Towards Assessment of IPv6 Readiness, Deployment and Transition Plans in Croatia

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Introduction

❖ **IP (Internet Protocol) addresses** identify the different devices connected in the network and allows them to communicate.

❖ IANA assigned the remaining IPv4 addresses of the central pool to the five Regional Internet Registries (RIR) in February 2011.

❖ In Europe the forecast from the relevant RIR is to exhaust their IPv4 pool before end of 2011.

❖ When IPv4 availability is exhausted, future allocations from the RIRs will be only-IPv6 addresses.

❖ The main motivation for the "new IP" is the exhaustion of IPv4 address space.

Introduction

❖ According to the report (April 2010) by OECD, the "progress in actual usage of IPv6 remains very slow" (5.5% of the Internet using IPv6).

❖ BGPmon (December 2010) - the global IPv6 deployment was just below 8%.
   ❖ countries at the top of the list, Czech Republic, The Netherlands, Norway, Japan, New Zealand and Taiwan, have reached over 20% deployment.

❖ The IPv6 adoption in Croatia is lagging behind (4%, per BGPmon), and remains way below the European and global average.

❖ In the new (draft) Broadband Development Strategy in Republic of Croatia 2011–2015, the readiness for IPv6 adoption has been noted in the context of development of broadband access value chain.

❖ HAKOM, FER, e-Croatia and CARNet, has set out to review and assess the current status of IPv6 readiness and transition plans in public and private sectors deployment

❖ Main advantages of IPv6 - expanded addressing capabilities, simplified header format, better support for "real-time" multimedia services, better support for authentication and privacy.

❖ To enable native IPv6 communication, all elements (end-to-end) involved in service provisioning need to be IPv6-capable

❖ Due to scale and complexity of transitioning the entire Internet to IPv6, it has been accepted from the beginning that this would be a long-term process, involving significant effort and investment.

❖ The proposed transition mechanisms fall into three categories:
  ❖ Dual IP layer, or "dual stack"
  ❖ Tunneling (encapsulation)
  ❖ Translation

Main actors in the deployment of IPv6

- ❖ **Service and content providers** - need to upgrade their offer of services to IPv6 (including eGovernment services).

- ❖ **Application providers** - need to provide solutions supporting IPv6.

- ❖ **ISPs** - must offer IPv6 connectivity to residential and business customers.

- ❖ **Telecomm operators** - must forward IPv6 traffic.

- ❖ **Communication equipment vendors** - must integrate capabilities to support and manage IPv6 traffic in their product for backbone and access networks.

Status of IPv6 deployment in Croatia

❖ First organized deployment of IPv6 in Croatia took place in CARNet, the national research and education network, in 2003 and 2004.

❖ In 2004, the first BGP peering between CARNet and another autonomous system was established with a local ISP, followed by the international IPv6 data exchange agreement with the SixXS and BGP peering with the pan-European network GÉANT

❖ In late 2008, some IPv6 enabled services, including the CARNet main Web site and Usenet news, have been offered over both IPv4/IPv6 infrastructure.

❖ In June 2010 CARNet implemented IPv6 in the entire core network and started to offer IPv6 Internet access as a service to its members.

❖ As of June 2011, a total of eleven member institutions (0.5%) have started to use IPv6 connectivity based on IPv4/IPv6 dual-stack on their own initiative

❖ In the past few years, there has been some progress in the IPv6 deployment by ISPs in Croatia.
  ❖ IPv6 BGP peering at the Croatian Internet eXchange - as of late June 2011, there are five ISPs that connect to CIX by using IPv6 and exchange IPv6 traffic

