Addressing the Barriers to IPv6 Adoption – Barriers to IPv6 Deployment in Public Administrations

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Lessons Learned? From Where?

- Previous Public Administration Experience

  - There is quite a bit of this

- Previous ISA2 Project

  - GEN6

- Current IPv6 Implementation Project

  - Research

  - Workshop I and the Technology Transfer Workshop

- Experience and Best Practices from Private Sector

Public Administration IPv6 Experience

- There is quite a bit of this

- Largely undocumented and anecdotal in nature

- Key message is: One-size-DOES-NOT-fit-all

- Key variables

  - Government organization

  - Availability of funding

  - Leadership

 - Technology transfer and training

EU Research into IPv6 Deployment Barriers

- There is not a great deal of documented research on IPv6 deployment barriers

- Why is this?

  - In the past, IPv6 transition was seen as primarily a technical issue (it isn't any longer)

- 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 are administrative

Characterising the Barriers to IPv6 Success

- Back in 2003, the European Commission's IPv6 Task Force identified 15 barriers to IPv6 adoption.

  - 12 of those 15 barriers were technical in nature

  - Today, those barriers have been largely overcome

  - For instance, Zero Configuration and End Node Support

- For EU public administrations, the barriers to IPv6 deployment are often <u>not technical</u>

  - 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 over the situation 10 years ago

Categorizing Barriers to IPv6 Adoption

Leadership/Advocacy

Budget

Technology Transfer

Technical Concerns
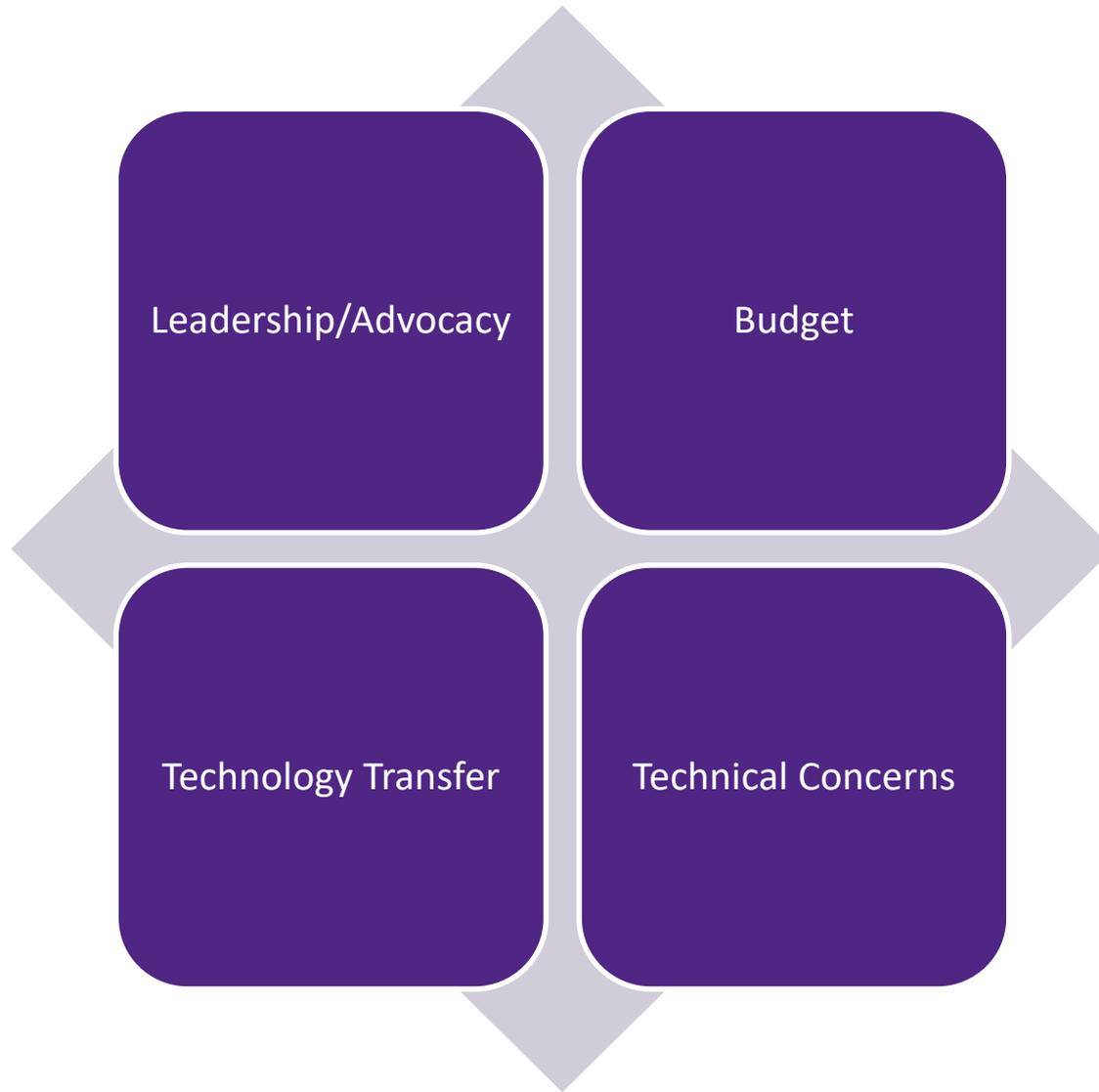
Barriers Identified During this Project

