

IPv6 - Migration Planning

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Some warnings. . .

- This is not an IPv6 introduction!
- This talk might contain humor, irony and nerd jokes
- Topics presented here are guidelines not rules

- Content providers don't offer content via IPv6 because there are only few access providers offering IPv6
- Access providers don't offer IPv6 access because there is few IPv6 content on the net

- “We’ll introduce IPv6 in 14 years. It’s when my colleague retires”
- “IPv6 is not an interesting topic. Everybody already knows everything about it!”
- “When will IPv6 as secure as IPv4?”

Migrating your network to IPv6 (I)

There is no big red button that someone will press on day X and IPv4 will cease to exist:

- IPv4 and IPv6 will run in parallel for quite some time
- But: There will be some resources only accessible over IPv6 in the (near) future
- There's no need to change everything at once. Take your time, you still have it.
- Some parts of a network will be running IPv4 for the next couple of years (decades?)

Migrating your network to IPv6 (II)

Start now:

- **IPv6 is not rocket science** but there are some differences to IPv4
- Talk to your management. Demand time now! In the long run it's cheaper to start **now!** But I'm happy to support you in a year or two. ;-)
- Setup a test environment and learn! Virtualization makes it easy.
- Train your staff (1st level support, ...)
- Check your Hardware (switches, routers, printers, etc.) if they support IPv6
- When buying new hard- and software check if they support IPv6

See [DoD IPv6 Standard Profiles For IPv6 Capable Products](#) for an example on how to define IPv6 support.

Migrating your network to IPv6 (III)

- Plan (IP addressing, which protocols to use, budget for new hardware, ...)
- Check your hard and software again. It's possible that not all features you want to use are available
- Configure your firewall, then your router(s) facing the Internet
- Make IPv6 available on your internal network (address configuration, routing, ...)
- Deploy IPv6 services. Start with DNS and DHCPv6, services requiring no user interaction (e.g. SMTP) should be next.
- Be careful when offering IPv6 services to the outside. There are broken IPv6 networks out there.

- Be prepared to see strange errors. While learning, also learn how to troubleshoot
- Some errors will have nothing to do with IPv6, but they'll be blamed on IPv6

- Some (older) hardware might not support IPv6 in hardware
- CPEs? Appliances?
- Some software might not support IPv6
 - Apache 1.3, Squid < 3.1, ...
 - Commercial Software?
 - What about custom applications?
- Some firewalls are not aware of IPv6
 - IPv6 is either completely dropped
 - or IPv6 is passed through without any notice
- RBLs for spam filtering

- Forget IPv4 when planning IPv6 networks
- Be generous. You have more then enough addresses and networks. A /64 is the smallest network size
- Aggregation is important!
- RF5375 gives some hints on address planing
- You might want do code interface-IDs / connections into your IPv6 addresses

IPv6 - How to assign addresses?

There are several different methods for assigning IPv6 addresses:

- Static configuration
- Stateless auto configuration (SLAC)
- DHCPv6

Use

- Static configuration for routers / servers / ...
- SLAC or DHCPv6 for clients

RFC 3177 suggests

- at least /32 for a normal LIR
- a /48 per customer site

RIPE

“End Users are assigned an End Site assignment from their LIR or ISP. The size of the assignment is a local decision for the LIR or ISP to make, using a minimum value of a /64 (only one subnet is anticipated for the End Site).”

- Use one /48 for Loopbacks
- Use one /48 for Point-2-Point Links

IPv6 - Assign addresses to customers?

- Static configuration - Customers get a static network
- DHCPv6-PD - Customer get a dynamic IPv6 network

- Most current firewalls support IPv6 (to some degree)
- There might be some filters (e.g. IPv6 extension headers) missing
- IPv6 needs ICMP. Completely dropping it will result in a very secure network (read: No connectivity at all)
- RFC4890 describes which ICMPv6 types should be filtered
- Some people confuse NAT with security. NAT for IPv6 is not as you know it from IPv4 (yet)
- RFC4864 describes some alternatives to NAT

- Some filters might be missing in firewalls
- Some vendors don't support IPv6 access lists
- Equivalents for features like DHCP snooping might be missing

Nothing really new:

IPv4

RIPv2

EIGRP

OSPFv2

ISIS

BGP

IPv6

RIPnG

EIGRP

OSPFv3

ISIS

BGP

Considerations for deciding on an routing protocol for IPv6:

- KISS
- Which protocols do you know? What are you using for IPv4?
- Want to be stuck to one vendor or do you want to use open standards?
- **There is also a chance to document and clean up your IPv4 network while implementing IPv6.**

Things not to do...

```
...  
    NS          ns1.example.com.  
    NS          ns2.example.com.  
    MX          10      mail.example.com.
```

```
...  
  
mail          A          192.0.2.254  
mail          AAAA       ::1
```

Further Reading

- Benedikt Stockebrand
IPv6 in Practice
A Unixer's Guide to the Next Generation Internet
ISBN 978-3540245247
- Ciprian Popoviciu, Eric Levy-Abegnoli, Patrick Grossetete
Deploying IPv6 Networks
ISBN 1-58-705210-5
- Scott Hogg, Eric Vyncke
IPv6 Security
ISBN 1-58705-594-5
- UpTimes 03/2007 (Proceedings ECAI6 2007)
ISBN 978-3865412287
- Vorträge ECAI6, http://www.guug.de/veranstaltungen/ecai6-2007/further_readings.html
- DoD IPv6 Standard Profiles For IPv6 Capable Products
- Empfehlungen der NSA zum Thema IPv6 Firewalling

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