Status of IPv6 deployment in Croatia

NetName	Owner	Allocated	First seen	Seen by	Last seen (*)
NTH-MEDIA	NTH Media d.o.o.	2011-05-04		0%	never
CIX-20040415	CIX Croatian Intern	2004-04-15	2010-12-08 14:32:48	0%	2010-12-30 12:17:48
HR-CARNET-20030305	Carnet	2003-03-05	2004-03-09 18:31:53	100%	2011-09-01 10:33:18
HR-ISKON-20040407	Iskon	2004-04-07	2004-04-14 12:00:41	98%	2011-09-01 10:33:19
HR-HPTNET-20081002	HT	2008-10-02	2011-02-15 09:32:56	98%	2011-09-01 10:33:23
HR-DCM-20081106	DCM	2008-11-06	2011-05-13 15:33:13	98%	2011-09-01 10:33:23
HR-VIPNET-20100222	VIPNET	2010-02-22		0%	never
HR-VOLJA-20110509	Voljatel telekomuni	2011-05-09		0%	never
HR-OPTIMA-20090302	OT - Optima Telek	2009-03-02	2009-04-02 11:17:28	99%	2011-09-01 10:33:25
HR-OIV-20100707	Odasiljaci i veze d.	2010-07-07	2011-01-03 13:32:50	99%	2011-09-01 10:33:26
HR-OMONIA-20101013	Omonia d.o.o. za u	2010-10-13		0%	never
HR-PORTUS-20110405	H1 Telekom d.d.	2011-04-05		0%	never

The database currently holds 12 IPv6 DFP's.

Of which 0 (0.00%) are reclaimed, 0 (0.00%) are returned to the pool and 6 (50.00%) IPv6 DFP's didn't have a routing entry.

Thus 6 (50.00%) networks are currently correctly announced.

0 (0.00%) only announced a /35 while they have been allocated a /32.

0 (0.00%) announce both their /32 and their /35.

Source: http://www.sixxs.net/tools/grh/dfp/all/?country=hr

❖ The transition from IPv4 to IPv6 can happen on a large(r) scale only if IPv6 is supported and properly configured for:
1. end user devices and equipment,
2. local area network and MAN/WAN infrastructure,
3. applications and services.

❖ The motivation, complexity and resources involved in the transition process differ for the above categories and should be considered independently.
  ❖ need to be taken into account when assessing the IPv6 readiness and planning the process of IPv6 deployment from the technical and organizational points of view.

❖ Three different assessment of IPv6 readiness were conducted

Assessment of IPv6 readiness in the national research and education network
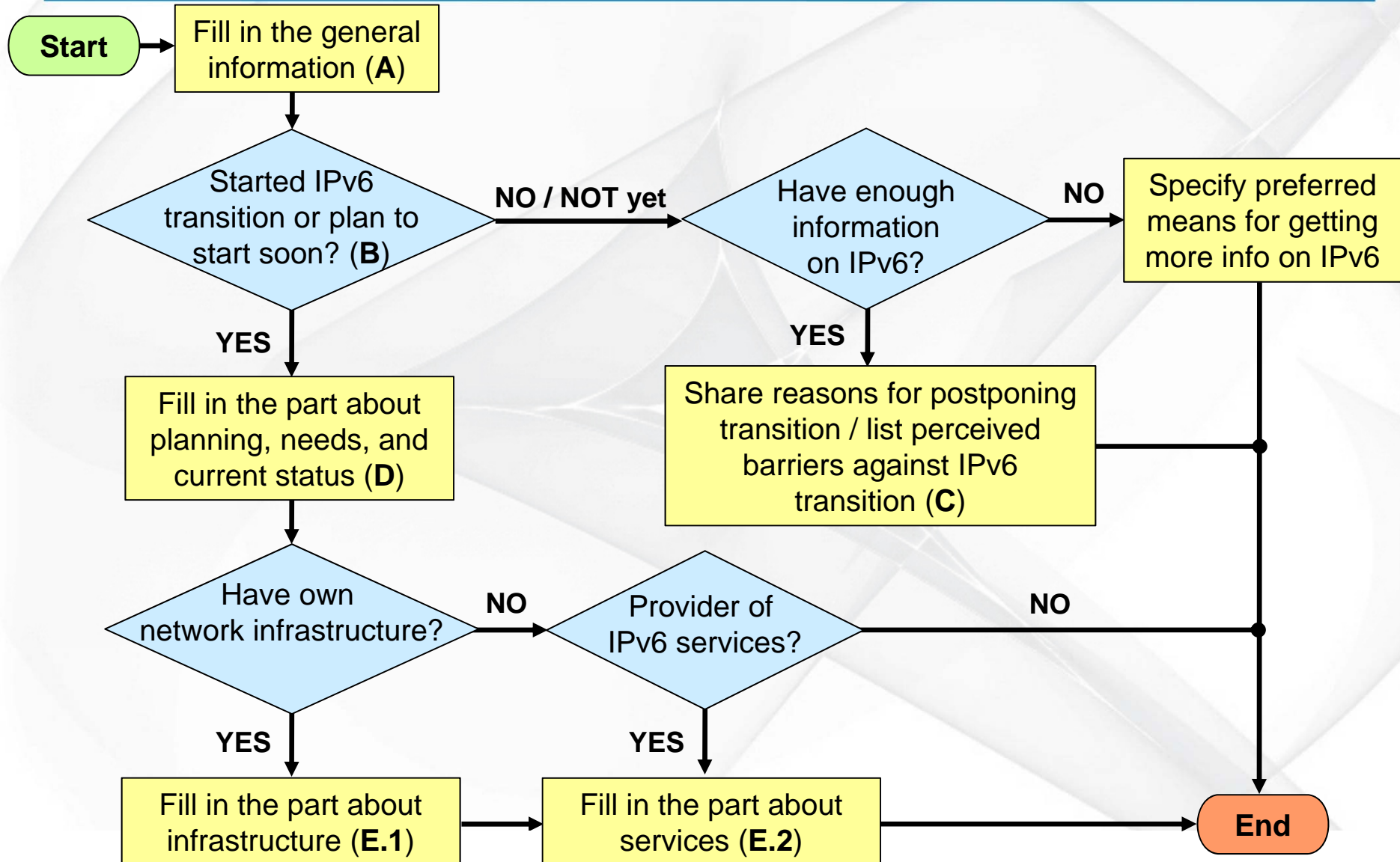
Assessment of IPv6 readiness in the national research and education network

