



From IPv6 Day
to IPv6 every day

Presented by
Yves Poppe
Director Bus. Dev. & Strategy
IP Services

MENOG plenary
Muscate, Oman, October 3-4th 2011

IPv6 is more than a new address format; it is a fundamental game changer

Solves address shortage

Better QoS (flow lables)

Restores p2p communication

Auto configuration

Mobility

- **Much easier roaming**
- **Better spectrum utilization**
- **Better battery life!**

- **Mobile networks**
- **Mobile Ad-Hoc networks (MANET)**
- **Networks in Motion (NEMO)**
- **Sensor networks**
- **Plug and Play networks**

Security

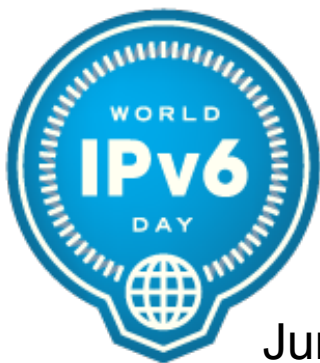
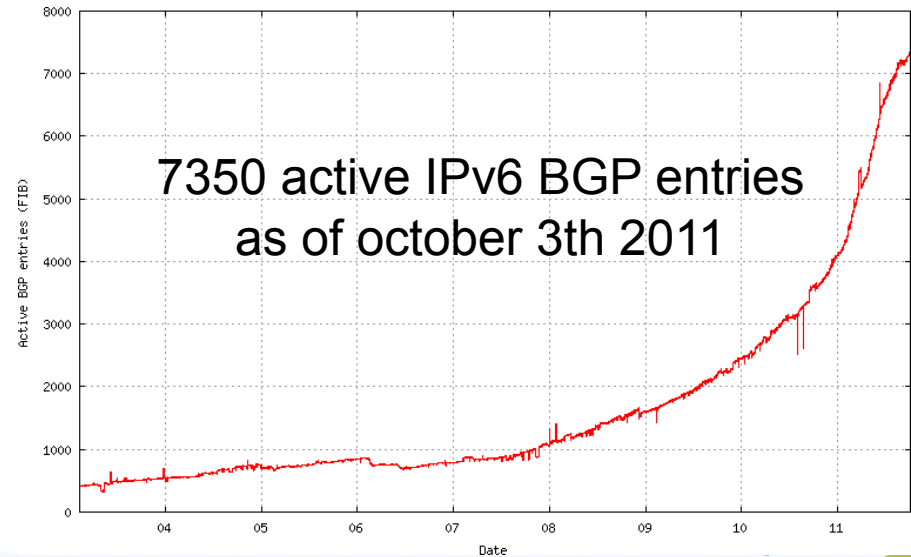
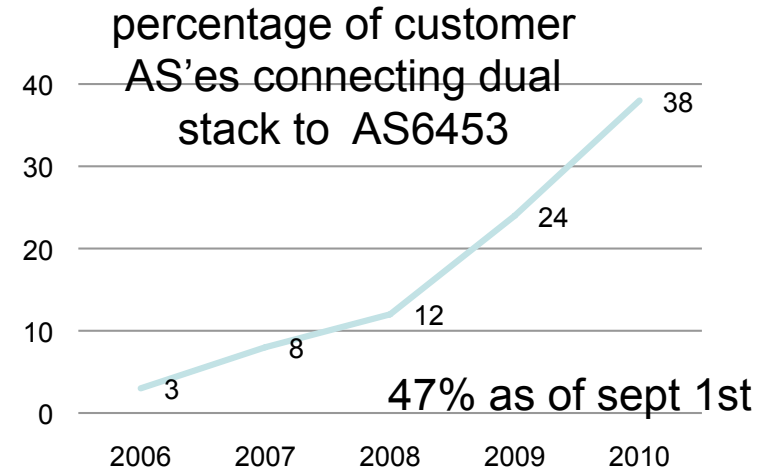
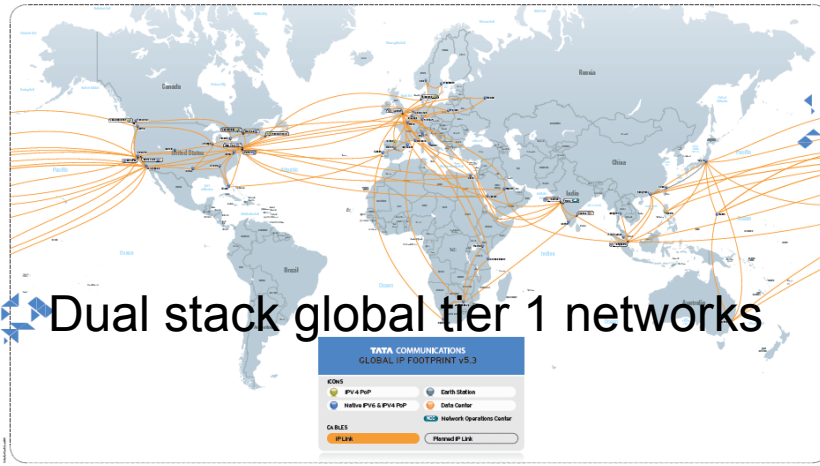
- **IPsec mandatory**

