

RouterOS: Peering the World

by Lorenzo Busatti

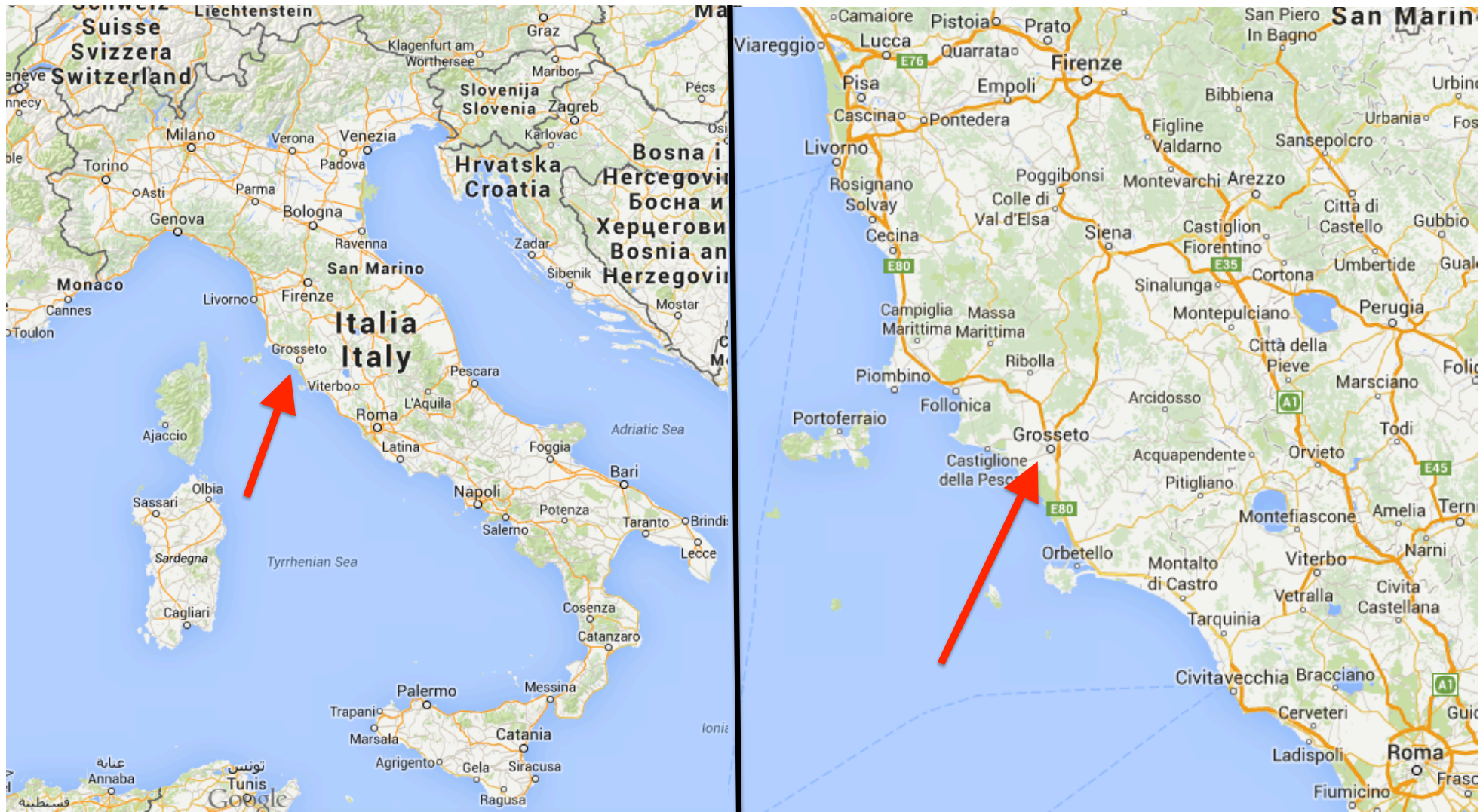
MUM BRAZIL ON NOVEMBER 17 - 18, 2014

About me

Lorenzo Busatti

- Founder of Grifonline S.r.l., Grosseto – ITALY
- ISP since 1997, WISP since 2006
- MikroTik Certified Trainer since 2010 for:
MTCNA, MTCWE, MTCRE, MTCTCE, MTCUME,
MTCINE
- Member of RIPE, AMS-IX, MIX-IT

About me



About Guilherme Ramires

MikroTik training partner

All MikroTik certificates

And my friend!

He will translate my presentation for you.

Presentation Objective

Raise awareness of the peering with the big players of the net, using RouterOS.

What is the peering?

Wikipedia say:

“In computer networking, peering is a voluntary interconnection of administratively separate Internet networks for the purpose of exchanging traffic between the users of each network.”

<http://en.wikipedia.org/wiki/Peering>

Wikipedia say:

And:

“An agreement by two or more networks to peer is instantiated by a physical interconnection of the networks, an exchange of routing information through the Border Gateway Protocol (BGP) routing protocol.”

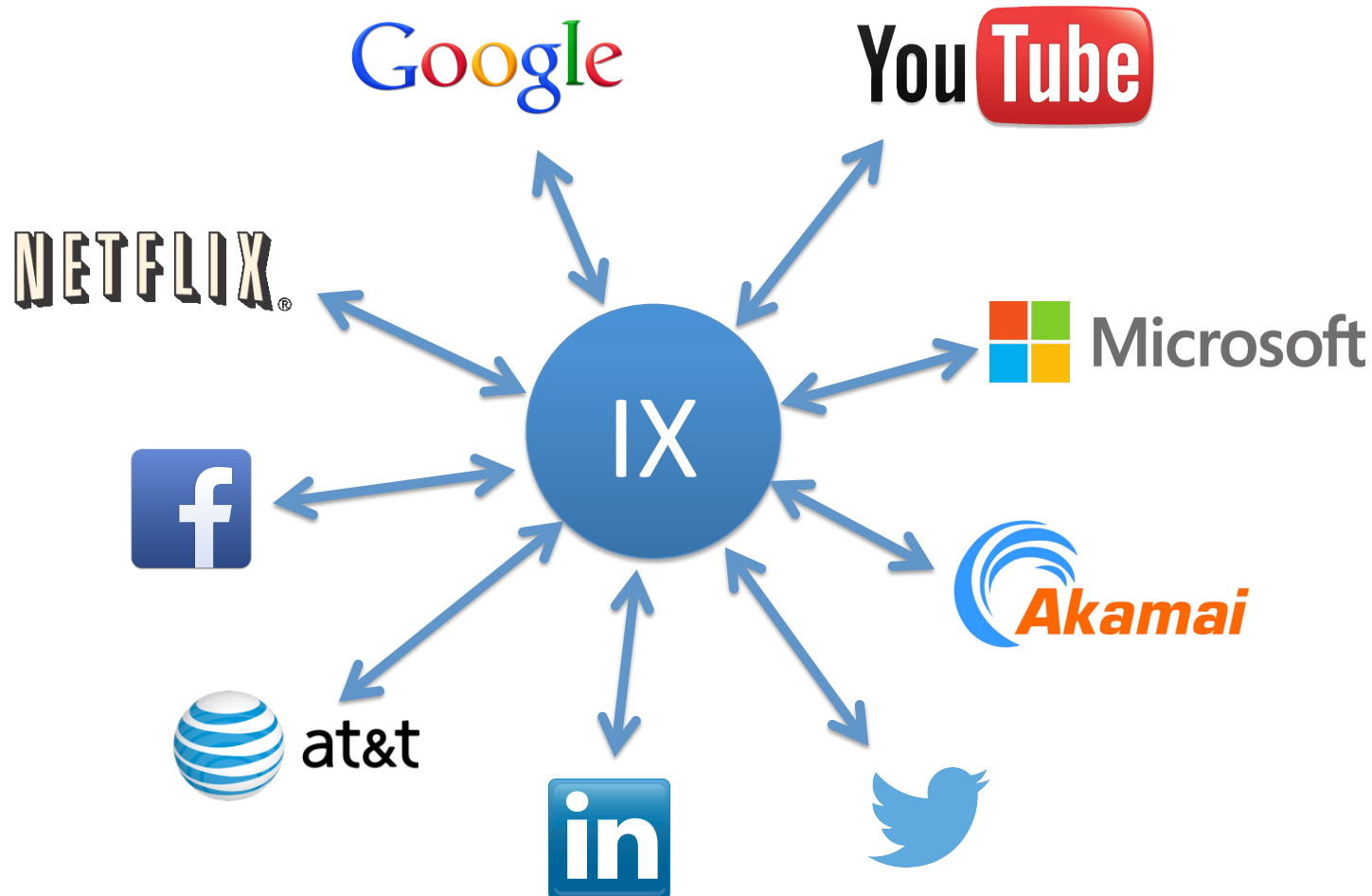
Internet Exchange

An Internet exchange point (IX or IXP) is a physical infrastructure through which Internet service providers (ISPs) exchange Internet traffic between their networks (autonomous systems).

