

***Croatian Post and Electronic
Communications Agency (HAKOM)***

IPv6 @HR

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About HAKOM

- ❖ HAKOM is an independent national regulatory body in the field of electronic communications and postal services;
- ❖ HAKOM originated in mid-2008 when previous Croatian Telecommunications Agency and Postal Services Council merged into a single organization - HAKOM;
- ❖ HAKOM was established and set up based on the Electronic Communications Act and the Postal Services Act;
- ❖ The work of HAKOM is run by the Council of the Croatian Post and Electronic Communications Agency. The Council is appointed by the Croatian Parliament;
- ❖ Expert, technical and administrative tasks of the national regulator are carried out by HAKOM's Administrative Service. Director runs the work of the HAKOM's Administrative Service.



HAKOM's competences and tasks

HAKOM's competences include:

- ❖ electronic communications and postal service market regulation
- ❖ consumer protection
- ❖ management of limited public goods in the interest of the Republic of Croatia, i.e.
 - ❖ RF spectrum
 - ❖ addressing space
 - ❖ numbering space

HAKOM's task is to ensure:

- ❖ market competition, stable growth and room for innovation in the electronic communications and postal service markets,
- ❖ protection of consumer interests and the possibility of selection among several communication and postal services at affordable prices,
- ❖ sustainable competitive conditions for operators and service providers with fair conditions for ROI,
- ❖ support to economic growth, public services and quality of life in Croatia through the introduction of modern technologies.



Introduction

- ❖ The IPv6 adoption in Croatia is lagging behind (4%, per BGPmon), and remains way below the European, as well as the 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, together with Faculty of Electrical Engineering and Computing (FER), Central State Administrative Office for e-Croatia and CARNet, has set out to review the past experiences and present state of IPv6 deployment in Croatia and assess the current status of IPv6 readiness and transition plans in public and private sectors deployment as a first step towards future IPv6 transition plans, in line with the national Strategy and internationally accepted directions
- ❖ Future activities to raise awareness of IPv6 in Croatia and to stimulate its adoption in research and education communities, government and public authorities, and private sector are discussed.



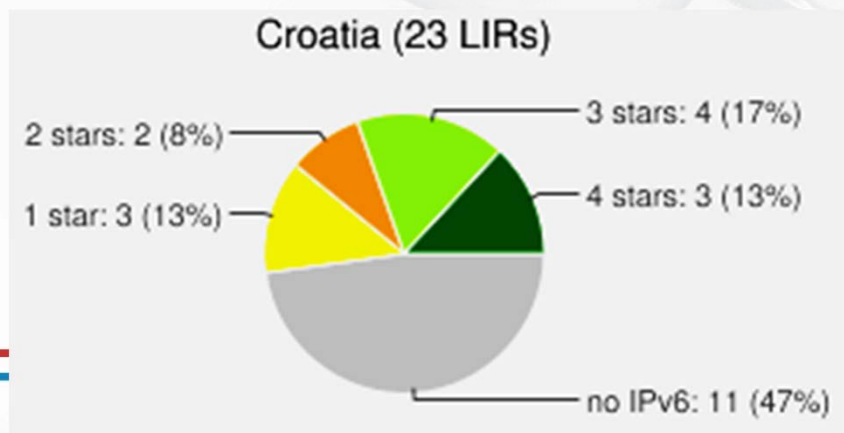
Status of IPv6 deployment in Croatia

- ❖ The first organized deployment of IPv6 in Croatia took place in CARNet, the national research and education network, in 2003 and 2004.
- ❖ Other ISPs (as of late June 2011, there are 67 registered ISPs in Croatia, but not all of them active) started with IPv6 deployment only recently, as shown by RIPE NCC data and other indicators.
- ❖ A local chapter of the IPv6 Forum, named IPv6 Task Force Croatia, was founded in November 2007, however, their latest activities according to their web page took place in 2008.
- ❖ 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 high bandwidth network GÉANT
- ❖ In late 2008, some IPv6 enabled services, including the CARNet main Web site and Usenet news, have been offered over both IPv4 and IPv6 infrastructure.



Status of IPv6 deployment in Croatia

- ❖ 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
 - ❖ IPv6 RIPEness information - 53% of LIRs (12 of 23) have at least 1 star, while 13% (3 out of 23) have 4 stars. On the other hand, 47% (11 of 23) have zero stars





Status of IPv6 deployment in Croatia

- ❖ the percentage of networks (ASs) that announce an IPv6 prefix for Croatia has grown from 1.82% in January 2009 to 8.45% in June 2011.

LG	Prefix	tld	NetName	Owner	AS	S	Allocated	First seen	Seen by	Last seen (*)
LG	2001:67c:2230::/48	hr	NTH-MEDIA	NTH Media d.o.o.	51778	A	2011-05-04		0%	never
LG	2001:7f8:28::/48	hr	CIX-20040415	CIX Croatian Internet eXc...		A	2004-04-15	2010-12-08 14:32:48	0%	2010-12-30 12:17:48
LG	2001:b68::/32	hr	HR-CARNET-20030305	Carnet	2108	A	2003-03-05	2004-03-09 18:31:53	100%	2011-09-01 10:33:18
LG	2001:1af0::/32	hr	HR-ISKON-20040407	Iskon	13046	A	2004-04-07	2004-04-14 12:00:41	98%	2011-09-01 10:33:19
LG	2a00:c30::/32	hr	HR-HPTNET-20081002	HT	5391	A	2008-10-02	2011-02-15 09:32:56	98%	2011-09-01 10:33:23
LG	2a00:dd8::/32	hr	HR-DCM-20081106	DCM	31012	A	2008-11-06	2011-05-13 15:33:13	98%	2011-09-01 10:33:23
LG	2a00:1bb8::/32	hr	HR-VIPNET-20100222	VIPNET		A	2010-02-22		0%	never
LG	2a00:7880::/32	hr	HR-VOLJA-20110509	Voljatelj telekomunikacije...	34362	A	2011-05-09		0%	never
LG	2a02:ac8::/32	hr	HR-OPTIMA-20090302	OT - Optima Telekom d.d.o...	34594	A	2009-03-02	2009-04-02 11:17:28	99%	2011-09-01 10:33:25
LG	2a02:20b8::/32	hr	HR-OIV-20100707	Odasiljaci i veze d.o.o.	48797	A	2010-07-07	2011-01-03 13:32:50	99%	2011-09-01 10:33:26
LG	2a02:2608::/32	hr	HR-OMONIA-20101013	Omonia d.o.o. za usluge i...	44306	A	2010-10-13		0%	never
LG	2a03:6100::/32	hr	HR-PORTUS-20110405	H1 Telekom d.d.		A	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>