Permanent addresses

- **Identity (CLID)**
- **Traceability (RFID)**
- **Addressability!**
- **IP address based billing**

Multicast

IPv6 : we have lift-off on the network side



June 8th was a major success

IPv6 Day : a fitness test for the internet ecosystem

In preparation peering links were double verified and a specialized helpdesk set up for the day. Traffic monitoring tools were IPv6 enabled at a number of strategic locations.

The Tata Communications website www.tatacommunications.com website was already IPv6 enabled and has been accessible in IPv6 ever since.

June 8th demonstrated the resiliency of the global Network and quite advanced readiness amongst all major backbone providers in anticipation of an eventual major and sudden surge in IPv6 traffic .



specialized helpdesk for IPv6 day

IPv6 SITE MONITORING

AS 4755
AS 6453

REPORT FROM AS4755

| S.no | Date (GMT) | Time (GMT) | URL | IPv6 Address | IPv4 Address | IPv6 RTT Avg | IPv4 RTT Avg | IPv4 Status | IPv6 Status | Traceroute Result |
|------|------------|------------|------------------------|--------------------------------|-----------------|---------------|---------------|-------------|-------------|-------------------|
| 1 | 7-06-2011 | 01:16:25 | tatacommunications.com | 2001:5a0:5000:2::149 | 121.243.66.50 | 281 | 24 | ↑ | ↑ | Traceroute Result |
| 2 | 7-06-2011 | 01:16:25 | www.google.co.in | 2404:6800:8008::68 | 74.125.236.48 | 69 | 24 | ↑ | ↑ | Traceroute Result |
| 3 | 7-06-2011 | 01:16:25 | in.yahoo.com | 2a00:1288:f00e:1fe::3001 | 121.101.152.169 | 153 | 26 | ↑ | ↑ | Traceroute Result |
| 4 | 7-06-2011 | 01:16:25 | www.youtube.com | 2404:6800:8006::5b | 209.85.153.136 | 90 | 21 | ↑ | ↑ | Traceroute Result |
| 5 | 7-06-2011 | 01:16:25 | www.facebook.com | 2620:0:1c18:0:face:b00c:0:2 | 69.171.224.13 | 264 | 309 | ↑ | ↑ | Traceroute Result |
| 6 | 7-06-2011 | 01:16:25 | www.bing.com | 2600:140e:5::3f96:8359 | 115.112.224.8 | 353 | 24 | ↑ | ↑ | Traceroute Result |
| 7 | 7-06-2011 | 01:16:25 | www.xbox.com | 2402:6800:720:11:230:48ff:fe8d | 203.77.189.7 | 453 | 292 | ↑ | ↑ | Traceroute Result |
| 8 | 7-06-2011 | 01:16:25 | www.aol.com | 2001:4b0:1668:2202:2::1 | 64.12.245.203 | 268 | Not Reachable | ↑ | ↑ | Traceroute Result |
| 9 | 7-06-2011 | 01:16:25 | www.mapquest.com | 2001:4b0:1668:2202:2::3 | 64.12.99.162 | 267 | Not Reachable | ↑ | ↑ | Traceroute Result |
| 10 | 7-06-2011 | 01:16:25 | www.t-online.de | 2003:2:2:40:62:153:159:92 | 62.153.159.92 | Not Reachable | 299 | ↑ | ↓ | Traceroute Result |
| 11 | 7-06-2011 | 01:16:25 | www.cisco.com | 2001:420:80:1:c:15c0:d06:f00d | 60.254.168.170 | 272 | 278 | ↑ | ↑ | Traceroute Result |