❖ Current IPv6 deployment in CARNet member institutions is around 0.5%.

❖ Most likely reasons for a low adoption of IPv6 are:
  ❖ a lack of incentive to switch (shortage of IPv4 addresses is not yet a problem)
  ❖ low awareness of the potential benefits of IPv6.

❖ To probe the level of interest for IPv6 deployment, CARNet conducted IPv6 deployment assessment in their member institutions.
  ❖ results showed a positive attitude of member institutions towards IPv6 deployment, but also a lack of readiness for most actually perform it.
  ❖ first step - raising awareness about the benefits of IPv6, explaining the need for transition from IPv4 to IPv6, and educating system administrators and other technical personnel in member institutions.
  ❖ next step would involve providing technical support during the transition.

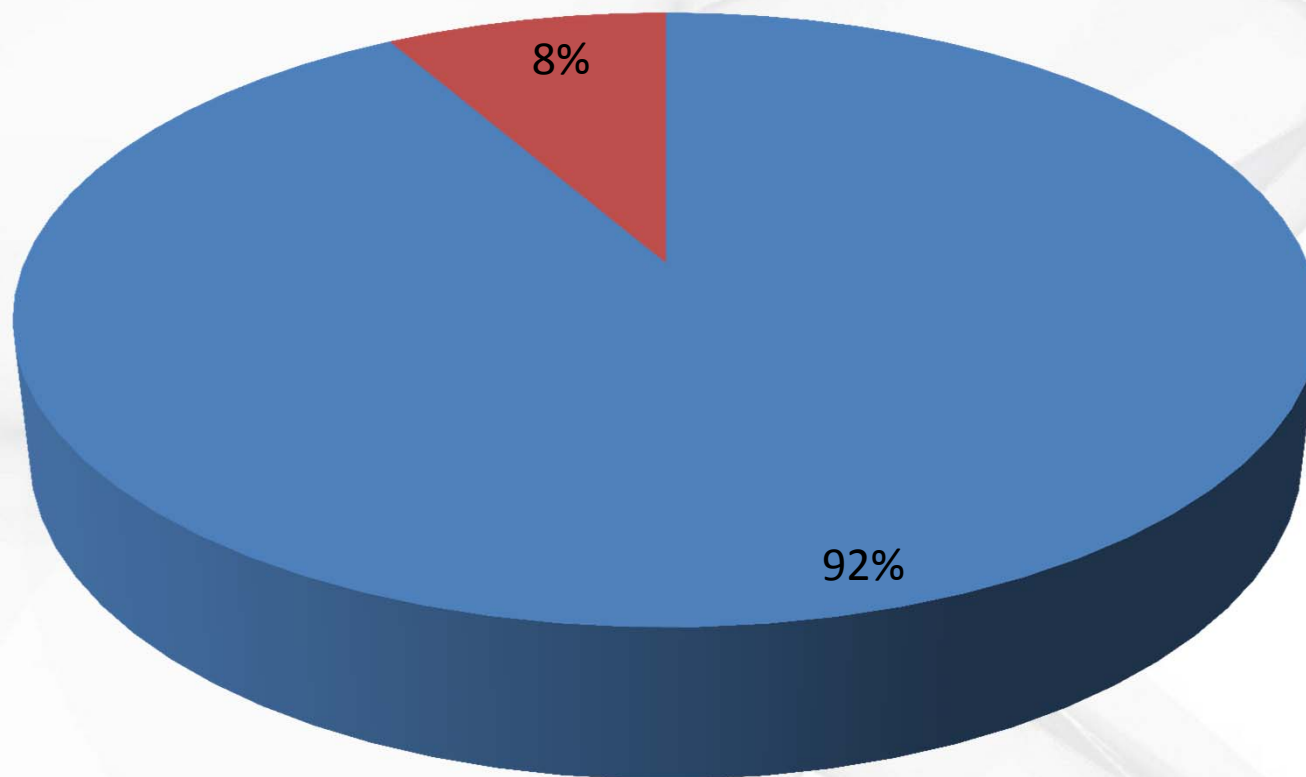# Assessment of IPv6 readiness of ISPs

Assessment of IPv6 readiness of ISPs

❖ As a national regulatory agency, HAKOM is also responsible for the principles and policy objectives for the development of electronic communications in Croatia.

❖ In order to assess the situation regarding IPv6 address space allocation and IPv6 deployment in Croatia, on June/August, 2011, HAKOM conducted a public consultation - "*Usage of IPv6 addresses in Croatia*".

❖ The purpose of the questionnaire was to obtain information about the respondents' knowledge of IPv6 technology, as well as status of and plans for IPv6 deployment.

❖ The main aspects covered by the questionnaire are:
   ❖ technology (knowledge and equipment),
   ❖ cost,
   ❖ motivation,
   ❖ security concerns and
   ❖ transition strategy

Questionnaire flowchart

Start → Fill in the general information (**A**)

Started IPv6 transition or plan to start soon? (**B**)
— **NO / NOT yet** → Have enough information on IPv6?
— **NO** → Specify preferred means for getting more info on IPv6

Have enough information on IPv6? — **YES** → Share reasons for postponing transition / list perceived barriers against IPv6 transition (**C**)

Started IPv6 transition or plan to start soon? (**B**) — **YES** → Fill in the part about planning, needs, and current status (**D**)

Fill in the part about planning, needs, and current status (**D**) → Have own network infrastructure?
— **NO** → Provider of IPv6 services?
— **NO** → **End**

Have own network infrastructure? — **YES** → Fill in the part about infrastructure (**E.1**)

Provider of IPv6 services? — **YES** → Fill in the part about services (**E.2**)

Fill in the part about infrastructure (**E.1**) → Fill in the part about services (**E.2**) → **End**

