-TARR-20071108	Tarr Kft.	8462	A	2007-11-08	2009-09-24 03:47:31	100%	2011-02-10 15:02:58
LG	2a02:558::/32		HU-EXTERNET-20080626	Externet Kft.	12594	A	2008-06-26	2009-05-18 14:17:30	100%	2011-02-10 15:02:58
LG	2a02:738::/32									
LG	2a02:730::/32									
LG	2a02:780::/32									
LG	2001:950::/32									
LG	2a02:808::/32									
LG	2a02:a50::/32									
LG	2a00:10b8::/32									
LG	2a00:10d0::/32									
LG	2a00:1110::/32									
LG	2a00:1530::/32									
LG	2a00:15f0::/32									
LG	2a00:1770::/32									
LG	2a00:1878::/32									
LG	2a00:1b90::/32									
LG	2a00:1f40::/32									
LG	2a02:2950::/32									
LG	2a02:2a98::/32									
LG	2a01:9200::/32									
LG	2a01:be00::/32									
LG	2a03:da00::/32									
LG	2001:1a98::/32									
LG	2a01:528::/32									

rt1.bud.hu - Hungarnet AP IPv6 Traffic

bits per second

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan

■ Inbound Current: 137.80 k Average: 137.22 k Maximum: 1.76 M ■ Peak
■ Outbound Current: 562.80 k Average: 3.43 M Maximum: 12.42 M ■ Peak

Find: 2001:738 Next Previous Highlight all Match case

Done

IPv6 elterjedtség /2

IPv6 Deployment Status

http://www.vyncke.org/ipv6status/detailed.php?country=hu

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1Password Use Wallet Use Identity Fill (none) Save... Generate Password 1Password v3.5.9 (build 30884)

Domain	Whois	ASN	Status	IPv6 Address	IPv6 Prefix	IPv6 Date
keprentes.hu	04737424	FAILED	FAILED	FAILED		
mindenkilapja.hu	65/38070	FAILED	FAILED	FAILED		
mav-start.hu	66/38460	FAILED	FAILED	FAILED		
bme.hu	67/38694	FAILED	nic.bme.hu	2001:738:2001:2001::2	ns.bme.hu nic.bme.hu	2001:738:2001:2001::2 2/3 2011-02-28
tv2.hu	68/41294	FAILED	FAILED	FAILED		
moovie.hu	69/41745	FAILED	FAILED	FAILED		
unideb.hu	70/72313	FAILED	FAILED	FAILED		
niif.hu	71/90669	www.niif.hu	mail.ki.iif.hu	2001:738::420:0:0:0:b	2001:738::411:0:0:0:241	2001:738::302:0:0:0:116 1/2 2011-02-28
pte.hu	72/121208	FAILED	FAILED	FAILED		
eumet.hu	73/170096	www.eumet.hu	ns2.sztaki.hbone.hu	2001:738::700:0:0:0:73	ns2.sztaki.hbone.hu kubiak.iif.hu	2001:4c48:2:a000:: 2/3 2011-03-04
uni-miskolc.hu	74/198895	www.uni-miskolc.hu	gold.uni-miskolc.hu	2001:738:6001:b0b0::2000	silver.uni-miskolc.hu dns.uni-miskolc.hu hera.iit.uni-miskolc.hu	2001:738:6001:500::4 3/4 2011-03-01
noilapozo.hu	75/223472	FAILED	FAILED	FAILED		
kfki.hu	76/409828	www.kfki.hu	smtp-in.kfki.hu	2001:738:5001::2:6	bifur.rmki.kfki.hu sunserv.kfki.hu ext-dns-2.cern.ch ubul.kfki.hu	2001:738:5001::1 4/6 2011-02-28
karolyrobert.hu	77/994541	www.karolyrobert.hu	mail.karolyrobert.hu	2001:738:6100::240	ingate.karolyrobert.hu ns.karolyrobert.hu	2001:738:6100::241 2/3 2011-02-28
inf.u-szeged.hu	/	FAILED	FAILED	FAILED		
www.mtmt.hu		FAILED	ns2.sztaki.hbone.hu			

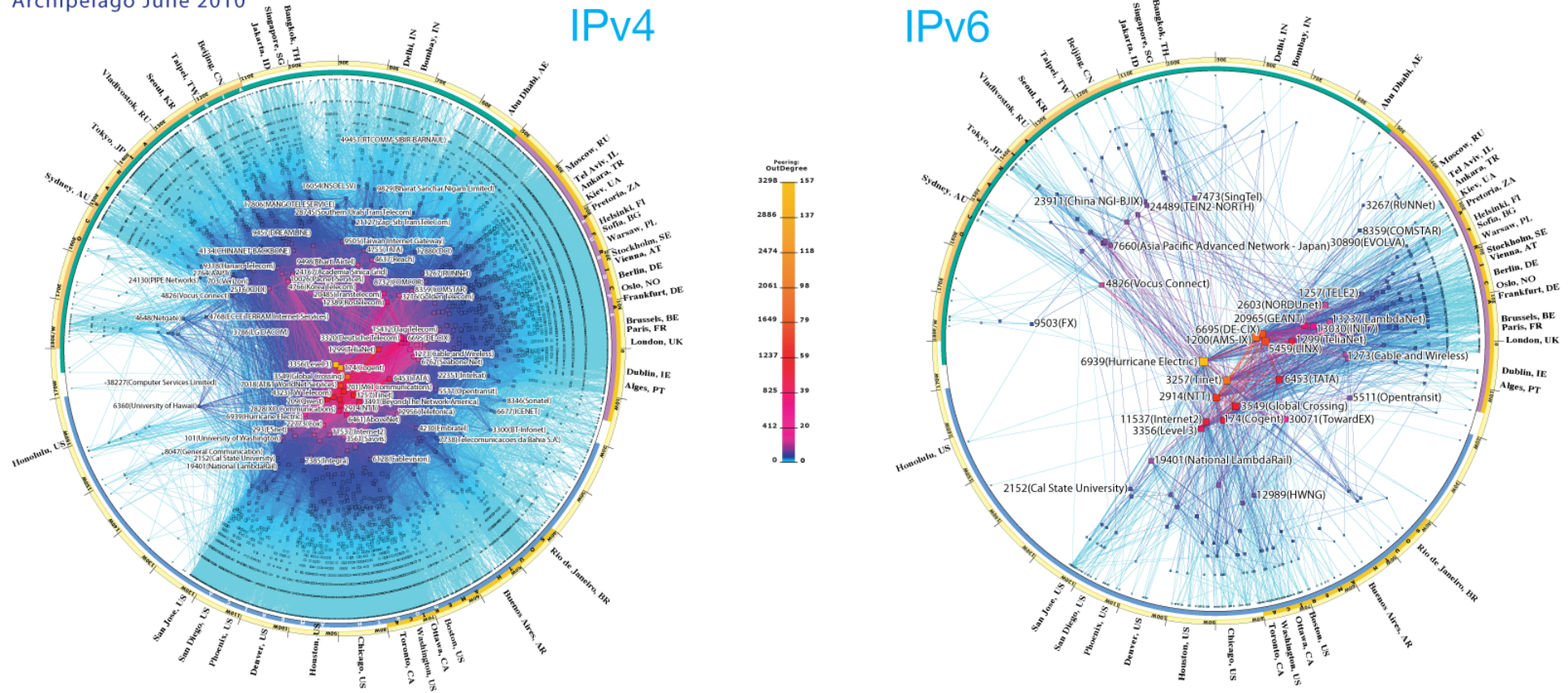
Find: google Next Previous Highlight all Match case

Transferring data from www.vyncke.org...

IPv6 elterjedtség /3

CAIDA's IPv4 & IPv6 AS Core AS-level INTERNET GRAPH

Archipelago June 2010



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World IPv6 day - ISOC

- 2011 június 8. – 24 órás teszt

<http://isoc.org/wp/worldipv6day/>

- IPv6 szolgáltatások nyújtása – koordinált!
- Tapasztalatok gyűjtése
- *“...some of the major organisations that will offer their content over IPv6 for a 24-hour “test flight”....*
- Sok résztvevő:
 - Google, Facebook, Yahoo!, Akamai, Limelight Networks
 - Cisco, Meebo, Genius, W3C, Universidad Nacional Autonoma de Mexico, Rensselaer Polytechnic Institute, NYI NET, Host Europe, Xiphiaspec, Tom's Hardware, NUST School of Electrical Engineering and Computer Science, Twenga, Plurk, Terra (Brazil), Jolokia Networks, Juniper Networks, Microsoft Bing, Gigatux, Voxel, LemonEntry, 2g2u, 2020Media, Vonage, sapo.pt, Tagadab.com, Mercury Z, Outpost10f, Public Interest Registry, Sesame Workshop, Arces

Reakciók

- RIPE-Meeting, 2011 május
 - Támogatás és elragadtatás
 - dDOS attack against the (production) Internet!
 - “prepare your personal schedule! ...or take a break from the Internet? “