http://en.wikipedia.org/wiki/Internet_exchange_point

Internet Exchange

Carriers, ISPs and Content Provider meet together

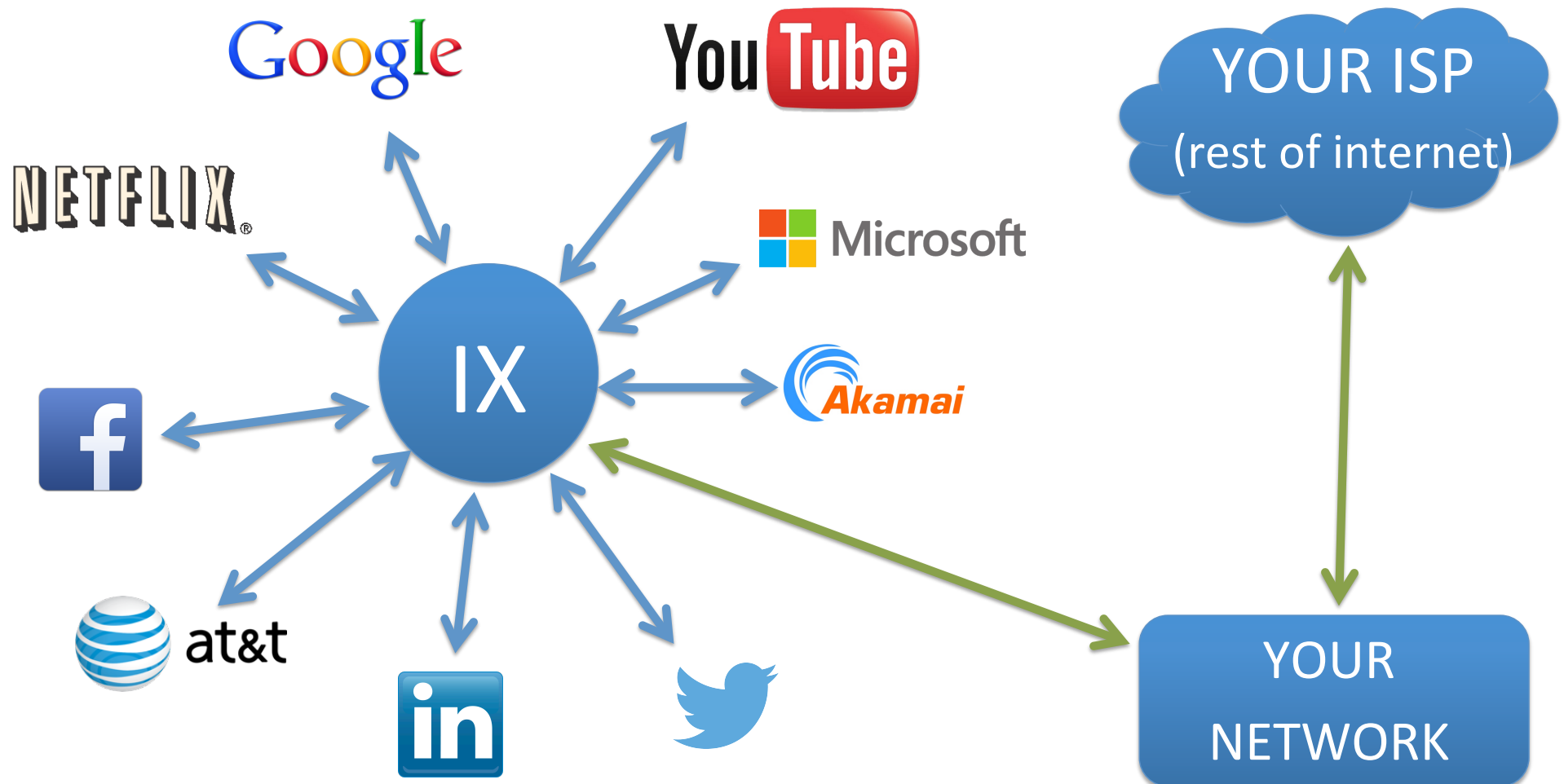


Internet Exchange (Cont.)

IXPs reduce the portion of an ISP's traffic which must be delivered via their upstream transit providers, thereby reducing the average per-bit delivery cost of their service. Furthermore, the increased number of paths learned through the IXP improves routing efficiency and fault-tolerance.

Internet Exchange (Cont.)

You can connect to an Internet Exchange



What I need?

- ✓ A transport up to an IXP, usually a “pseudo-wire” (MPLS L2VPN)
- ✓ An IXP membership
- ✓ To be AS (Autonomous System)
- ✓ A router with BGP capabilities
- ✓ BGP knowledge

BGP

- Border Gateway Protocol, the protocol that route the Internet today.
- Designed for Inter-AS routing protocol
- Supported by RouterOS.
- For the BGP my ISP's use RouterOS since version 3.XX. I can say it's working!

BGP (cont.)

- For every “peer” (i.e.: Google, FB,) you need to setup a separate “BGP peer”

Public & Private Peering

Each entity that participates in a IXP define if:

- Participate in the "public peering" (Route Server) [many-to-many]
- Only do private “peering” [one-to-one]

Public & Private Peering

Check the IXs member list:

↕ Organisation	↕ URL	↕ AS	↕ Policy	↕ Routerserver	↕ Location	↕ Vlan
GoDaddy.com, Inc	▼ http://www.godaddy.com/	26496	open	Yes	Telecity 5	ISP
Golden Telecom Limited	▼ http://www.goldentelecom.com/	3216	case-by-case	No	Equinix AM1/2	ISP
Google Ireland Limited	▼ http://www.google.com	15169	case-by-case	Yes	TeleCity 2, Vancis	ISP
GooMobile srl	▼ http://www.goomobile.it	198291	open	Yes	Lepida Spa	ISP
Gopas Solutions GmbH (new)	▼ http://www.gopas.de/	13157	open	Yes	Peering GmbH / ECIX	ISP
Goscomb Technologies Ltd	▼ http://www.goscomb.net/	39326	open	No	NIKHEF	ISP
Green.ch AG	▼ http://www.green.ch	1836	open	No	Vancis	ISP
Greenhost	▼ https://greenhost.nl/	47172	open	Yes	NL-IX	ISP
Grifonline S.r.l.	▼ http://www.linkwave.it	43942	open	Yes	Vancis	ISP
GTT Communications, Inc.	▼ http://www.gtt.net/	3257	case-by-case	No	TeleCity 2	ISP

Public Peering

If you participate at the “Route Server” with policy “open” you’ll need just one peer and you’ll be automatically peering with the others in the “Route Server” with policy “open” .

Private Peering

You can write to a member for request to peer, or you can receive a request by the others.

In most cases the peering is free, but this isn't a rule!

Public & Private Peering

In the real life probably you'll have a public peering and some private peerings, they don't exclude each other.

Traceroute

If you're just buying internet from an ISP, your customers should obtain something like this:

```
Lorenzos-MacBook-Pro:~ Lorenzo$ traceroute www.facebook.com
```

```
traceroute to star.cl0r.facebook.com (31.13.73.193), 64 hops max, 52 byte packets
```

```
1  192.168.176.1 (192.168.176.1)  0.969 ms  0.685 ms  0.775 ms

2  192.168.25.1 (192.168.25.1)  1.500 ms

   177.184.136.65 (177.184.136.65)  2.140 ms  2.137 ms

3  177.184.137.89 (177.184.137.89)  3.972 ms *  2.482 ms

4  * gvt-be-5-90.rd03.flg.gvt.net.br (179.184.83.81)  17.038 ms *

5  gvt-te-0-0-0-4.rc01.flg.gvt.net.br (179.185.131.57)  14.076 ms

   gvt-te-0-7-0-3.rc01.flg.gvt.net.br (189.59.251.157)  9.542 ms

   gvt-te-0-2-0-4.rc01.flg.gvt.net.br (179.185.131.61)  6.370 ms

6  186.211.241.1 (186.211.241.1)  88.708 ms  103.148 ms  114.605 ms

7  nota.br01.mia1.tfbnw.net (198.32.124.200)  89.564 ms  87.921 ms  103.844 ms

8  * * *

9  * * *

10 edge-star-shv-13-mia1.facebook.com (31.13.73.193)  91.461 ms  88.426 ms  90.890 ms
```

Traceroute

.. And like this:

