Bundesministerium
des Innern
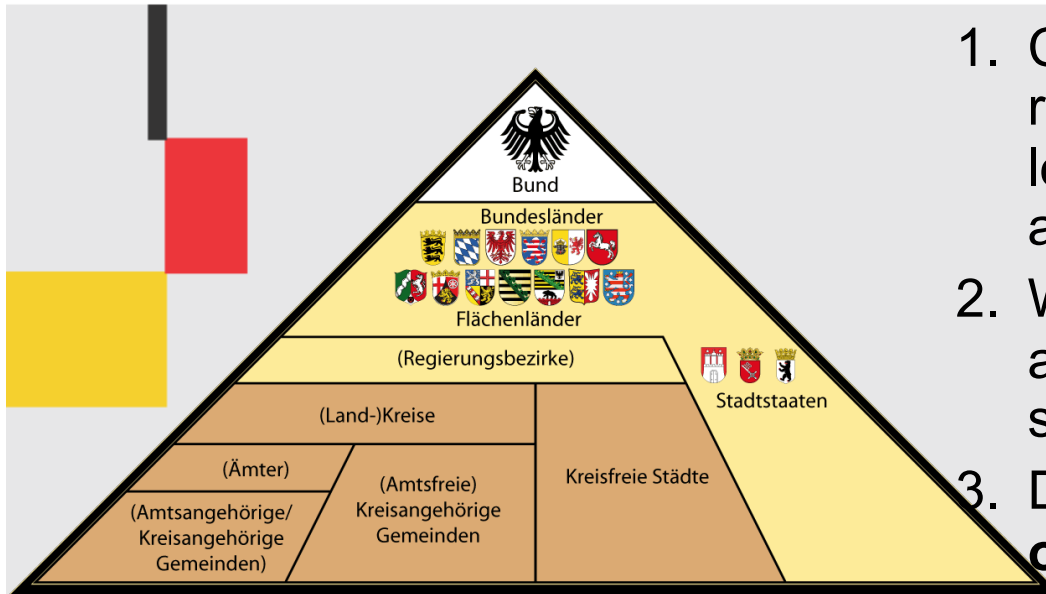
IPv6 in the
Public Administration of Germany

Constanze Bürger
Bundesministerium des Innern

![Bundesministerium des Innern logo]

Our Basis

1. Consensus within decision boards representing all administration levels to apply for a common IPv6 address space

2. We are LIR- de. government / got an Assignment of a /26 address space in 2010

3. Decisions – Organisation **Council of** federation, countries and municipalities from **March 2011**

IT-Planungsrat

What did we do …

Federal Ministry of the Interior and Federal Office of Administration

- took over the coordination of IPv6 working group - Colleagues from federation, states and municipalities
- Bundles know-how from all user levels
- Worked out proposals for the organization, address management and recommendations for technical implementation
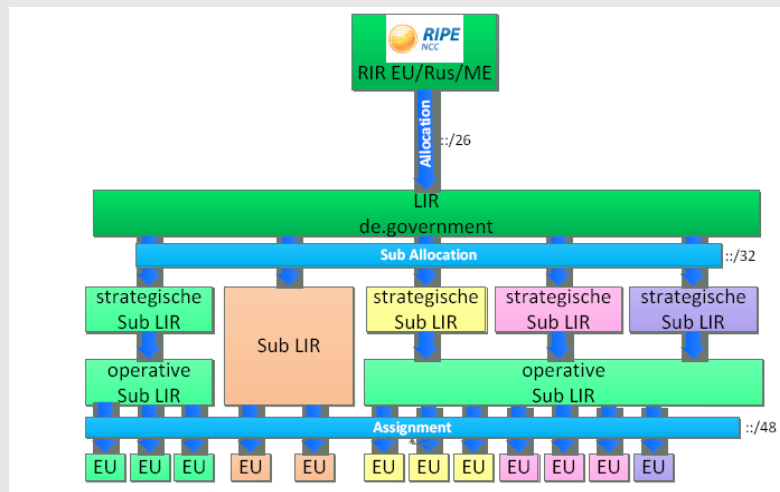

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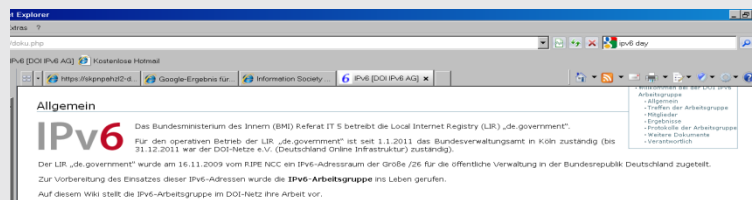
Organisation