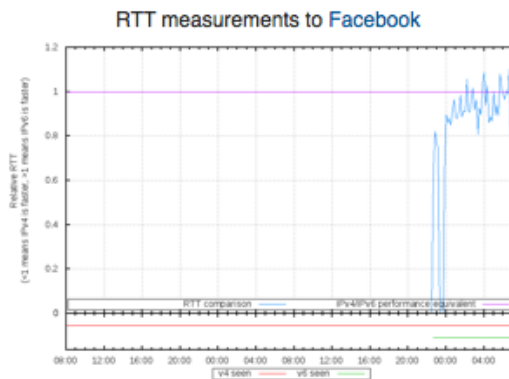
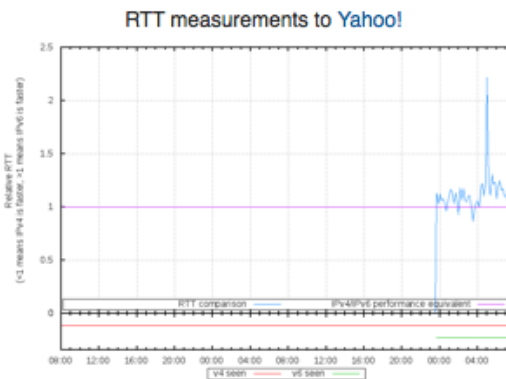
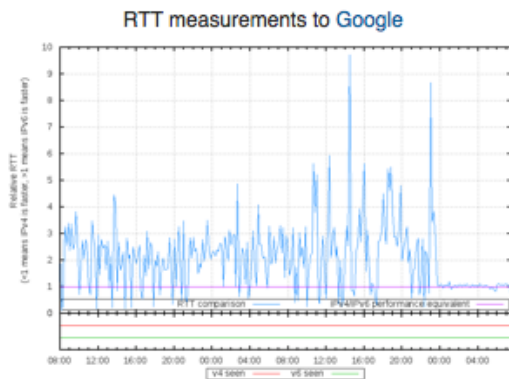
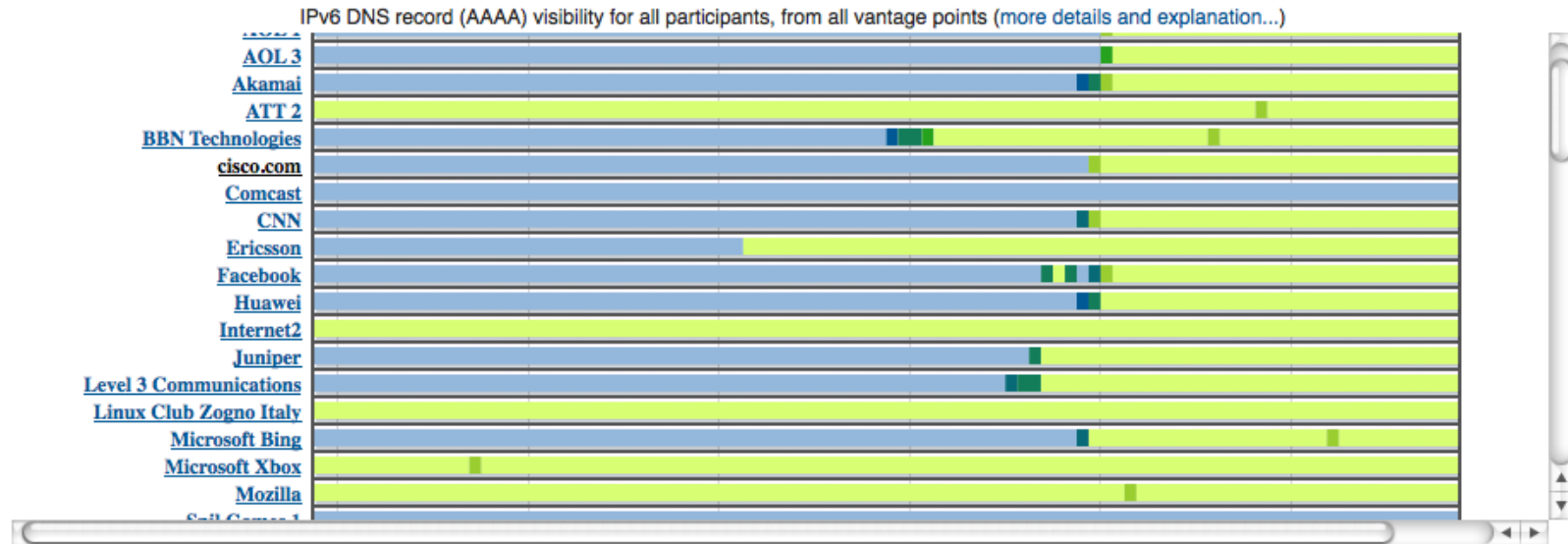
NIIF felkészülés

- 2006 év eleje óta támogatott az IPv6
- Szolgáltatások IPv6 képesek régóta
- Operátorok felkészítése
- Felhasználók értesítése
- **IPv6 readiness check**
 - <http://go6.se/check>
 - <http://test-ipv6.com/> és <http://test-ipv6.sth.sze.hu/>
 - <http://netalyzr.icsi.berkeley.edu/m=testv6>

Mi működött

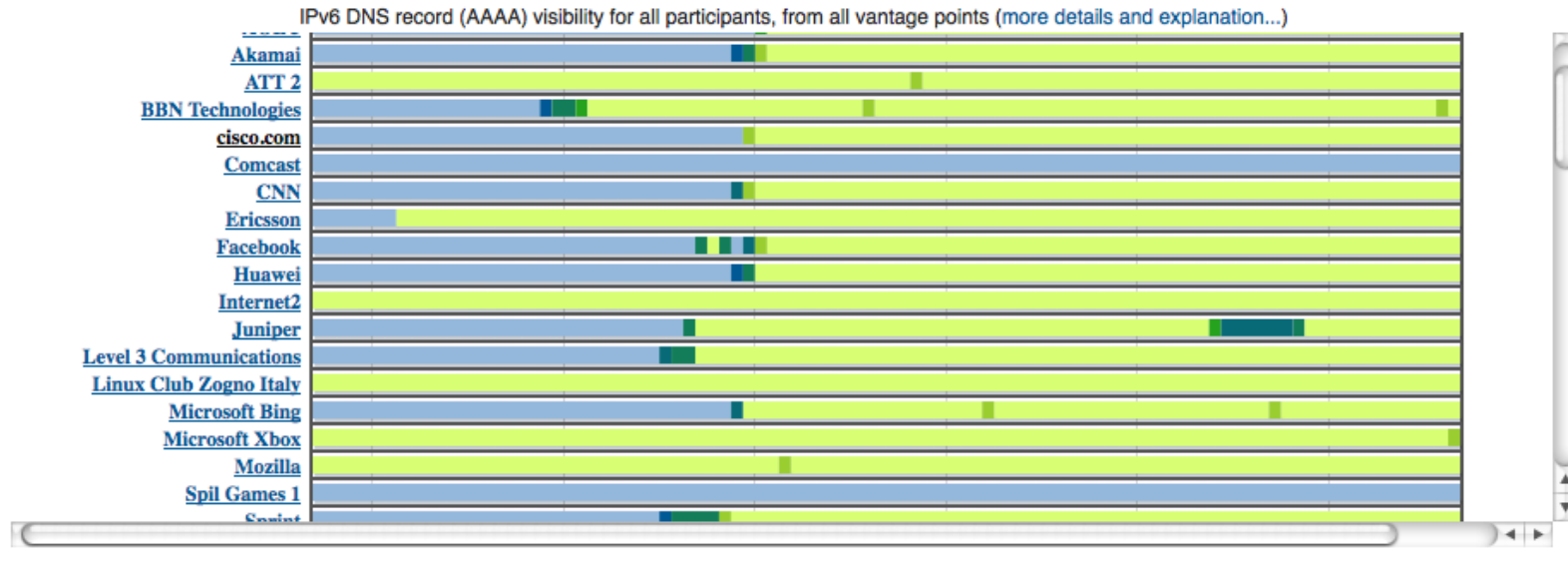
- Google (gmail, picasa, googldocs)
 - Nem ment IPv6-on:
 {smtp,imap,pop}.gmail.com
- Youtube
- Facebook
- Cisco (Akamai)
- CNN
- freemail

RIPE IPv6 dashboard - reggel

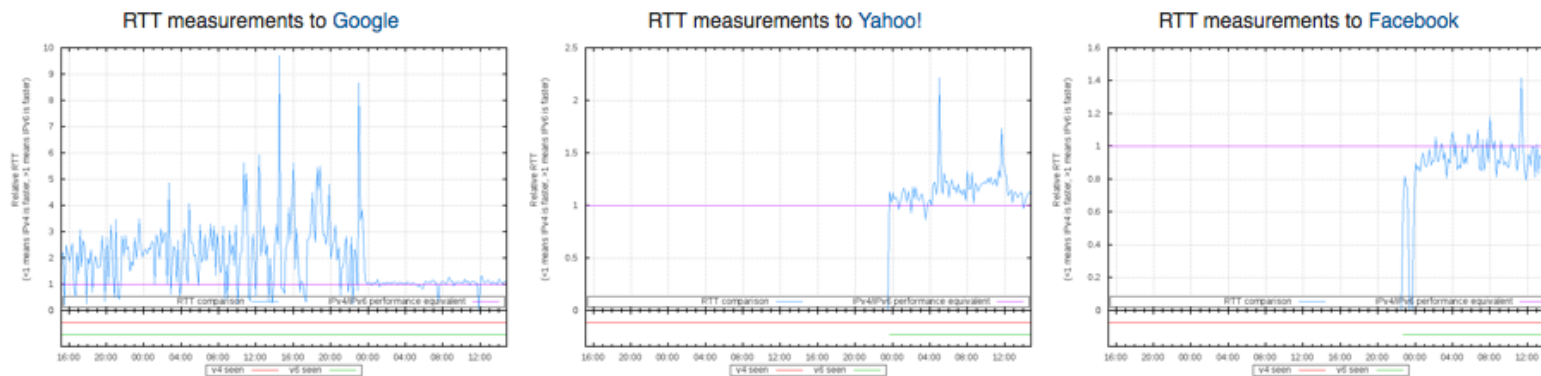


[More RTT measurement results...](#)

