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An Example of IPv6 Necessity in the Greek School Network

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6DEPLOY project

Outline

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The GSN - Introduction

- The Greek School Network (GSN) interconnects ~15.000 school units in Greece
- Each school unit (usually) has …
  - two public IPv4 addresses, one for the edge router and one for the local (school) server.
  - Multiple private addresses used for interconnecting the local PCs

The Problem

- How it is possible to upgrade the software of the PC labs and other PCs?
  - Software upgrades, security patches, install new applications, etc.
- Technical challenged
  - PCs are located behind a NAT gateway
  - PCs may be assigned to multiple networks, e.g. lab, administration, etc
  - PCs use different (versions of) operating systems
  - PCs are often moved between the networks, e.g. during hardware upgrades

The IPv4 Solution (?) (1/2)

- **Method A:** Send administration personnel to perform the upgrades manually
  - Time consuming task, e.g. a security update may take weeks to be applied in all PC-labs in all sites
  - Expensive method, especially in terms of human resources
- **Method B:** Use port forwarding at the edge routers to allow connections to end systems
  - Simple procedure, though, significant administration overhead
  - Some limitations may arise with the available ports
  - Error prone process as PCs may be relocated

The IPv4 Solution (?) (2/2)

- **Method C**: Use a remote management tool
  - A software client is necessary to be installed in each remotely managed PC.
  - Not applicable to all nodes, e.g. network nodes running proprietary operating system
  - Expensive solution due to the costs of licences, especially for networks with large number of end sites / systems
  - Limitations may arise due to port forwarding conflicts and insufficient scripting support

The IPv6 Alternative

- Restore end-to-end communication
  - Public IPv6 addresses are assigned in each PC (removing any need of NAT gateways or complex router configuration)
- Upgrades can be handled centrally, based on built-in scripts and open source tools
- Policies can easily applied based on IPv6 address (& network)

A Commercial Approach

- M$ DirectAccess
  - Enables remote users to have continuously secure access to their enterprise networks using IPv6 (and IPSec) without connecting to a VPN
  - http://technet.microsoft.com/en-us/network/dd420463.aspx
- Manage remote machines more effectively

  "With DirectAccess, IT administrators can manage mobile computers by … distributing software updates any time the mobile computer has Internet connectivity… This flexibility gives IT the opportunity to service remote machines on a regular basis ..."

Other User Cases

- A services provider may apply the same model for remotely upgrading multiple set-top boxes at the subscribers premises
- A system administrator may upgrade server farm software without the need of a local application server (for distributing software)
- An end user may upgrade multiple sensors firmware over the network

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