Responsibilities :

Federal Mininstry of the Interior and Federal Office of Administration take over the role „de.government"

/32 blocks are self administrated bySub Local Internet Registries (Sub LIR)

Sub LIRs are for instance data centers, states, public network providers,…

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Address Concept

Block	Nr.	Dual	Präfix	Block	Nr.	Dual	Präfix
00: Hamburg	0	000000	2a02:1000 /32	08: Niedersachsen	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-Vorpommern	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	Nr.	Dual	Präfix	Block	Nr.	Dual	Präfix
16:Hessen	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+Öffentliche DL	26	011010	2a02:101a /32
19: Reserve	19	010011	2a02:1013 /32	27: Reserve	27	011011	2a02:101b /32
20: Rheinland-Pfalz	20	010100	2a02:1014 /32	28: Sachsen	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
Block	Nr.	Dual	Präfix	Block	Nr.	Dual	Präfix
32: Brandenburg	32	100000	2a02:1020 /32	40: Baden Württemberg	40	101000	2a02:1028 /32
33: Reserve	33	100001	2a02:1021 /32	41: Reserve	41	101001	2a02:1029 /32
34: Berlin	34	100010	2a02:1022 /32	42: Reserve	42	101010	2a02:102a /32
35: Reserve	35	100011	2a02:1023 /32	43: Reserve	43	101011	2a02:102b /32
36: Sachsen-Anhalt	36	100100	2a02:1024 /32	44: Bayern	44	101100	2a02:102c /32
37: Reserve	37	100101	2a02:1025 /32	45: Reserve	45	101101	2a02:102d /32
38: Thüringen	38	100110	2a02:1026 /32	46: Reserve	46	101110	2a02:102e /32
39: Reserve	39	100111	2a02:1027 /32	47: Reserve	47	101111	2a02:102f /32
Block	Nr.	Dual	Präfix	Block	Nr.	Dual	Präfix
48: Netze des Bundes	48	110000	2a02:1030 /32	56: BMVg res.	56	111000	2a02:1038 /32
49: Reserve	49	110001	2a02:1031 /32	57: BMVg res.	57	111001	2a02:1039 /32
50: Reserve	50	110010	2a02:1032 /32	58: BMVg res.	58	111010	2a02:103a /32
51: Reserve	51	110011	2a02:1033 /32	59: BMVg res.	59	111011	2a02:103b /32
52: Reserve	52	110100	2a02:1034 /32	60: BMVg	60	111100	2a02:103c /32
53: Reserve	53	110101	2a02:1035 /32	61: BMVg	61	111101	2a02:103d /32
54: Reserve	54	110110	2a02:1036 /32	62: BMVg	62	111110	2a02:103e /32
55: Reserve	55	110111	2a02:1037 /32	63: BMVg	63	111111	2a02:103f /32

Splits the /26 in 64 /32 bloks

Aim: well structured networks

Transparent Networks, hierarchical routing

We know, we have to learn

RIPE NCC LIR Training

RIPE Database Administration <ripe-dbm@ripe.net>

The update causing these changes had the following IP address:

 - From-Host: 77.87.228.66
 - Date/Time: Thu Apr 14 15:11:51 2011

CREATION REQUESTED FOR:

```
inet6num:     2a02:102c::/48
netname:      DE-GOVERNMNET
descr:        John Rambo Netz
country:      de
admin-c:      JR1-TEST
tech-c:       JR1-TEST
status:       ASSIGNED
mnt-by:       Bayern-MNT
changed:      John.Rambo@funfun.com
source:       TEST
```

Teaching each other

Reference Handbook

- Address concept - templates
- Roles
- Organisation
- Processes
- Technic recommandations
- Security
- Policies
- Checklists
- etc
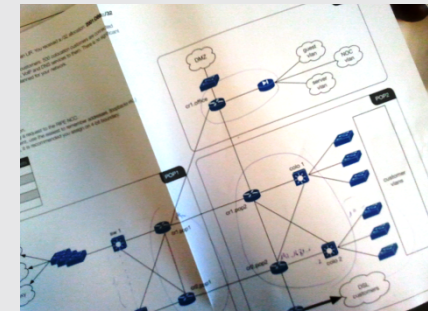
Telling about our needs

- Specify the demands of public administrations with respect to v6 (eg. IPv6 profiles)
- Discuss technical policies (routing, security, etc.) with the community considering the special needs of public infrastructures
- Explain the government strategies to manufactures so that they can anticipate future developments.