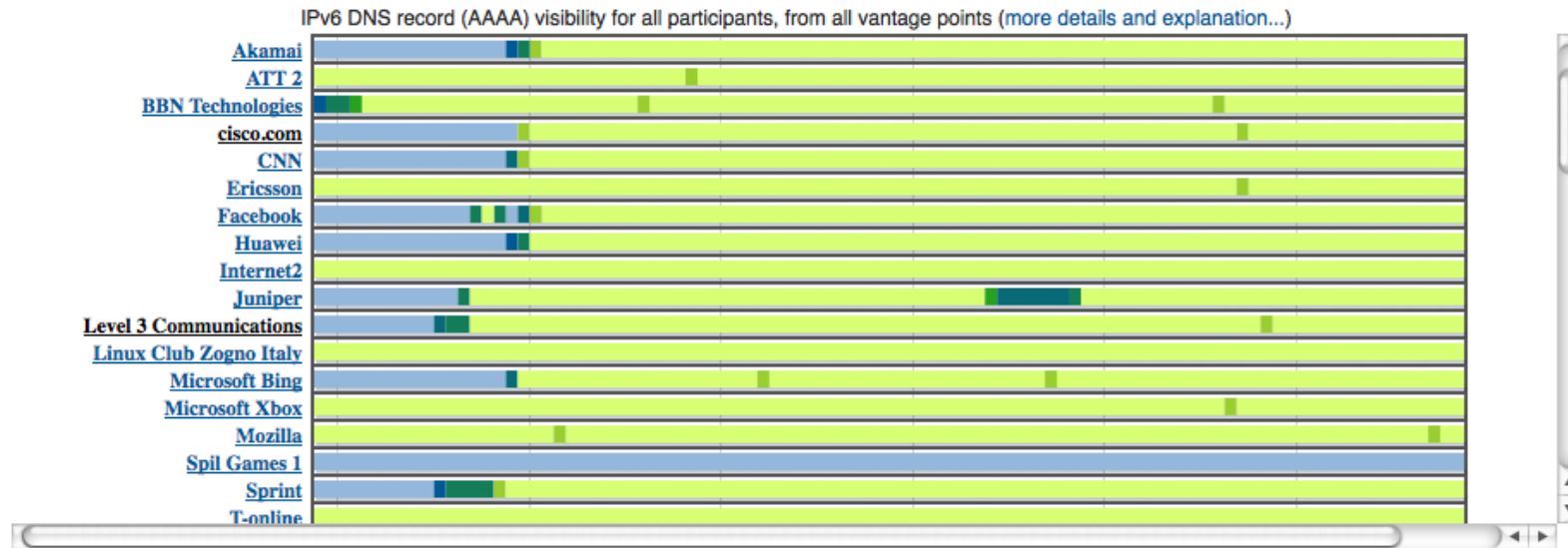
RIPE IPv6 dashboard - délután



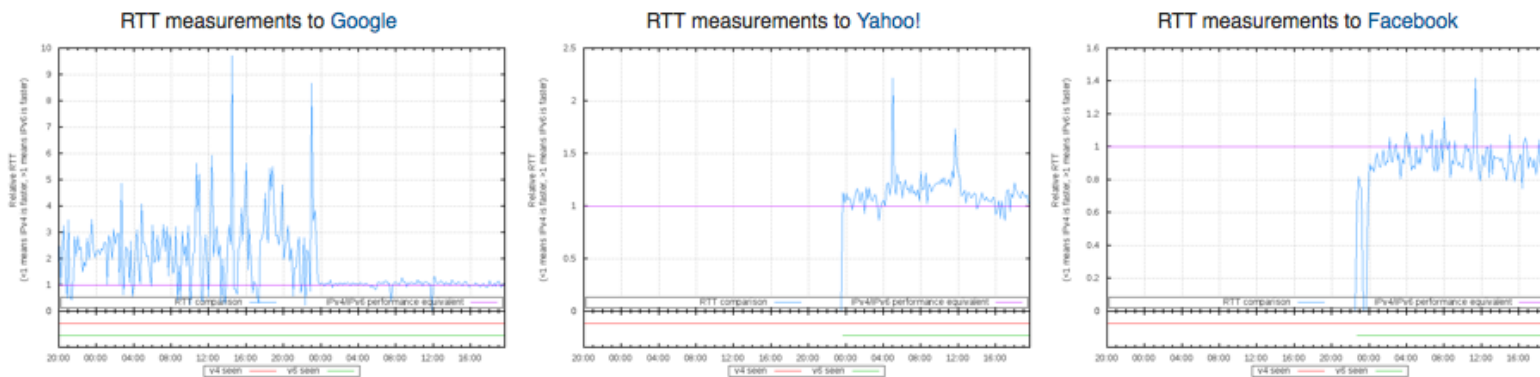
IPv4/IPv6 comparison to some sites (more RTT measurement results and explanation...)



RIPE IPv6 dashboard - este



IPv4/IPv6 comparison to some sites ([more RTT measurement results and explanation...](#))



Akamai IPv6 statisztika - reggel

Akamai IPv6 Statistics

225 IPV6 HITS PER SECOND

IPV6 LATENCY

IPV6 PACKET LOSS

Akamai IPv6 Statistics

225 IPV6 HITS PER SECOND

IPV6 LATENCY

IPV6 PACKET LOSS

Akamai IPv6 Statistics

8am

225 IPV6 HITS PER SECOND

IPV6 LATENCY

IPV6 PACKET LOSS

8am 6/6

5pm 6/6

2am 6/7

11am 6/7

8pm 6/7

12am 6/8

7am 6/8

69 hits/sec

59 hits/sec

49 hits/sec

39 hits/sec

30 hits/sec

20 hits/sec

10 hits/sec

59 hits/sec Peak
(6/8 - 07:30am GMT)

Overall

North America

South America

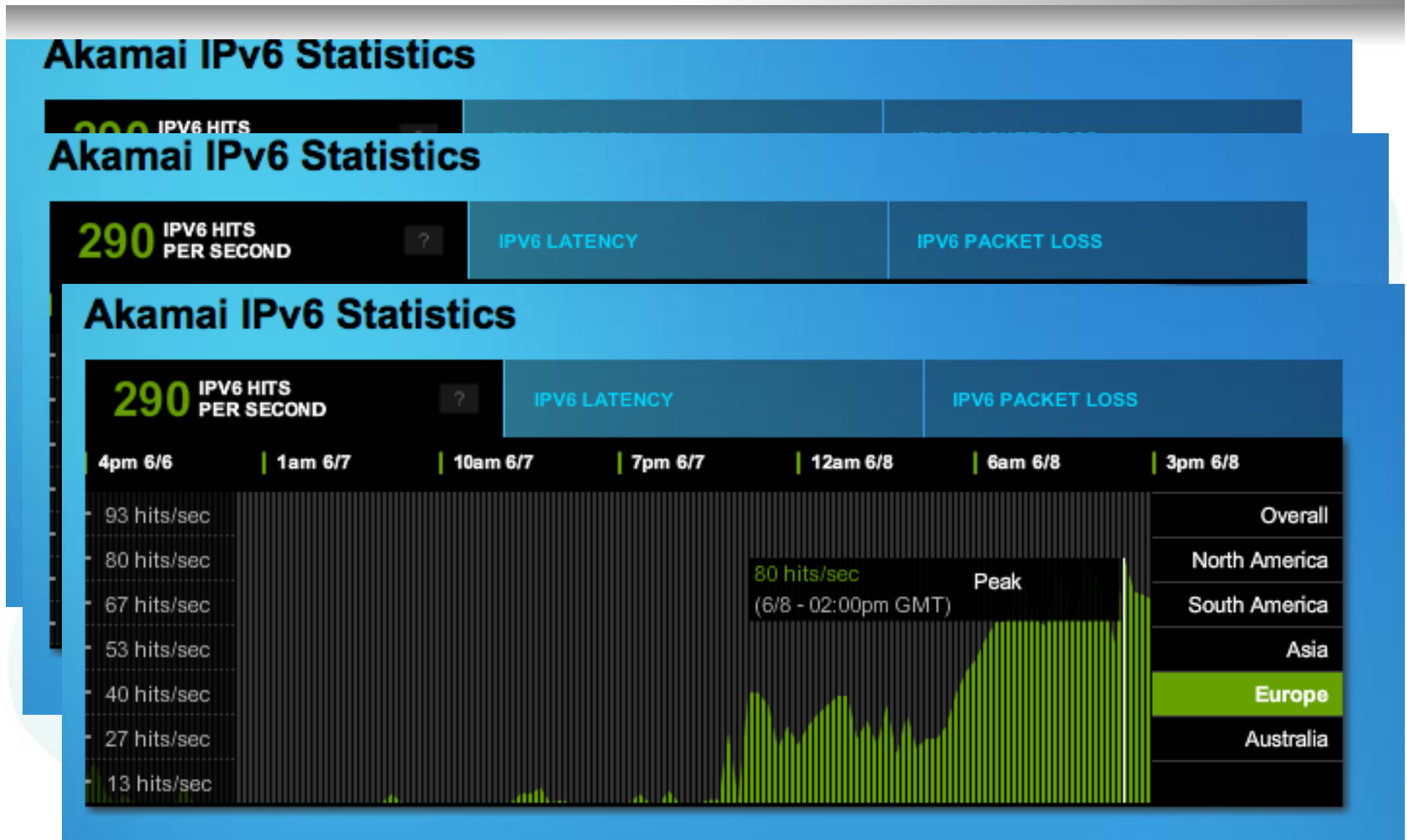
Asia

Europe

Africa

Australia

Akamai IPv6 statisztika – délután



Akamai IPv6 statisztika - este

Akamai IPv6 Statistics

250 IPV6 HITS PER SECOND

IPV6 LATENCY

IPV6 PACKET LOSS

Akamai IPv6 Statistics

250 IPV6 HITS PER SECOND

IPV6 LATENCY

IPV6 PACKET LOSS

Akamai IPv6 Statistics

250 IPV6 HITS PER SECOND

IPV6 LATENCY

IPV6 PACKET LOSS

9pm 6/6

6am 6/7

3pm 6/7

12am 6/8

2am 6/8

11am 6/8

7pm 6/8

109 hits/sec

94 hits/sec

78 hits/sec

62 hits/sec

47 hits/sec

31 hits/sec

16 hits/sec

94 hits/sec
(6/8 - 06:00pm GMT)

