IPv6 Deployment Survey

Based on responses from the global Regional Internet Registry (RIR) community during June 2013, and compared with those from earlier years

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The Internet has become a fundamental infrastructure, worldwide, for economic and social activity, and its usage continues to grow exponentially:

- More users
- New applications (e.g. mobile, Internet of Things etc.)
- The transition from IPv4 to IPv6 is the only sustainable option in the long run.
- A smooth transition requires understanding the challenges and a timely start.
Global IPv6 Deployment Monitoring Survey

- Aim to establish comprehensive view of present IPv6 penetration and future IPv6 deployment plans by surveying Internet providers and users in the RIR communities around the world

- Process
  - Prepared and carried out by GNKS in close collaboration with AFRINIC, APNIC, ARIN, LACNIC and RIPE NCC
  - Survey was kept short and focused on essentials. Changes to the survey were kept to a minimum and are taken into account in the analysis
  - Privacy guaranteed

- History
  - ARIN carried out such a survey with its members in March 2008, a starting point for the current survey
  - RIPE NCC and APNIC carried out this same survey in 2009
  - In 2010, 2011, 2012 and 2013, all RIRs participated to the survey making it truly global
Summary report on 2013 results

1 – Respondents’ profile
2 – Experience and assumptions
3 – Planning
Section 1 – Respondents’ profile

• Respondents’ profile remained generally consistent over the years, and again in 2013.

• Main change in 2013 is in responding countries, not in global spread nor in composition of sort of responders.
  – “government” respondents continued to grow in numbers, which may be congruent with higher policy interest in IPv6.

• Median respondent
  – for-profit ISP in the RIPE NCC region that signed a registration services agreement and serves up to 10,000 customers with less than 50 personnel.
In which country/economy is your organization registered?

- 1515 respondents from 131 countries/economies
- Top 10 respondent countries in 2013

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>2013 Respondents</th>
<th>2012 Respondents</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>USA</td>
<td>215</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Germany</td>
<td>74</td>
<td>341</td>
<td>-267</td>
</tr>
<tr>
<td>3</td>
<td>United Kingdom</td>
<td>66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Russia</td>
<td>53</td>
<td>306</td>
<td>-253</td>
</tr>
<tr>
<td>5</td>
<td>Netherlands</td>
<td>48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Brazil*</td>
<td></td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>France</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>India*</td>
<td></td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Indonesia*</td>
<td></td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Australia</td>
<td></td>
<td>35</td>
<td></td>
</tr>
</tbody>
</table>

* New in Top 10

Notable Changes

- Taiwan from 104 to 17 respondents
- Germany from 341 to 74 respondents
- USA from 306 to 215 respondents
- Brazil, India and Indonesia new

source: GNKS 2013
Which category which best describes your organization?

![Graph showing the percentage of organizations in different categories from 2010 to 2013.](source: GNKS 2013)

- **ISP**: 67% in 2010, 53% in 2011, 39% in 2012, 46% in 2013
- **Government**: 7% in 2010, 15% in 2011, 18% in 2012, 15% in 2013
- **Research and Development**: 5% in 2010, 7% in 2011, 5% in 2012, 6% in 2013
- **ICT/Internet tools industry**: 6% in 2010, 7% in 2011, 7% in 2012, 6% in 2013
- **Internet content industry**: 8% in 2010, 10% in 2011, 12% in 2012, 10% in 2013
- **Non-ICT/Internet supply industry**: 9% in 2010, 10% in 2011, 11% in 2012, 9% in 2013
- **Education**: 6% in 2010, 4% in 2011, 2% in 2012, 3% in 2013
- **Other**: 2% in 2010, 1% in 2011, 1% in 2012, 1% in 2013

_ Source: GNKS 2013, N=1515_
Are you a mobile network operator?

- 2012: 12% mobile network operators
- 2013: 13% mobile network operators
- No significant change compared to 2012
- No data from earlier years

N=1515  
source: GNKS 2013
To which RIR does your country/economy belong?

source: GNKS 2013

N=1515

(source: GNKS 2013)
Has your organization signed a Registration Services Agreement with your RIR?

- More respondents have signed a registration services agreement in 2013

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>54%</td>
<td>40%</td>
<td>68%</td>
</tr>
<tr>
<td>No</td>
<td>16%</td>
<td>25%</td>
<td>5%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>29%</td>
<td>35%</td>
<td>27%</td>
</tr>
</tbody>
</table>

ISPs only
N=684

source: GNKS 2013
How large is your customer base?

(source: GNKS 2013)

N=646

(source: GNKS 2013)
What is the size of your organization?

