SEE 6DISS - Session A - IPv6 Basics Hands-on

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1. Lab information

Network Topology

The network topology is shown in Figure 1. PCs belong to different VLANs, each of them having a different IPv6 address prefix. For example, the first three routers in the 2^{nd} row belong in the VLAN 3 and use the 2001:648:E000:3::/64 address space.



Figure 1: Lab topology

Exercise A: Enable IPv6 to WinXP

Objectives

Activate IPv6 protocol stack at the WinXP PCs and understand basic IPv6 concepts.

Exercises steps

1. There are two alternative methods for activation IPv6 in WinXP (SP2)

• Use the WinXP GUI to install the new protocol

🗕 Local Area Connection Prope ? 🗙				
General Authentication Advanced				
Connect using:				
Intel(R) PR0/100 VE Network Conne Configure				
This connection uses the following items:				
The Wetwork Monitor Driver The Wetwork Monitor Drive				
Install Uninstall Properties				
Description Allows your computer to access resources on a Microsoft network.				
 ✓ Show icon in notification area when connected ✓ Notify me when this connection has limited or no connectivity 				
OK Cancel				

- From a CLI run "ipv6 install"
- 2. Identify the available interface at your PC. Identify which of these interfaces are related to IPv6 transition mechanisms? From a CLI run the following commands
 - ipconfig /all
 - netsh interface ipv6 show interface
 - ipv6 -v if
- 3. Identify all the IPv6 addresses (link local, public addresses, etc)
 - Link local (Tip: Search for fe80::...)
 - Identify the auto-configuration IPv6 address (Tip: Search for ...ff:fe...)
 - Identify the IPv6 address due to privacy extension
 - Identify the validity of addresses (Tip: Use the command netsh interface ipv6 show address <interface>)
- 4. Ping / traceroute IPv6 hosts
 - Ping the IPv6 localhost addresse (::1)
 - Ping other addresses
 - Ping IPv6 web sites (www.grnet.gr, www.6diss.org, etc)
- 5. Find IPv6 neighbours in your LAN. What could be the problem in terms of security?
 - (Tip: Use the command netsh interface ipv6 show neighbors)
- 6. Identify the local router address.
 - What is the appropriate command? "traceroute"? "... show neighbours"?
- 7. Use "ethereal" tool to capture IPv6 traffic, e.g. advertisements (RAs), or own traffic. Which IPv6 address is used when communicating?
 - Tip: See at the end of the document for ethereal filters.
- 8. Disable privacy extensions (RFC3041). What could be the problem in terms of security if you enable / disable privacy extension?
 - (Tip: Use the command netsh interface ipv6 set privacy ...)

Exercise B: Transition mechanisms

Objectives

Familiarise with IPv6 in IPv4 static tunnels.

Exercises steps

At the beginning of this exercise, the local edge routers stops to send any route advertisements (RAs). This causes the PCs to loose IPv6 connectivity with the rest of IPv6 Internet. Students are requested to create static tunnels between different VLANs and partially restore connectivity between two VLANs. Students in the same row of PCs should work as a group in order to complete the below exercises.

- 1. Reboot the system. Why is this needed? Why the connectivity is broken?
- 2. Create the address plan for the group of five PCs according the Figure 2.



Figure 2: Transition labs

- (Tip: Find the IPv4 addresses for the tunnel interfaces before start)
- 3. Put static IPv6 addresses in the appropriate interfaces. When finish, validate the connectivity inside the LAN.
 - (Tip:netsh interface ipv6 add address <if_index> 2001:648:E000:VLAN_X::a type=unicast valid=infinite)
- 4. Create a static tunnels between the two routers (PCs)
 - (Tip:netsh interface ipv6 add v6v4tunnel "Tunnel" <local_IPv4_addr> <remote_IPv4_add>)
 - (Tip:netsh interface ipv6 add address "Tunnel" 2001:648:E000:100::1)
- 5. Is there any connectivity between PCs in different VLANs? Yes? No? Explain. 2001 648 E000 10
- 6. Validate the IPv6 routes for PCs that terminate the tunnels.
 - (Tip: netsh interface ipv6P@g routes) PC b
 - (Tip: netsh interface ipv6 show routes level=verbose)
- 7. Add static route to tunnel interface.
 - (Tip:netsh interface ipv6 add route ::/0 "Tunnel" 2001:648:E000:100::1 publish=yes)
- 8. Is there connect 2010 be 64 as the OAN / YASNN Patially? Explain.
- 9. Allow packet forwarding to "PC routers"
 - (Tip:netsh interface ipv6 set interface Tunnet MN_X::b forwarding=enable)
- 10. Why we did not use auto-configuration? What could be a problem? 2001:648:E000:VLAN