Peak

Overall

North America

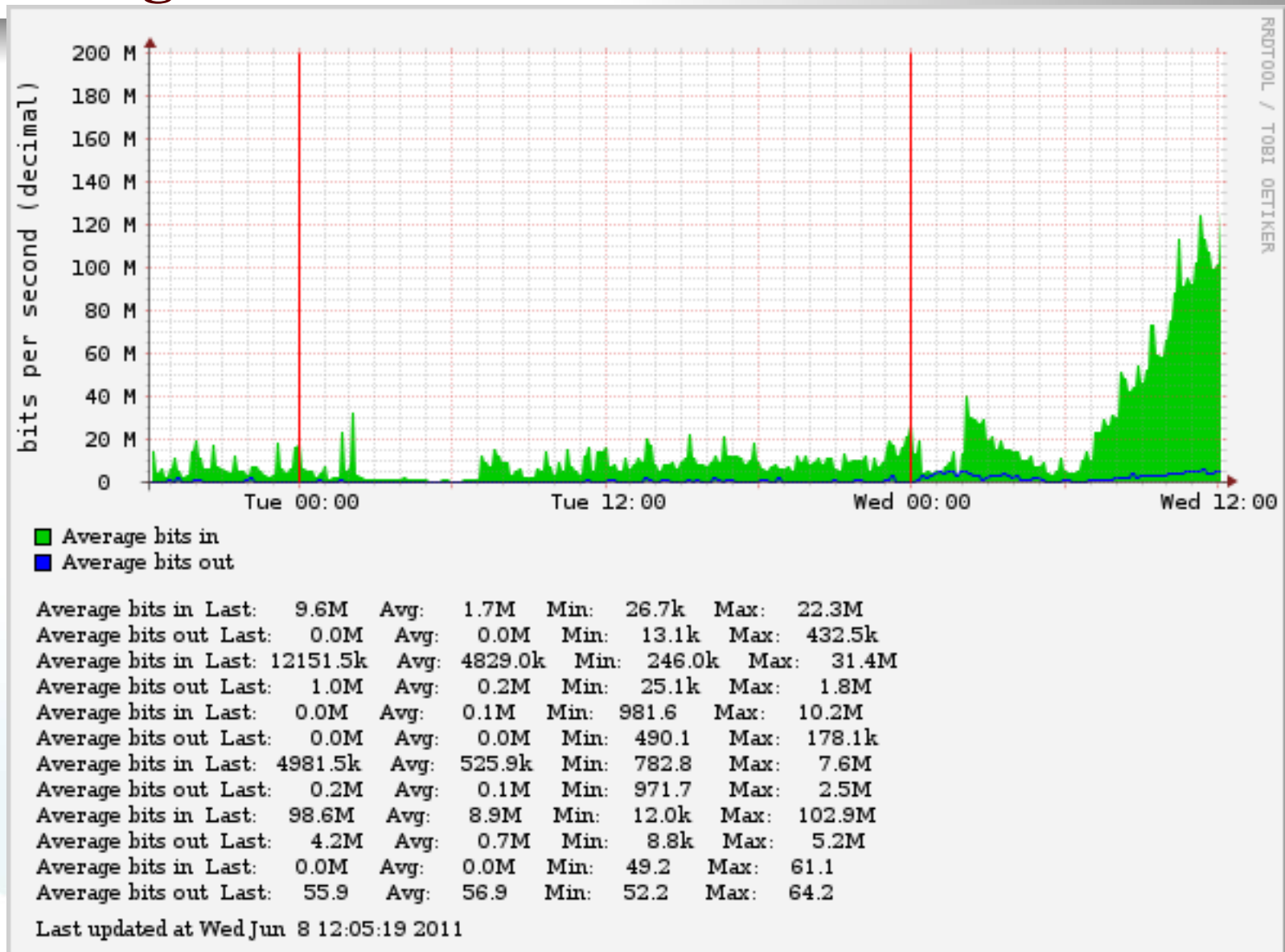
South America

Asia

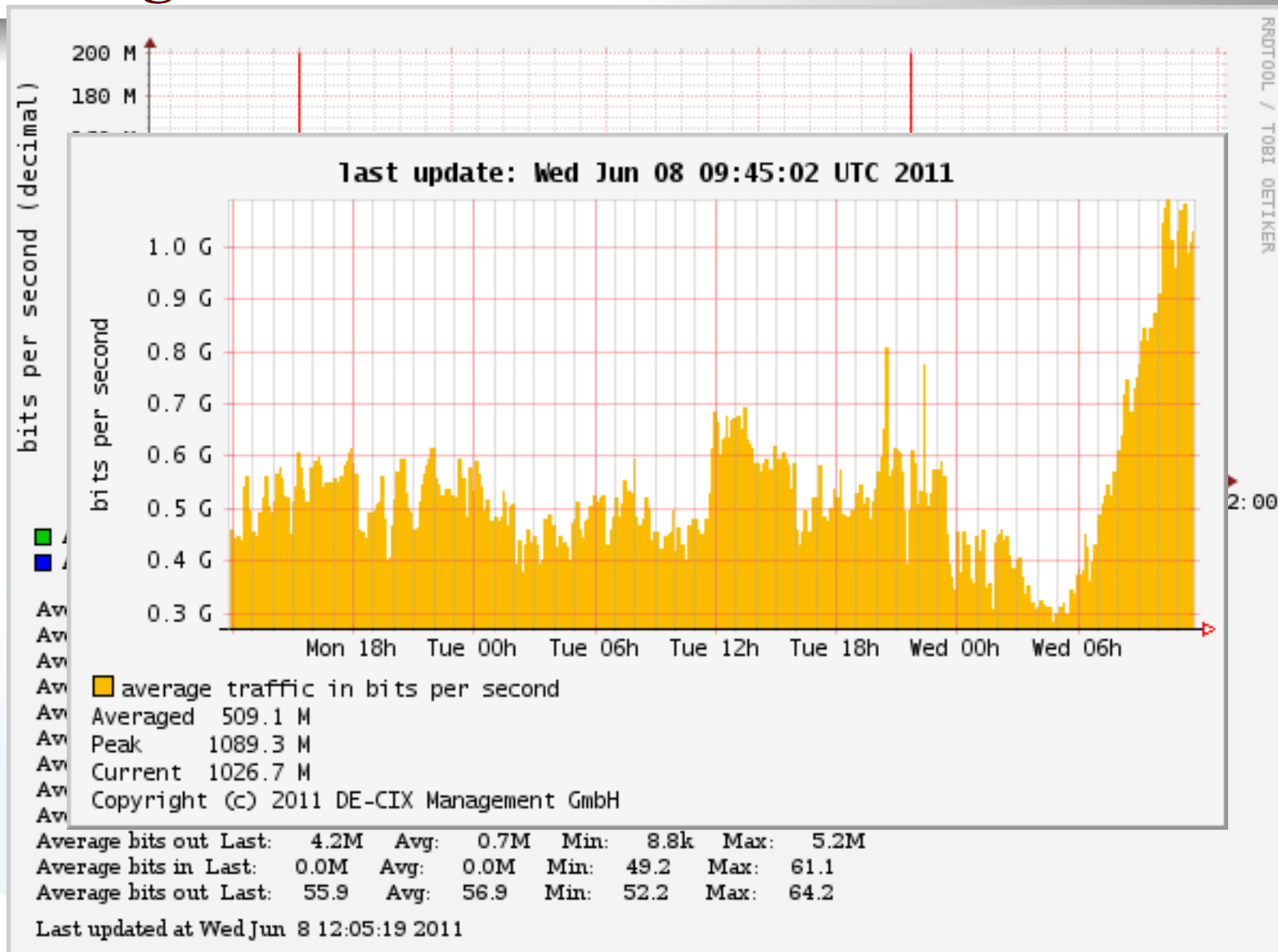
Europe

Australia

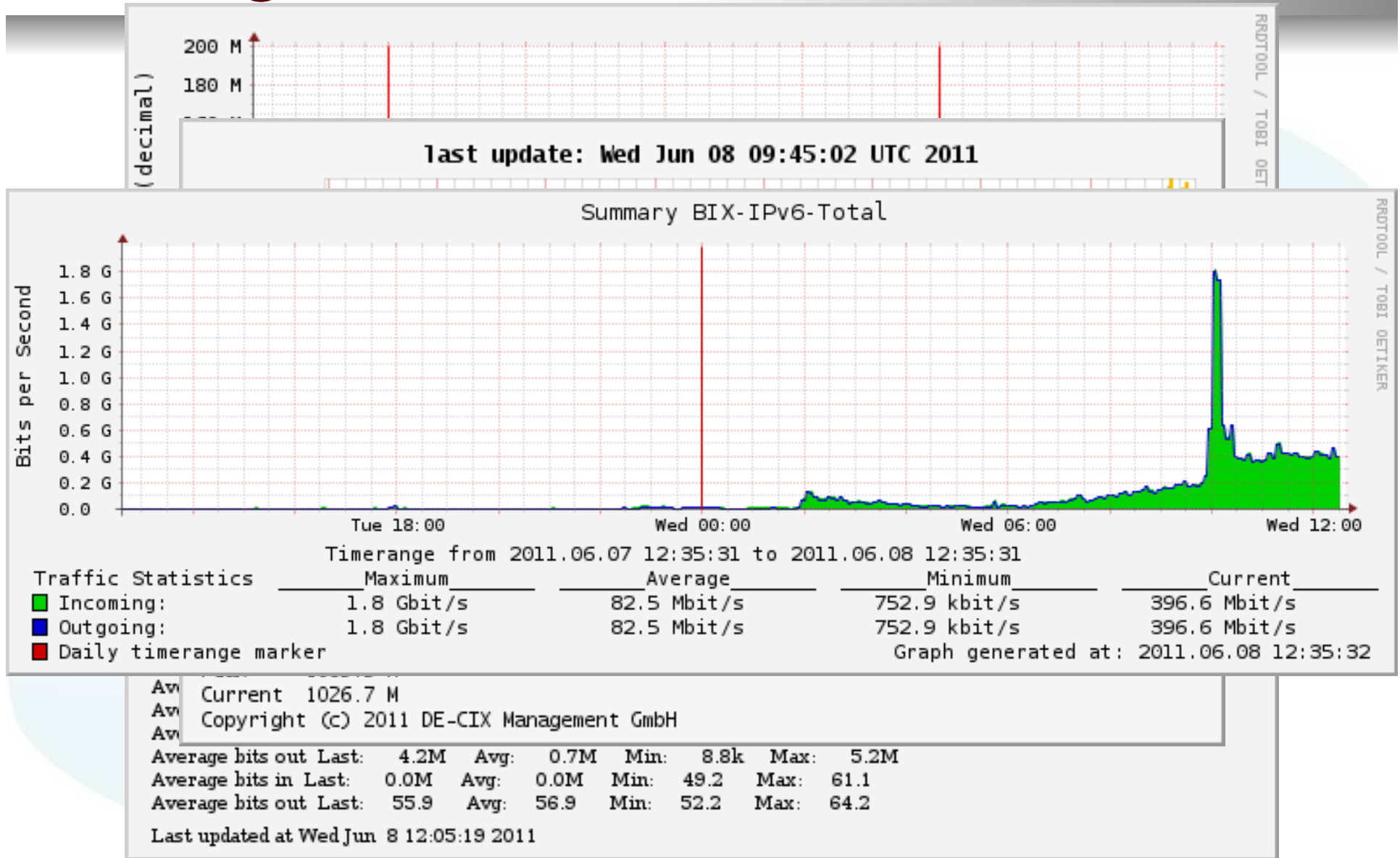
IPv6 forgalom - délelőtt



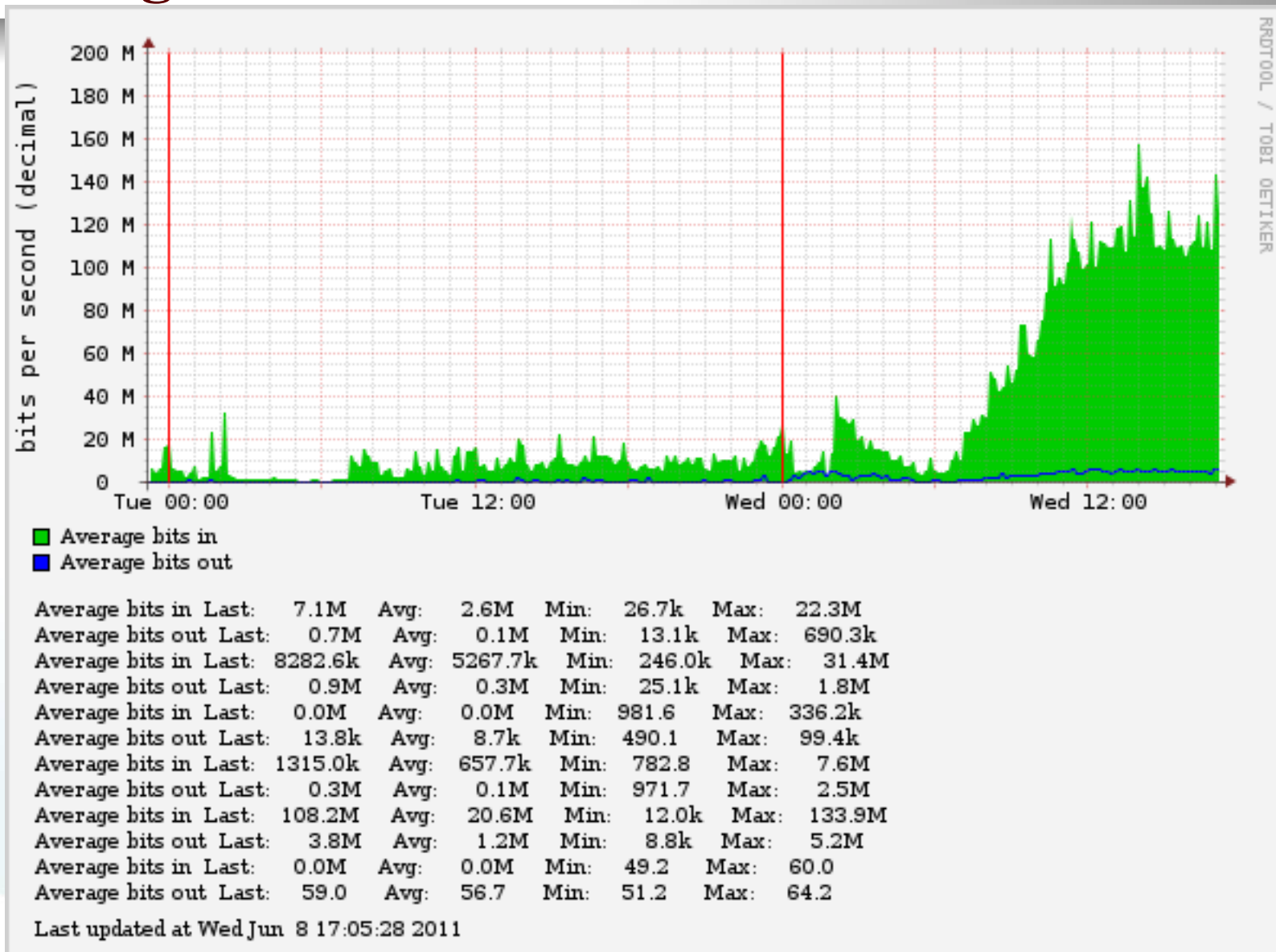
IPv6 forgalom - délelőtt



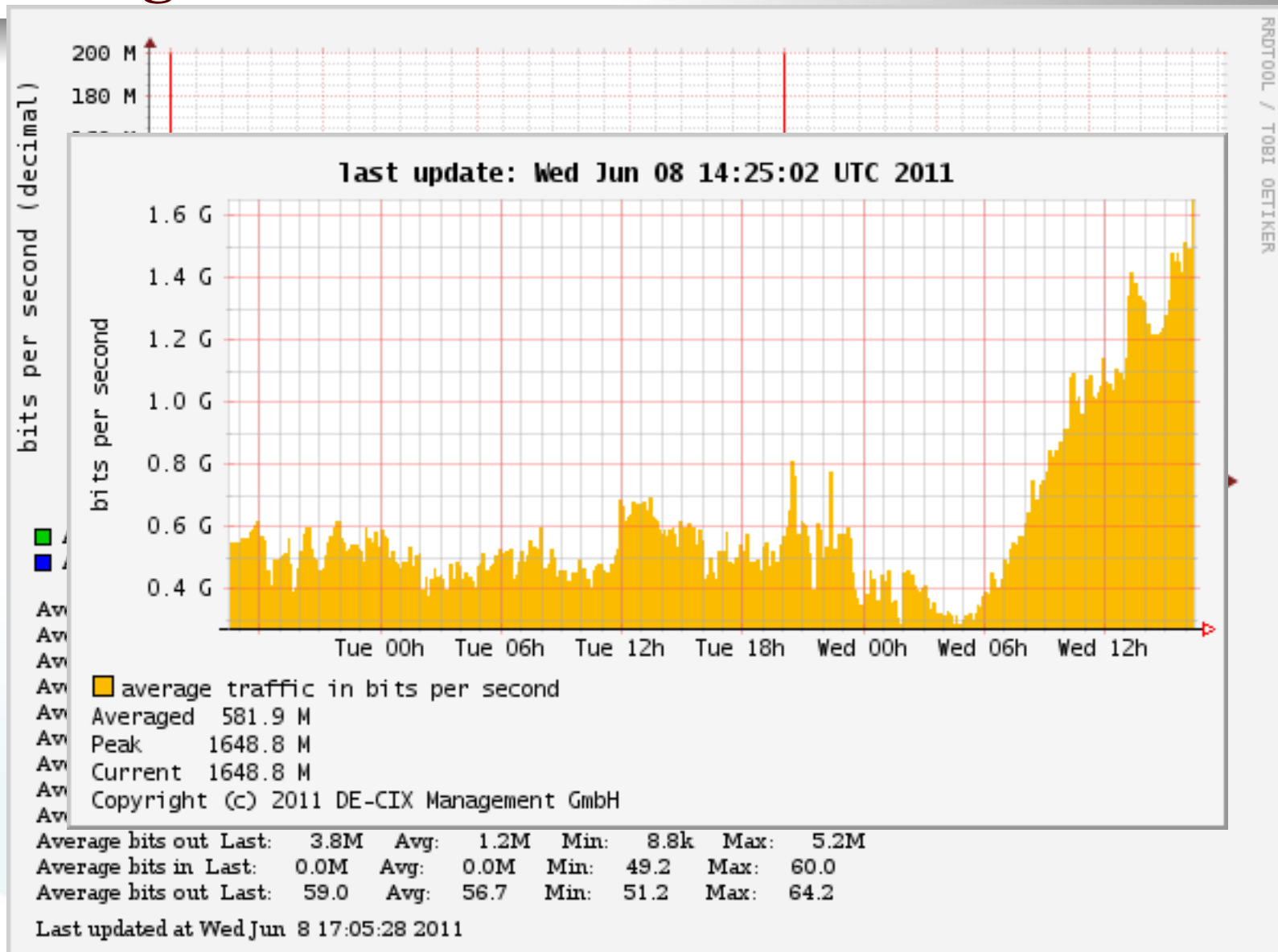
IPv6 forgalom - délelőtt



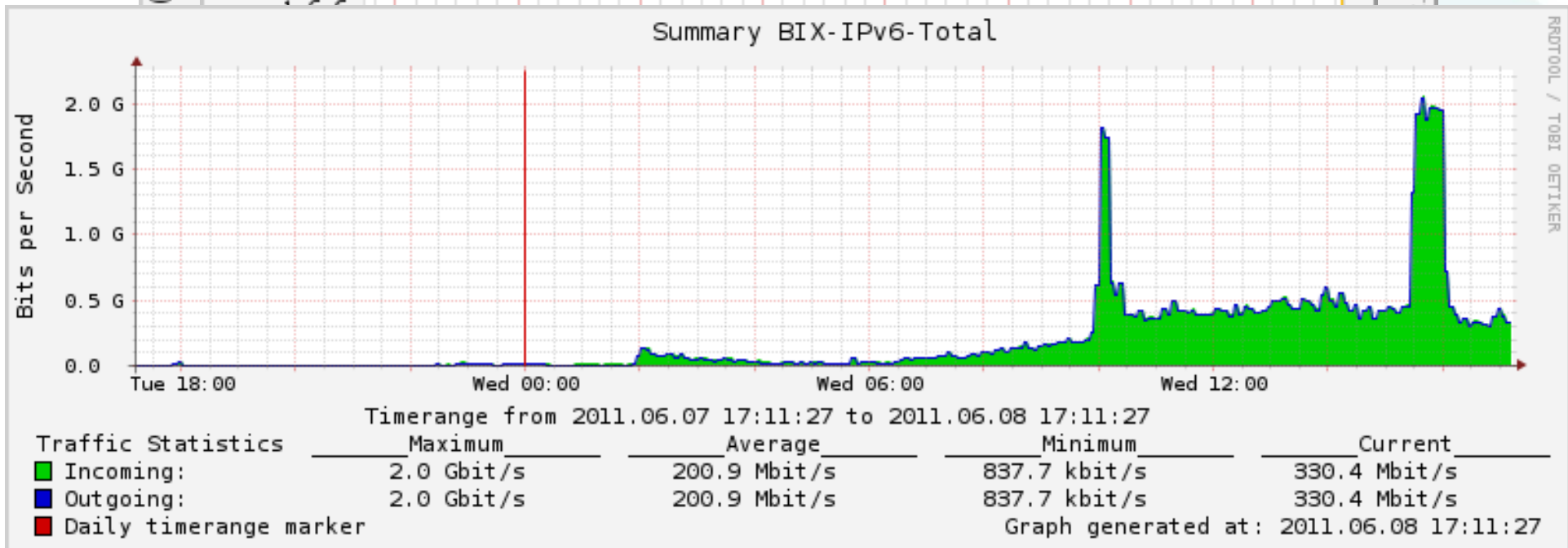