IPv6 SITE MONITORING

AS 4755
AS 6453

REPORT FROM AS6453

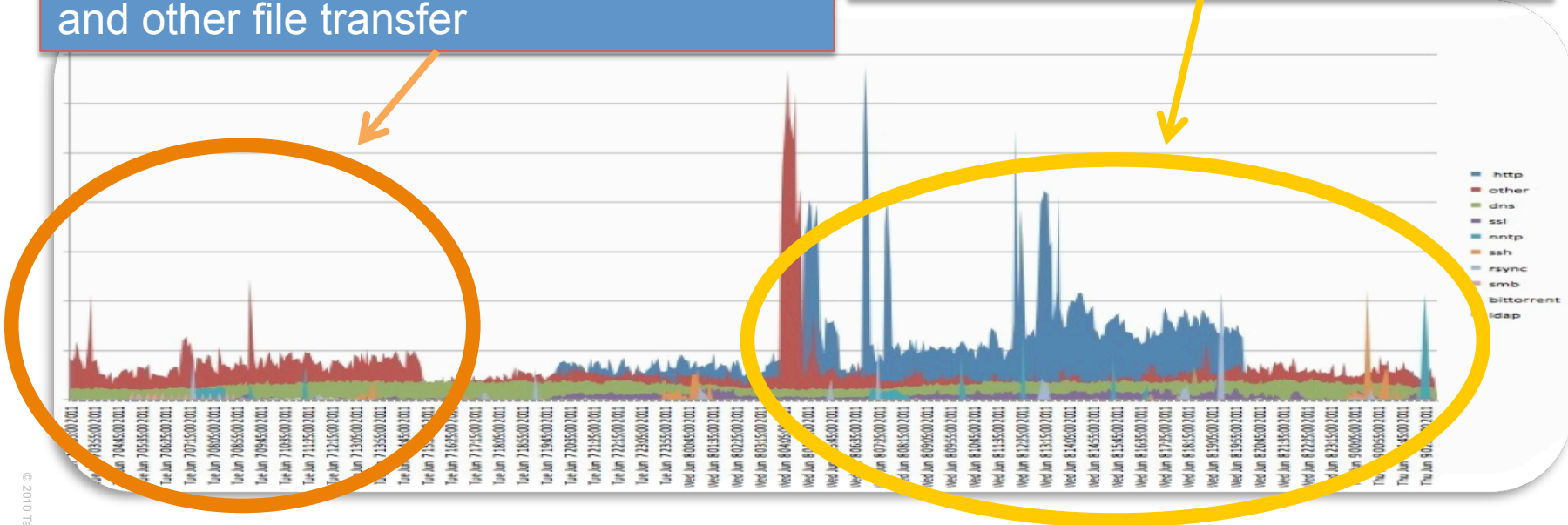
| S.no | Date (GMT) | Time (GMT) | URL | IPv6 Address | IPv4 Address | IPv6 RTT Avg | IPv4 RTT Avg | IPv4 Status | IPv6 Status | Traceroute Results |
|------|------------|------------|------------------------|-------------------------------|----------------|---------------|---------------|-------------|-------------|--------------------|
| 1 | 7-06-2011 | 00:50:01 | tatacommunications.com | 2001:5a0:5000:2::149 | 121.243.66.50 | 13 | 201 | ↑ | ↑ | Traceroute Result |
| 2 | 7-06-2011 | 00:50:01 | www.google.co.in | 2404:6800:8008::93 | 74.125.235.51 | 247 | 234 | ↑ | ↑ | Traceroute Result |
| 3 | 7-06-2011 | 00:50:01 | in.yahoo.com | 2001:4998:f00b:1fe::3000 | 67.195.160.76 | 33 | Not Reachable | ↑ | ↑ | Traceroute Result |
| 4 | 7-06-2011 | 00:50:01 | www.youtube.com | 2404:6800:800b::be | 74.125.235.38 | 241 | 240 | ↑ | ↑ | Traceroute Result |
| 5 | 7-06-2011 | 00:50:01 | www.facebook.com | 2620:0:1c08:4000:face:b00c:: | 69.171.224.41 | 71 | 90 | ↑ | ↑ | Traceroute Result |
| 6 | 7-06-2011 | 00:50:01 | www.bing.com | 2001:418:2007:1::a88f:169 | 204.245.162.35 | Not Reachable | Not Reachable | ↑ | ↑ | Traceroute Result |
| 7 | 7-06-2011 | 00:50:01 | www.xbox.com | 2001:418:2007:1::a88f:128 | 204.245.162.41 | Not Reachable | Not Reachable | ↑ | ↑ | Traceroute Result |
| 8 | 7-06-2011 | 00:50:01 | www.aol.com | 2001:4b0:1668:2202:2::1 | 64.12.245.203 | Not Reachable | Not Reachable | ↑ | ↑ | Traceroute Result |
| 9 | 7-06-2011 | 00:50:01 | www.mapquest.com | 2001:4b0:1668:2202:2::3 | 64.12.99.162 | Not Reachable | Not Reachable | ↑ | ↑ | Traceroute Result |
| 10 | 7-06-2011 | 00:50:01 | www.t-online.de | 2003:2:2:40:62:153:159:92 | 62.153.159.92 | Not Reachable | 99 | ↑ | ↓ | Traceroute Result |
| 11 | 7-06-2011 | 00:50:01 | www.cisco.com | 2001:420:80:1:c:15c0:d06:f00d | 72.246.112.170 | 78 | Not Reachable | ↑ | ↑ | Traceroute Result |