(Google.com.br
15 hops)

```
traceroute to www.google.com.br (74.125.225.24), 64 hops max, 52 byte packets
 1  192.168.176.1 (192.168.176.1)  15.849 ms  1.824 ms  0.937 ms
 2  177.184.136.65 (177.184.136.65)  2.634 ms  5.032 ms  1.962 ms
 3  177.184.137.89 (177.184.137.89)  2.959 ms * *
 4  core001.plaz.wirelink.com.br.45.60.187.in-addr.arpa (187.60.45.1)  5.646 ms * 3.658 ms
 5  xe-0-3-1.csrl.fcsl.for.gblx.net (159.63.52.129)  18.874 ms  2.142 ms  2.037 ms
 6  po3-40g.asr1.grul.gblx.net (67.16.139.166)  419.514 ms
    po5-30g.asr1.grul.gblx.net (67.16.130.58)  326.170 ms
    gvt-te-0-6-0-11.rc01.spo.gvt.net.br (179.184.72.253)  48.695 ms
 7  google-1.ar5.grul.gblx.net (64.208.110.102)  51.403 ms  43.347 ms
    gvt-te-0-4-0-2.rt01.spo.gvt.net.br (187.115.215.58)  48.099 ms
 8  72.14.198.181 (72.14.198.181)  47.343 ms
    216.239.51.228 (216.239.51.228)  43.387 ms
    72.14.198.181 (72.14.198.181)  49.158 ms
 9  209.85.245.53 (209.85.245.53)  58.193 ms  76.383 ms  52.908 ms
10  209.85.245.54 (209.85.245.54)  164.945 ms  161.104 ms  167.806 ms
11  209.85.245.54 (209.85.245.54)  155.576 ms
    64.233.175.206 (64.233.175.206)  178.308 ms
    209.85.252.96 (209.85.252.96)  174.168 ms
12  72.14.239.91 (72.14.239.91)  195.022 ms
    72.14.233.196 (72.14.233.196)  196.196 ms *
13  72.14.232.163 (72.14.232.163)  197.179 ms
    209.85.254.239 (209.85.254.239)  197.063 ms
    72.14.232.163 (72.14.232.163)  195.611 ms
14  72.14.237.109 (72.14.237.109)  197.291 ms  196.044 ms
    72.14.232.163 (72.14.232.163)  194.559 ms
15  72.14.237.109 (72.14.237.109)  189.895 ms
    ord08s12-in-f24.1e100.net (74.125.225.24)  196.617 ms  251.374 ms
```

Traceroute

With direct peering your customer should obtain something like this:

```
traceroute to www.netflix.com
```

- 1 The ip address of your customer router
- 2 The ip address of your PPPoE server or something else
- 3 The ip address of your BGP router
- 4 The ip address of the destination BGP router
- 5 The ip address of the destination server.

Traceroute

Your customers will start to think you're a real ISP, connected directly to the Big internet players and you're not just "reselling" other ISPs.

The Internet Exchange

IXP in the world

Many Internet Exchange in the continents. The largest ones in the world are DE-CIX in Frankfurt, AMS-IX in Amsterdam, LINX in London, the Moscow Internet Exchange, Equinix Ashburn in Washington D.C., and JPNAP in Tokyo, and so on.

http://en.wikipedia.org/wiki/List_of_Internet_exchange_points

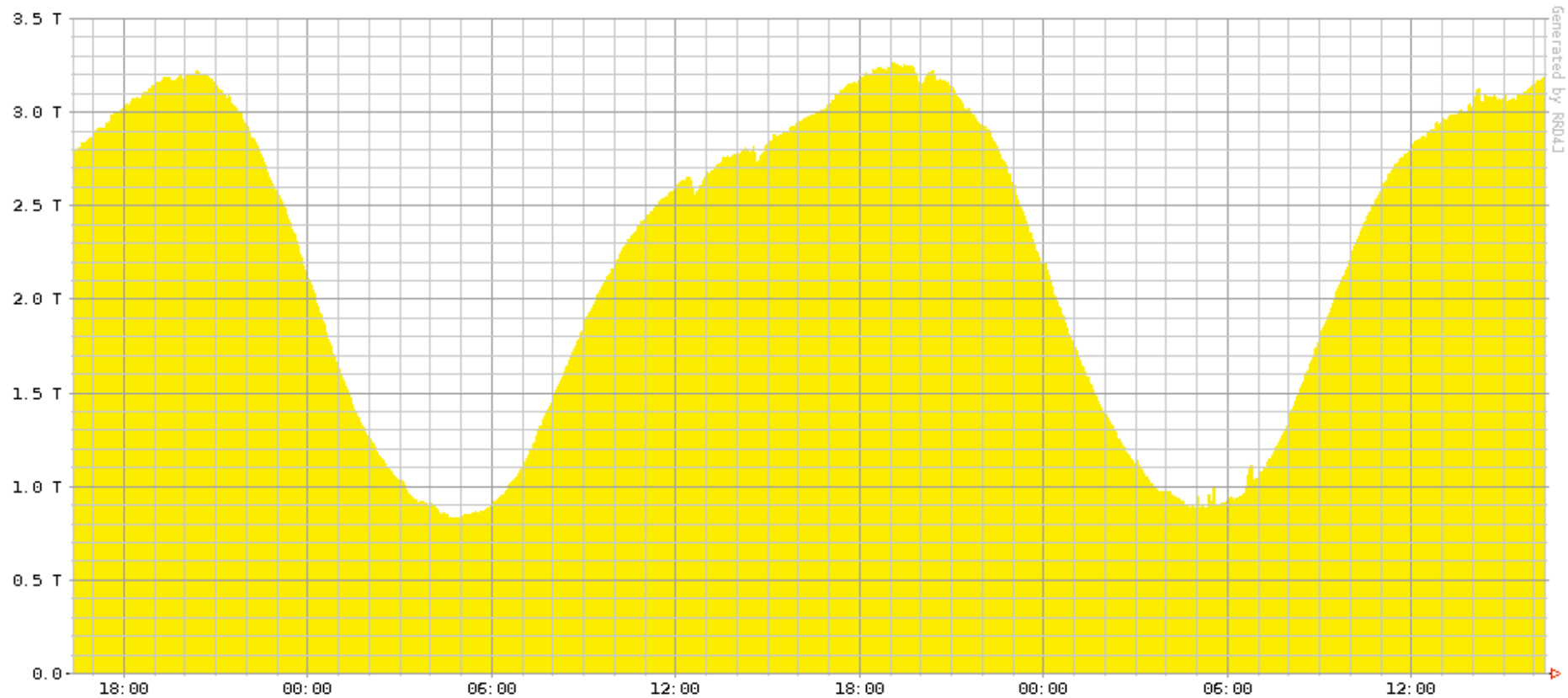
http://en.wikipedia.org/wiki/List_of_Internet_exchange_points_by_size



DE-CIX, Frankfurt

1st in the world, for traffic exchange.

The last 2 days traffic average:

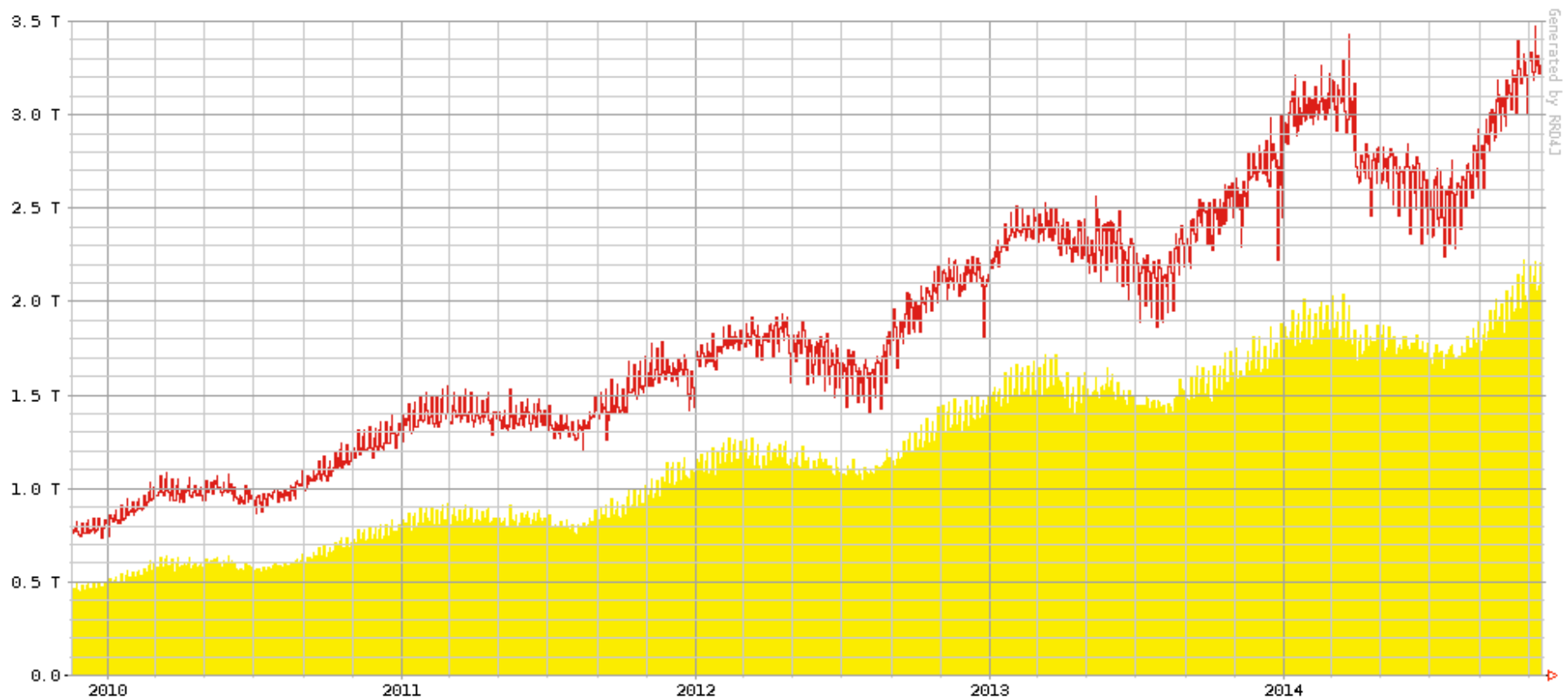




DE-CIX, Frankfurt

1st in the world, for traffic exchange.

The last 5 years traffic average:

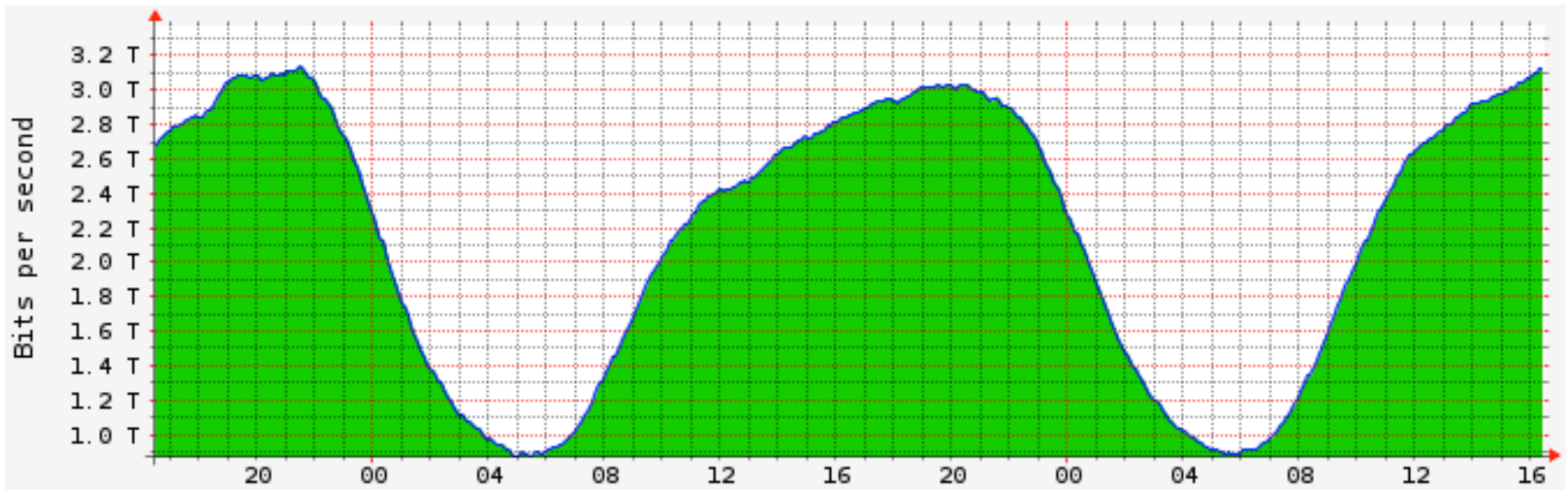




AMS-IX, Amsterdam

2nd in the world, for traffic exchange.

The last 2 days traffic average:

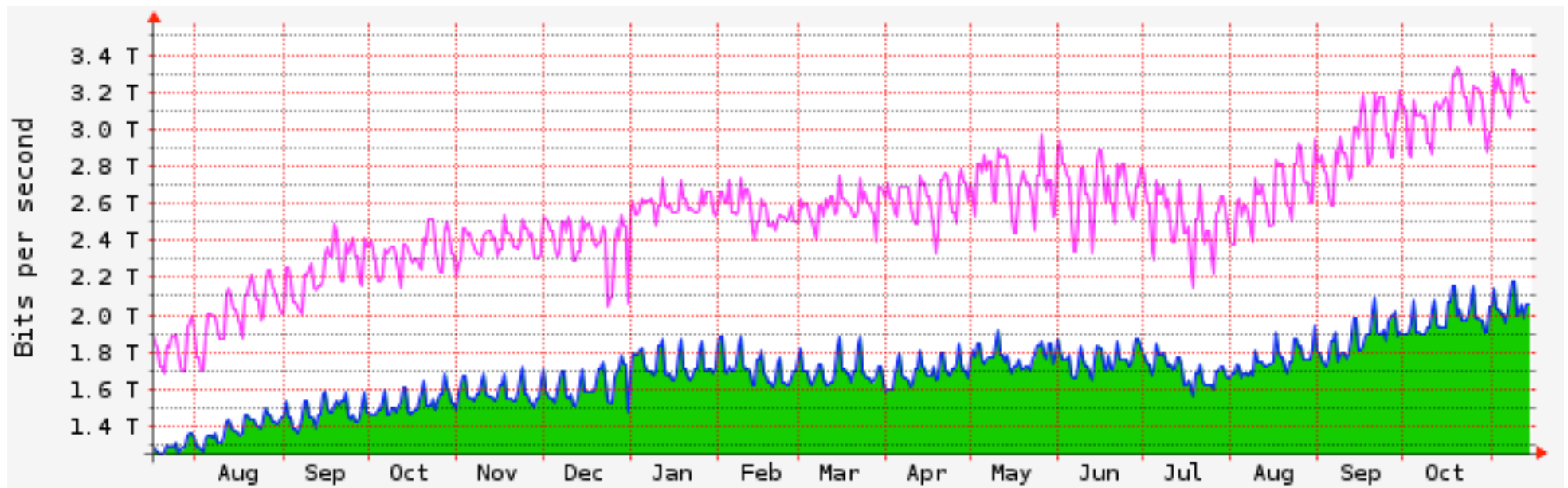




AMS-IX, Amsterdam

2nd in the world, for traffic exchange.

The last year traffic average:





AMS-IX, Amsterdam

Some numbers:

ASNs

685

Ports

1324

Peak (Tb/s)

3.339

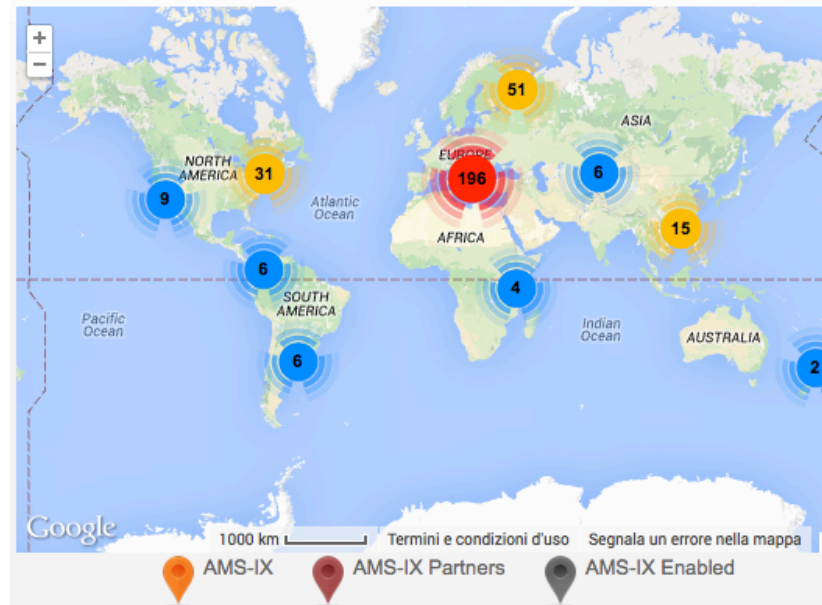
Cur (Tb/s)