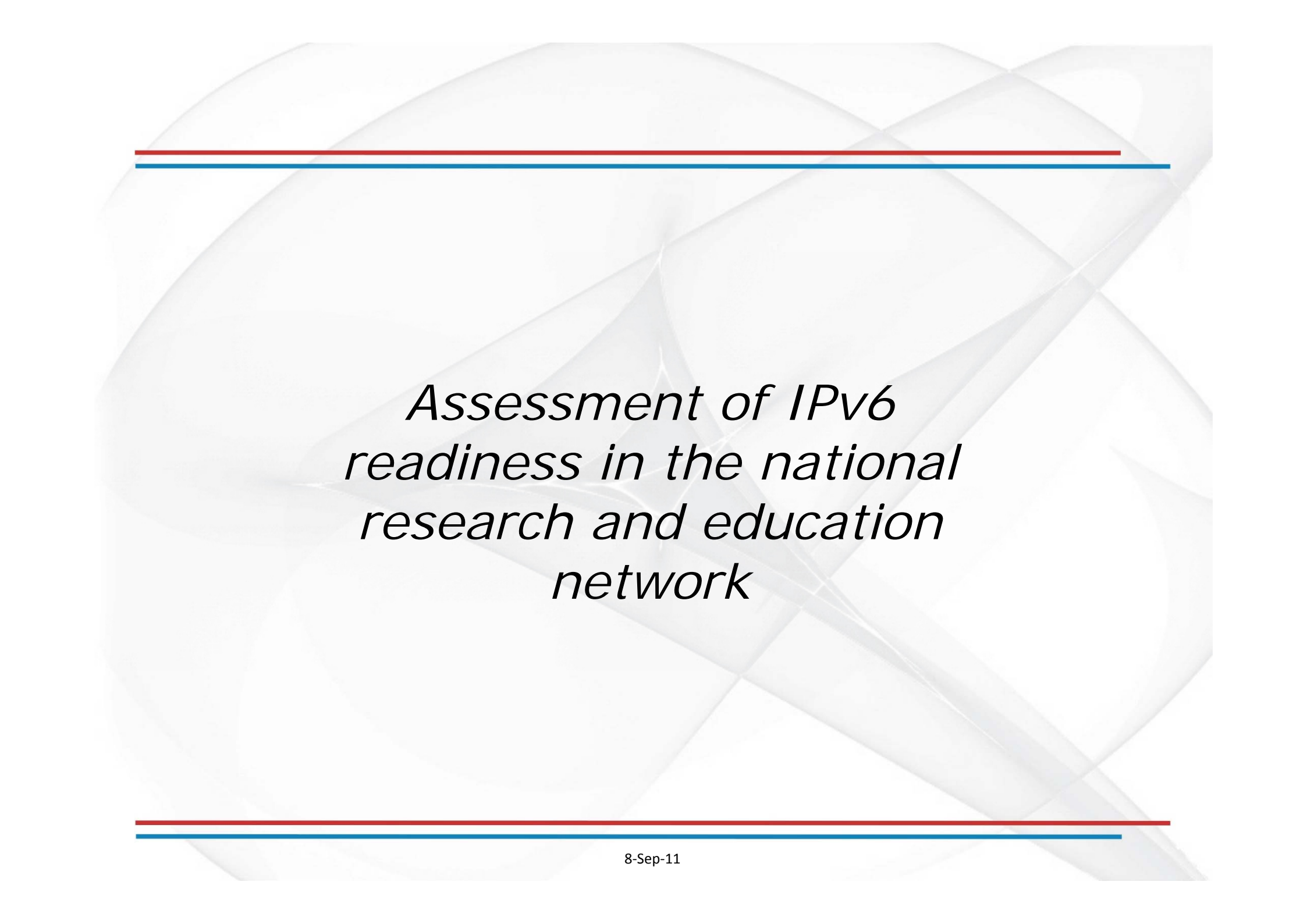


Assessment of IPv6 readiness for a large scale IPv6 deployment

- ❖ 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, availability, complexity and resources involved in the transition process differ for the above categories and should be considered independently. They 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 for CARNet's member institutions,
 - ❖ assessment for the ISPs and
 - ❖ assessment for government and public authorities.



*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 (the shortage of IPv4 addresses is not a problem as of yet) and
 - ❖ 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 to actually perform it (on their own initiative).
 - ❖ Thus, the first step should be 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.
 - ❖ The next step would involve providing technical support during the transition.

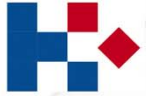


Assessment of IPv6
readiness of ISPs

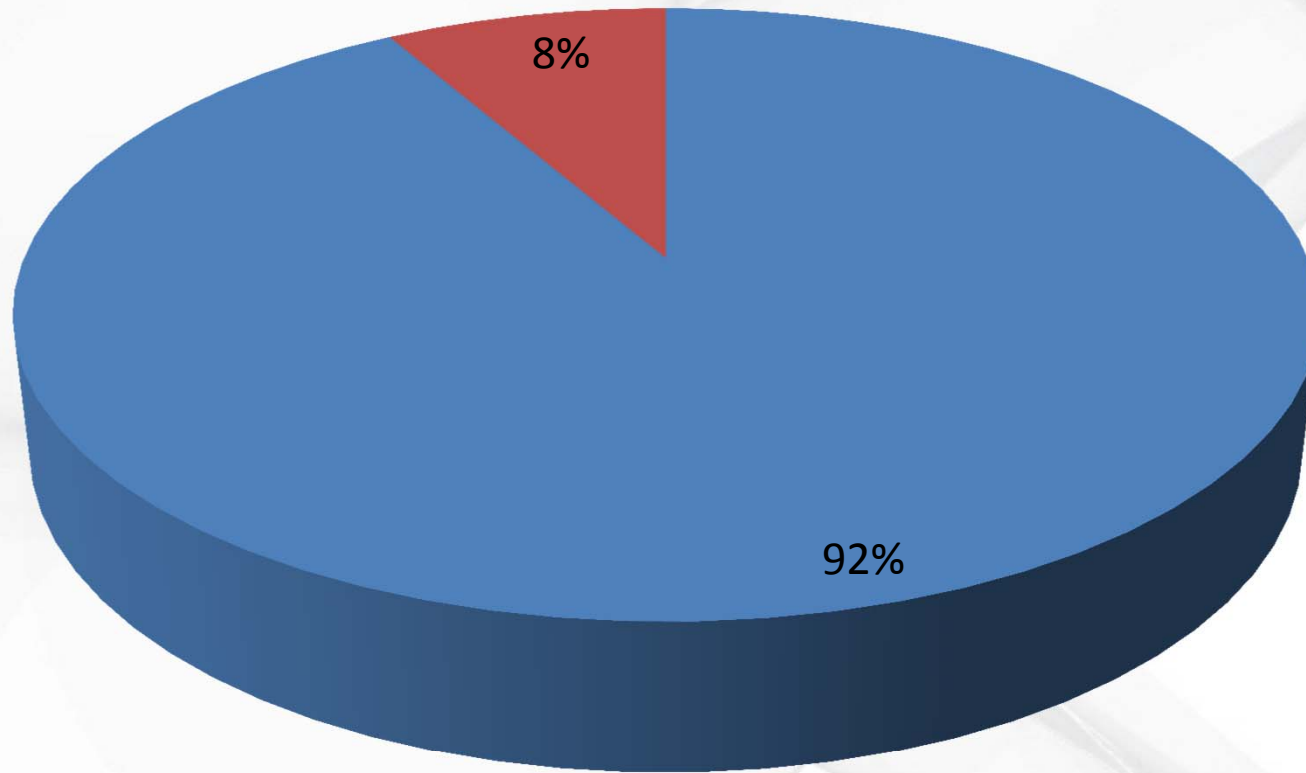


Assessment of IPv6 readiness of ISPs

- ❖ As a national regulatory agency, HAKOM is also responsible for the principles and policy objectives for the development of electronic communications in the Republic of 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 entitled "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

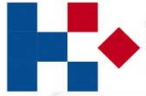


Are you planning (currently, or any time soon) IPv6 transition?