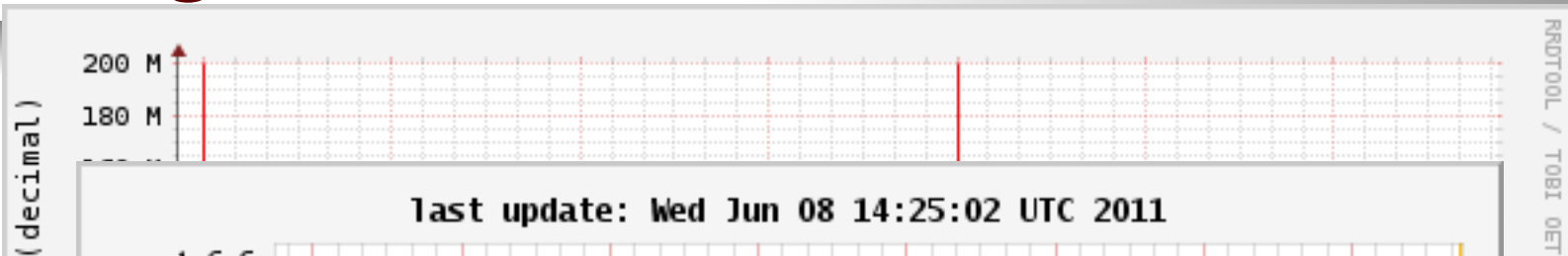
IPv6 forgalom - délután



IPv6 forgalom - délután



IPv6 forgalom - délután



Av Current 1648.8 M
 Av Copyright (c) 2011 DE-CIX Management GmbH
 Av

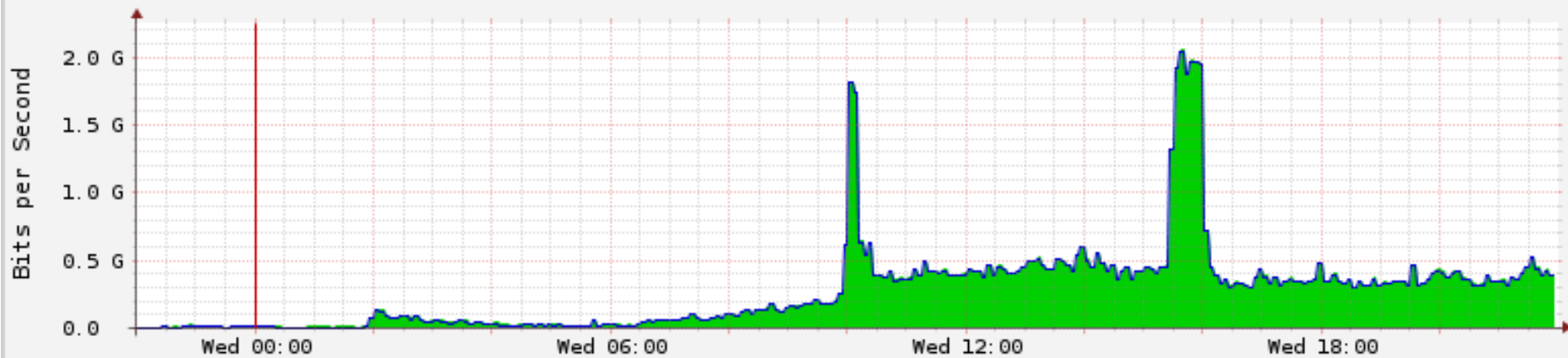
Average bits out Last: 3.8M Avg: 1.2M Min: 8.8k Max: 5.2M
 Average bits in Last: 0.0M Avg: 0.0M Min: 49.2 Max: 60.0
 Average bits out Last: 59.0 Avg: 56.7 Min: 51.2 Max: 64.2