3.142

Capacity (Tb/s)

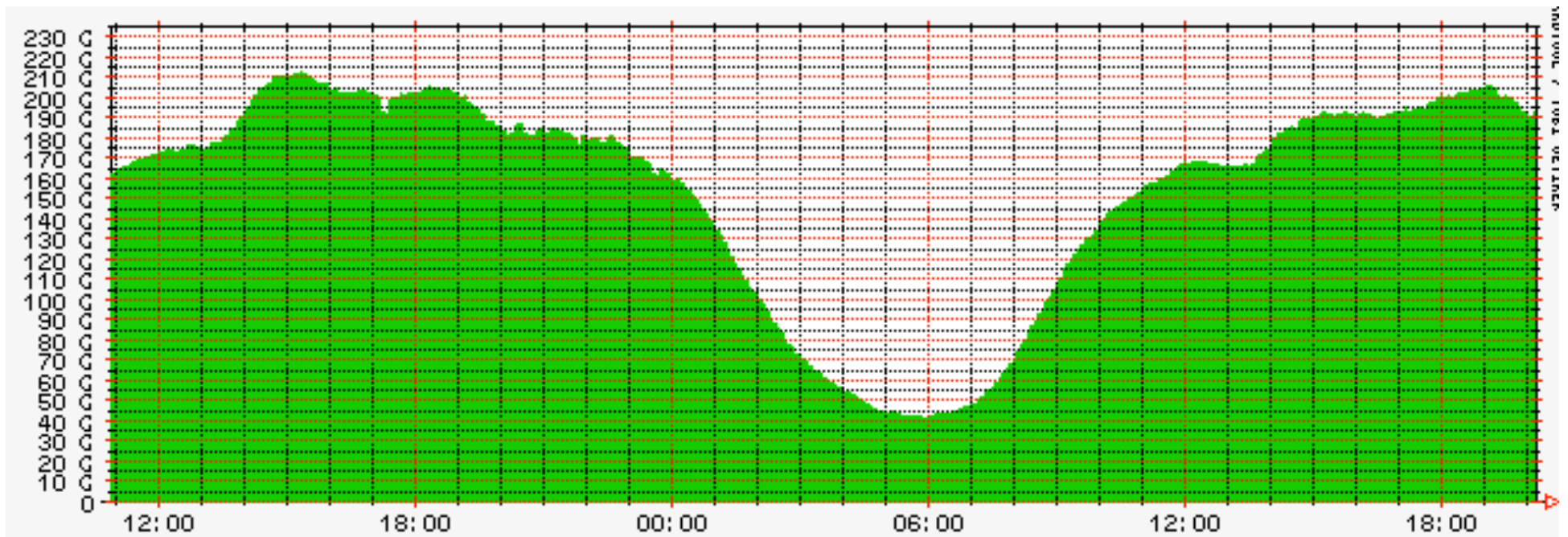
12.907

Peering around the globe



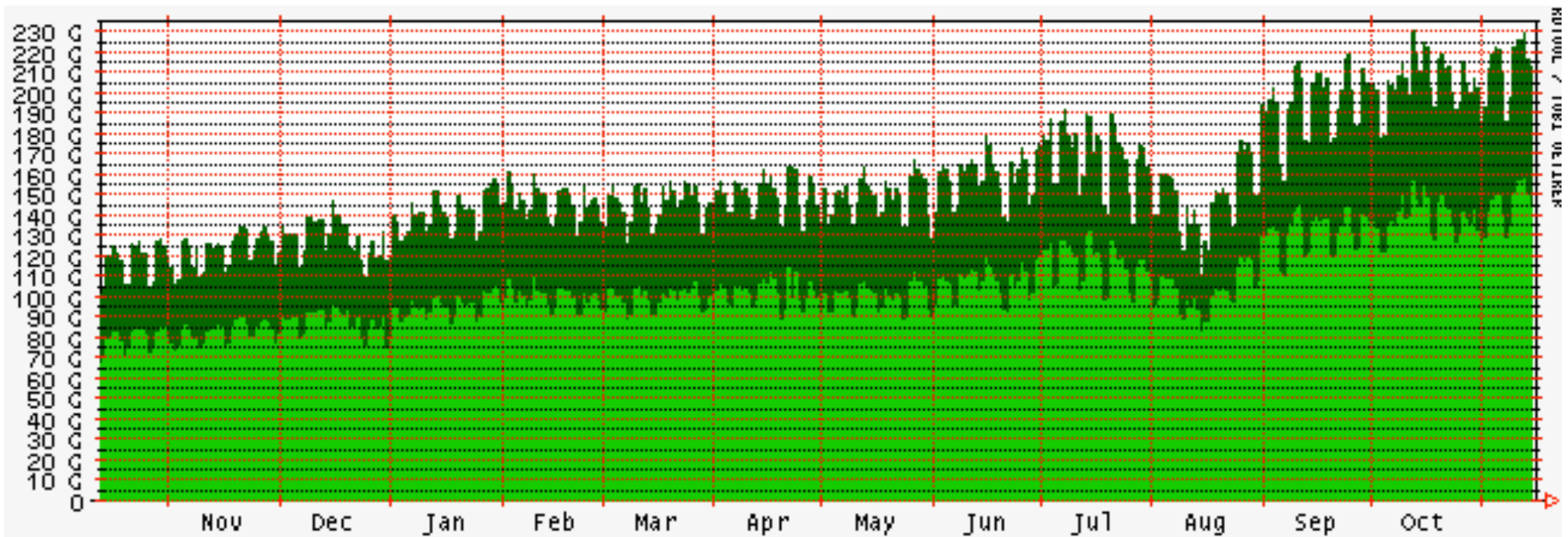
MIX-IT, Milan

The biggest in Italy, yesterday:



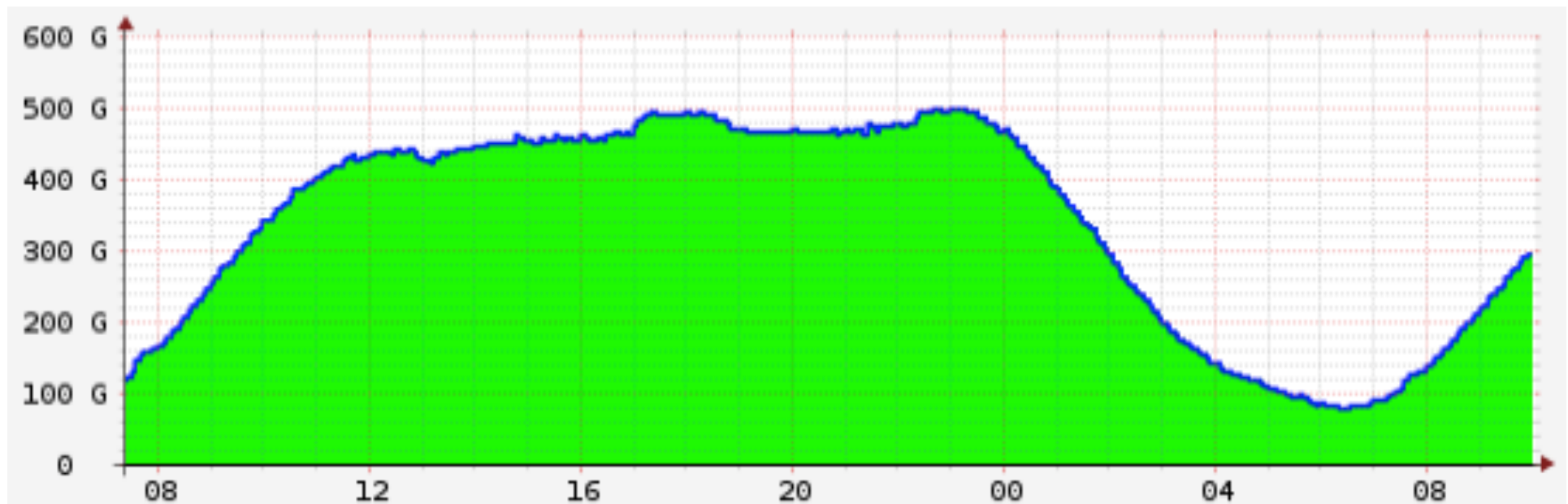
MIX-IT, Milan

The biggest in Italy, one year average:



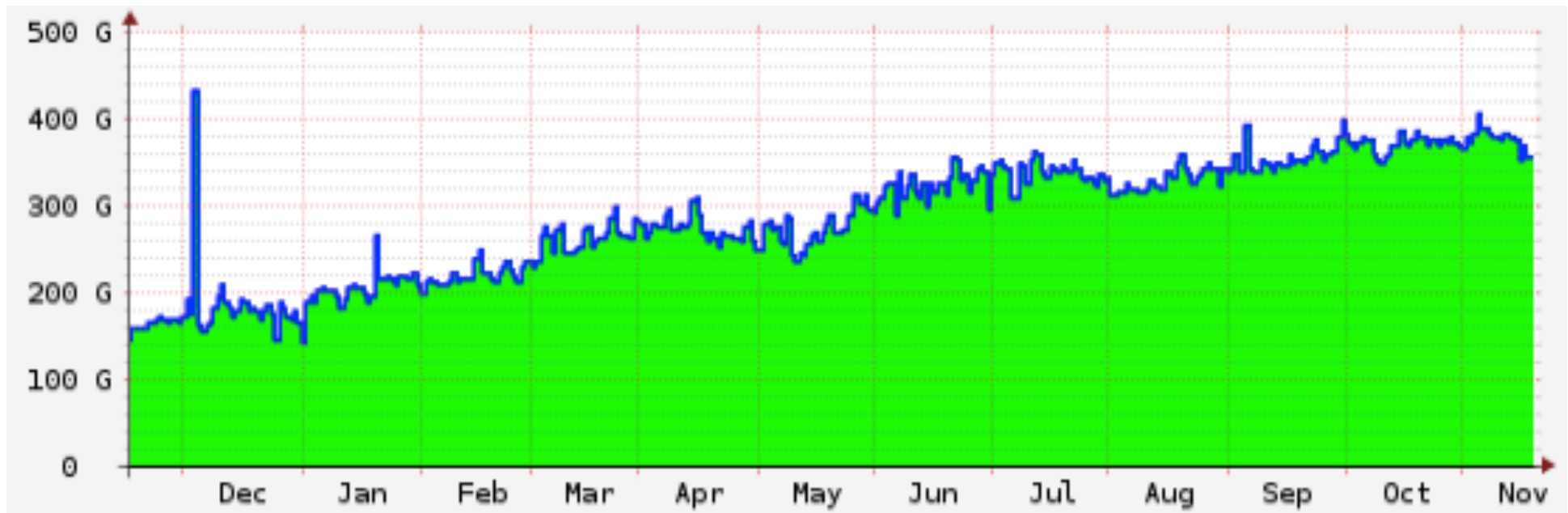
PTTmetro, Brasil

Yesterday traffic average:



PTTmetro, Brasil

The last year traffic average:



Why you should know that?

Things you should know:

- ✓ Internet isn't only your main ISP
- ✓ You can be part of the internet, not just a customer.
- ✓ You can use RouterOS for these tasks!

That's why I'm telling you my experiences.

RouterOS at the IXPs

What is RouterOS?

Some years ago I had a training at RIPE in Amsterdam and there I meet an AMS-IX technician, taking this training with me. He discovered I'm a MikroTik Trainer and asked me some informations. He know that RouterOS existed but he never used one. I showed him some RouterOS functionalities.

What is RouterOS?

I said him that I'll use RouterOS for peering at the AMS-IX. He replied me I'll be the first one.

In every IXP are used only Cisco, Juniper and Huawei. In the IXPs websites exist setup guides only for Cisco and Juniper.

What is RouterOS?

Some months later I started to peer at AMS-IX using RouterOS. In few days I had dozens of running peers!

This technician was very impressed by RouterOS, I never called for an help (and they're used to provide it).

Epilogue

Years later this technician meet my colleague and friend Tom, an Irish Trainer. Tom started to talk about RouterOS. The technician stopped him and said: I know a very good technician that is using RouterOS at AMS-IX with success, if you need help I can recommend him.

Epilogue

The world is really small and RouterOS is now famous in the bigger Internet Exchange of the world! :-)

Name	Instance	Remote Address	Remote AS	TTL	Remote ID	Prefix Co...	State
MIX RouteServer1 IPv4			61968 rr 1			1983	established
MIX RouteServer1 IPv6			61968 rr 1			125	established
MIX RouteServer2 IPv4			61968 rr 1			4588	established
MIX RouteServer2 IPv6			61968 rr 1			345	established
MIX ServerTest IPv4			16004 rr 1				established
MIX ServerTest IPv6			16004 rr 1			1	established
retelit			28716 rr 1			508499	established
retelit IPv6			28716 rr 1			19791	established
zzz AMS-IX: Akamai 1 IPv4 [NEW]			20940 rr 1			17	established
zzz AMS-IX: Akamai 1 IPv6			20940 rr 1			2	established
zzz AMS-IX: Akamai 2 IPv4 [NEW]			20940 rr 1			23	established
zzz AMS-IX: Akamai 2 IPv6			20940 rr 1			2	established
zzz AMS-IX: BIT IPv4 [NEW]			12859 rr 1			65	established
zzz AMS-IX: BIT IPv6			12859 rr 1			29	established
zzz AMS-IX: Cablesystems IPv4 [NEW]			6327 rr 1			1664	established
zzz AMS-IX: Cablesystems IPv6			6327 rr 1				idle
zzz AMS-IX: Computerline IPv4 [NEW]			41913 rr 1			17	established
zzz AMS-IX: Computerline IPv6			41913 rr 1			4	established
zzz AMS-IX: Facebook 1 IPv4 [NEW]			32934 rr 1			22	established
zzz AMS-IX: Facebook 1 IPv6			32934 rr 1			8	established
zzz AMS-IX: Facebook 2 IPv4 [NEW]			32934 rr 1			22	established
zzz AMS-IX: Facebook 2 IPv6			32934 rr 1			8	established
zzz AMS-IX: GoDaddy IPv4 [NEW]			26496 rr 1			595	established
zzz AMS-IX: GoDaddy IPv6			26496 rr 1			8	established
zzz AMS-IX: HE IPv4 [NEW]			6939 rr 1			59759	established
zzz AMS-IX: HE IPv6			6939 rr 1			10380	established
zzz AMS-IX: LinkedIn IPv4 [NEW]			14413 rr 1			4	established
zzz AMS-IX: LinkedIn IPv6			14413 rr 1			1	established
X zzz AMS-IX: MANDA IPv4			8365 rr 1				idle
zzz AMS-IX: MANDA IPv6			8365 rr 1			13	established
zzz AMS-IX: Microsoft 1 IPv4 [NEW]			8075 rr 1			165	established
zzz AMS-IX: Microsoft 1 IPv6			8075 rr 1			16	established
zzz AMS-IX: Microsoft 2 IPv4 [NEW]			8075 rr 1			165	established
zzz AMS-IX: Microsoft 2 IPv6			8075 rr 1			16	established
zzz AMS-IX: NLhosting IPv4 [NEW]			24793 rr 1			1	established
zzz AMS-IX: Netflix IPv4 [NEW]			2906 rr 1			2	established
zzz AMS-IX: Netflix IPv4 [NEW]			2906 rr 1			2	established
zzz AMS-IX: Netflix IPv6			2906 rr 1			2	established
zzz AMS-IX: Netflix IPv6			2906 rr 1			2	established
zzz AMS-IX: Open Carrier IPv4 [NEW]			41692 rr 1			63	established
zzz AMS-IX: Open Carrier IPv6			41692 rr 1			20	established
zzz AMS-IX: Packet Clearing House 1 IPv4 ...			42 rr 1			48	established
zzz AMS-IX: Packet Clearing House 1 IPv6			42 rr 1			42	established
zzz AMS-IX: Packet Clearing House 2 IPv4 ...			3856 rr 1			1	established

55 items (1 selected)

RouterOS

My RouterOS BGP router:

```
[admin@BGP] > ip route print count-only  
1088614
```

Resources

Resources

For fast BGP knowledge these two MikroTik trainings will help you into this world:

MTCRE: MikroTik Certified Routing Engineer

MTCINE: MikroTik Certified
InterNetworking Engineer

Resources

For self-study and for see lots of examples and some very interesting case studies use this beautiful presentation made by my colleague Wardner Maia:

<http://mum.mikrotik.com/presentations/HR13/maia.pdf>

Resources

MTCRE & MTCINE Training after the MUM,
By Lorenzo Busatti & Guilherme Ramires



Roteamento Avançado - MTCRE/MTCINE - PÓS MUM

Fortaleza/CE

Dias: 19 e 20/11 - MTCRE

Dias: 21, 22 e 23/11 - MTCINE

Hotel Blue Tree Fortaleza

<http://www.alivesolutions.com.br>

Tips & Tricks

Security

When planning a peer you should consider the use of the MD5 password.

