IPv6 Enterprise Planning
Do's and Don'ts of Transition

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Topics

- **Do's and Don'ts – a course in polarity**

- **Learning from others** (history shows that we often don't do that)

- This presentation is about:
  - Setting Goals, making decisions, taking reponsibility
  - Planning early
  - Taking enough time
  - Work carefully
  - Value quality over profit

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Do's and Don'ts

- Another expression for Best Practices

- What you should do and what you should not do highly depends on your goal.

- Here is the first DO: get clear about your goal! ;-)

- **What Best Practice or Do's and Don'ts means:**
  Do's are what others have not done and regret it
  Dont's are what others have done and regret it
  And you can't have one without the other

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Define your goal

- Do I really need a goal?

- Do you have the information and understanding that you need in order to define your goal?

- Do you want to get this IPv6 topic off the table asap? What are you willing to pay to reach this goal? (are you actually paying it or will someone else have to pay that?)

- Is it your goal to have the best possible most cost effective deployment so your network can thrive in the future?

- The Do's and Dont's I am talking about in this presentation are only relevant for the last group. The others can go and have coffee.

Plan early

- We don't need IPv6, we have enough IPv4 addresses

- We have outsourced our network / our services, we don't care – oh really?

- Our applications won't support IPv6 for many years, so why care?

- We have many other projects on the table, no priority for IPv6.

- We are currently busy planning our next generation datacenter.

- **So why should you plan early?**

Early planning

- Early planning allows for:

  - Make use of product life cycles, refresh cycles, other IT projects

  - Investment protection by having clear IPv6 requirements for purchasing, outsourcing contracts and SLA's

  - Integrating IPv6 will take up to 3 or even more years. If you don't plan early, you won't be ready when you need it.

  - You need time to educate all IPv6 team members and IT personel

  - You want to use all the opportunities IPv6 offers!

  - You need sufficient time for labs, testing and pilots

 - You need time for bugfixing with vendors (early stacks)

  - Is a unique opportunity to clean out and redesign your IT and to implement standardization

IPv6 101

Main Changes from IPv4 to IPv6

- Expanded addressing capability (128 bits)

- Expanded address architecture

- Expanded autoconfiguration mechanisms

- Simplification of the header format
  (fixed length: 40 bytes)

- Improved support for extensions and options (Extension Headers)

- Extensions for authentication and privacy (security)

- Flow labelling capability (QoS – Quality of Service)

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Dual IP Layer

Dual IP Layer

| Application Layer |
| TCP/UDP |
| IPv6 | IPv4 |
| Network Interface Layer |
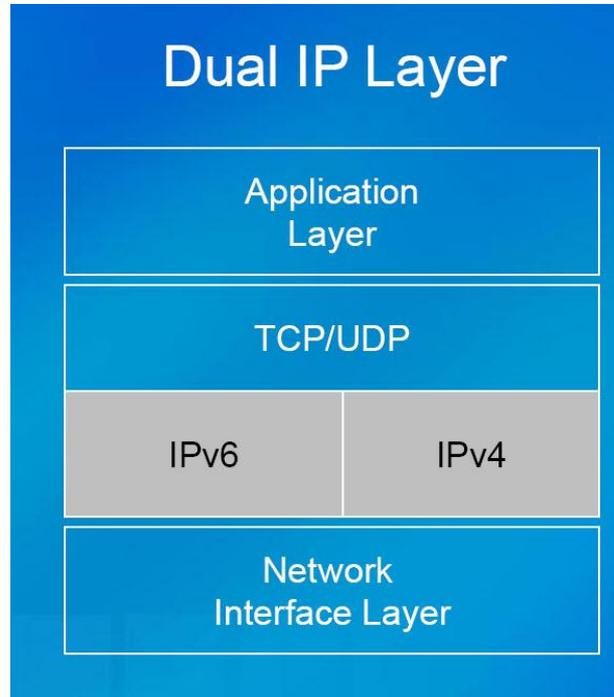
- **Many applications that follow the OSI model have no issues in IPv6 networks.**

- **If you develop your own applications for yourself or for your customers, make sure your developers understand the implications.**

- **State of the Art applications have to perform in an IPv4-only network, in a dual-stack network and also in an IPv6-only network.**

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Facing the challenges

- **Don't think** IPv6 is almost like IPv4 and your guys can handle it without a lot of education and consulting, they have been doing IPv4 for many years after all

- **Don't think** IPv6 is way to complex, new and immature, it will kill your company to introduce it.

- **Do** try to find the balance
  and use the opportunity to improve your network, your address, routing and security designs

- Profit: you will save many headaches and operational cost in the future!

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IPv6 Strategy

- Get an overall perspective

- Involve all teams

- Include Business Vision, Business Strategy, IT-Strategy and base the IPv6 Strategy on this foundation to make it sustainable

- Your IPv6 strategy is supposed to support the business

- Don't base your strategy on the results of a generic assessment!

- Don't base your strategy on current bugs.