What did we actually see on World IPv6 Day?

Typical day dominated by Peer to Peer and other file transfer

World Day IPv6 day traffic surge



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- The experiment on a global scale has enabled content providers and ISP's alike to gain confidence in their IPv6 deployments.
- On June 8th, AS6453 witnessed the sharpest spikes in IPv6 traffic in the US and Europe regions and we reported a 67% day over day traffic increase.



IPv6 since IPv6 day seen through AS6453

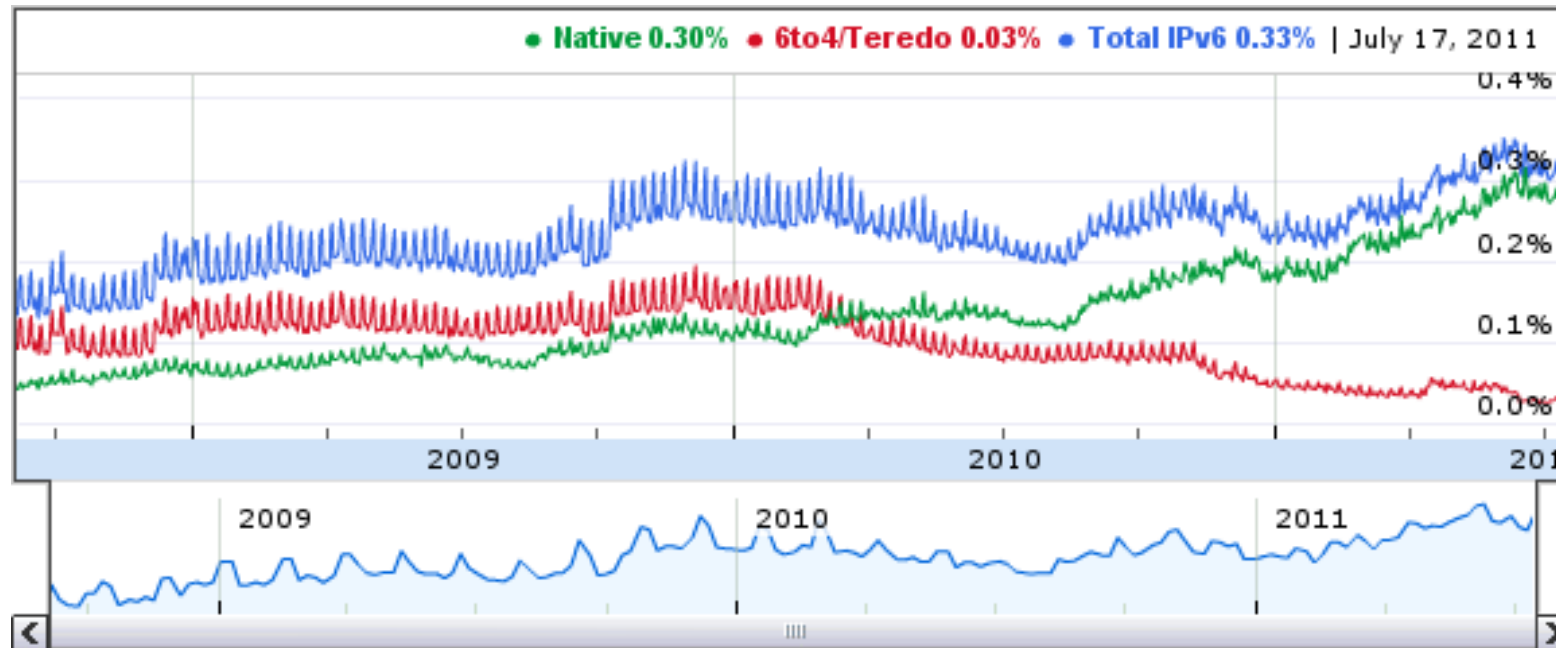
Global IPv6 traffic grows at a slow but steady pace with the june 8th peak disappearing in the background noise



Note that these figures represent only a fraction of the overall Pv4 plus IPv6 traffic of AS6453 derived from probes on a selected number of network points.