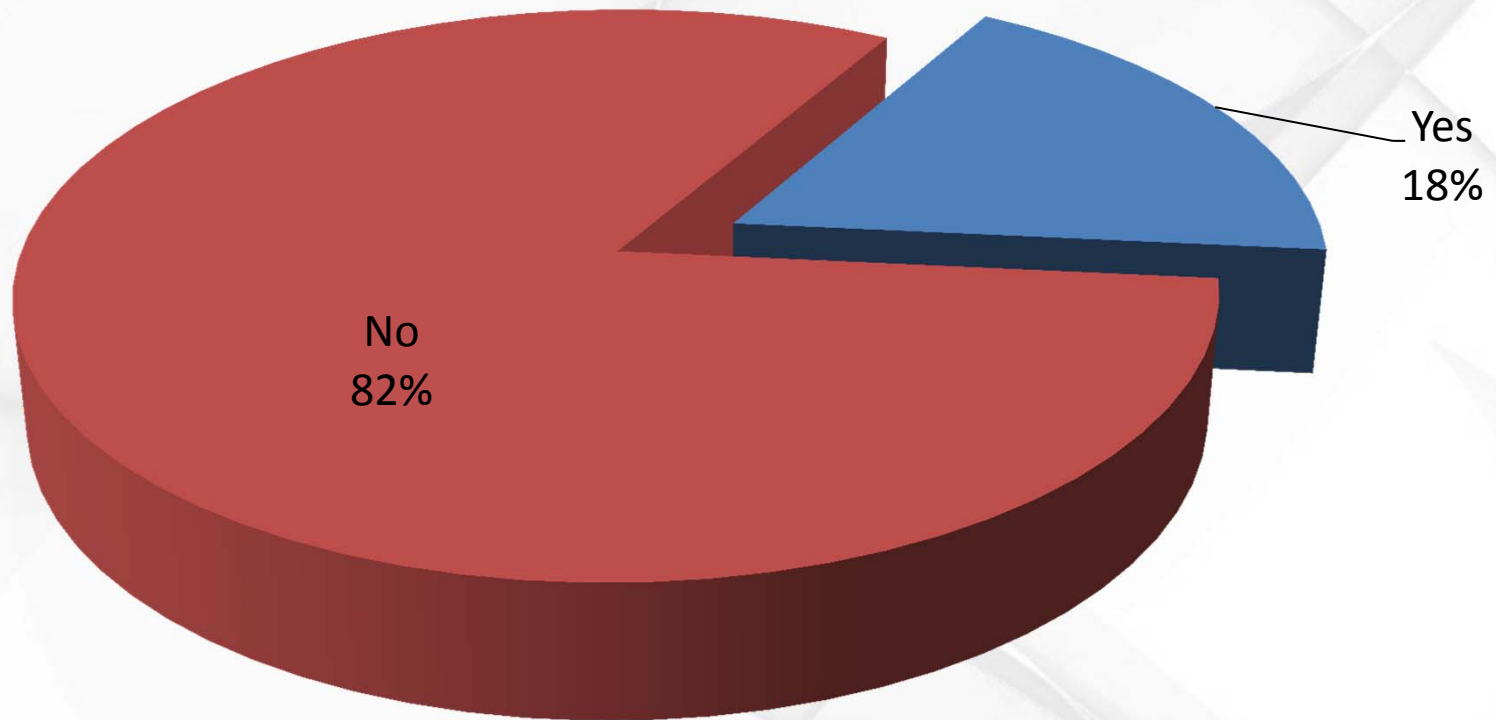


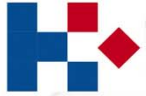
■ Yes

■ No; not enough information

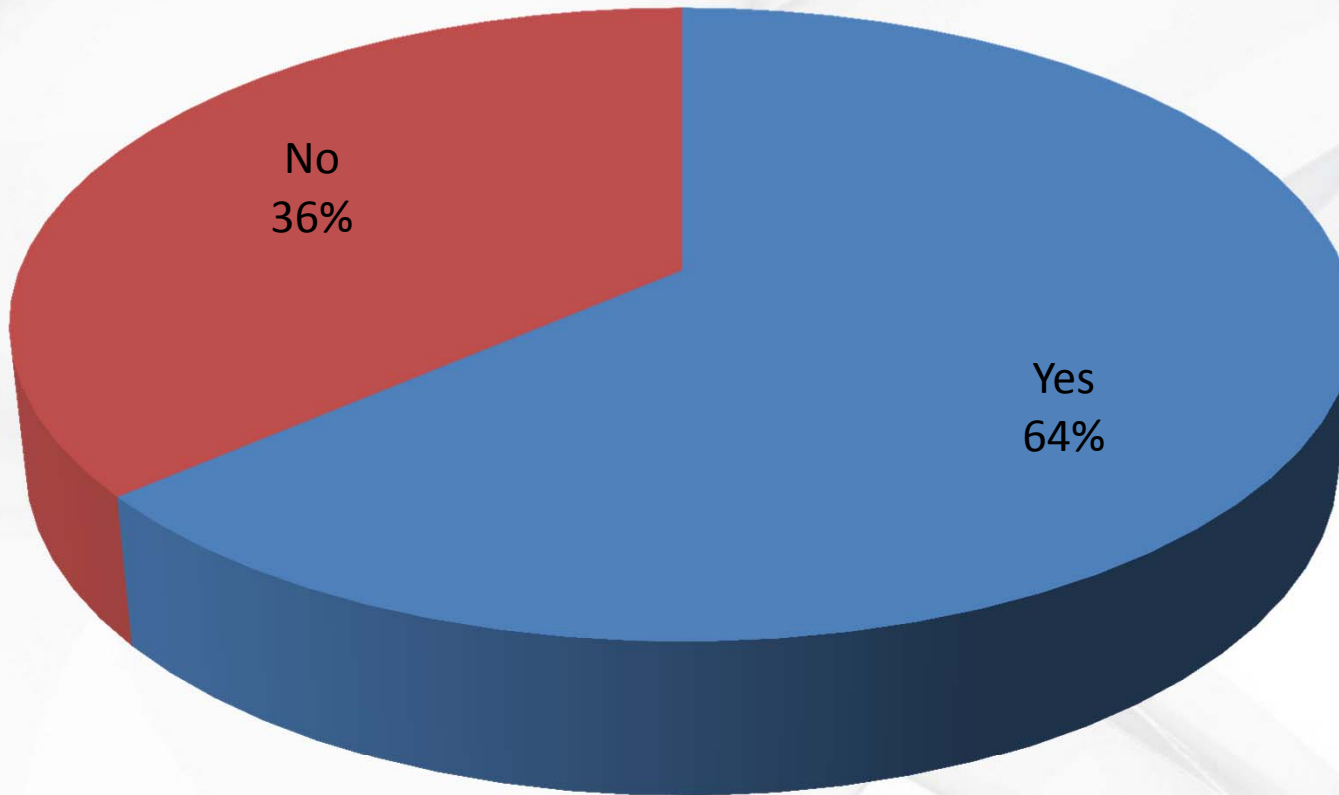


Is the current number of allocated IPv4 addresses satisfactory for the next three years?



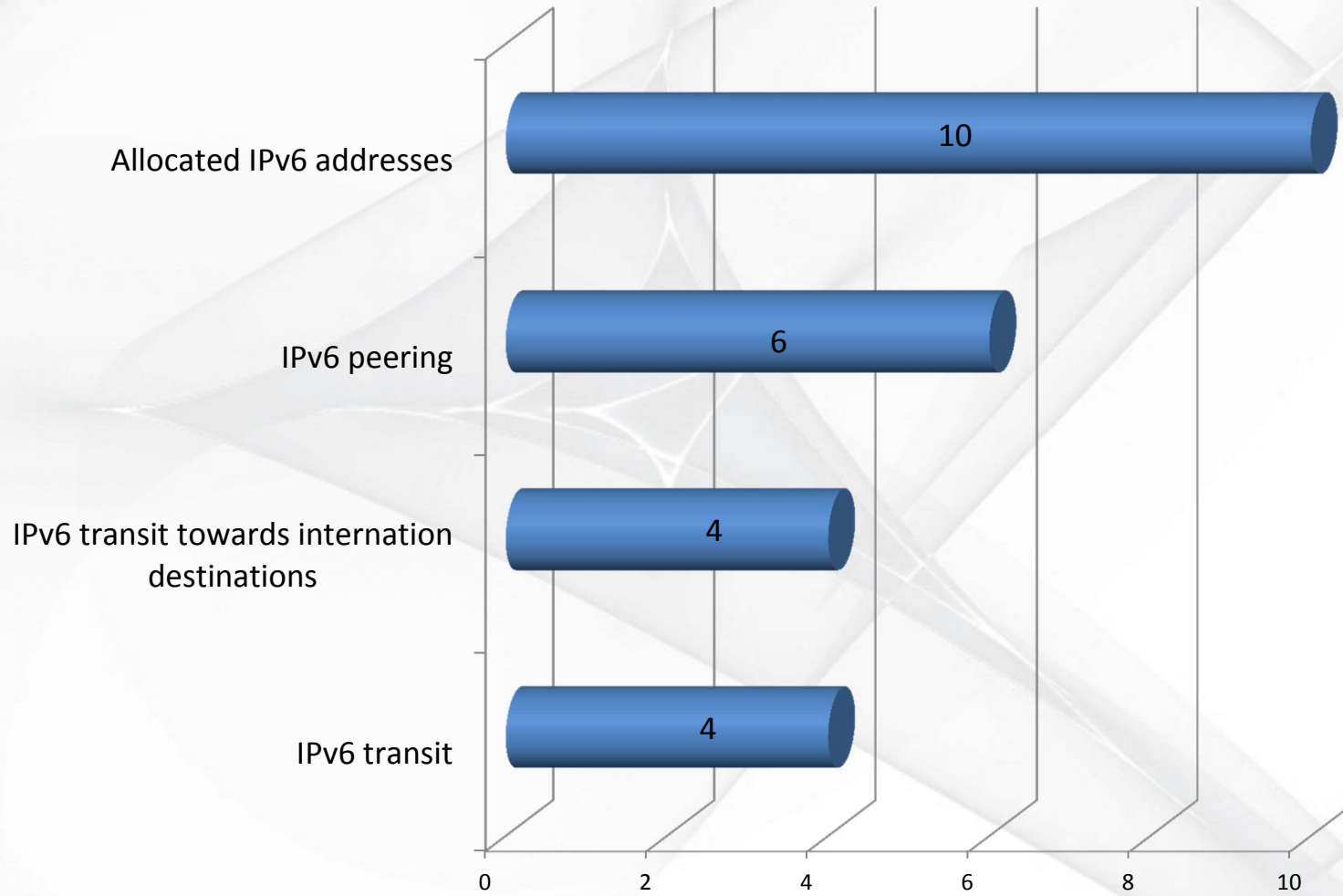


Have you already started IPv6 transition?



