

GEN6 road show Brussels 21st May 2015 Address considerations and planning for governments



Martin Krengel Citkomm This project has received funding from the European Union's



European Commission challenges for IPv6 addressing in huge networks



- Connectivity in huge environments
- Setup of a national IPv6 addressing scheme for governments
- Special support for IPv6 transition in governments



Connectivity in huge environments

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Inter-networking with IPv4

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Inter-networking with IPv6

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Business networking – real live





Situation for national governments

- Specific situation for national governments, esp. with federal constitution
 - Several locations
 - Independent in ICT (strategy, organization, architecture, infrastructure)
 - No unit being able to set and enforce central decisions in ICT
 - Using secured networks for communication between each other is common sense
- Similar for huge companies / corporate groups with only small integration in ICT



Resulting Challenges

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- Quadratic growth of routing entries to the closed network according to linear growth of number of connecting networks
- Attendees of the closed network vary heavy in dimension single user locations up to central governments
 - Broad difference of used routers and router capabilities
 - Full set of routing entries must be handled by each router in the network even the poorest to enable any to any communication
 - Exchange and announcement of network addresses is necessary between all participants of the private network
 - Dynamic Routing is limited due to router dimension or security governance

What to want ...

- Easy routing decision between Internet and private networks
 - Security by transparency
 - Scalability by components
 - Scalability by network dimension
- Never need to renumber any more (after once numbering with IPv6)
 - Infrastructure ready for future communication requirements (e.g. end to end to other governments, to Internet services)



Solution idea

OVERNN



- Allocation of one Global Unique Address per endpoint
 - Use for communication over private links
 - Use for communication with Internet peer _
- ENABI Setup of a (central) governmental LIR (local internet registry)
 - Design of a central (aggregatable) address space for all national governments



Additional advantages

- Address space for governmental end site can be used (network) provider independent
- Advanced security architecture possible
 - Management of unused address space / prevention of IP-hijacking
 - Setup of security features like Routing PKI independent from single operators possible



Setup of a national IPv6 addressing scheme for governments



Germany: Setup LIR de.government

- Address block /26 was assigned in 2009
- Organisational structures had to be developed
 - National LIR localized at Federal Office of Administration
 - Setup of federal working group (the "IPv6 working group")
 - Suggested structure was accepted by the national ICT planning council (1/2011)

Setup of a central IPv6 addressing



Germany: Request of IPv6 address resources

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Source: DOI IPv6 Reference Manual



	Block	No.	Dual	Prefix	Block	No.	Dual	Prefix
	00: Hamburg	0	000000	2a02:1000 /32	08: Lower Saxony	8	001000	2a02:1008 /32
	01: Reserve	1	000001	2a02:1001/32	09: Reserve	9	001001	2a02:1009/32
	02: Schleswig Holstein	2	000010	2a02:1002/32	10: Reserve	10	001010	2a02:100a/32
	03: Reserve	3	000011	2a02:1003/32	11: Reserve	11	001011	2a02:100b /32
	04: Bremen	4	000100	2a02:1004/32	12: NRW	12	001100	2a02:100c/32
	05: Reserve	5	000101	2a02:1005/32	13: Reserve	13	001101	2a02:100d /32
	06: Mecklenburg-							
	Western Pomerania	6	000110	2a02:1006 /32	14: Reserve	14	001110	2a02:100e /32
	07: Reserve	7	000111	2a02:1007 /32	15: Reserve	15	001111	2a02:100f/32
	Block	No.	Dual	Prefix	Block	No.	Dual	Prefix
	16:Hesse	16	010000	2a02:1010 /32	24: Saarland	24	011000	2a02:1018/32
	17: Reserve	17	010001	2a02:1011/32	25: Reserve	25	011001	2a02:1019/32
	18: Reserve	18	010010	2a02:1012/32	26: DOI+Public SP	26	011010	2a02:101a/32
	19: Reserve	19	010011	2a02:1013/32	27: Reserve	27	011011	2a02:101b /32
	20: Rhineland-Palatin.	20	010100	2a02:1014/32	28: Saxony	28	011100	2a02:101c/32
	21: Reserve	21	010101	2a02:1015/32	29: Reserve	29	011101	2a02:101d /32
	22: Reserve	22	010110	2a02:1016/32	30: Reserve	30	011110	2a02:101e /32
	23: Reserve	23	010111	2a02:1017 /32	31: Reserve	31	011111	2a02:101f /32
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||*** *** Gen Address concept de.government SubLIR level

Setup of a central IPv6 addressing



Approach in other European nations

- Switzerland
 - Requested a central address space at RIP NCC
- Spain

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- Setup of a central address space
- Netherland
 - Investigation on a central addressing concept
- UK
 - Brought in a RIPE proposal on lowering barriers on address requirements by the department of defence



Special support for IPv6 transition in governments

Special support for IPv6 transition in governments

Motivation to start IPv6 transition now

• Network provider enable IPv6 as default

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- Carrier grade NAT causes potential problems
- Microsoft declared IPv6 as "mandatory part of the Windows operating system" in 2008*
 - Microsoft does no tests for evaluation on system behaviour with deactivated IPv6
 - New system services of Microsoft partly base on IPv6 only (e.g. HomeGroup, DirectAccess)

<u>* http://technet.microsoft.com/en-us/magazine/2009.07.cableguy.aspx</u> http://www.msxfaq.de/konzepte/ipv6.htm



Governmental specific basics - IPv6 transition guide

Content

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- Basics on IPv6
- Workshop modules for training and approach planning
- Best practices for approach
- Suggestions for solutions
- Checklists
- Documents public available in English
 - <u>http://www.lir.bund.de</u> best practice





Governmental specific basics - IPv6 profiles

Special support for IPv6 transition in governments

IPv6 profiles

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- Evaluation of existing equipment
- Support for procurement
- Bases on existing profiles (ripe-554, NIST USGv6, ...)
- End to end view on eGov-applications
 - Investigation of Hardware and Software
- No recommendations for configuration
- Documents public available in English
 <u>http://www.lir.bund.de</u> best practice

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Gesam	ter Gerä	tetyp						
Kommu	inikation	i des IPv	6-Knotens					
	Grund-J	Anforder	rungen					
		Basis						
			RFC 2460	Internet F	Protocol, Version 6 (IPv6) Specification	verpflichtend		
					Flow Label Feld wird nicht genutzt und	verpflichtend		
					ignoriert (solange RFC 6437 nicht			
			RFC 6540	IPv6 Sup	port Required for All IP-Capable Nodes	verpflichtend		
			RFC 6437	IPv6 Flor	w Label Specification	empfohlen		
			RFC 5722	Handling of Overlapping IPv6 Fragments		verpflichtend	überlappende	
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							Errata berück	
		ICMP						
			RFC 4443	ICMPv6		verpflichtend		
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Questions ?

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