- Lack of interest or involvement from many MS

  - Benefits of IPv6 deployment are unidentified and are considered unclear

  - These MS often leave IPv6 deployment to ISPs

  - This is mainly the case for MS that are not well advanced in IPv6 deployment

- Cost and budget necessary to complete the transition to IPv6

  - MS see IPv6 as essentially a cost center

  - MS see an increase in costs from having to support both IPv4 and IPv6

  - This is mentioned even by leading MS, that have later reduced their ambitions

- Not enough involvement of national ISPs

  - ISPs are often an additional roadblock to IPv6 deployment

  - The ISPs are themselves lagging behind in IPv6 deployment

- Lack of coordination and leadership in the public sector

What Was Learned from GEN6

- GEN6 gave MS general guidelines for planning and transition steps
  - Documentation on technical issues (network topologies, addressing types)
  - Addressing plans for Governments
  - Identification of transition technologies
  - Deployment supports
- Pilot projects in a set of countries in Europe
  - Transition experience
  - Especially on technology and infrastructure
- Participation in the ETSI IPv6 Integration Industry Specification Group

GEN6 Documented Challenges & Successes

- Most of the challenges focused on the technical issues surrounding IPv6 deployment

  - Little about the planning, administrative or technology transfer issues

  - Some examples where there is a clear model for success

  - For instance, for federal governmental models – de.government

- In some cases, the success was built on pilot or academic implementations

- Many IPv6 Task Forces were set up in member states, but few survived

Where do Member States Stand?

What Stage of IPv6 Transition are You In?
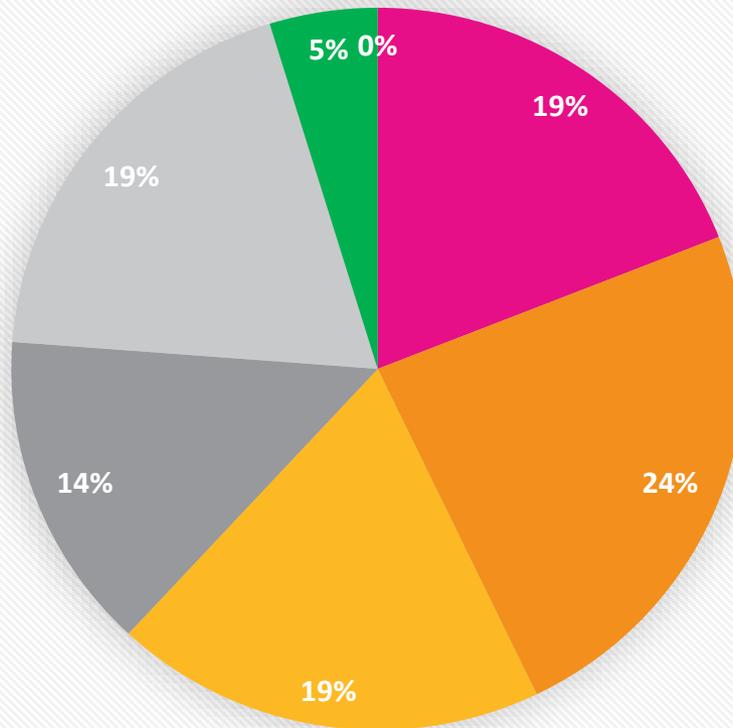
Legend:
- Not Thinking About It
- Aware, but not doing anything
- Starting to think about it
- Planning stage
- Started transition
- Advanced transition
- Completed

Values shown: 0%, 19%, 24%, 19%, 14%, 19%, 5%

Workshop I - Presentations from Member States

- Four member states gave presentations about their successful IPv6 deployments
  - Germany
  - Spain
  - Belgium
  - The Netherlands
- Germany are Belgium are in this project's "Leaders" group
- The Netherlands is in this project's "Pioneers"
- Spain is just outside the "Pioneers" group

IPv6 Within the German Public Administration

- Decision to adopt IPv6 was made in the public sector in 2007

- The migration process is driven by the Federal Ministry of the Interior (BMI) and the Federal Office of Administration (BVA)

- The government is a Local Internet Registry (LIR)

  - Different needs of governments led to a change of RIPE policy (RIPE 655)

  - Created a detailed addressing plan

- The government developed IPv6 deployment materials:

  - IPv6 Profile (German/English)

  - Migration Plan (German/English)

  - Workshop Modules

- A number of pilot IPv6 deployments have taken place

  - Example: Datacentre migration

Workshop I Addressing the Barriers to IPv6 Deployment: Spanish Use Case

- Plan to adopt IPv6 created in 2011: "Initiatives for the IPv6 Deployment"