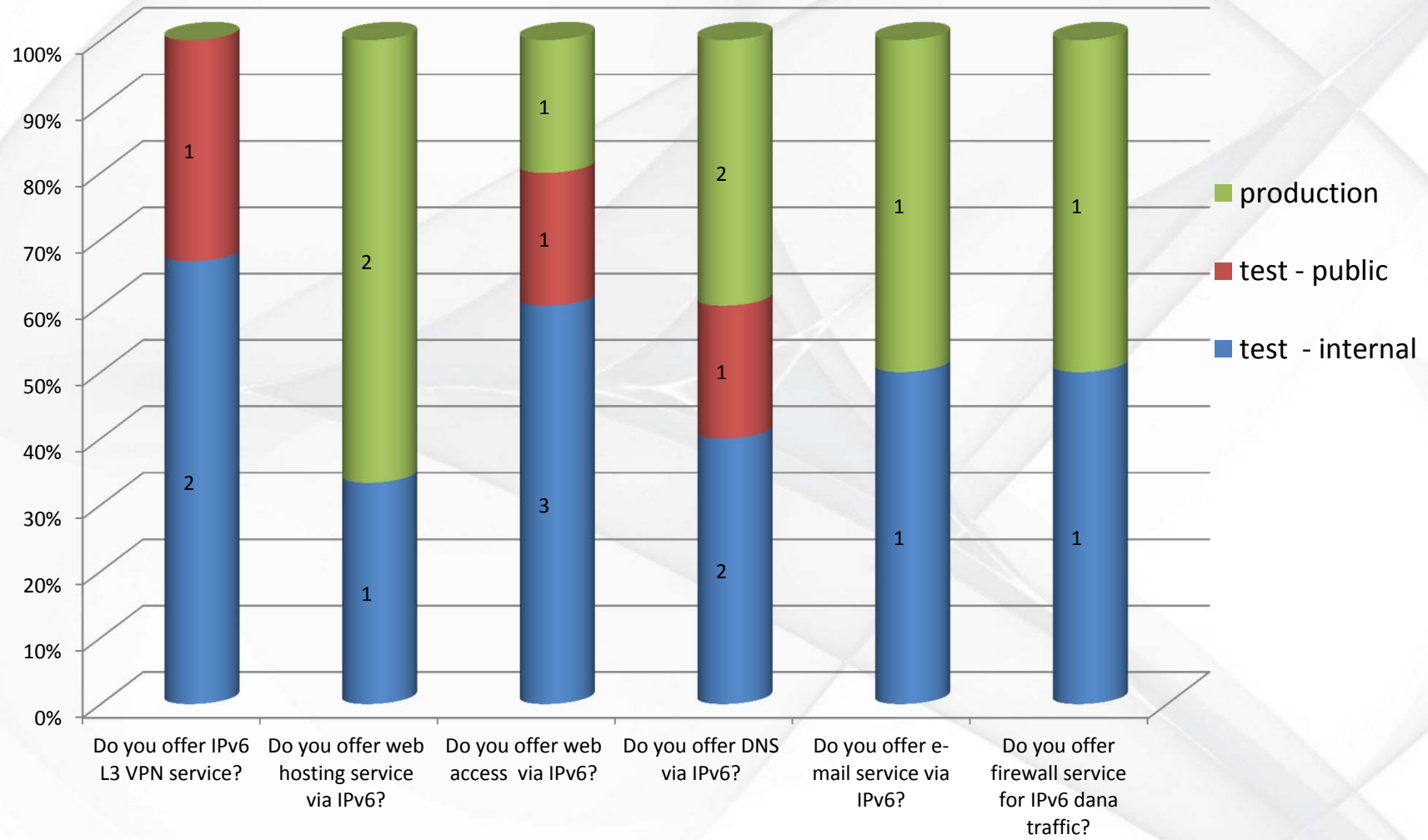


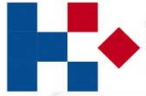
Status of IPv6 deployment



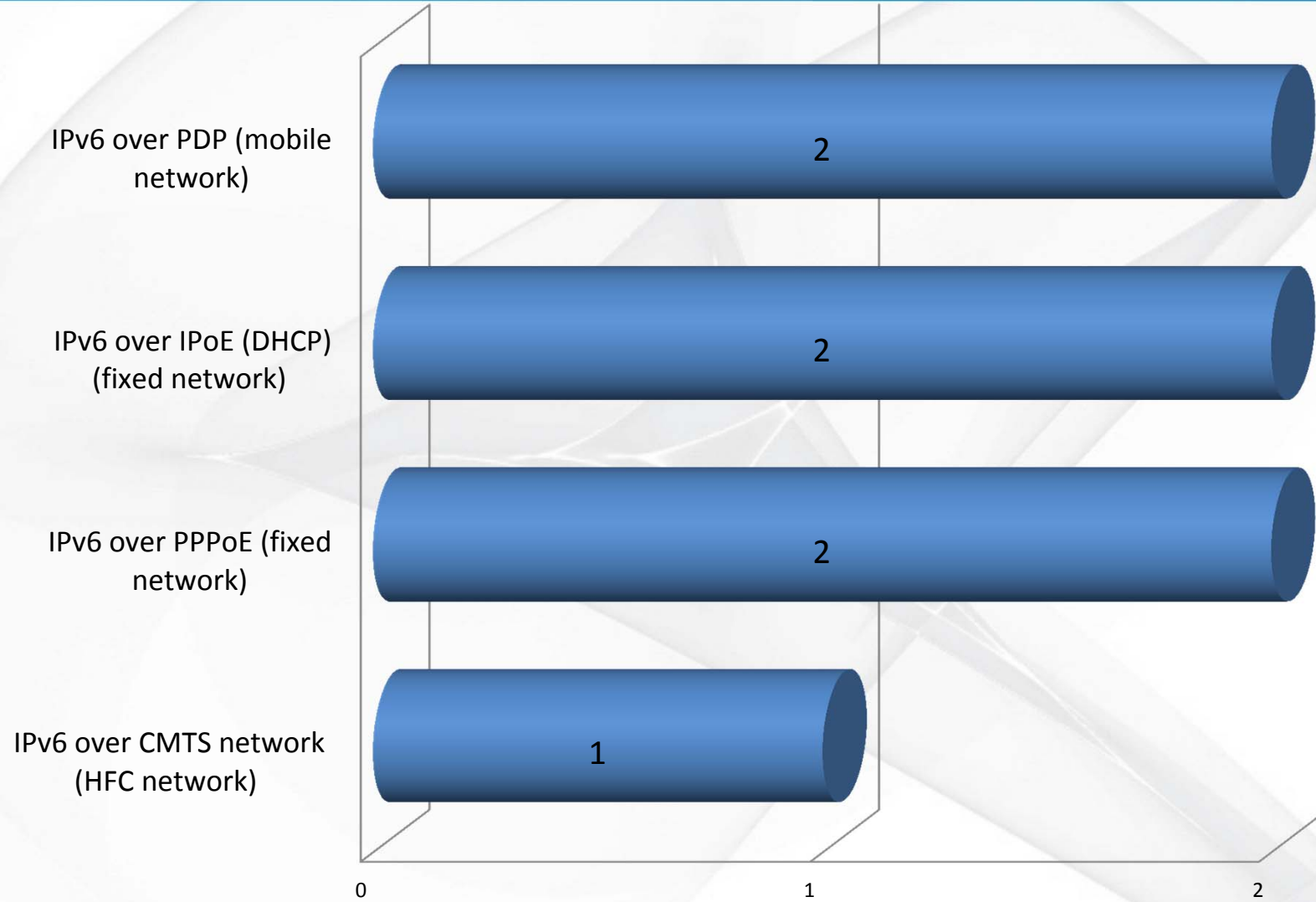


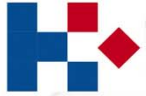
Service provisioning over IPv6



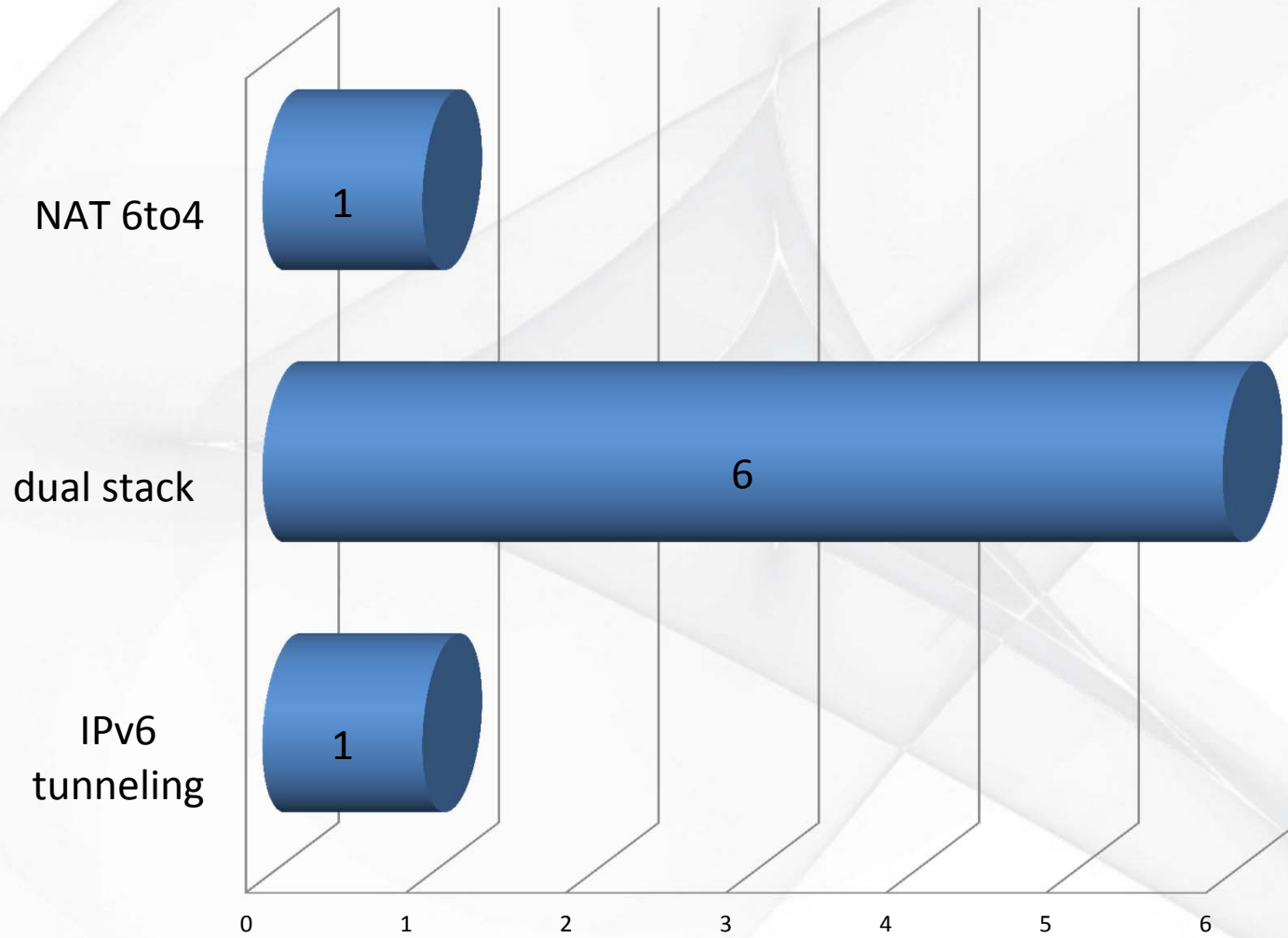


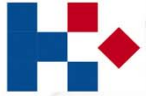
IPv6 network infrastructure - Access network