The MAC Address on the interfaces you're using verso the IXP should not change: their router doesn't tolerate this action and will close all the connections.

Filtering

Use the filters for:

- Avoid to announce private addresses;
- Avoid to receive private addresses;
- Avoid to receive your own addresses;
- Avoid to be used as a “transit”
- Manipulate upload and download preferences

Neighbor Discovery Protocol

Disable the MikroTik Neighbor Discovery protocol (MNDP) on the interfaces you're using verso the IXP: their router doesn't tolerate such broadcast traffic, they will treat you like a threat.

PeeringDB

PeeringDB is "a freely available web-based database of networks that are interested in peering", which has become the default location for Internet peering data.

www.peeringdb.com

PeeringDB

With PeeringDB you can know where an AS is connected, at which speed, addresses, notes, policies, contacts (for peering purpose only!!), etc.

Company Information			
Company Name	Yahoo!		
Also Known As	Favorite whipping post of the tech media		
Company Website	http://www.yahoo.com/		
Primary ASN	10310		
IRR Record	AS-YAHOO		
Network Type	Content		
Approx Prefixes	500		
Traffic Levels	200-300 Gbps		
Traffic Ratios	Heavy Outbound		
Geographic Scope	Global		
Looking Glass URL			
Route Server URL			
Notes	We require sessions to be built to both IPs for all dual-attached public exchange points. Peers that only establish adjacencies with only one router may be eliminated for non-compliance.		
Protocols Supported	Unicast IPv4 <input checked="" type="checkbox"/> Multicast <input type="checkbox"/> IPv6 <input checked="" type="checkbox"/>		
Date Last Updated	2014-10-27 15:22:26 UTC		
Peering Policy Information			
Peering Policy URL			
General Policy	Selective		
Multiple Locations	Not Required		
Ratio Requirement	No		
Contract Requirement	Not Required		
Contact Information			
Role	Contact Name	Telephone	E-Mail
Technical	Igor Gashinsky	917-807-2213	igor@yahoo-inc.com
Technical	Matthew Petach	408-349-7231	mpetach@yahoo-inc.com
Policy	Peering Committee		peering@yahoo-inc.com
Technical	NOC	866-GET-YNOC	ynoc@yahoo-inc.com
NOC	NOC	408-349-5555	ynoc@yahoo-inc.com

Public Peering Exchange Points						
Exchange Point Name	ASN	IP Address	Mbit/sec			
AMS-IX	10310	2001:7f8:1::A501:310:1/64	20000			
AMS-IX	10310	80.249.209.110	20000			
AMS-IX	10310	80.249.209.163	20000			
AMS-IX	10310	2001:7f8:1::A501:310:2/64	20000			
BNIIX	10310	206.130.61.11	1000			
BNIIX	10310	2001:504:20:81::11/64	1000			
CoreSite - Any2 California	10310	2001:504:13:0:0:0:195/64	10000			
CoreSite - Any2 California	10310	206.72.210.195/23	10000			
CoreSite - Any2 Denver	10310	2605:6c00:303:303::25/64	10000			
CoreSite - Any2 Denver	10310	206.51.46.25	10000			
DE-CIX Frankfurt	10310	80.81.193.115	10000			
DE-CIX Frankfurt	10310	2001:7f8::2846:0:1/64	10000			
1 2 3 4 5 of 8 Next > Last >>						
Private Peering Facilities						
Facility Name	ASN	City	Country	SONET	Ethr	ATM
CoreSite - DE1	10310	Denver	US	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Equinix Ashburn (DC1-DC11)	10310	Ashburn	US	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Equinix Chicago (CH1/CH2)	10310	Chicago	US	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Equinix Dallas (DA1)	10310	Dallas	US	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Equinix Los Angeles (LA1)	10310	Los Angeles	US	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Equinix New York (111 8th)	10310	New York	US	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Equinix Palo Alto (SV8)	10310	Palo Alto	US	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Equinix San Jose (SV1/5)	10310	San Jose	US	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Equinix Seattle (SE2/3)	10310	Seattle	US	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Equinix Sydney	17457	Mascot (Sydney) NSW	AU	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Equinix Tokyo (TY1)	10310	Tokyo	JP	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Equinix Vienna, VA (DC7)	10310	Vienna	US	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1 2 of 2 Next > Last >>						

BGP Community

The BGP Community will let you manage “things” of your peering partner without calling him. You can manage these “things” yourself.

And they’re very useful in the real life.

BGP Community

You can know the available BGP Community settings from your peer, or querying public DB like RIPE or anothers.

For example let's have a look at Cogent, AS174 . Just for illustration purpose!

AS174 Community

BGP Community String	Local Pref	Effect
174:10	10	Set customer route local preference to 10 (below everything-least preferred)
174:70	70	Set customer route local preference to 70 (below peers)
174:120	120	Set customer route local preference to 120 (below customer default)
174:125	125	Set customer route local preference to 125 (below customer default)
174:135	135	Set customer route local preference to 135 (above customer default)
174:140	140	Set customer route local preference to 140 (above customer default)

AS174 Community

BGP Community String	Effect
174:970	Do <u>not send</u> route to NA (<u>North America</u>) - not accepted in NA
174:971	Do not send route to NA peers.
174:975	Set local preference to 10 in NA.
174:980	Do not send route to EU (Europe) - not accepted in EU
174:981	Do not send route to EU peers.
174:985	Set local preference to 10 in EU.
174:990	Do not send route to BGP customers, or peers.
174:991	Do not send route to peers.

AS174 Community

BGP Community String	Effect
174:3000	Do not <u>announce</u> .
174:3001	Prepend 174 1 time.
174:3002	Prepend 174 2 times.
174:3003	Prepend 174 3 times

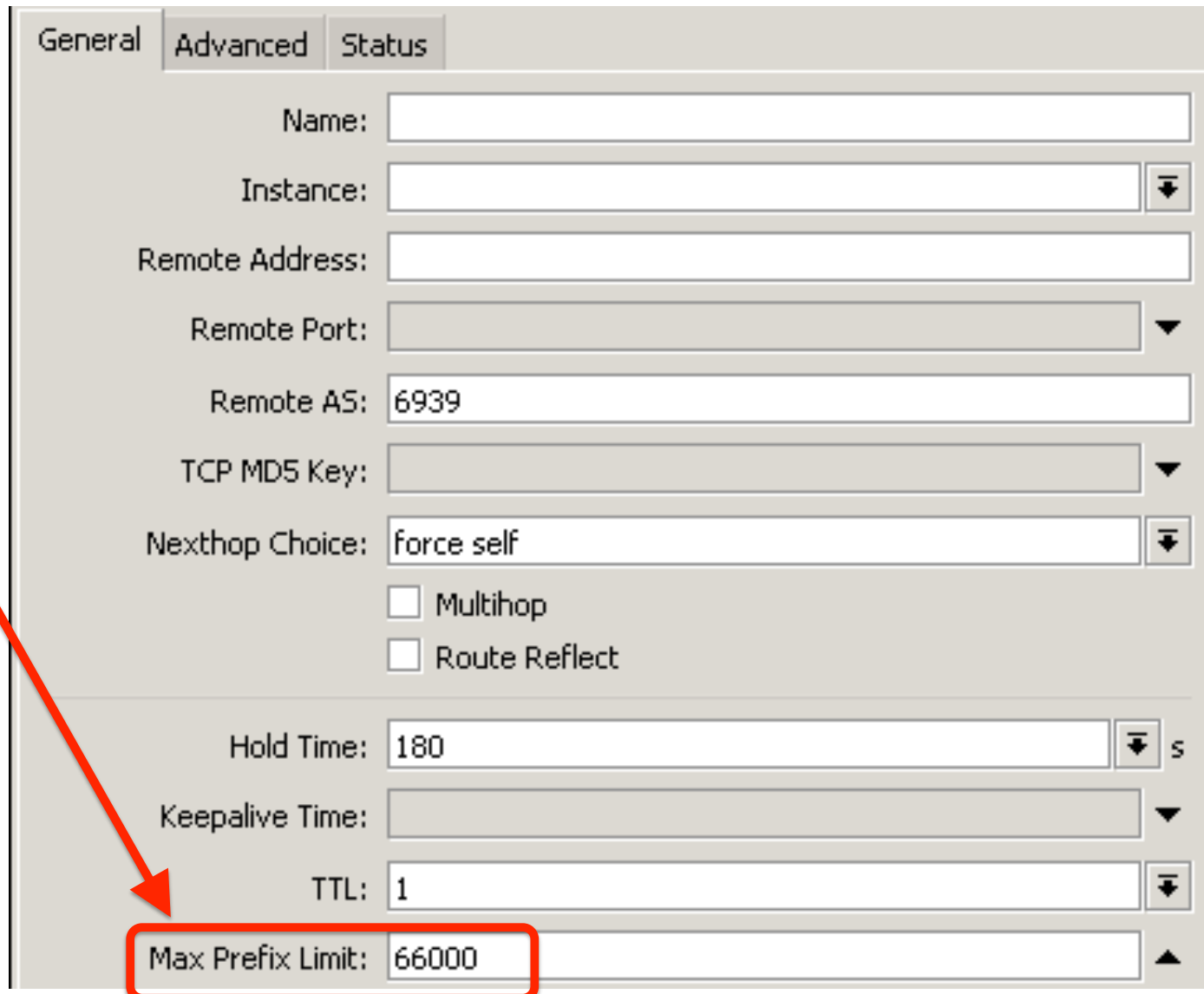
BGP Community String	Description
174:21000	Route is learned from NA (North America) non-customer.
174:21001	Route is NA internal or customer route.
174:21100	Route is learned from EU (Europe) non-customer.
174:21101	Route is a EU internal or customer route.

