

Implementing IPv6 in an Organization

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Date: 09-02-2005

Topics

- **Problem definition**
- **Research questions**
- **Research planned**
- **Research done**
- **Results**
- **Conclusions**
- **Questions**

Problem definition

- **What problems do you encounter when implementing IPv6 in an IPv4 environment such as that of the organization SNB?**

Research questions

- What kind of problems do you encounter when implementing IPv6 in applications, network devices, host- and server connectivity?
- How does these problems reflect on the IPv4 environment?
- How does the IPv6 network on application level reflects to the IPv4 network?

Research Planned

- **Setting up IPv6 Infrastructure**
- **Testing of Operating Systems:**
Mac OS X, Linux, BSD, Windows XP SP2 and Windows 2003 Server
- **Adding IPv6 functionality into services**
DNS, SMTP, SSH, IMAP, LDAP, HTTP and DHCP

Research done

- **Gathering Information**
- **Inventory**
- **Infrastructure**
- **Operating Systems**
- **Services**

Inventory

System	Hardware	OS	Software	IPv6 capable
Network device	IPv6 compatible	Version and Patches	Software	IPv6 capable
Router	V	Experimental IOS 12.3	N/A	N/A
Server	IPv6 compatible	Version and Patches	Version and Patches	IPv6 capable
Siena	V	Macintosh Darwin 7.5	OpenLDAP 2.1.22	Y
Firenze	V	Macintosh Darwin 6.8	Apache 1.3.29	N
			Postfix 2.1.3	N
			Bind 9.2.2	Y
			OpenSSH_3.4p1	N
			Xinetd 2.3.10	Y
Carleone	V	OpenBSD	OpenSSH	Y
Pisa	V	Gentoo 2.4.25	Apache 2.0.48	Y
			OpenSSL 0.9.7d	Y
			OpenSSH_3.9p1	Y
Lucca	V	Gentoo 2.4.27-sparc	OpenSSH_3.9p1	Y
			Bind 9.2.2-P1	Y
			Sendmail 8.12.11	Y
Client	IPv6 compatible	Version and Patches	Version and Patches	IPv6 capable
Linux	V	Gentoo 2004-3	Chapter 6	Y
		Debian 2.6	Chapter 6	Y

Table 4.2: Inventory SNB-lab

Infrastructure

- IPv6 Numberplan
- Configuring router
- Testing IPv6 connectivity

IPv6 Numberplan

Subnet	Category	Prefix	Site	Interface	Mask
Productie Clients		2001:610:158	1000		
	Network Devices		1100		/64
	Servers		1200		/64
	Clients		1500	RA = ON	/64
Experiment Clients		2001:610:158	2000		
	Network Devices		2100		/64
	Servers		2200		/64
	Clients		2500	RA = ON	/64
Admin		2001:610:158	3000		
	Network Devices		3100		/64
	Servers		3200		/64
	Clients		3500	RA = ON	/64
Productie		2001:610:158	4000		
	Network Devices		4100		/64
	Servers		4200		/64
	Clients		4500	RA = ON	/64
Experiment		2001:610:158	5000		
	Network Devices		5100		/64
	Servers		5200		/64
	Clients		5500	RA = ON	/64

Table 5.1: SNB subnet-number plan

Configuring router

- **Router Advertisements**
 - **Blocking**
- **Clients: stateless autoconfiguration**
- **Servers: static IPv6 addresses**

Server- IPV6 Numberplan

Servername:	IPv6 address:
Siena	2001:610:158:1200::11/64
	LDAP2001:610:158:1200::1:389/64
Firenze	2001:610:158:1200::10/64
	SSH 2001:610:158:1200::1:22/64
	DNS 2001:610:158:1200::1:53/64
	IMAP2001:610:158:1200::1:143/64
	POP2001:610:158:1200::1:110/64
Lucca	2001:610:158:3200::10/64
	SSH 2001:610:158:3200::1:22/64
	SMTP2001:610:158:3200::1:25/64
	DNS 2001:610:158:3200::1:53/64
	NTP2001:610:158:3200::1:123/64
	SYSLOG 2001:610:158:3200::1:514/64
Carleone	2001:610:158:3200::2/64
	SSH 2001:610:158:3200::2:22/64
Pisa	2001:610:158:1200::13/64
	SSH 2001:610:158:1200::2:22/64
	HTTP2001:610:158:1200::2:80/64

Operating Systems - Tests

IPv6 and IPv4

- Basic connectivity
- Name resolving
- Remote login
- File transfer
- Web
- Mail

OS – test results

Linux, BSD, MAC OS X, Windows XP SP2, Windows 2003 Server

- All tests successful
- Software is the key of using IPv6
- Easy address configuration

Services

- **With problems encountered**
- **Without problems encountered**
- **DHCP**

Services - Without problems

DNS

- Bind 9x
- AAAA records
- Microsoft DNS server

SSH

- Openssh

LDAP

- openLDAP

IMAP

- UW-IMAP with Xinetd
- Microsoft POP server

Services - With problems

SMTP

- Sendmail
- Postfix
- Client software

HTTP

- Apache
 - Webobjects
- Microsoft IIS

Services - DHCP

- DHCPv6 Draft

Conclusion

- **Implementing easy**
- **No IPv4 problems**
- **Operating Systems IPv6 ready**
- **Software compatability**
- **Services**

Recommendations

- **Inventory**
- **Not yet native-IPv6 possible**
- **Implement IPv6 now, saves work later**

Questions

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