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Protocol Analyzer

- In order to perform the following exercises, a protocol analyzer (a.k.a. network analyzer) is needed
- One can be downloaded at http://analyzer.polito.it/download.htm
  - Follow installation instructions therein
  - Get familiar with the tool by reading the documentation or online help, or by browsing through the menus
  - Advised as more suitable to learning activities
- Another one can be downloaded at http://www.ethereal.com
- Yet another one at http://www.wireshark.org
Exercise 1: Ethernet Header

Start a traffic capture and stop it after 10 or more packets have been captured

■ Are all the captured frames of the same type (e.g., Ethernet frames)?
  ■ Explain why

■ Observe the Ethernet header and all of the fields of a few packets
  ■ What is the destination address?
  ■ What is the source address?
  ■ How is the protocol of the packet carried in the payload identified?
  ■ What type of encapsulation (Ethernet v2 or IEEE 802.2) is being used?
Exercise 2: IP Header

Using the capture of the previous exercise (or a new one)

- Do all the captured Ethernet frames contain IP packets?
  - How can we know whether a captured frame contains an IP packet?
- Observe the header and all of the fields of a few IP packets
  - What is the version of the protocol?
  - What is the destination address?
  - What is the source address?
  - How is the protocol of the packet carried in the payload field identified?
  - What is the value of the TTL field?
  - What is the value of the ToS field?
  - Is there any fragmented packet?
Exercize 3: Ping

Capture the traffic resulting from a station executing the command

- `ping [address]`

where `[address]` is the IP address of another PC in the lab.

- Make sure, prior to execution, that the ARP cache is empty (use `arp` command)
- In case of access privilege issues in flushing the ARP cache, use the `arp2` command rather than the stock `arp` command
- Use an address (e.g., `10.2.1.3`), not a name (`www.polito.it`)
- Consider the following questions
  - What is the purpose of the first two packets in the capture (related to the execution of the command) explaining to which systems the source and destination MAC address belong?
  - Is the source MAC address in the ARP response the same as the destination MAC address of the first IP packet? Why is that the case?
  - What is the Destination IP Address in the first IP packet? What does it mean/is it used for?
  - What is the source IP address of the packets used by ping?
  - What is the destination IP address of the packets used by ping?
  - Does the MAC destination address of the first packet belong to the host targeted with the ping command?
Exercise 4: Ping

Capture the traffic resulting from a station executing the command

- ping 130.192.182.33

- Make sure, prior to execution, that the ARP cache is empty (use arp command)
  - In case of access privilege issues in flushing the ARP cache, use the arp2 command rather than the stock arp command

- Use an address (e.g., 10.2.1.3), not a name (www.polito.it)

- Consider the following questions
  - What is the purpose of the first two packets in the capture (related to the execution of the command) explaining to which systems the source and destination MAC address belong?
  - Is the source MAC address in the ARP response the same as the destination MAC address of the first IP packet? Why is that the case?
  - What is the Destination IP Address in the first IP packet? What does it mean/is it used for?
  - What is the source IP address of the packets used by ping?
  - What is the destination IP address of the packets used by ping?
  - Does the MAC destination address of the first packet belong to the host targeted with the ping command?
Exercise 5: Traceroute

Capture the traffic resulting from a station executing the command

- tracert -d 130.192.182.33 (Windows)
- traceroute -n 130.192.182.33 (Unix)

- Make sure, prior to execution, that the ARP cache is empty (use `arp` command)
- Consider the following questions
  - What is the source IP address of the packets generated by the command?
  - What is the destination IP address of the packets generated by the command?
  - What is the source IP address of the packets received by the command?
  - Does the destination IP address of the packets used by the command change over time?
  - Does the destination MAC address of the packets used by the command change over time?