EU COM
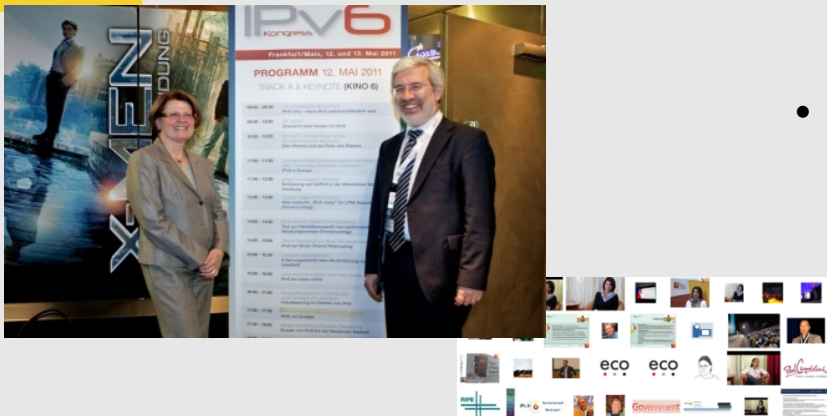
Research and Development Project
for German public administration

IPv6 profile for ICT equipment (RIPE proposal) is necessary

Research and Development Project for German public administration

- IPv6 Profile-NIST analogue gov US

- Requirement specification

- IPv6 specifications / purchasing guideline
we would propose to extend it for Europe later

- Transparent Industries /Users

- Influence to public IT infrastructure framework

- Focusing on the specific requirements of the
existing public infrastructure

Fraunhofer
FOKUS

BIT

IPv6 ACT NOW
www.ipv6actnow.org

2001:db8::cafe:babe
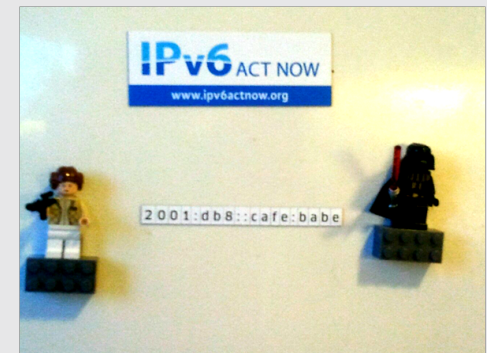
Characteristics of the IPv6 Profile

Kate-gorie	Kate-gorie	Kate-gorie	RFC	Titel	Merkmal, Funktion	Projekt-Empfehlung	Kommentar	ripe-501	NIST	ipv6ready.org	RFC 6434 - IPv6 Node Requirements	US DoD UCR 2008 Change 2 / IPv6 Standard Profiles
Gesamter Gerätetyp												
Kommunikation des IPv6-Knotens												
	Grund-Anforderungen												
		Basis											
			RFC 2460	IPv6 Basic		verpflichtend		verpflichtend	verpflichtend	Core	Req. 2	verpflichtend
					Nicht-Nutzung und *Ignorieren* des *Flow-Label* Feldes	genutzt wird: verpflichtend					UCR, Kap. 5.3.5, Req. 7	verpflichtend
			RFC 6437	IPv6 Flow Label Specification		empfohlen					empfohlen für Quell-Endsystem	nicht erwähnt (jünger als Profil-Dokumente)
			RFC 5722	Handling of Overlapping IPv6 Fragments		verpflichtend					verpflichtend	nicht erwähnt
		ICMP										
			RFC 4443	ICMPv6		verpflichtend		verpflichtend	verpflichtend	Core	verpflichtend	UCR, Kap. 5.3.5, Req. 14	verpflichtend
					Konfigurierbarkeit der Erzeugung von 'Destination Unreachable'	verpflichtend	DoS-Angriff durch übermäßige, nicht zustellbare Nachrichten möglich					UCR, Kap. 5.3.5, Req. 14.2	verpflichtend
					Konfigurierbarkeit der Beantwortung von 'echo Request'-Nachrichten an Multicast- und Anycast-Adressen	verpflichtend	DoS-Angriff durch übermäßige 'echo Request'-Nachrichten möglich					UCR, Kap. 5.3.5, Req. 14.3	verpflichtend
			RFC 5095	Revised ICMPv6		verpflichtend		optional	verpflichtend	Core	verpflichtend	UCR, Kap. 5.3.5, Req. 2	verpflichtend
			RFC 4884	Extended ICMP for multi-part messages		optional		optional	empfohlen		optional	IPv6 Standard Profiles, Kap. 2.1	empfohlen
	Neighbor Discovery												
			RFC 4861	Neighbor Discovery		verpflichtend		verpflichtend	verpflichtend	Core	empfohlen	UCR, Kap. 5.3.5, Req. 11	verpflichtend
					Nicht-Setzen des 'Override Flag'	verpflichtend					UCR, Kap. 5.3.5, Req. 11.1	verpflichtend
					Verwerfen von 'Neighbor Advertisement'-Nachrichten, für die kein Ziel-Eintrag im 'Neighbor Cache' vorhanden ist	verpflichtend					UCR, Kap. 5.3.5, Req. 11.3	verpflichtend
					Verwerfen von 'Neighbor Advertisement'-Nachrichten im 'Neighbor Cache INCOMPLETE'-Zustand	verpflichtend					UCR, Kap. 5.3.5, Req. 11.4	verpflichtend
					Verwerfen von 'Neighbor Cache'-Einträgen, für die 'Address Resolution' fehlschlägt	verpflichtend					UCR, Kap. 5.3.5, Req. 11.5	verpflichtend
			RFC 5942	IPv6 Subnet Model		empfohlen	Ergänzung zu RFC 4861			empfohlen	nicht erwähnt (jünger als Profil-Dokumente)
	wenn SEND eingesetzt werden soll						empfohlen		optional				