- **Small (50 or less)**
- **Medium (51 up to 250)**
- **Large (251 up to 2500)**
- **Very large (more than 2500)**

Source: GNKS 2013

N=1417
Section 2 – Experience and assumptions

• Overall, most ISPs have IPv6 experience (65% of respondents) & this is stable across years

• Significance of IPv6 as a service is increasing:
  – More ISPs indicate more significant usage by their clients (now 31%, >0.5% from last year’s 26%)
  – Promoting IPv6 to customers is even more part of the “mix” (now 72%, up from 63% in 2012)

• Biggest hurdle still vendor support
  – 61% of respondents, no significant change

• Biggest problem lack of user demand (55%)
What percentage of your customer base uses IPv6 connectivity?

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
<td>60%</td>
<td>44%</td>
<td>35%</td>
<td>35%</td>
</tr>
<tr>
<td>0% - 0.5%</td>
<td>30%</td>
<td>36%</td>
<td>39%</td>
<td>35%</td>
</tr>
<tr>
<td>0.5% - 1.0%</td>
<td>10%</td>
<td>4%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>1.0% - 2.0%</td>
<td>10%</td>
<td>2%</td>
<td>4%</td>
<td>4%</td>
</tr>
</tbody>
</table>

N=639 ISPs only

source: GNKS 2013
Do you consider promoting IPv6 uptake to your customers?

<table>
<thead>
<tr>
<th>Year</th>
<th>No</th>
<th>Maybe</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>10%</td>
<td>33%</td>
<td>58%</td>
</tr>
<tr>
<td>2011</td>
<td>8%</td>
<td>29%</td>
<td>63%</td>
</tr>
<tr>
<td>2012</td>
<td>10%</td>
<td>27%</td>
<td>63%</td>
</tr>
<tr>
<td>2013</td>
<td>9%</td>
<td>20%</td>
<td>72%</td>
</tr>
</tbody>
</table>

ISPs only N=646

Source: GNKS 2013
Does your organization have an IPv6 allocation and/or assignment?

Source: GNKS 2013

<table>
<thead>
<tr>
<th>Year</th>
<th>No</th>
<th>Yes, we consider</th>
<th>No but hosted by 3rd party</th>
<th>IPv6 enabled website</th>
<th>Yes, we have IPv6</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>16%</td>
<td>84%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>29%</td>
<td>71%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>41%</td>
<td>58.3%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>26%</td>
<td>74%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = 1417
If your organization hasn’t considered having an IPv6 allocation/assignment, why not?

- Communications service provider doesn’t support IPv6.
- ISP doesn’t support IPv6.
- Can’t afford the expense.
- Can’t afford the risk of transition from my IPv4 base.
- Haven’t gotten around to it yet.
- Our infrastructure doesn’t support it.
- Other.
- Could not convince business decision makers.

source: GNKS 2013

n=219
What do you expect to be the biggest hurdle(s) to your organization if you were to deploy IPv6?

(Only those not considering IPv6)

n=197

source: GNKS 2013
If you don't plan on transitioning your network over to IPv6, what technology will you use in the future to grow your business as IPv4 depletes?

Out of 34 respondents

• 8 respondents indicate that they have plenty of IPv4 addresses for the time to come
• 3 respondents indicate to be dependent on getting access to IPv6
• (Only) one respondent mentions NAT
What motivated your organization to obtain an IPv6 allocation/assignment?

- Want to be “ahead of the game” and expect to meet future needs
- To make sure IPv6 is supported in our products
- Want to benefit from IPv6 as soon as possible
- Availability of IPv4 address space
- Customer demand
- Other

source: GNKS 2013

n=1086
What has been the key argument that has enabled non-technical budget decision makers to appreciate the business case for IPv6 adoption?

- Out of 550 respondents, top key argument is “IPv4 is running out” (100)
- Next group “prepare for future” (86)
- Another large group indicated “customer demand” (36)
- Includes statements like:
  - “If I knew, I'd be using it.”
  - Specific technical and costs advantages of IPv6
Does your organization have an IPv6 presence?

- 2010: 36% No, 50% Yes, only within internal networks, 14% Yes, only on the Internet, 1% Yes, both within internal networks and on the Internet
- 2011: 27% No, 56% Yes, only within internal networks, 17% Yes, only on the Internet, 0% Yes, both within internal networks and on the Internet
- 2012: 23% No, 57% Yes, only within internal networks, 20% Yes, only on the Internet, 10% Yes, both within internal networks and on the Internet
- 2013: 22% No, 59% Yes, only within internal networks, 20% Yes, only on the Internet, 9% Yes, both within internal networks and on the Internet

n=1084, source: GNKS 2013
What are likely to be the biggest hurdle(s) when deploying IPv6?
What are the biggest problems with IPv6 in production?

- Lack of user demand
- Technical problems
- No experience, yet
- Budget issues: convincing non-technical business responsible people
- Budget issues: no access to investment money due to scarcity of resources
- Other

Source: GNKS 2013

n=1056
How is your organization’s IPv6 setup?

- Only IPv6
- Separate infrastructure for IPv4 and IPv6
- Dual-stack (i.e. IPv4 and IPv6 on the same hardware)

n=1000

source: GNKS 2013
What is the nature of your organization’s IPv6 production services?

