



Addressing the Barriers to IPv6 Adoption - Barriers to IPv6 Adoption: Overview and Categories

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IPv6 Framework for European Governments – SMART 2016/0099

Workshop I

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Agenda – Meeting Purpose

This workshop aims at identifying barriers to IPv6 deployment, discussing possible solutions based upon lessons learned from first-mover Member States.

Key Research Result

Strong correlation for most MS
between the level of adoption of
IPv6 in the public sector and
globally

Progressive roll out as IPv6 is
being offered by ISPs
And, what is the situation in
Europe?

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Context: Where Does Europe Stand

Code	SubRegion	IPv6 Capable	IPv6 Preferred	Samples
XQ	Nothern America, Americas	31.59%	29.57%	68,501,410
QO	Western Europe, Europe	30.62%	29.83%	35,598,428
QM	Northern Europe, Europe	18.94%	17.98%	20,107,685
XT	Southern Asia, Asia	18.48%	17.38%	117,369,411
QP	Australia and New Zealand, Oceania	13.69%	12.95%	5,395,543
XP	South America, Americas	8.92%	8.60%	54,540,354
QN	Southern Europe, Europe	4.74%	4.64%	21,942,546
XU	South-Eastern Asia, Asia	3.32%	3.00%	46,369,668
XS	Eastern Asia, Asia	3.23%	2.69%	190,115,466
XW	Eastern Europe, Europe	2.48%	2.34%	39,202,534
XV	Western Asia, Asia	1.29%	1.15%	27,109,063
XN	Caribbean, Americas	1.23%	1.16%	3,644,845

<https://stats.labs.apnic.net/ipv6/QM>

<https://stats.labs.apnic.net/ipv6/QO>

<https://stats.labs.apnic.net/ipv6/QN>

Source APNIC

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Why are Public Administrations Interested?

- Public institutions rely on the Internet just as much as others
 - And, are affected by trends in the general Internet just as much as others
- Internet, as a platform for growth and innovation, requires IPv6
 - IPv6 necessary for Internet economy growth
 - the alternatives entail unacceptable risks
 - Limitations on scalability (dense NAT without IPv6)
 - Hurried/unstable IPv6 deployment (wait and rush)
 - Need to promote interoperability where possible
 - As IPv6 becomes norm, IPv6 expertise key for economic competitiveness
 - The “end” of IPv4 also brings competition concerns and regulatory issues
 - Governments need expertise

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Characterizing the Barriers

- Back in 2003, the European Commission’s IPv6 Task Force identified 15 (!) barriers to IPv6 adoption
 - http://www.eu.ipv6tf.org/PublicDocuments/Barriers_to_Deployment_v1.1.pdf
- But 12 of those 15 barriers were technical in nature
 - And, today, those barriers have been largely overcome
 - For instance, Zero Configuration and End Node Support
- For public administrations, the barriers to IPv6 deployment are often not technical
- Instead, the key barriers to IPv6 adoption in public administrations can be explained in business terms and not technical terms
 - This is a substantial change from the situation 10 years ago

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EU Research into IPv6 Deployment Barriers

- There is not a great deal of recent research on IPv6 deployment barriers
- Why is this?
 - In the past it was primarily a technical issue (it isn't anymore)
- In the past, the motivation to research barriers came from the technical community
 - It doesn't anymore
- Our research in 2017 and 2018 shows that the primary barriers to IPv6 deployment in public administrations is primarily administrative in nature
- This research through direct interviews with public administrations in EU MS

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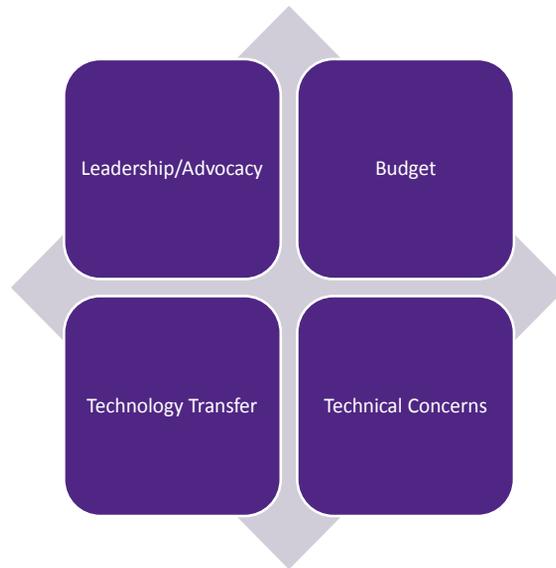
Main results : Key barriers

- The lack of interest and involvement of most MS
 - Benefits considered unclear. Mostly the case of MS not well advanced
- The cost and budget necessary to operate the transition to IPv6.
 - MS see IPv6 as essentially costs, especially as IPv4 still be supported
 - Mentioned even by leading MS, that have then reduced their ambitions
- Technical issues.
 - IPv6 maturity (around hardware) considered as being low, especially in terms of performance and security, even for leading MS.
 - Many MS mention they would need some technical support.
- Not enough involvement of ISPs in some MS
- Lack of coordination