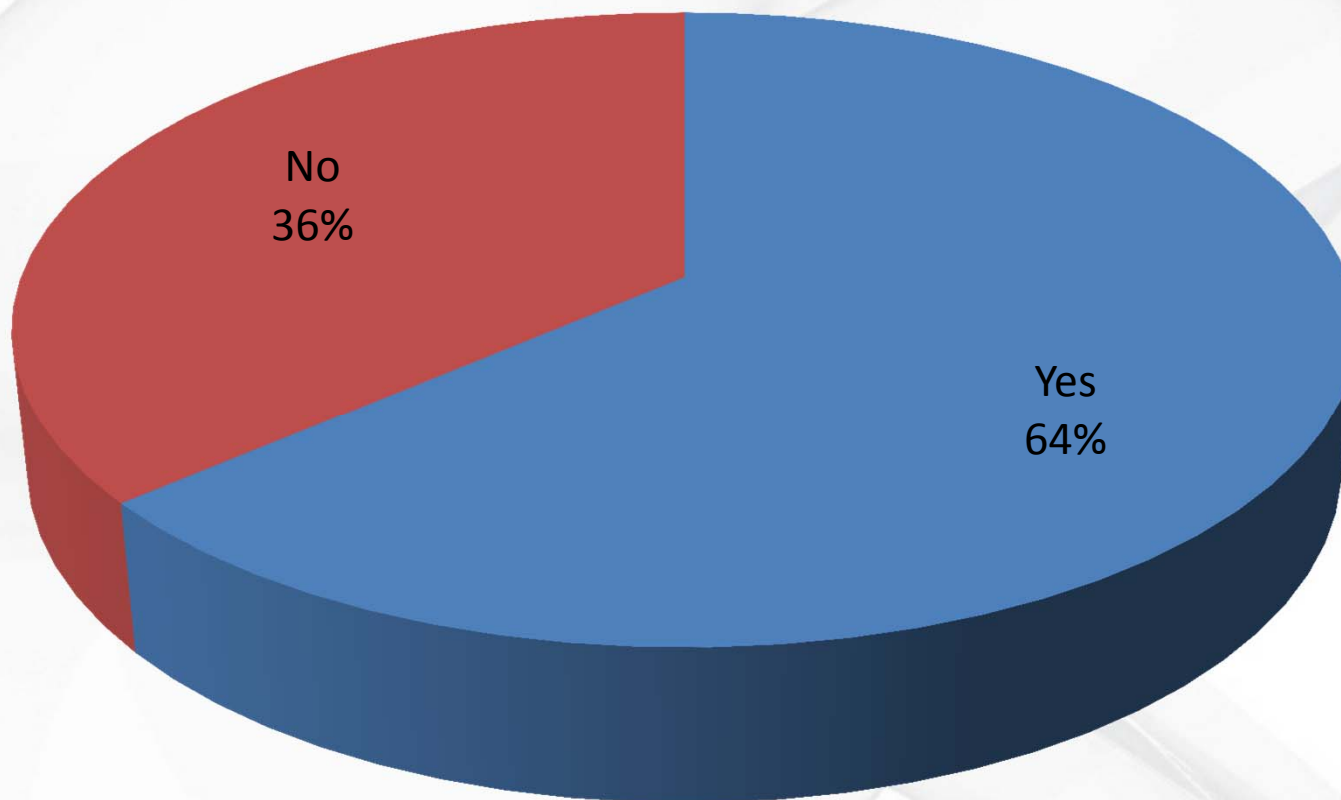# Are you planning (currently, or any time soon) IPv6 transition?