Last updated at Wed Jun 8 17:05:28 2011

IPv6 forgalom - este



Summary BIX-IPv6-Total



Timerange from 2011.06.07 21:58:27 to 2011.06.08 21:58:27

Traffic Statistics	Maximum	Average	Minimum	Current
Incoming:	2.0 Gbit/s	272.7 Mbit/s	1.1 Mbit/s	386.0 Mbit/s
Outgoing:	2.0 Gbit/s	272.7 Mbit/s	1.1 Mbit/s	386.0 Mbit/s
Daily timerange marker				

Graph generated at: 2011.06.08 21:58:27

Average bits in Last:	747.0k	Avg: 727.1k	Min: 905.6	Max: 7.6M
Average bits out Last:	0.1M	Avg: 0.1M	Min: 1.2k	Max: 2.5M
Average bits in Last:	106.8M	Avg: 31.5M	Min: 12.0k	Max: 133.9M
Average bits out Last:	3.2M	Avg: 1.5M	Min: 8.8k	Max: 5.2M
Average bits in Last:	0.0M	Avg: 0.0M	Min: 49.2	Max: 60.0
Average bits out Last:	55.5	Avg: 56.7	Min: 51.2	Max: 64.2

Last updated at Wed Jun 8 21:55:17 2011

Problémák

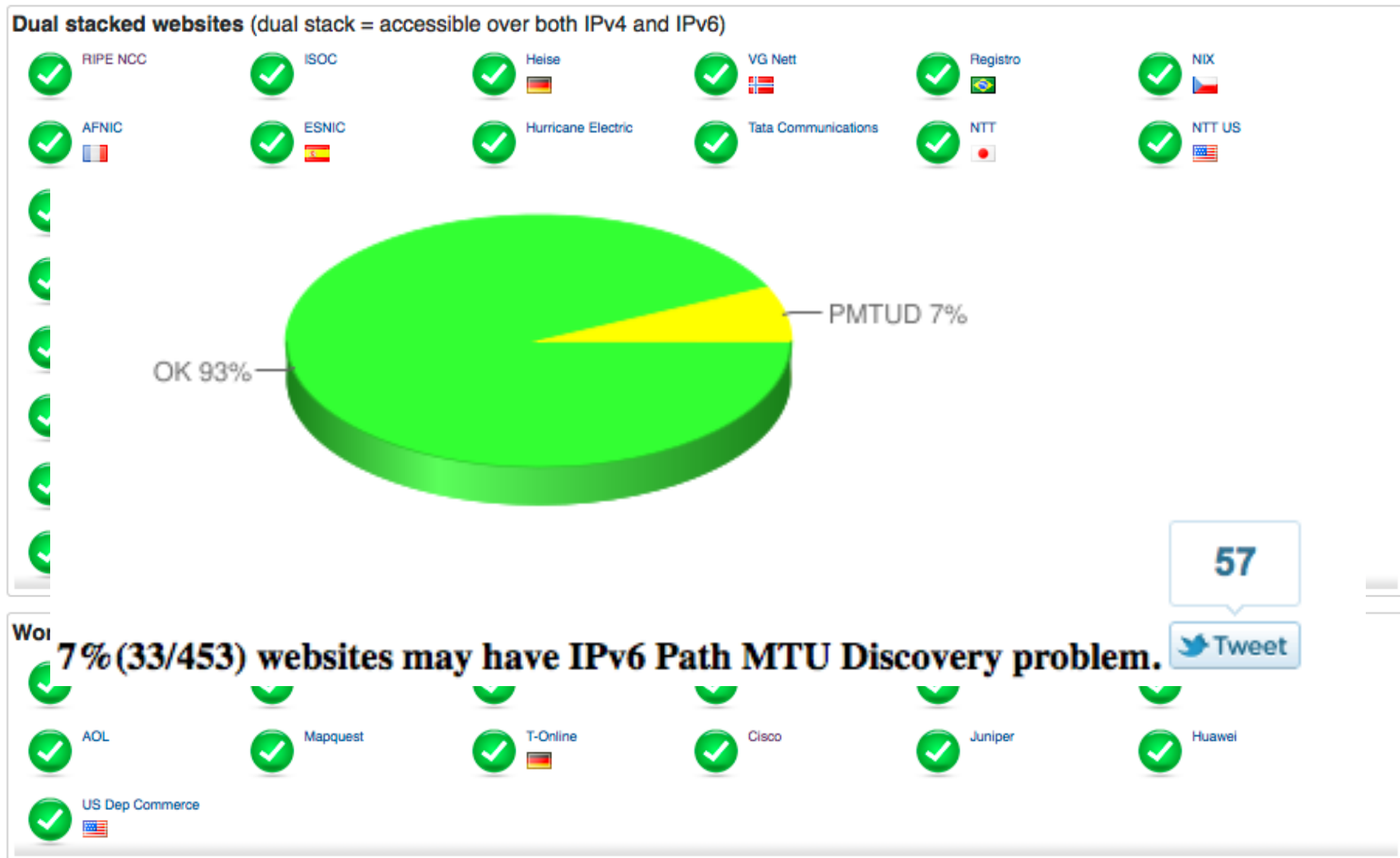
- freemail (T-com routing?) IPv6 elérési probléma 10:00 körül – 30 perc után megjavult
- Mac OS X – AAAA nem cachelés
- Érdekes routing – Level3:

```
traceroute to ipv6.test.Level3.com (2001:1900:2018:3000::105) from 2001:738:0:1:206:5bff:fef3:4366, port 33434, from port 42608, 30 hops max, 60 byte packet
 1  c6513-2-vlan150.vh.hbone.hu (2001:738:0:1::1)  0.456 ms  0.245 ms  0.398 ms
 2  be2.rtr1.vh.hbone.hu (::ffff:195.111.96.60)  0.694 ms  0.572 ms  0.567 ms
 3  2001:2000:3080:17::1 (2001:2000:3080:17::1)  0.228 ms  0.225 ms  0.230 ms
 4  ldn-b5-v6.telia.net (2001:2000:3018:b::1)  38.152 ms  36.232 ms  38.066 ms
 5  * * *
 6  vl-4086.car1.NewYork1.Level3.net (2001:1900:6:1::12)  106.838 ms  106.080 ms  106.225 ms
 7  vl-4083.car2.SanJose1.Level3.net (2001:1900:4:1::ee)  104.267 ms  165.523 ms  691.354 ms
 8  vl-4060.car2.NewYork2.Level3.net (2001:1900:4:1::fe)  115.120 ms  115.138 ms  115.773 ms
 9  vl-4061.car1.Chicago1.Level3.net (2001:1900:4:1::21)  136.240 ms  136.943 ms  136.156 ms
10  * * *
11  vl-4041.car2.Denver1.Level3.net (2001:1900:4:1::35)  212.448 ms  166.424 ms  166.655 ms
12  vl-4081.car1.Denver1.Level3.net (2001:1900:4:1::31)  173.636 ms  317.868 ms  162.589 ms
13  Level3-MOSS.vl-956.car1.Denver1.Level3.net (2001:1900:4:2::fa)  159.885 ms  160.297 ms  160.744 ms
```