VLAN X 3/62001:648:E000:VLAN X::/64

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- (Tip: How to select a router in the LAN!)
- (Tip:netsh interface ipv6 set interface "Local Area Network" forwarding=enable advertise=enable)

Supporting info

Compact "Ethereal" documentation

Ethereal is used by network professionals around the world for troubleshooting, protocol analysis, software and protocol development, and education. Its open source license allows talented experts in the networking community to add enhancements. It runs on all popular computing platforms, including Unix, Linux, and Windows. See further information at http://www.ethereal.com/.

In order to capture packets, use the menu (Capture -> Start)

If you want to capture only a specific set of packets, use *capture filters* (Capture->Options), as shown in Figure 3.

© Ethereal: Cap	oture Op	otions			
Capture					
Interface: Intel(R) PRO/100 VE Network Connection (Microsoft's Packet Scheduler) : \De					
IP address: 195.251.29.55					
Link-layer header type; Ethernet 👻 Buffer size: 1 🗢 megabyte(s)					
Capture packets in promiscuous mode					
Limit each packet to 68 🗘 bytes					
Capture Filter:					
Capture File(s)			Display Options		
File:		Browse	Update list of packets in real time		
Use <u>m</u> ultiple files					
Next file every	1	🗘 megabyte(s) 👻	L Automatic scrolling in live capture		
Next file every	1	🗘 minute(s) 💉	🗌 Hide capture info dialog		
Ring buffer with	2	🗘 files	Lines Developing		
🗌 Stop capture after		🗘 file(s)	Name Resolution		
Stop Capture					
🔲 after 🛛 1	¢ (packet(s)	Enable network name resolution		
🔲 after 🛛 1		megabyte(s) 💉			
🔲 after 🛛 1	\$	minute(s) 💉	Enable transport name resolution		
Help			Start Cancel		

Figure 3: Ethereal packet capture filters

(Tip: Use the capture filter "ip6" to capture only IPv6 packets or "icmp6" capture only ICMPv6 packets)

After having captured some traffic, you can also filter the results using the "Filter" option, as shown in the Figure 4.

(Untitled) - Ethereal					
Elle Edit Yiew Go Capture Analyze Statistics Help					
$\textcircled{\label{eq:states} \below \$	◎ 종 월 🗐 📑 🔍 Q, Q, 🖭 👹 🕅 🔡 🚿				
Eiher: Expression <u>C</u> lear <u>Apply</u>					
No Time Source	Destination Protocol Info				
1 0.000000 fe80::204:ddff:fe64:400	ff02::1 ICMPv6 Rou 🗸				
•					
Frame 1 (118 bytes on wire, 118 bytes captured) * Ethernet II, Src: Cisco_64:04:00 (00:04:dd:64:04:00), Dst: IPv6-Neighbor-Discovery_0 * Internet Protocol Version 6 Version: 6					
Traffic class: 0xe0 Flowlabel: 0x00000 Payload length: 64 Next header: ICNPV6 (0x3a) Hon Diwit: 255					
Source address: fe80::204:ddff:fe64:400					
<pre>= Internet Control Message Protocol v6 Type: 134 (Router advertisement) code: 0 Checksum: 0x107d [correct] Cur hop limit: 64 # Flags: 0x00 Router lifetime: 1800 Reachable time: 0 Patrane time: 0</pre>					
E TOMPy6 options					
Type: 1 (Source link-layer address) Length: 8 bytes (1) Link-layer address: 00:04:dd:64:04:00 © ICMPV6 options © ICMPV6 options					
•	>				
0010 00 00 00 40 5a TT Te 80 00 00 00 00 0	0 00 02 04@:				
0020 aa TT TE 64 04 00 TT 02 00 00 00 00 00 00 00 00 00 00 00 00	10 00 00 00a				
0040 00 00 00 00 00 00 01 01 00 04 dd 64 0	4 00 05 01d.				
P: 1D: 1M: 0 Drops: 0					

Figure 4: Ethereal interface

(Tip: Use the filter "ip6" to show only IPv6 packets, "icmpv6.code==0" to show ICMP packets of specific code or "http" to show HTTP traffic.)

Lab specifications

PCs are running WinXP (SP2) while Ethereal Version 0.10.13 is installed. Router is an Cisco 2610 using 2600-jk8s-mz.122-13.T14.bin IOS.