![Chart showing IPv6 production services from 2010 to 2013](source: GNKS 2013)
If your organization has IPv6 in production, how does the amount of IPv6 traffic compare to your IPv4 traffic?

- 2010: 81% IPv6 traffic is greater than IPv4 traffic
- 2011: 78% IPv6 traffic is greater than IPv4 traffic
- 2012: 68% IPv6 traffic is non-negligible but less than IPv4 traffic
- 2013: 68% IPv6 traffic is non-negligible but less than IPv4 traffic

n=877

Source: GNKS 2013
What type of applications generate the most IPv6 traffic for your organization?

• By far most respondents indicate http, web browsing, followed by DNS
• Wide range of responses
If your organization is connected to one or several Internet Exchanges (IXs), do you...?

- Peer in IPv6 in all the IXs you are connected to: 27% in 2012, 34% in 2013
- Peer in IPv6 in some of the IXs you are connected to: 16% in 2012, 17% in 2013
- Not peer in IPv6: 12% in 2012, 11% in 2013
- I am not connected to IXs: 45% in 2012, 39% in 2013

n=1053

Source: GNKS 2013
Do you use Large Scale NAT (LSN) aka CGN (Carrier Grade NAT)?

- 2012: 85% using, 9% plan to use, 9% no plan
- 2013: 82% using, 10% plan to use, 8% no plan

n=994

Source: GNKS 2013
Do you use/plan to use Large Scale NAT (LSN) aka CGN (Carrier Grade NAT) along with or instead of IPv6?

- Plan to use LSN in 2013: 92% along with IPv6, 8% instead of IPv6
- Plan to use LSN in 2012: 84% along with IPv6, 16% instead of IPv6
- Are using LSN in 2013: 71% along with IPv6, 29% instead of IPv6
- Are using LSN in 2012: 79% along with IPv6, 21% instead of IPv6

n=182 – those that indicated they plan to use, or use LSN

source: GNKS 2013
If you are using Large Scale NAT (LSN aka CGN), who are you using it for?

- **We are not using LSN**: 80%
- **Mobile users**: 9%
- **DSL users**: 9%
- **Fiber to the home users**: 9%

Source: GNKS 2013

n=766
Are there any services which should be offered, or facilitated, by the Regional Internet Registries which would further enable your organizations’ adoption of IPv6?

- 337 responses
- 124 a clear “no”
- Top responses:
  - Training
  - Informing governments
  - Stimulating providers to support IPv6
Section 3 - Planning

• IPv6 Preparedness among ISPs continues to grow
  – Implementing IPv6 capability
  – Planning for deployment
  – Preparing for increasing demand from customers

• Deployment continues to improve
  – Yet 10% of ISP respondents do not foresee offering IPv6 to consumers within 4 years
  – 6% indicate no plans within 4 years to businesses

• Many are waiting for large scale usage of IPv6 (which is still not happening)
Which best describes your organization’s IPv6 implementation (plans)?

source: GNKS 2013
IPv6 implementation plans for ISPs offering services to consumers

source: GNKS 2013

n=630
IPv6 implementation plans for ISPs offering services to business customers

n=644

source: GNKS 2013
IPv6 implementation plans for Internal (non public) network

source: GNKS 2013

n=914
IPv6 implementation plans for providing IPv6 transit

source: GNKS 2013
IPv6 implementation plans for IPv6 peering

source: GNKS 2013

n=828
IPv6 implementation plans for hosted IPv6 services

source: GNKS 2013

n=836
IPv6 implementation plans for web services

Source: GNKS 2013

n=896
IPv6 implementation plans for DNS services

source: GNKS 2013

n=950
IPv6 implementation plans for email services

n=849

source: GNKS 2013
IPv6 implementation plans for cable/DSL modems

[source: GNKS 2013]

n=390
IPv6 implementation plans for corporate/university desktops

source: GNKS 2013

n=610
Which best describes your organization’s LTE and IPv6 implementation (plans)?

Only mobile operators, - n=71

source: GNKS 2013
High level conclusion

• Preparedness for IPv6 deployment continues to increase
  – Generally at high levels
    • Almost half of ISP respondents offer IPv6 to their customers
    • More than 80% will do so within 2 years

• More ISPs are now experiencing more significant usage by their clients
  – 31% experience more than 0.5% usage

• Carrier Grade NAT is generally not used as a solution to replace IPv6
  – 18% of respondents use, or plan to use CGN but more than 70% of those use it along with IPv6 (not instead of)
While a small minority is still banking on their stock of IPv4 addresses for the years to come, most recognize the importance of transitioning to IPv6.

As many are ready with initial preparations and are now waiting for a large scale IPv6 deployment and implementation, large scale deployment pilots would be a prudent way forward.
We thank all respondents for their contributions!

When asked if they’d be interested in participating in this survey again in a years’ time 93% of respondents said “Yes”

For more information: maarten@gnksconsult.com