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Categorizing Barriers



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Barrier group I: Leadership and Advocacy

- In public administrations, many MS are simply not interested in IPv6 transition
 - External motivation is low
 - Internal strategic objectives do not include IP infrastructure issues
 - Many MS have no internal advocate/leader for IPv6
 - As a result: no easy way to put IPv6 transition on the agenda
- In other cases, more than one part of the government tries to lead
 - Perhaps because of the organization of ICT responsibilities
 - Competing ministerial initiatives
 - Mixed messages about what is to be done (and who is to do it)
- Lack of coordination in the MS was a significant barrier to successful IPv6 adoption in the public administration

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Barrier group II: Budget

- Another key group of barriers are related to budget
- It proves to be very difficult to budget for an initiative that is only “transition to IPv6”
- Proves that a need to align the IPv6 activities with other strategic ICT activities in the MS is essential
- The budget barrier is a category which includes:
 - Staffing
 - Equipment costs
 - Planning effort
 - Internal audit activities
 - Staff training and technology transfer
- Budget is the most common barrier mentioned amongst smaller MS

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Barrier group II: Budget

- Hidden in the budget barriers is an administrative concern: administrative and organizational complexity
- For larger MS, the transition to IPv6 is a complex administrative task
 - As well as a complex technical task
- As a result, many MS use the argument that the complexity increases the demands on budget
 - Which is a precious resource
 - Not identifying IPv6 as a strategic objective, or aligning IPv6 transition with other, strategic ICT activities in the MS leads to a barrier which is a combination of budgetary and planning issues
- Again, budget is one of the most often cited barriers to IPv6 deployment – especially in smaller MS that are struggling with national fiscal issues

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Barrier Group III: Technology Transfer

- Expertise for the IPv6 transition
 - Internal
 - External
 - Vendor-provided
- Where does this expertise come from? In most cases, MS have no natural source of expertise for IPv6 transition
- Instead, they need help from external sources for technology transfer
 - IPv6 planning
 - IPv6 technology training
 - IPv6 deployment
- Almost no MS in our research has tried to “go it alone”
 - Instead, almost always relying on external assistance to plan, coordinate or deploy IPv6

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Barrier Group III: Technology Transfer

- Successful MS seem to use a combination of sources of expertise
 - Vendor support
 - External consultancy
 - Training for internal staff
- Seems to be most successful in combination with a overarching strategic approach
- NOTE: Technology transfer seldom is effective for MS where there is a national plan in place that addresses both the public and private sector
- ALSO: There are examples of clear leadership by the public sector in Europe – where the public sector is a “Public Pioneer”

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Barrier Group IV: Technical Concerns

- Technical concerns used to be the dominant barrier to IPv6 adoption – anywhere
- This is simply no longer the case
- There are clear signs that many of the technical issues related to IPv6 deployment have been solved: Consider the following:
 - Google reports 37 countries exceeding 5% of traffic, with new countries being added weekly
 - Akamai reports 7 countries whose IPv6 traffic exceeds 15%.
 - In Japan, all three major mobile networks, NTT, KDDI, and Softbank, are deploying IPv6 this year, and in India, Reliance JIO's deployment has driven measures of IPv6 traffic in the country to exceed 20%.
 - The IPv4 Market Group comments that it expects IPv6 user count to exceed 50% world-wide in 2019, and with that, the start of the decline of the IPv4 address market.
- But, without doubt, IPv6 transition for a public administration is a complex task to plan, procure and implement

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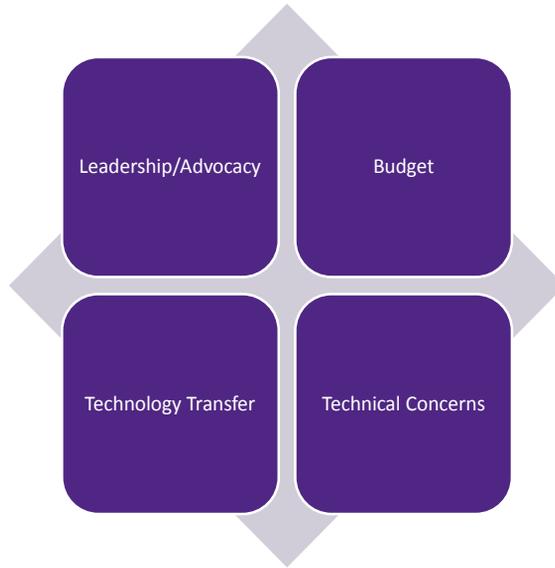
Barrier Group IV: Technical Concerns

- In some MS, there is not much movement on the part of ISPs
 - This holds back deployment in the public sector
- Many MS indicated that IPv6 infrastructure maturity was a concern
 - Yet, in Europe very few Hardware/Network profiles have been developed to help understand/address this concern
- There is a gap between perceived difficulty and actual difficulty on the technical front
 - This perception gap leads to delays in proceeding with transition plans

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Categorizing Barriers



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Questions?

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