8%

92%

■ Yes　　■ No; not enough information
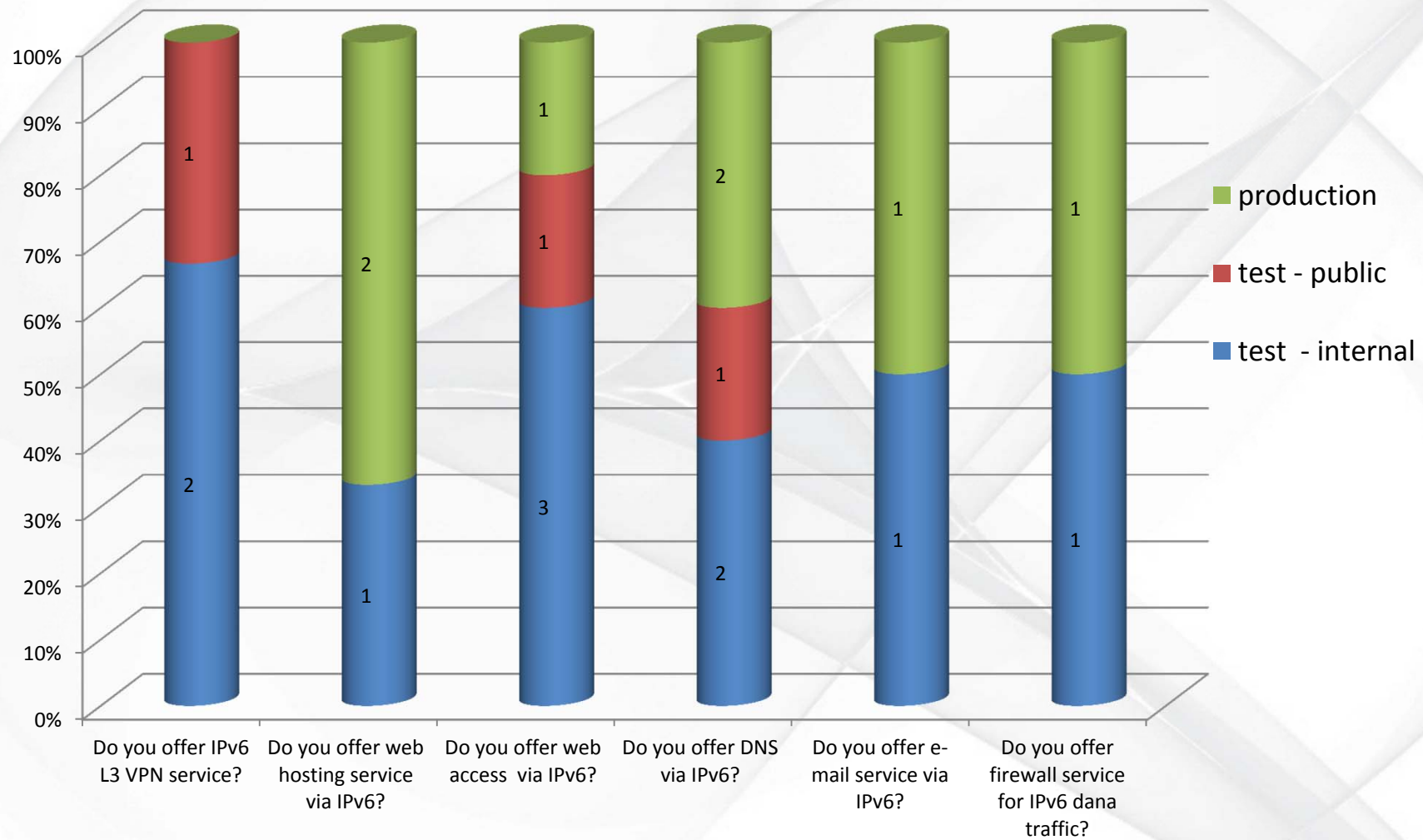