- IPv6 deployment is driven by the Ministry of Energy, Tourism and the Digital Agenda and the Ministry of Finance and Civil Service (for public administration deployment)

- The government is an LIR

- The government has:

  - Carried out IPv6 deployment pilots

  - Created a portal for the dissemination of IPv6 deployment information

    - This coordinates the deployment of IPv6 across all levels of government

  - Specified IPv6 as a requirement in purchasing

  - Planned to deploy IPv6 in the public administration

  - Begun work on a single IPv6 addressing plan for the whole government

IPv6 in Belgium

- 2012 Belgium Code of Conduct set a limit on CGN compression of 16:1

- Belgium only has three major ISPs easing coordination

- A national IPv6 plan was supported by Belgian council of ministers

- The Belgium government is not an LIR

  - Still debating Provider Assigned (PA) vs. Provider Independent (PI)

- By 2016 almost 50% of traffic in Belgium was IPv6

- Belgium is gradually enabling IPv6 on federal web-sites

- Used abstract paragraph in public tenders "IPv6 must be equivalent to IPv4"

- Found that working closely with IPv6 Council was beneficial

- Attempted an IPv6-only datacentre deployment in 2012/2014

  - Was not successful then BUT could work now

- Still on-going checking with suppliers for IPv6 support – gradually upgrading hardware and software

Workshop on Addressing the Barriers to IPv6 Deployment: the Netherlands

- Logius is the digital government service of the Netherlands Ministry of the Interior and Kingdom Relations
  - Was tasked with obtaining IPv6 address space and distributing it to ministries (excepting the ministry of defence)
  - Is an LIR and has obtained IPv6 address space from RIPE
  - Created a government wide IPv6 numbering framework
- Ministries, provinces and municipalities are very autonomous
  - However, there is a requirement for IPv4 *and* IPv6
  - Deployment is responsibility of individual organisation
- Lack of budget is a barrier to deployment
- Mandates need to have teeth to be effective
- Lack of IPv4 addresses has not been a driver for IPv6 adoption

What Were the Recommendations from Workshop 1?

- Interactive engagement in Workshop I led to a set of clear recommendations:
  - MS should remain in contact with their national Internet industry
  - MS should share addressing plans and strategies with other MS
  - There needs to be a mechanism developed for MS to engage in discussions on IPv6 deployment issues
  - The priority of IPv6 in ISA[2] should be raised via its interoperability requirement
  - Motivations for IPv6 deployment should be documented
  - MS should have a single focal point for IPv6 issues

What Were the Findings from the Lisbon Workshop?

- Technology Transfer Workshop also discussed barriers

  - Almost all of the barriers were non-technical

  - Instead, involves the political layer

    - Common theme: need for an "evangelist" or leader at the political layer and not at the typical ICT layer of the public administration

  - Many new initiatives stress the application layer and not the network layer

    - Some new initiatives – brand new – in MS don't even consider IPv6 as an option

    - Another MS example: choice between having just 32 IPv4 addresses or as many IPv6 addresses as they want – picked 32 IPv4 addresses!

    - Another MS example: when faced with a choice between buying 256 IPv4 addresses for €14,000 or using IPv6 for free, MS chose IPv4

  - Barriers include awareness and leadership

Further Findings from the Lisbon Workshop

- Desperation for IPv4 implementation is leading to some bad practices

    - Buying addresses from Africa to use in Europe

    - Buying addresses that cannot be routed (e.g. blacklisted because of spam)

- Smaller MS do not perceive this as an immediate problem to be solved

- "As long as the infrastructure works, nobody cares."

- "Digitalization" is an important buzzword for many administrations, but there's little interest in infrastructure in digitalization projects (other than CDN and virtualization solutions)

- A key barrier is the lack of a connection between the political promise of digitalization and reliable access to IPv6 addresses and transit

A Finding Common to the Lisbon and 1ˢᵗ Workshop

- The level of enthusiasm and interest for IPv6 in public administrations peaked about five years ago

  - Is currently not as nearly "on the radar"

  - IPv6 Task Forces in MS have all but disappeared

  - The ability to connect interested stakeholders has decreased

    - Because interested and motivated stakeholders no longer get together

    - No ability for a common "push" from interested parties

  - Is a revival of the IPv6 MS Task Force something that is possible? Needed?

  - Otherwise, what takes the place of a common community of interest in IPv6 in public administrations in MS?

  - Pilot projects rarely evolved into nation-wide IPv6 implementations

What Are the Key Lessons Learned?

- There has been success in Europe

  - There are multiple IPv6 transition successes

  - Using very diverse models

- The key barriers to success are no longer technical in nature

  - Most of the technical barriers can be surmounted via technology transfer and the use of best practices

- National plans for IPv6 deployment can be a success

  - Especially if not too ambitious at early stages

- There are sources for support, training and technology transfer in Europe

- Many countries are not moving quickly on IPv6 transition for public administrations

Questions?