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Clear Guidance for Implementing IPv6 in Enterprises

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IT Departments



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Lack of IT personal

In Germany there are 130.000 open positions in IT

How many open positions in IT in the EU? 500.000?

How many open position in IT in the USA? 500.000?

Many enterprises don't have a network department anymore.

Who can start an IPv6 project?

No time for projects

IT departments have no time for new projects

They drown in daily work

Even if they get training they work on their network during the training

No time for reading (and understanding) RFCs and White Papers

Lack of Knowledge



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IPv6 Project in large Enterprise

First Step : Every IT department will be informed of the new project

Second Step: Every department gets time to think of their requirements

Third Step:

Empty Sheet of Paper

The department was not unwilling

They had just no idea

No IPv6 knowledge

No time to learn about IPv6 without a project

We need an address plan

It has to be very detailed from the beginning

All IPv6 addresses get distributed to our departments

We use ULA, because we have always used RFC1918 addresses

We need an address plan

It has to be very detailed from the beginning

All IPv6 addresses get distributed to our departments

We use ULA, because we have always used RFC1918 addresses

They have no idea how many addresses they have

The project does not start with the address plan

An aerial, long-exposure photograph of a multi-lane highway at night. The image is dominated by vibrant, multi-colored light trails (orange, yellow, green, blue) that curve and flow across the dark landscape, representing the movement of traffic. The background shows the dark terrain of the highway's surroundings.

What do we as a community do?



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We write papers

RFCs

BCOP

RIPE-772

Readers can learn from these papers

but do they?

Example RFC 9099

A clarification on how intermediate nodes should handle packets with existing or future extension headers is found in [RFC7045]. The uniform TLV format to be used for defining future extension headers is described in [RFC6564]. Sections 5.2 and 5.3 of [RFC8504] provide more information on the processing of extension headers by IPv6 nodes.

From Chapter 2.2 Extension Header

Don't get me wrong: RFC9099 is a very useful document ...

... for IT specialists

... for IT departments without prior knowledge?

RFCs

RFCs define the standards

Do IT Departments know the RFCs?

RFCs are informational

Do IT Departments read the RFCs?

RFCs describe Best Practices

Do IT Departments know about the RFCs?

Papers are good, but ...

From my experience:

IT departments have no time to read papers

They don't have the knowledge to understand the papers

Example: Use the M Flag in combination with the A Flag to ...

Clear Guidance



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Router Configuration

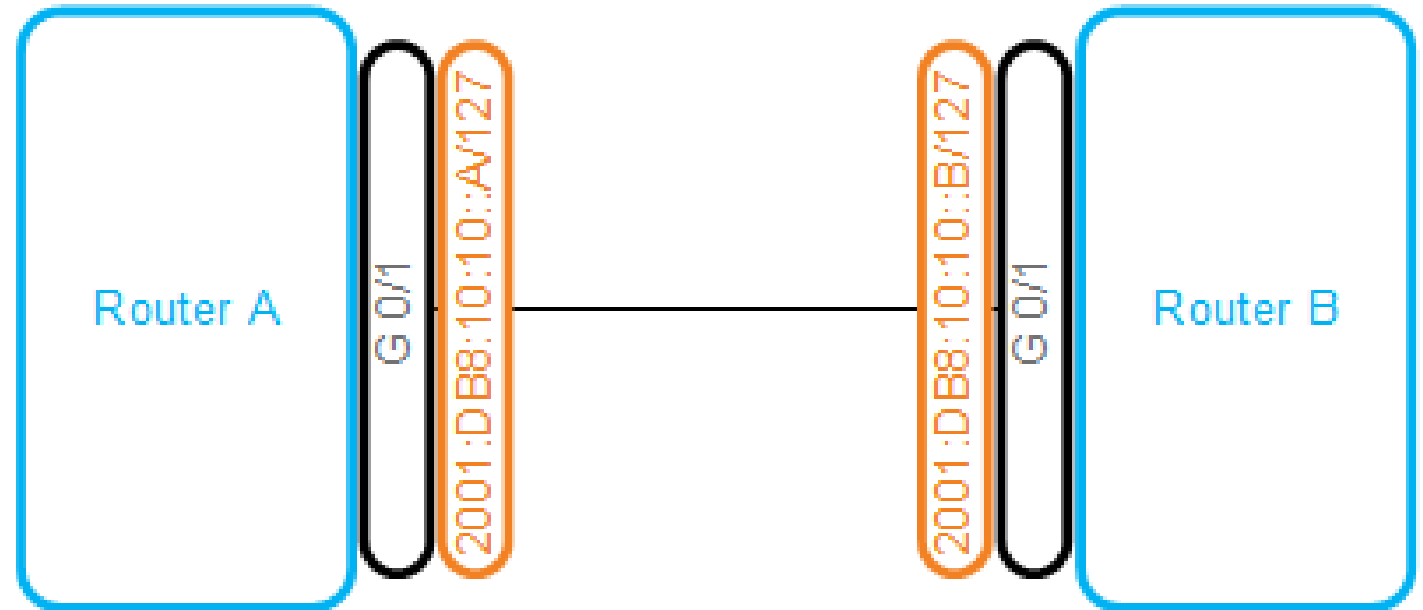
If you connect two routers:

Use a /127

Set aside the full /64

Use addresses ::a and ::b

Don't use address „zero“



Loopback

In the addressplan define a /64 for loopback addresses

All loopback addresses are taken from this /64

Use a /128 per device

BGP Configuration

Many enterprises have never used BGP before

Now they get an IPv6 prefix and an AS number

How to configure BGP?

Do I need to filter?

How to filter?

Too many unanswered questions

Bogon prefixes / BGP Filter

Use Bogon prefix list for full table:

```
ipv6 prefix-list BOGON-IPv6 deny 2001:2::/48 le 128
ipv6 prefix-list BOGON-IPv6 deny 2001::/32 le 128
ipv6 prefix-list BOGON-IPv6 deny 2001:3::/32 le 128
ipv6 prefix-list BOGON-IPv6 deny 2001:10::/28 le 128
ipv6 prefix-list BOGON-IPv6 deny 2001:20::/28 le 128
ipv6 prefix-list BOGON-IPv6 deny 2001:DB8::/32 le 128
ipv6 prefix-list BOGON-IPv6 deny 2002::/16 le 128
ipv6 prefix-list BOGON-IPv6 permit 2000::/3 le 48
ipv6 prefix-list BOGON-IPv6 deny ::/0 le 128
```

The same is true for ...

SLAAC and DHCPv6

Most enterprises go for Dual Stack

Easy to implement, no change in network design

IPv6 looks like IPv4 with longer addresses

DHCP is the central authority for IP addresses

Clear Guidance helps with ...

starting the project quickly

saving cost

saving time

getting security right

getting IPv6 up and running (finally)

Question is

Can we as a community provide IPv6 configuration guidance to enterprises?