



# Introduction of IPv6 in Vienna University's LAN, ACOnet, VIX, ccTLD name service

Wilfried Wöber, UniVie - ACOnet  
for FLIP-6, San Jose, CR  
Octoberber 27, 2004



# The background

---

- Vienna University honours a set of network-related responsibilities, some of them for historical reasons
  - Develop, maintain and operate the university's LAN
  - Develop, maintain and operate ACOnet, the Austrian NREN (the national research and education network)
  - Manage the Vienna Internet eXchange: "VIX"
  - Operate the .at ccTLD name service (and registration services) under a contract with NIC.at
  - Participate in regional development projects



# IPv6: when and where did it start

- Actually, many years ago, as a "pastime" and as a technical interest activity
- IPv6 stacks got installed on some workstations, some legacy routers were made IPv6-capable
- Started to participate in European NREN research activities (TERENA Task Force)
- Official test-bed activity was started to investigate impact on various services
- Eventually full participation in 6NET project



# Building Blocks

- Some hardware
  - Initially, mostly legacy stuff (PCs, old workstations)
  - Recycled routers (c2500, c4500, c7500)
  - Some additional network interfaces & VLANs
- Management mandate
- Address space
  - /35 ==> /32 ==> /30
  - Participated in developing and later adjusting the RIPE-Region's address distribution policies



# The 1st steps

---

- A separate, dedicated IPv6-network
  - Reason: initially no security features were available
  - Didn't want to put the production network at risk!
- Installation of IPv6-capable name service
  - bind9
  - Separate namespace for IPv6-enabled interfaces
- External connections got established
  - to the 6bone (IPv6-in-IPv4 tunnels)
  - and to native European IPv6-backbone projects



# How to spread the word?

- Offer IPv6 support on the Vienna Internet eXchange
  - A separate VLAN on the switches to support IPv6 native connections
  - Offer limited transit (for free, till the end of 2004!) over the testbed projects and the 6bone tunnels
  - Some 15 IPv6 connections got configured (v4: ~100)
- Seminars and training events
  - For staff, VIX membership and NREN customers



# From playground to pilot production

- Upgrade of ACOnet's backbone
  - From point-to-point serial links to GigEthernet with physical redundancy (switched)
  - Separate VLAN dedicated to IPv6 traffic
  - Access to IPv6-LAN is free of charge
- Address distribution service for our customers
- Replacement of old routing equipment
  - From software-based IPv6-packet forwarding to hardware-assisted packet switching (LAN & NREN)



# IPv6 enabled services

- The 1st Test: Vienna Universities's ftp server
  - Straight-forward (1 more interface, OS upgrade, server configuration, some cabling, done!)
  - Good performance! (at least over 6NET :-)
- DNS for the university and for the ccTLD .at
  - Not a software problem - **bind9.x** simply works
  - Management becomes more complex (scripts)!
  - Security (configuration) and firewalling (non-ex)
- SMTP is easy, the Web (in our case) is not!



# UniVie's network goes dual-stak

- Router upgrades (the normal life-cycle!)
- We need an addressing plan!
  - To include the LAN, dial-up and ISDN,
  - xDSL and cable-based remote access
  - Some room to move (~70K students, 6...7K staff)
- /32 prefix is too small - if we want to follow the RFCs (/48 for each site) ==> upgrade!
- IPv6-aware firewall-code is becoming available, eventually (stability, performance, support)



# .at ccTLD nameservice

---

- The DNS stuff itself is easy
  - If you had a chance before to play in a sandbox :-)
- The registration machinery needs a brush-up
  - Scripts have to understand IPv6 addresses
  - Configuration checker must be made v6-aware
- The delegation policies need an update
  - Paperwork and legal stuff (it's a nasty business...)
- Delegation from the up-stream (the root)



# Lessons learned...

---

- It takes some time
  - To get used to some of the concepts
  - To get your staff (operations **and** helpdesk) up-to-speed by training and testlab access
- When purchasing new (routing) equipment, make sure that it can do IPv6 in hardware
- Don't believe in
  - "it will be supported in the next version"
  - you need to get it now



# Lessons learned...

---

- Security and firewalling
  - If you need a firewall for the v4-based network then you need a firewall for the v6-based network, too!
  - Watch out for tunnels and other "backdoors"
- Functionality vs. Performance
  - like DNS: you'd like to see the same performance for v6-based transport!
- Management, Trouble-Shooting and Statistics
- Try to remove 6bone tunnels asap!!



.

# Questions

