ENCS4130 Computer Networks Laboratory

EXPERIMENT #1 LAN Setup and Monitoring

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Objectives

- Study the types of Ethernet cabling and when and how to use them.
- Installing a Peer-to-Peer local area network (Workgroup LAN) using crossover cable.
- Learn to create a simple LAN with two PCs using an Ethernet switch and two
- straight-through cables to connect the workstations
- Learn to configure and verify the network connectivity.
- Implementing some applications like file sharing between workstations
- Learn about various network related commands.



Network Cables



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What is Network Cabling?

- Medium for Data Transmission:
 - Information is transmitted between devices through cables.
- Commonly Used Cable Types:
 - Multiple cable types are used in Local Area Networks (LANs).
- Single vs. Multiple Cable Types:
 - Some networks use one cable type, while others use a combination.
- Cable Selection Criteria:
 - Network Topology
 - Protocols
 - Network Size







Types of Network Cables

- Unshielded Twisted Pair (UTP):
 - Wires are twisted without a shield.
 - Commonly used in LANs.

- Shielded Twisted Pair (STP):
 - Wires are twisted with an additional shield.
 - Provides more protection from interference.





Types of Network Cables (Cont.)

- Coaxial Cable:
 - Similar to TV cables.
 - Used in older Ethernet networks.



- Fiber-Optic Cable:
 - Transmits data using light.
 - High-speed and long-distance communication.





Comparison Between Network Cables

Туре	Max distance	Bandwidth	Noise effect	Cost
Twisted pair	100 m	Up to 1-100 MHz	High noise	Cheap
Coaxial	100 m	Up to 3 GHz	Medium noise	Moderate
Fiber Optics	100 km	Up to THz	Less Nosie	Expensive

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Cable Connection for Network Devices

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Straight Through Cable

- Same connection on both ends (RJ45).
- Used for connecting dissimilar devices (e.g., switch to router, switch to PC).
- Only pins 1, 2, 3, and 6 are used.





Cross-Over Cable

- Different pin connections on each end.
- Used for connecting similar devices (e.g., PC to PC, router to router).



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Roll-over Cable

- Connections are reversed on each end.
- Used to connect a PC to a router/switch via the console port for management.



Various Network Related Commands

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IPCONFIG Command

• This command is used to get IP configurations present in your PC.





PING Command

 Ping is a basic Internet program that lets you verify that a particular IP address exists and can accept requests.

> Command Prompt Microsoft Windows [Version 10.0.14393] (c) 2016 Microsoft Corporation. All rights reserved. C:\Users\Matt>ping google.com Pinging google.com [103.13.116.155] with 32 bytes of data: Reply from 103.13.116.155: bytes=32 time=2ms TTL=60 Reply from 103.13.116.155: bytes=32 time=3ms TTL=60 Reply from 103.13.116.155: bytes=32 time=2ms TTL=60 Reply from 103.13.116.155: bytes=32 time=1ms TTL=60 Ping statistics for 103.13.116.155: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 1ms, Maximum = 3ms, Average = 2ms C:\Users\Matt>



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TRACERT Command

- Tracing the Path from Your PC to a Web Server.
- How Data Travels: Just like you can list the crossroads from your house to your office, you can trace the path data takes from your PC to a web server.

```
Select Administrator: Command Prompt
                     Microsoft Windows [Version 10.0.22621.2283]
                     (c) Microsoft Corporation. All rights reserved.
                     C:\Windows\System32>tracert www.geeksforgeeks.org
                     Tracing route to a1991.dscr.akamai.net [139.5.243.58]
                     over a maximum of 30 hops:
                             2 ms
                                      1 ms
                                               1 ms 192.168.1.1
                       1
                                      3 ms
                       2
                             3 ms
                                               6 ms 205.254.162.9
                       3
                                      4 ms
                                               3 ms 205.254.162.1
                             4 ms
                       4
                                               5 ms 205.254.162.38
                             *
                                     29 ms
                       5
                             *
                                      *
                                                     Request timed out.
                       6
                                               5 ms 139.5.243.58
                             6 ms
                                      4 ms
                     Trace complete.
                     C:\Windows\System32>_
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```



NETSTAT Command

• This command is used to get information about the open connections on your system (ports, protocols being used, etc.), incoming and outgoing data and also the ports of remote systems to which you are connected.

C:\>netstat -ano							
Active (Connections						
Proto TCP TCP TCP TCP TCP TCP TCP TCP TCP TCP	Local Address 0.0.0.0:135 0.0.0.0:445 0.0.0.0:3389 0.0.0.0:49152 0.0.0.0:49153 0.0.0.0:49154 0.0.0.0:49155 0.0.0.0:49156 10.0.2.15:139 [::]:135 [::]:445 [::]:445 [::]:49152 [::]:49153 [::]:49153 [::]:49154 [::]:49155 [::]:49155 [::]:49155 [::]:49155 [::]:49156	Foreign Address 0.0.0.0:0 0.0.0.0:0 0.0.0.0:0 0.0.0.0:0 0.0.0.0:0 0.0.0.0:0 0.0.0.0:0 0.0.0.0:0 (.::]:0 [::]:0 [::]:0 [::]:0 [::]:0 [::]:0 [::]:0 [::]:0	State LISTENING LISTENING LISTENING LISTENING LISTENING LISTENING LISTENING LISTENING LISTENING LISTENING LISTENING LISTENING LISTENING LISTENING LISTENING	PID 680 4 1128 348 772 896 432 448 4 680 4 1128 348 772 896 432 448			
UDP	0.0.0.0:5355	*:*	5754 0005 Merudia dae 5 Madibi 52	1128			

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Try it!

- IPCONFIG Command:
 - Ipconfig
- PING Command:
 - Fragmenting Packets: ping ritaj.birzeit.edu -n 5
 - Non-Fragmenting Packets: ping ritaj.birzeit.edu -f -n 5
- TRACERT Command:
 - tracert ritaj.birzeit.edu
- NETSTAT Command:
 - Open http://www.birzeit.edu then: netstat -an





References

- Manual for ENCS4130 Computer Networks Laboratory.
- Slides from Dr. Amr Slimi.