General Design Rules

- Native IPv6 where ever possible, dual-stack as long as necessary

- New services IPv6-only whenever possible (internally)

- Tunneling only if necessary and only as a temporary solution

- No NAT, no translation (only with a gun to your head)

- Future networks are end-to-end

- The expanded address architecture allows for new security concepts
  (embed service information in address, adapt security concept)

- Consider new services (monitoring, sensors, health care, Car2Car … depending on industry) – many new services have a much higher demand for addresses and mobility requirements

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Manage your vendors

- Your vendors face the same challenges you do, only they should be ahead of the game. But don't assume they are. Check!

- If they had the greatest services or products for IPv4, don't assume they also have the best for IPv6.

- In the early stage write letters of intent

- Don't forget SLA's, Outsourcing contracts, ISPs….

- When evaluating check the following:

  - Technical features (according to your RFC requirements)
  - Staff (do they have sufficient knowledge, certifications?)
  - All channels need to be educated, sales, engineering, support
  - Ask for their processes (upgrade, incident management)
  - **Don't trust brochures, test in your lab**

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Vendor management

- **What happens if you don't?**

  - You may be purchasing products that do not support your IPv6 strategy

  - You may become stuck in the deployment process when you find out that critical features are not supported or don't work

  - You may loose a lot of time to wait for your vendor to fix bugs

  - **This can cost a lot of money and be critical for the success of your IPv6 project or other projects that are based on it**

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Assessment

- Aligned with IPv6 strategy

- Definition of RFC requirements for all components

- Assessment of all components (Hardware, OS, Applications) according to RFC requirements

  - Systems that are IPv6-ready

  - Systems that need to be upgraded to be IPv6-ready (hardware and/or software upgrade)

  - Systems that are not IPv6-ready

- Vendor assessments

Only now you can estimate costs for deployment (investment and labor).

Addressplan

- Take the learnings from operating an IPv4 network into designing an IPv6 address plan

- Use all the rules you know:

  - Aggregation

  - Subnet Consistency

  - …..

- Get rid of all conservation rules (host counts)

- Value ease of administration over conserving address space. This results in saving operational cost!

- Align it with security concept

- Reserve enough space for Growth-Growth-Growth and new technologies

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Allocating time

- Education across all teams

- Building experience in labs

- **Strategy – Addressplan – Security Concept**
  Plan for multiple iterations, take time for thorough reviews and discussions, get 2nd and even 3rd opinions from people with an external view

- This is going to be the foundation for your network for the next 20 years

- **Don't do it quick and dirty!**

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The External View

- For reviews and external 2nd opinions choose the most experienced consultants you can find.

- They may cost a little more than standard IPv4 consultants, but this will save a lot of money in the project.

- You are laying the foundation for your future network to be operated for 20 years or so.

- Saving on the initial planning of new concepts is the wrong way to go and will cost a lot (redo designs and concepts, high operational costs, complexity and therefore error-prone environments).

The 7 most important steps (+1)

1. Get management on board, appoint an IPv6 program manager
2. Education for all team members (focused and specific to groups)
3. Define Strategy, High Level Plan and Roadmap
4. Perform assessments (everything, HW, SW, OS, Services, Apps)
5. Refine strategy and roadmap, define detail projects, create budget for investments and work
6. Define addressplan and network design
7. Define security- and management concept

8. Test, test, test and deploy – (cycles)

The most common stumbling blocks

- Lack of management support
- Heads in the sand politics
- Processes (get in your own way)
- Shortterm thinking
- Lack of authority (across departments)
- Too many projects, not enough people, no time for carefulness
- Too much pressure, doing it quick and dirty
- Treat IPv6 as a network and infrastructure project (mind the apps)

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Executive Summary

- IPv6 is on its way. It will take you 3 to 5 years for a smooth and cost efficient migration. So you have to start today with the planning and testing.

- Every component in your network is affected. If you don't use the natural life cycles of your products, costs will be excessive.

- Why now?
    - Business Continuity
    - Reachability
    - Life Cycle Management
    - Investment protection
    - Time for education and to build experience

AINT NO WAY AROUND IT

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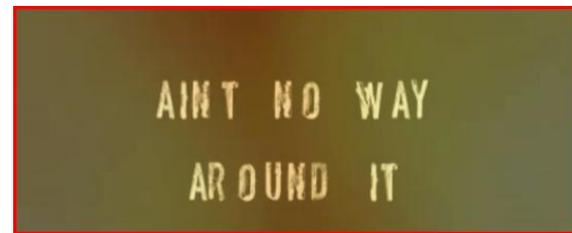
Thank You For Your Attention!

IPv6 Essentials

    by Silvia Hagen, English

    2nd Edition, O'Reilly, May 2006

    ISBN 978-0-596-10058-2
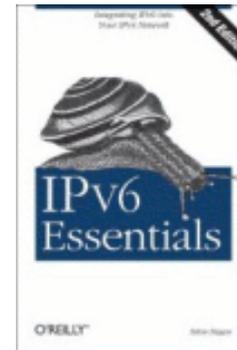
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    by Silvia Hagen, English

    O'Reilly, September 2011

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