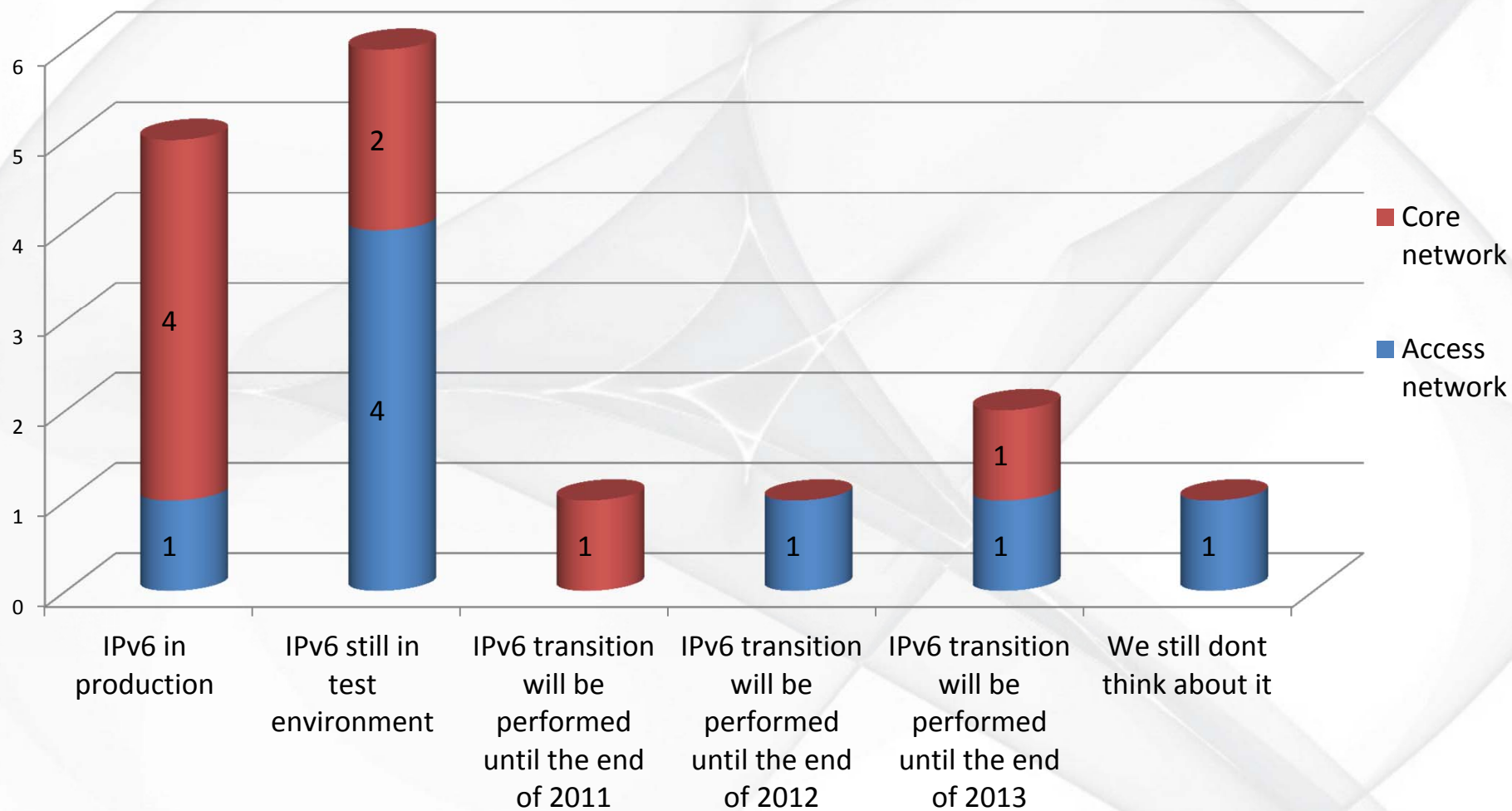
Have you already started IPv6 transition?