Prefix limit

For every peer should be a very good idea to set up a prefix limit. It should be limit the damage from receiving too many routes, i.e. in case of some “leaks”.


When according for a peer this information should be exchanged!

Prefix limit




General Advanced Status


Name:


Instance: 

Remote Address:

Remote Port: 


Remote AS:


TCP MD5 Key: 


Nexthop Choice: 


☐ Multihop

☐ Route Reflect

Hold Time:  s

Keepalive Time: 

TTL: 

Max Prefix Limit: 

Peer Status

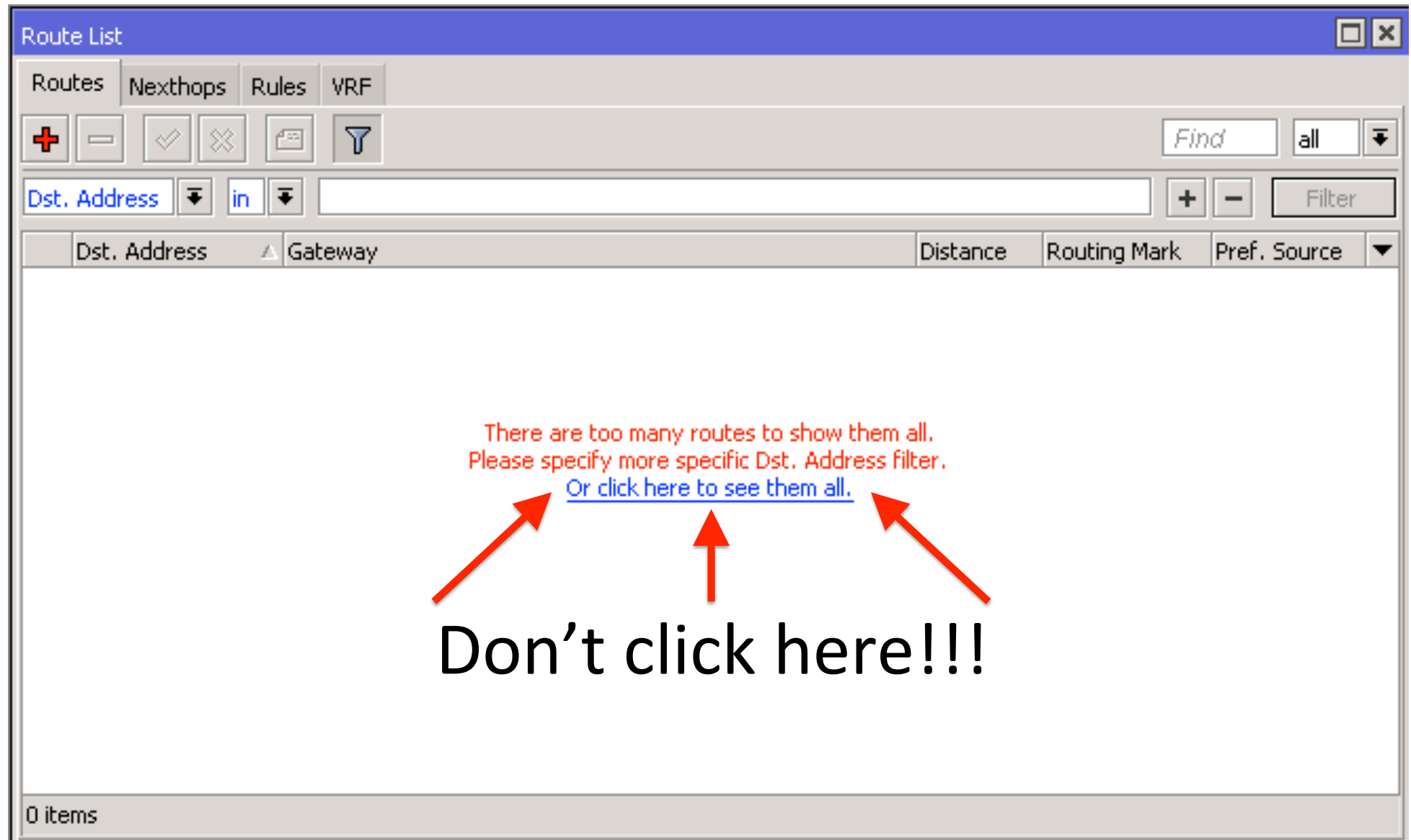
Check the uptime, the prefix count (maybe you'll update the "prefix limit"), and the updates that happened.

General	Advanced	Status
Remote ID:		
Local Address:		
Uptime:		7d 05:52:51
Prefix Count:		59761
Updates Sent:		3
Updates Received:		185 650
Withdrawn Sent:		
Withdrawn Received:		90 983
Remote Hold Time:		180 s
Used Hold Time:		180 s
Used Keepalive Time:		60 s
		<input checked="" type="checkbox"/> Refresh Capability
		<input checked="" type="checkbox"/> AS4 Capability

Winbox

Do you want to check your routing table using Winbox on your BGP router?

Winbox



Winbox

You're surely don't want your router will upload to your winbox client all the "thousand of thousands" routes.

The CLI (Command Line Interface) will do the task better!

Winbox

```
ip route print count-only
```

```
routing bgp advertisements print <peer_name>
```

```
ip route print detail where <ip_addresses> in  
dst-address and bgp
```

```
ip route print where received-  
from=<peer_name>
```

[admin@BGP] > ip route print detail where 90.189.192.1 in dst-address and bgp

Flags: X - disabled, A - active, D - dynamic,

C - connect, S - static, r - rip, b - bgp, o - ospf, m - mme,

B - blackhole, U - unreachable, P - prohibit

- 0 ADb dst-address=90.189.128.0/17 gateway=xxx.yyy.zzz.kkk
gateway-status=xxx.yyy.zzz.kkk reachable via ether5 distance=20
scope=40 target-scope=10 bgp-as-path="8928,12389,41440" bgp-med=10
bgp-communities=8928:10403,8928:10901,8928:10902,
8928:11003,8928:65103,8928:65152,8928:65193,8928:65194,
41440:1501
received-from=Peer1

- 1 Db dst-address=90.189.128.0/17 gateway=xxx.yyy.zzz.kkk
gateway-status=xxx.yyy.zzz.kkk reachable via ether1 distance=20
scope=40 target-scope=10 bgp-as-path="28716,1299,12389,41440"
received-from=Peer2

- 2 ADb dst-address=90.189.192.0/23 gateway=xxx.yyy.zzz.kkk
gateway-status=xxx.yyy.zzz.kkk reachable via ether5 distance=20
scope=40 target-scope=10 bgp-as-path="8928,12389" bgp-med=10
bgp-communities=8928:10403,8928:10901,8928:10902,
8928:11003,8928:65103,8928:65152,8928:65193,8928:65194
received-from=Peer1

- 3 Db dst-address=90.189.192.0/23 gateway=xxx.yyy.zzz.kkk
gateway-status=xxx.yyy.zzz.kkk reachable via ether3 distance=20
scope=40 target-scope=10 bgp-as-path="6939,12389" bgp-med=1
received-from=Peer3

- 4 Db dst-address=90.189.192.0/23 gateway=xxx.yyy.zzz.kkk
gateway-status=xxx.yyy.zzz.kkk reachable via ether1 distance=20
scope=40 target-scope=10 bgp-as-path="28716,6939,12389"
received-from=Peer2

Wrap up

- ✓ Expand your network and **become part of Internet.**
- ✓ **Use RouterOS for BGP**, it's working very well.
- ✓ Improve your **BGP knowledge.**
- ✓ And quoting my friend Tom Smith:
“Buy bigger routers, bitches!”



Thank you!

Q & A

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