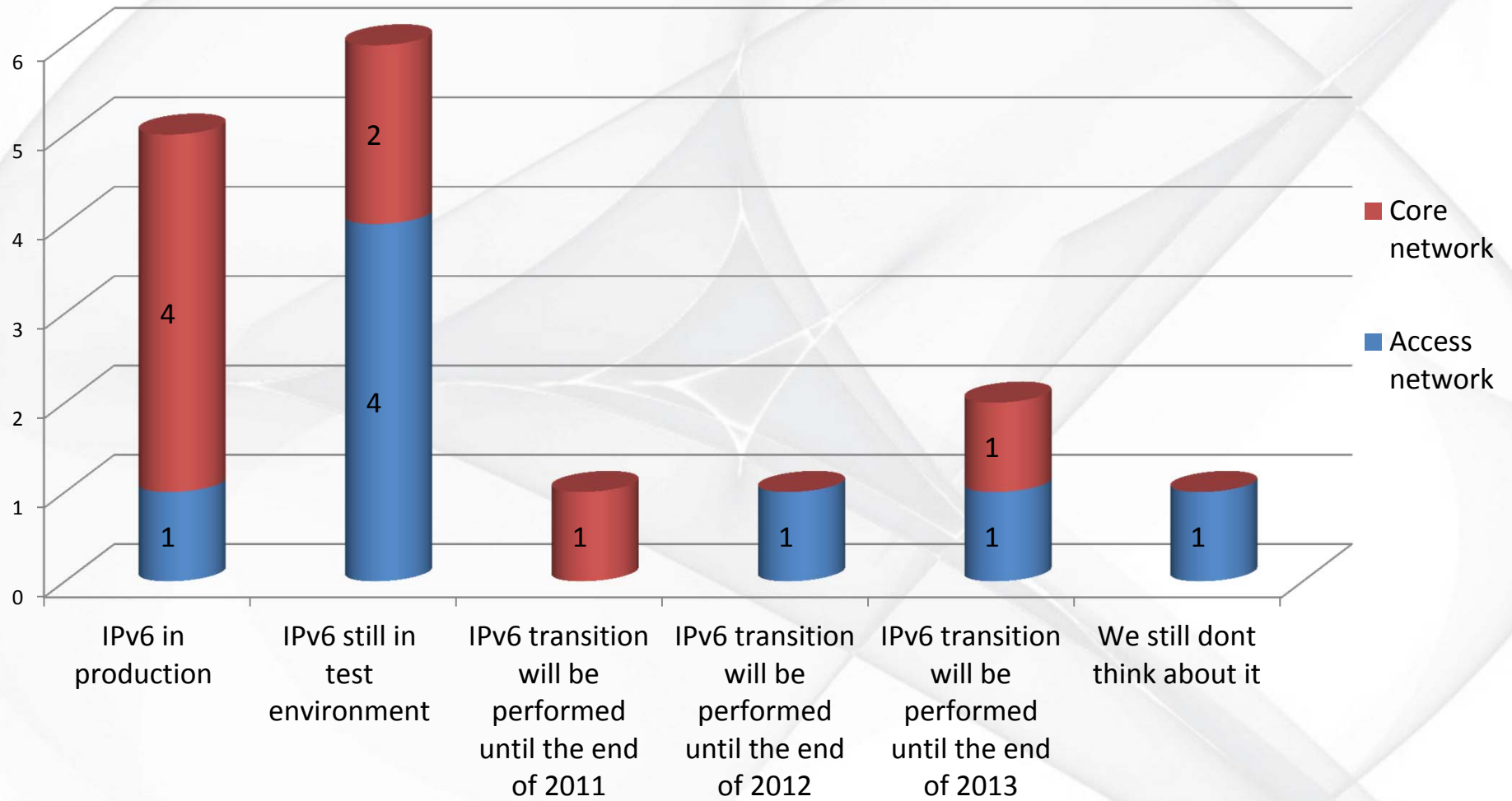


IPv6 network infrastructure - Core network





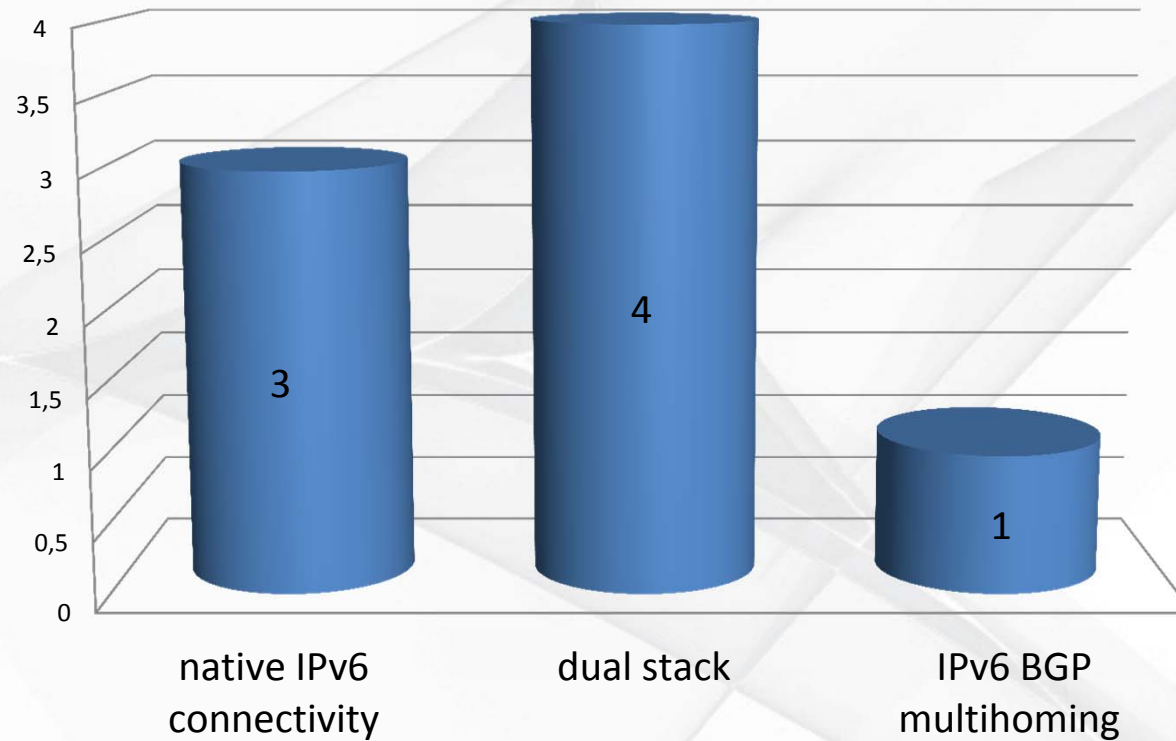
IPv6 connectivity

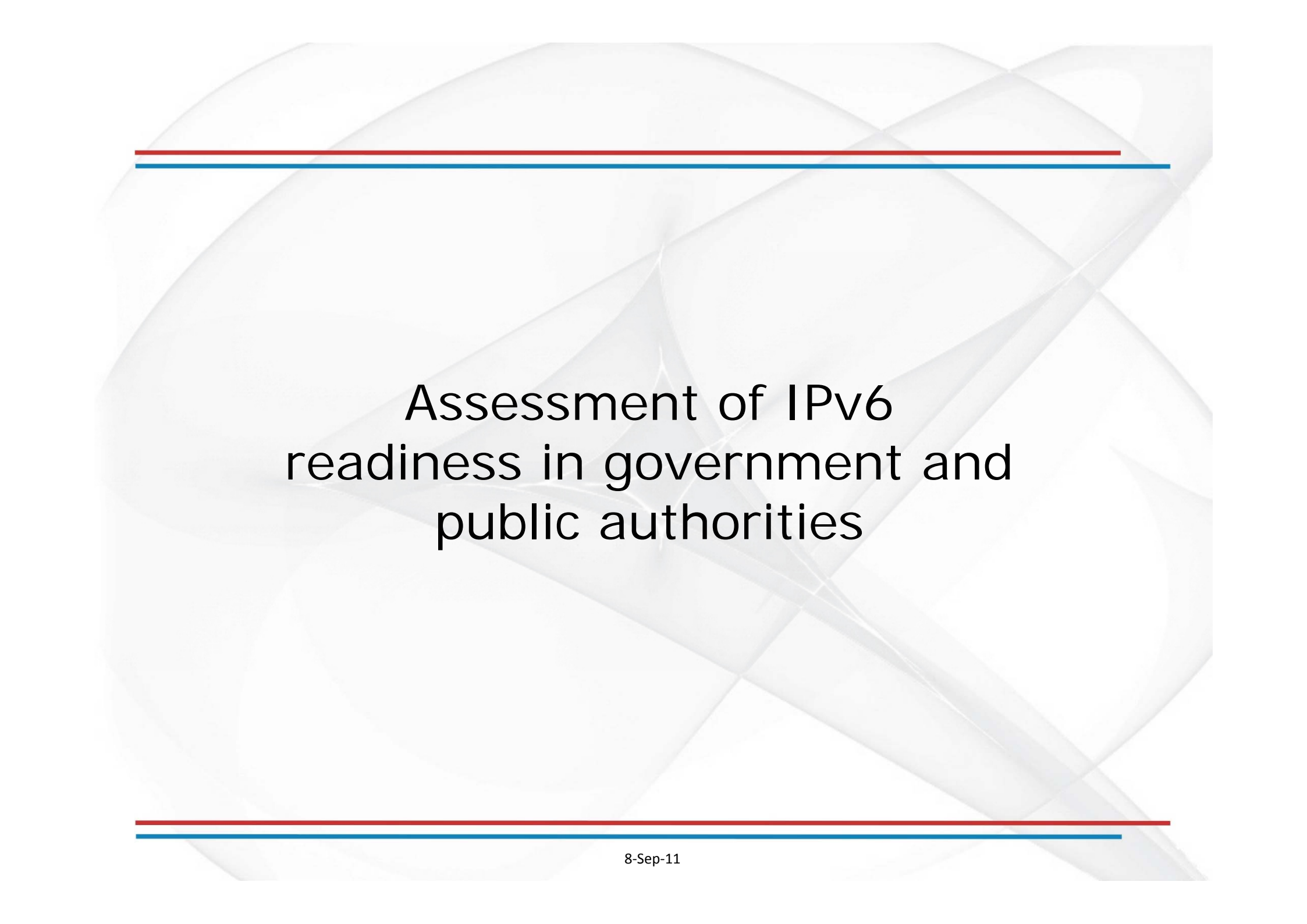