- Citrix Netscaler fragmentation crash bug

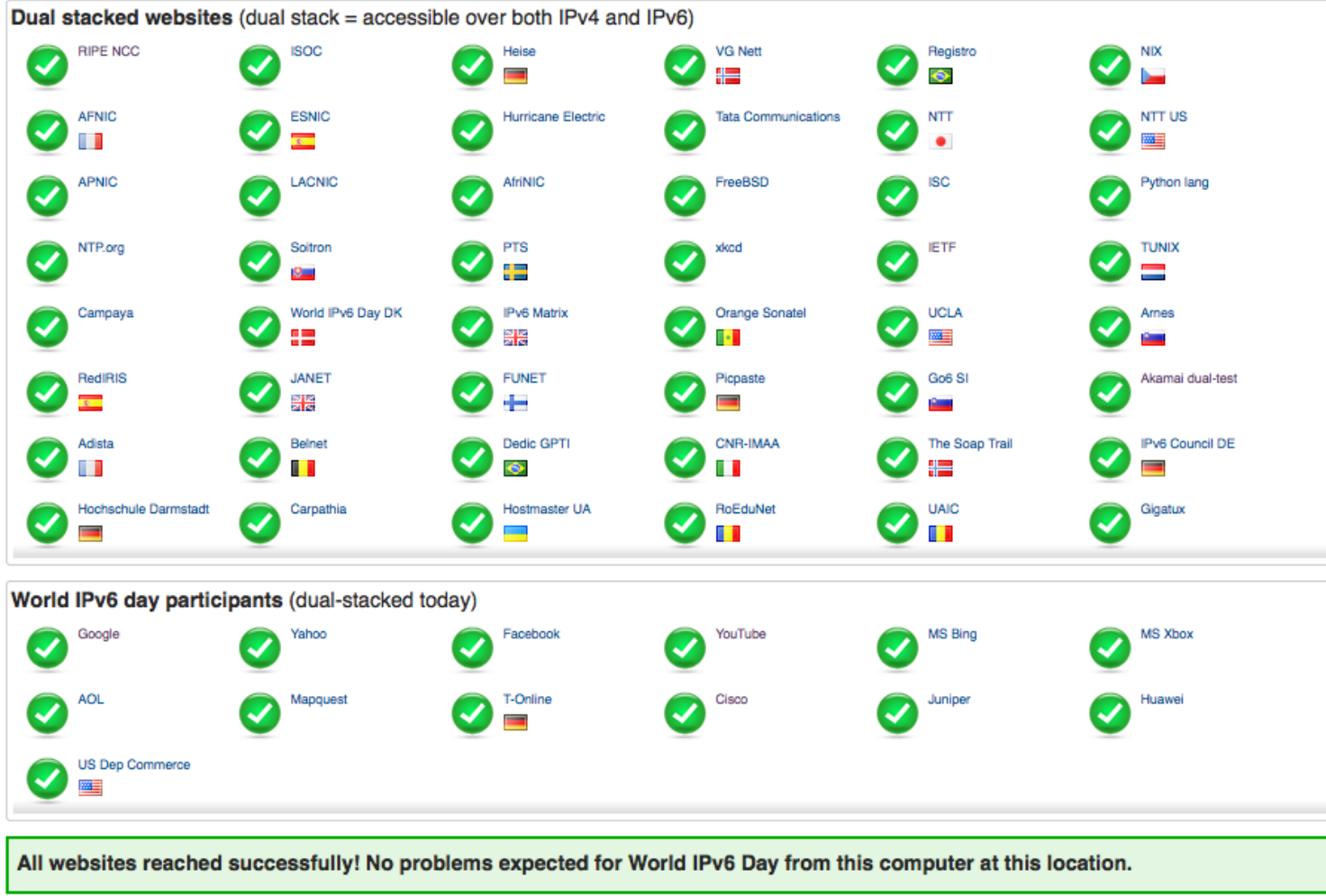
World IPv6 day résztvevők

World IPv6 Day Connectivity Chart

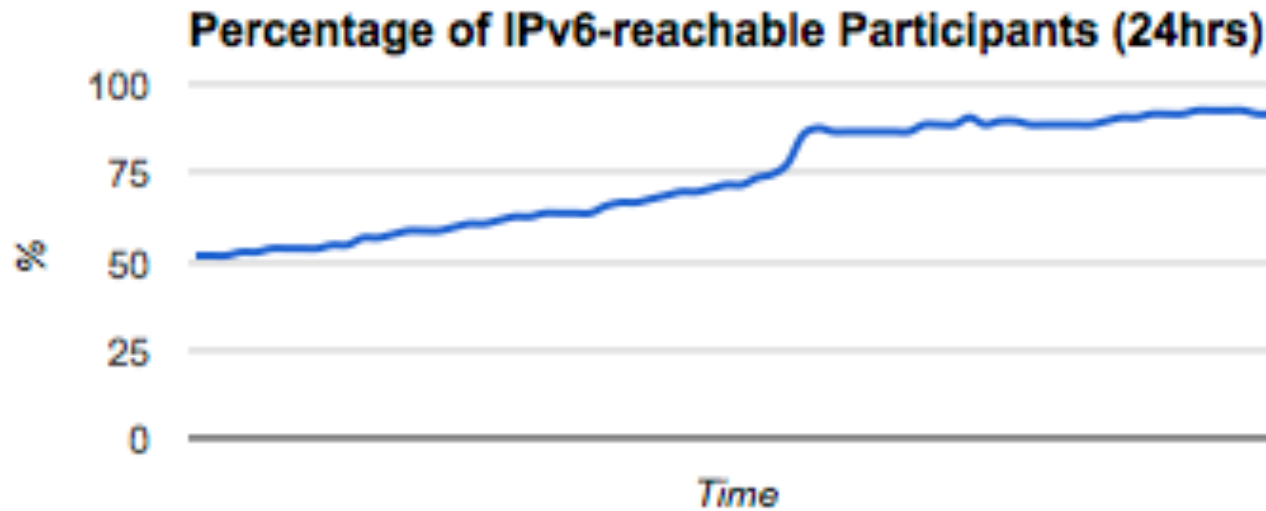


IPv6 eyechart – NIIF ADSL-en

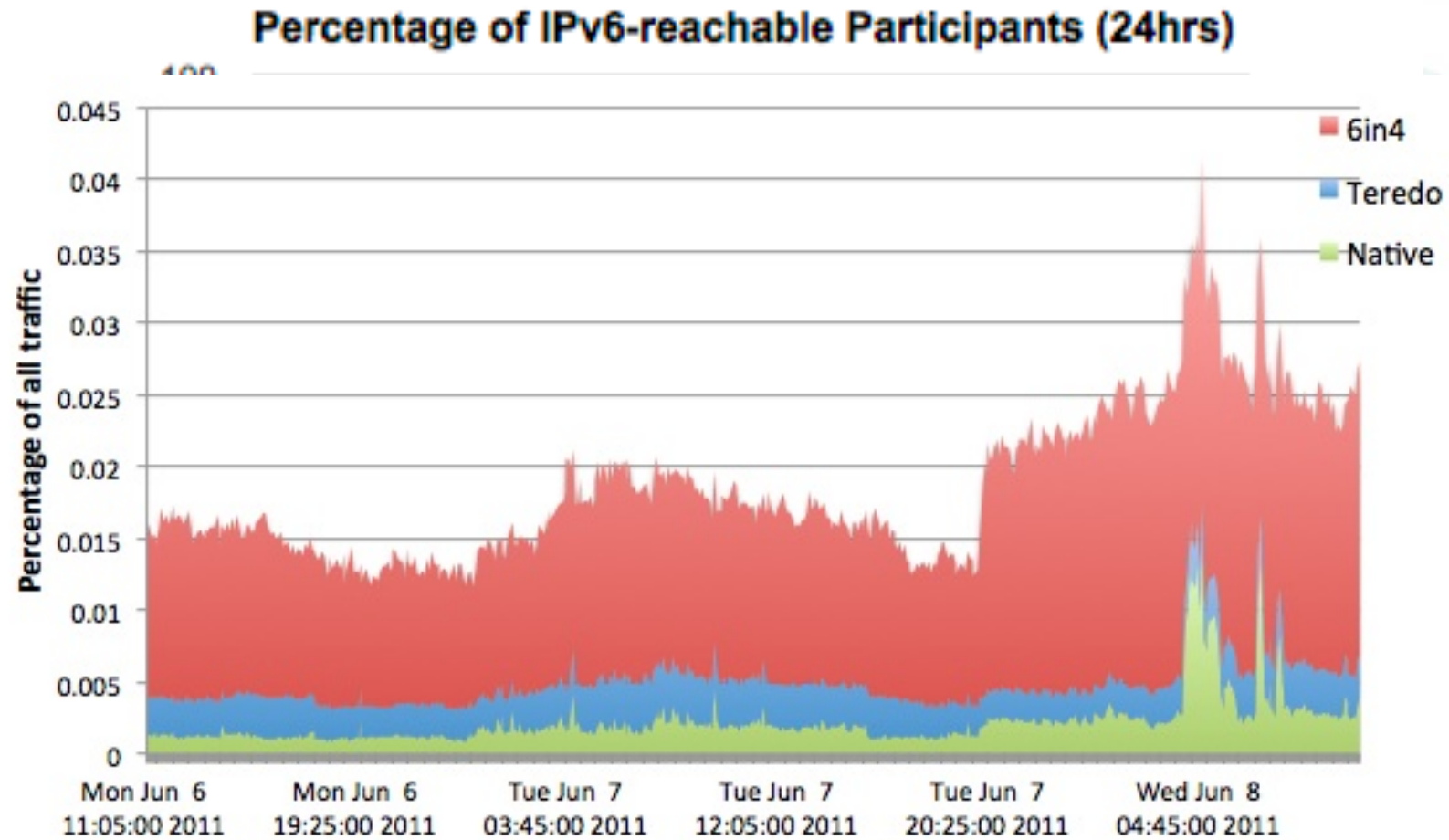
World IPv6 Day Connectivity Chart



ISOC Dashboard



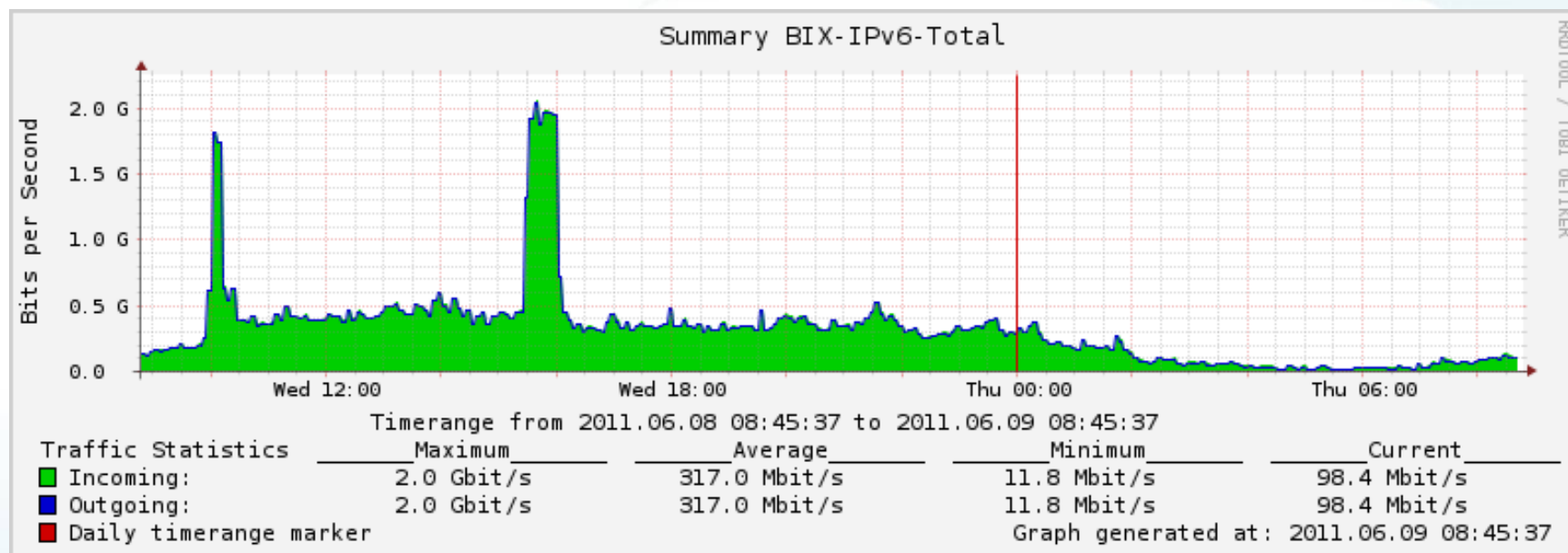
ISOC Dashboard



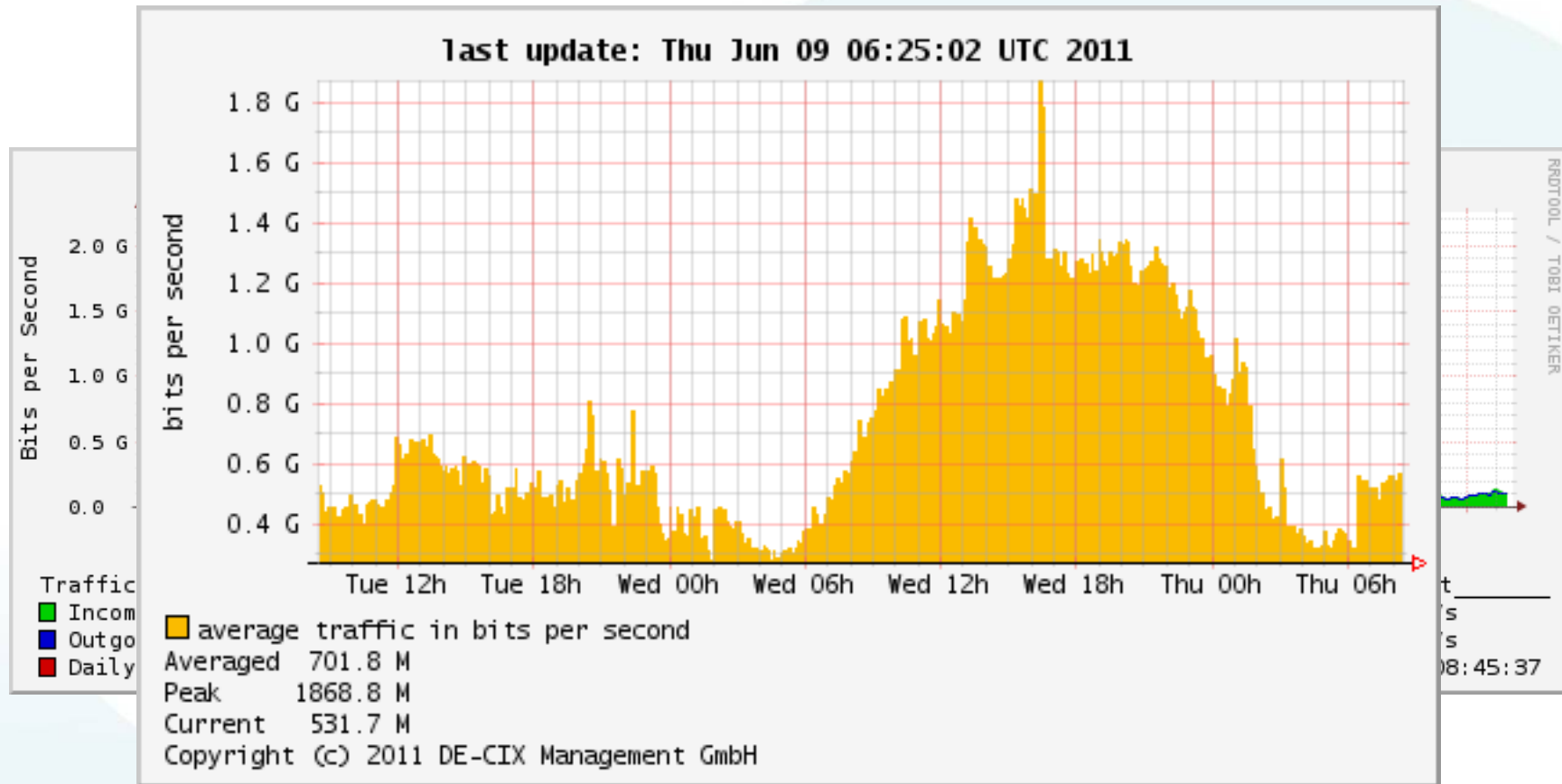
Konkluzió forgalmi statisztikák alapján

- Európai szinten az IPv6 forgalom akár 3x lehetne
- Magyarországi szinten az IPv6 forgalom akár 5x lehetne
- NIIF felhasználói szinten az IPv6 forgalom akár 5-10x is lehetne
 - Sok az IPv6 képes kliens!
- Hiányzik az IPv6 képes tartalom!

2011 jun 9.

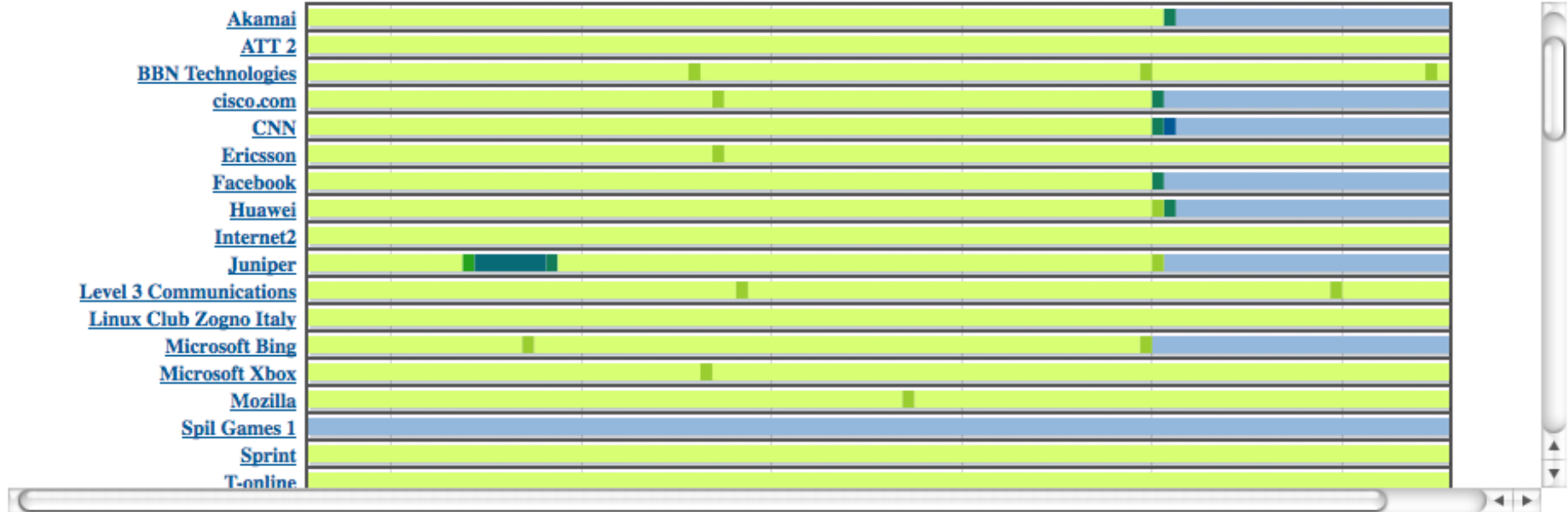


2011 jun 9.



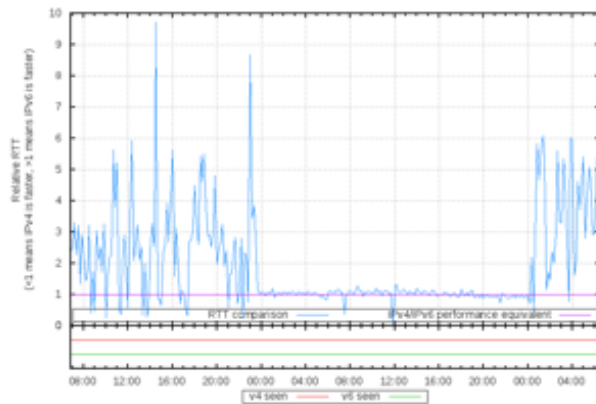
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IPv6 DNS record (AAAA) visibility for all participants, from all vantage points (more details and explanation...)