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IPv6 traffic seen by Google



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End July France was the IPv6 traffic champion at 3.6% while Japan clocked in at 1.4% . Without France and Japan world IPv6 traffic share fell to 0.1%

As reported by Lorenzo Colitti at the Quebec IETF meeting on July 25th
<http://www.ietf.org/proceedings/81/slides/plenary-9.pdf>

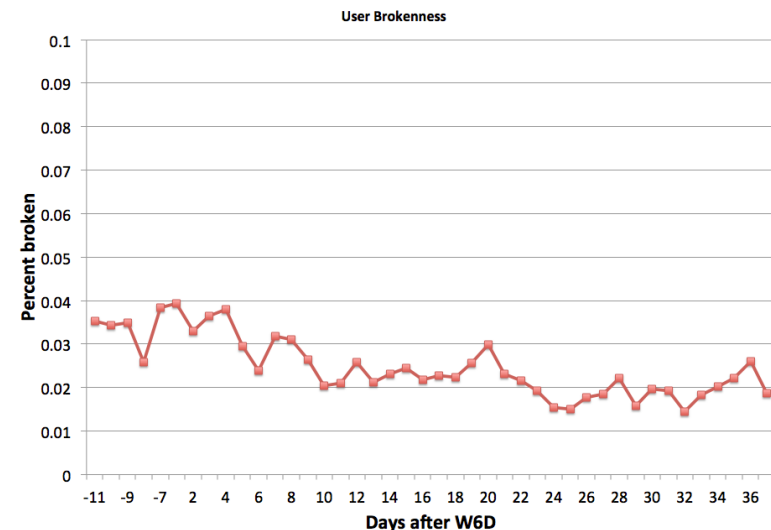
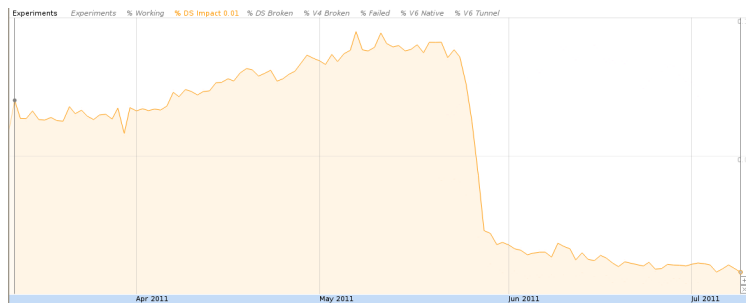
See latest statistics at
<http://www.google.com/intl/en/ipv6/statistics/>



The brokenness issue as delaying factor

Concern about brokenness still delays opening the IPv6 floodgates on the content side. Youtube, Yahoo and facebook provided an update on the issue on July 25th in Quebec City at the IETF meeting:

Facebook reports brokenness down to around 0.02%. Google reports brokenness issues largely fixed in Chrome, Firefox 7 follows, Apple's OS X Lion more robust, IE to follow soon.



Chrome versions with fast fallback are 99.995% as reliable as IPv4

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Some of the lessons learned from IPv6 day

Major tier-1 carriers IP networks are dual stack with adequate peerings to cope with the transition from IPv4 to IPv6 and sudden shifts in relative traffic. Upgrade to dual stack still patchy amongst tier 2&3 carriers but improving fast.

Work-around options such as 6rd or DS-lite are workable and gaining popularity on the local access to avoid the bottleneck of sizeable investments in non easily upgradeable IPv4 only CPE boxes, cable modems and DSL's.

Major content providers found the 'brokenness' going down also but still too high to allow for total commercial deployment. That might change after the tentative IPv6 Week considered for second half of february 2012.

The reality of the IPv4 address exhaustion sinks in : business continuity makes adoption and gradual transition to IPv6 unavoidable.





Thank You

« These days all competitive advantages are fleeting. So the smartest companies are learning to create new ones – again and again and again »

Robert D. Hof , Business Week