Number of ISPs that offer IPv6 connectivity for customers

Business customers

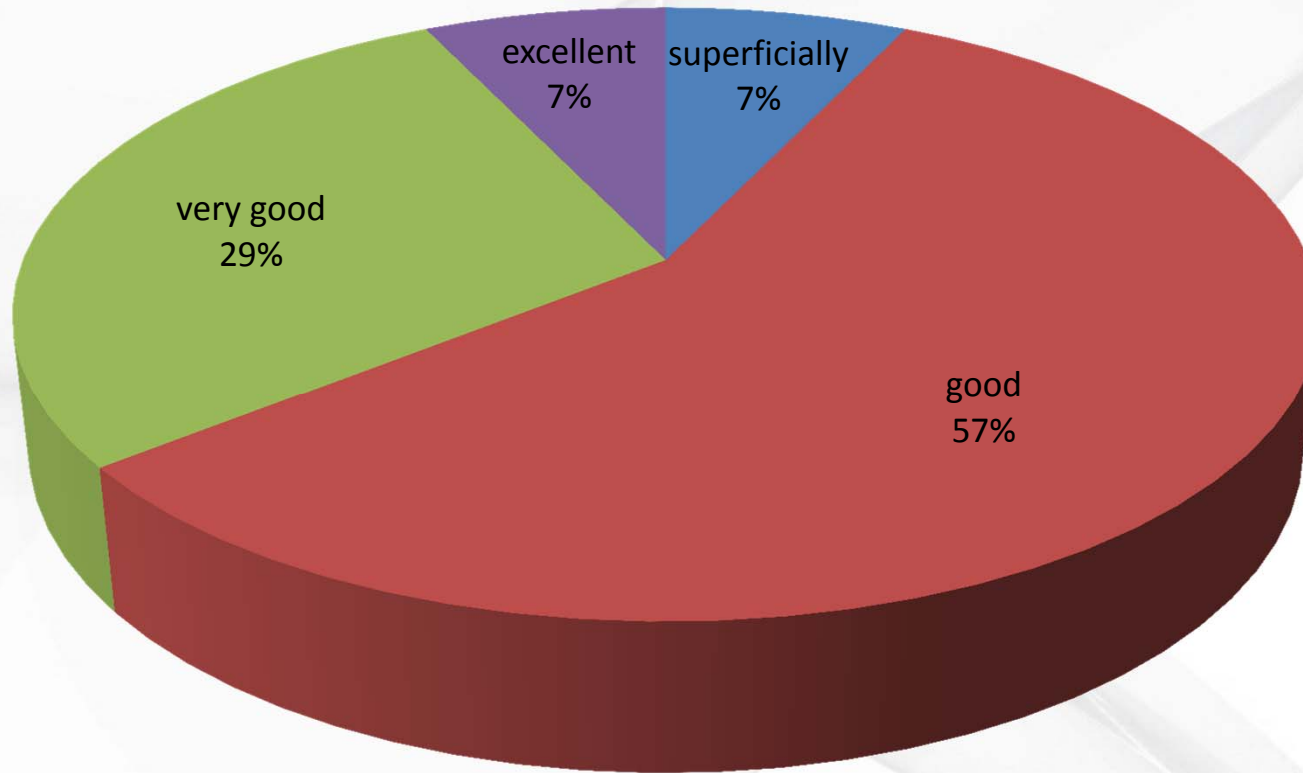




Assessment of IPv6
readiness in government and
public authorities

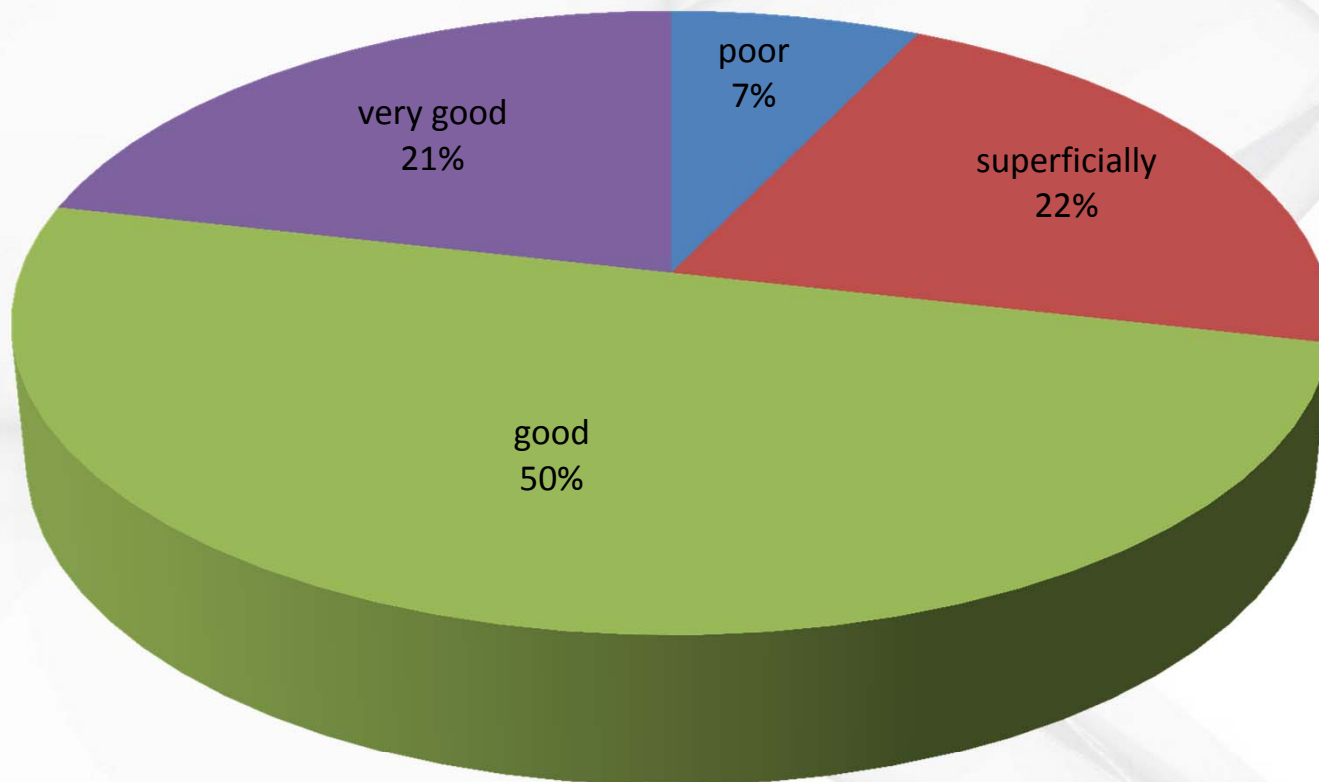