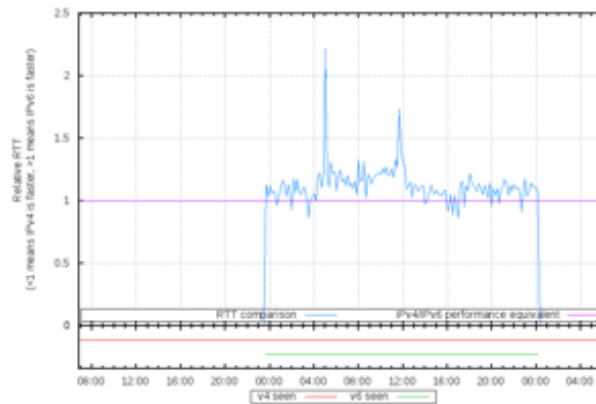


IPv4/IPv6 comparison to some sites (more RTT measurement results and explanation...)

RTT measurements to Google



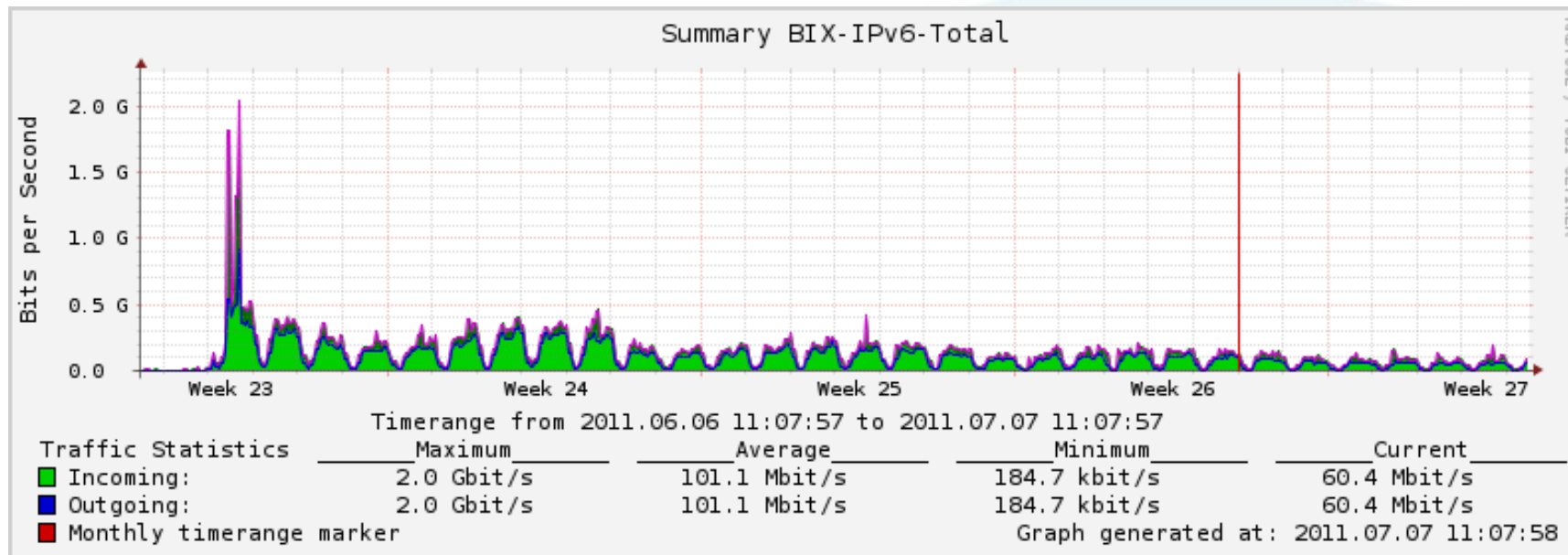
RTT measurements to Yahoo!



RTT measurements to Facebook



2011 jul 7.



IPv6 forgalom az IPv6 világnap utáni héten magasabb maradt?

Konkluzió

- IPv6 világnap – jól előkészített
- A potenciális hibák nagy része előre ismert volt
- Részletes analízis szükséges a tartalom szolgáltatók részéről az ő tapasztalataikról
 - mi működött, mi nem
 - CDN?
- Újabb IPv6 world day-re lenne szükség – a hibákból tanulva
- 1 éven belül bevezethető lenne a IPv6 világnapon tesztelő tartalom tulajdonosoknál az IPv6...
- Facebook a fejlesztői weboldalát dual-stack-re konfigurálva hagyta..... – mert jók voltak a tapasztalatok

Köszönöm a figyelmet!
Kérdések?



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