No
36%

Yes
64%

Service provisioning over IPv6

IPv6 connectivity

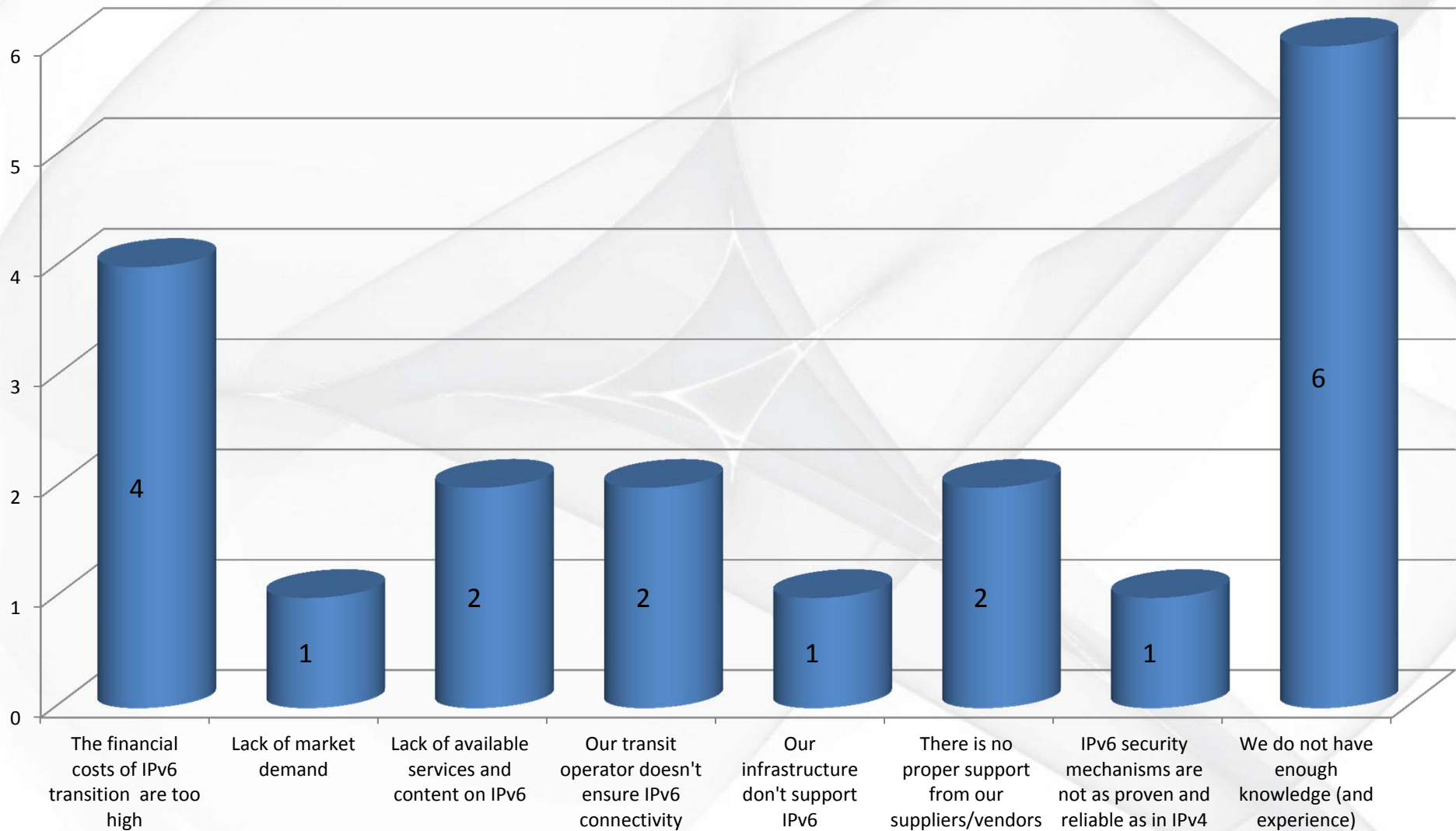# Assessment of IPv6 readiness in government and public authorities