The knowledge about IPv6 transition



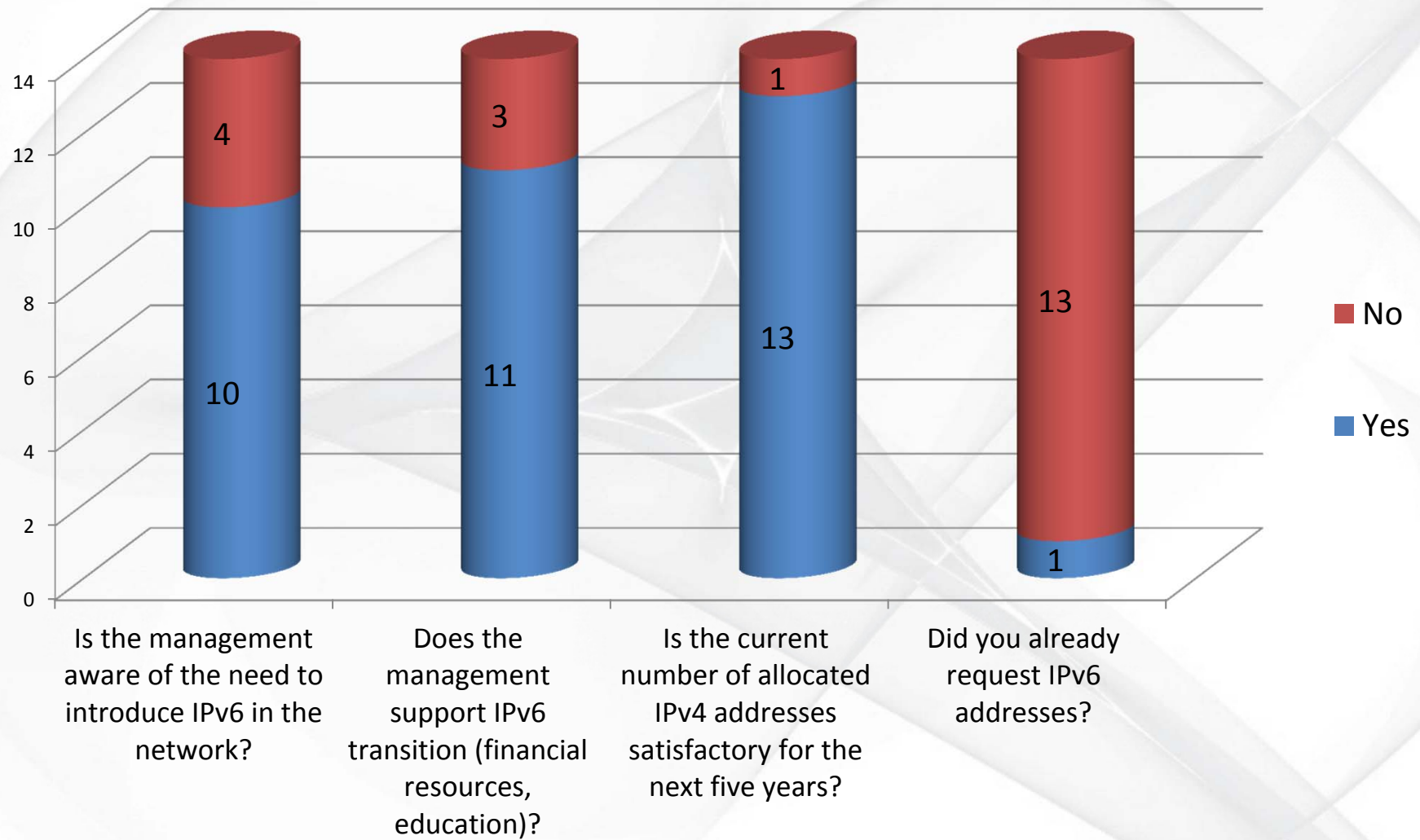


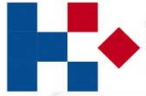
How do you assess the knowledge of the system administrators regarding IPv6 transition?