German profile for public sector

comparison to other profiles

Unified structure

Project Overview

**Development of IPv6 profiles and migration guide for government**

- Supporting migration plan and implementation

- Supporting calls for tender:

  - Network / software components and services

  - Recommendations for IPv6 operation

- Definition of reference architecture

- Useful guideline focusing especially on the requirements of the German public administrations

Embedded in IPv6 strategic plan for the public sector

1. First: Unified address concept for government

2. Project: Supporting migration to IPv4/IPv6-Dual-Stack

3. Dissemination: EU pilot network „GEN6" for eGov, migration workshops for the public sector

IPv6 ?

IPv6
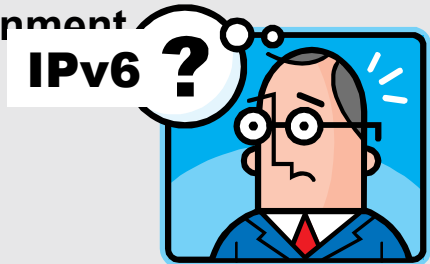
Migration Guide

- **Migration guide**
  - Objective: „*Dual Stack for networks and applications*"
  - Approach: Definition of eGov scenarios
- **Holistic view on migration:**
  - Illustration of migration steps from planning to testing of functionality
  - Migration end-to-end, from workstation to eGov application
- ***„Self-Help"*: Efficient and structured migration**
  - Also migration of parts of infrastructure, parallelization cost-effective
  - More security by a structured introduction of IPv6

IPv4

IPv4 **IPv4/ IPv6** **IPv6**
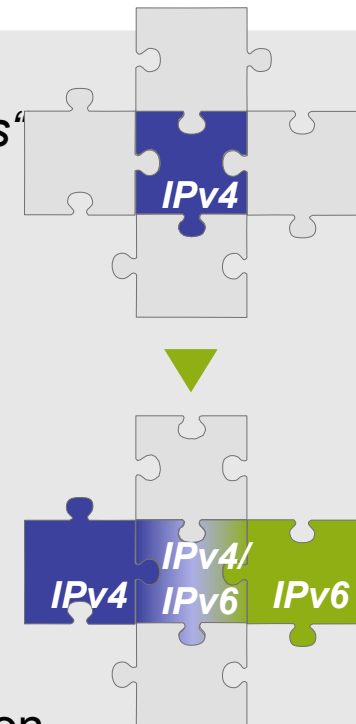
Lessons learned
Issues to be addressed

- IPv6 - knowledge is improvable

- IPv6 technology still not mainstream

- A lot of insecurity how to migrate

- practical migration scenarios are missing

- Vendor IPv6 awareness / support could be enhanced

Thank you
for
your attention!

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