Reasons for not planning IPv6 transition

Chart data:
- The financial costs of IPv6 transition are too high: 4
- Lack of market demand: 1
- Lack of available services and content on IPv6: 2
- Our transit operator doesn't ensure IPv6 connectivity: 2
- Our infrastructure don't support IPv6: 1
- There is no proper support from our suppliers/vendors: 2
- IPv6 security mechanisms are not as proven and reliable as in IPv4: 1
- We do not have enough knowledge (and experience): 6

Next steps towards IPv6 transition

❖ The first step towards IPv6 transition is education and training

  ❖ In the regular education system, IPv6 should be taught in networking technology classes in schools, at the same level as Internet technology and IPv4 are taught now.

  ❖ seminars for system engineers in academic institutions and schools on how to configure, monitor, and manage IPv6 network and services.

❖ For the government and public authorities in Croatia, the new national broadband strategy sets the general direction in favor of IPv6 deployment.

❖ Government and public authorities have an important role to play as major consumers of ICT products and services, as well as providers of e-services which are becoming increasingly important means for them to interact with citizens.

  ❖ specify requirements for IPv6 compatibility when issuing tenders for ICT equipment and support, so as to be "future ready" at no additional (unnecessary) cost.

❖ Successful IPv6 deployment needs to be led by the private sector, provided that the private sector recognizes that adopting IPv6 is an investment for the future.

❖ Advantages and disadvantages, costs, risks and timing have to be established for each enterprise individually in order to select the right strategy.

   ❖ combination of the factors of the inevitable exhaustion of the available IPv4 addresses and the open competitive marketplace in the domestic ICT will be sufficient to encourage ISPs to adopt IPv6.

❖ HAKOM can act within its authority to promote and to raise awareness of IPv6 in Croatia and ensure competition.

❖ HAKOM initiated the establishment of IPv6 Croatia Forum, with the goal of promoting and advancing the use of IPv6 in Croatia.

   ❖ open for all interested parties (operators, equipment manufacturers, application developers, academic community, government, public authorities, etc.).

❖ The IPv6 adoption in Croatia is way below the European and global average.

❖ Three different assessment of IPv6 readiness were conducted:
  ❖ assessment for CARNet's member institutions,
  ❖ assessment for the ISPs and
  ❖ assessment for or government and public authorities.

❖ For the purposes of the assessment, questionnaire was made
  ❖ preliminary results - http://meetings.ripe.net/dubrovnik2011/presentation-upload/show.php?id=45

❖ Detailed and comprehensive analysis of this results will be first task of the newly established IPv6 Croatia Forum

❖ Next steps towards successful IPv6 transition in Croatia are also proposed

Thank you!