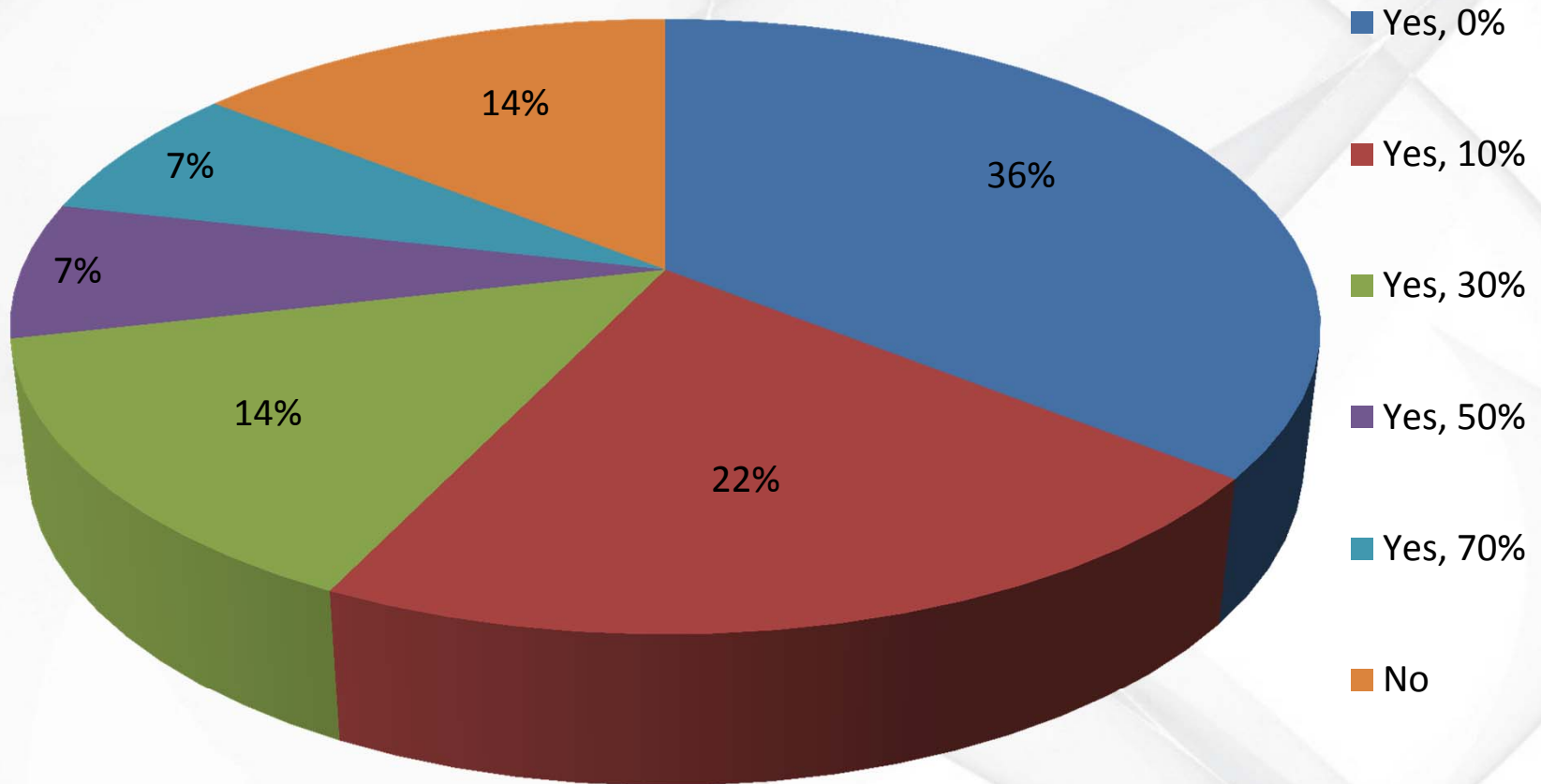


Deployment of IPv6 – current status



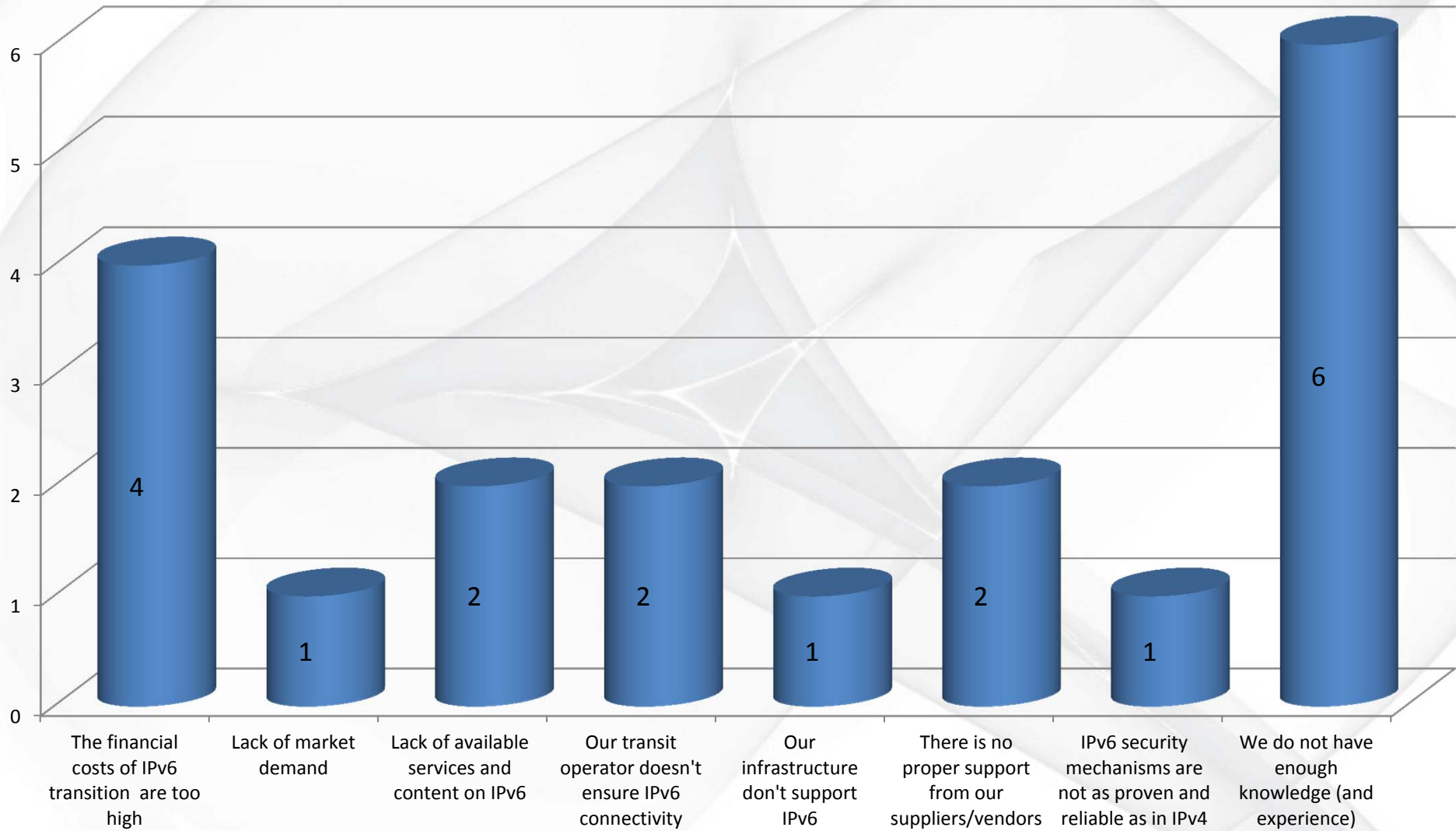


Did you make a list of hardware and software that needs to be replaced or upgraded for the purpose of IPv6 deployment (%)?





Reasons for not planning IPv6 transition





Next steps towards IPv6 transition

- ❖ The first step towards IPv6 transition is education and training, to be performed at several levels.
 - ❖ 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, secure, monitor, and manage IPv6 network and services in an IPv6 enabled end site (local area network).

- ❖ 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.
 - ❖ take part in building awareness and helping to minimize potential barriers, to complement the initiatives by actors coming from the private sector



Next steps towards IPv6 transition

- ❖ 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. It appears that the combination of the factors of the inevitable exhaustion of the available IPv4 addresses and the open competitive marketplace in the domestic ICT and related services industry 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 has also initiated the establishment of IPv6 Croatia Forum, with the goal of promoting and advancing the use of IPv6 in Croatia. IPv6 Croatia Forum will be open for all interested parties (operators, equipment manufacturers, application developers, education and academic community, government, public authorities, etc.).

Thank you!

