Fundamental Network Topics

Understanding Basic Network Terms like IP, TCP/IP, DNS, DHCP and more.

These exercises are meant to be answered with text, based on internet searches so write down your reply so you will remember for later.

* What is your public IP address right now, and how did you find it?

*What is my ip in google or log into my router* [http://192.168.0.1](http://192.168.0.1/)

* What is your private IP address right now (do this both at home and in school), and who/what gave you that address?
  + 1. *Ipconfig in cmd or see properties under your connection*
    2. *Dynamic host configuration protocol assigns ip address*
* What’s special about these address ranges?
  + 10.0.0.0 – 10.255.255.255
  + 172.16.0.0 – 172.31.255.255
  + 192.168.0.0 – 192.168.255.255

*Inter assigned numbers authority (IANA) reserves these number blocks for private IPs*

* What is special about this ip-address: 127.0.0.1?

*Is a loopback back address and is also knowns as localhost – the IP to establish connection to the same machine*

* What kind of service would you expect to find on a server using these ports: 22, 23, 25, 53, 80, 443?

*22: SSH remote login protocol*

*23: Telnet (not as secure as SSH)*

*25: Simple mail transfer protocol (SMTP)*

*53: Domain name system (DNS)*

*80: Hypertext transfer protocol (HTTP)*

*443: Secure HTTP – design to transmit individual messages securely*

*Note: Secure socket layer (SSL) creates a secure connection between a client and a server*

* What is the IP address of studypoints.info and how did you find it?

*157.230.21.145 – by writing ‘ping studypoints.info’ in cmd*

* If you write https://studypoints.info in your browser, how did “it” figure out that it should go to the IP address you discovered above?

*With the help of the internet phonebook aka domain name system (DNS)*

* Explain shortly the purpose of an IP-address and a port-number and why we need both

*The IP-address is to locate what computer to connect to and the port is to figure out which application to use*

* What is your (nearest) DNS server?

*nslookup – my nearest DNS server is cache100.ns.tdc.net*

* What is (conceptually) the DNS system and the purpose with a DNS Server?

*Instead of writing the IP you can write an URL since its easier to remember an URL for a human. The purpose is to link the domain names with an IP like a phonebook.*

* What is your current Gateway, and how did you find it?

*Ipconfig and Default Gateway will show. The default gateway IP address is the private IP address assigned to the router*

* What is the address of your current DHCP-Server, and how did you find it?

*192.168.0.1 – It can be found under network properties or ipconfig -all*

*On a home network it is build-in to your router. In an enterprise there is a dedicated server to manage this*

* Explain (conceptually) about the TCP/IP-protocol stack

*TCP is a protocol to make sure you won’t loss IP-packages. Packages will be received in the same order they were send. Three-way handshake that comes into play. First you sync up with the receiver thereafter the receiver acknowledges the sync request and to finish is all the sender acknowledge the sync acknowledge*

*IP (internet protocol) – is about packages where there is a header with information about the sender and receive*

* Explain about the HTTP Protocol (the following exercises will go much deeper into this protocol)

*A client sends a HTTP request to a server which sends a response. The server runs an application that takes care of the request. An answer could be 200 or 404 which is wrapped in the header of a package*

* Explain (conceptually) how HTTP and TCP/IP are connected (what can HTTP do, and where does it fit into TCP/IP)

*HTTP operates on the application layer, TCP on the transport and IP on the network layer which leads to a communication between a client and a server.*

*I found this explanation which explains it very well:*

*“*The term "TCP/IP" stands for Transmission Control Protocol / Internet Protocol and refers to a number of protocols. The "IP" part of the term, which stands for Internet Protocol, is used by TCP and UDP, to transport them from one network to another. Think of IP as a sort of high-way that allows other protocols to get on and find their way to other computers. TCP and UDP are the "trucks" on the highway, and the "load" they are carrying are protocols such as HTTP, File Transfer Protocol (FTP) and more.

HTTP (HyperText Transfer Protocol) is a protocol that utilizes TCP to transfer its information between computers (usually Web servers and clients). The client makes an HTTP request to the Web server using a Web browser, and the Web server sends the requested information (website) to the client.

Remember, IP is required to connect all networks; TCP is a mechanism that allows us to transfer data safely; and HTTP, which utilizes TCP to transfer its data, is a specific protocol used by Web servers and clients.”

**Opgaver fra slides**

**Nslookup:** Til at slå en navne server op

*nslookup url*

**Ipconfig:** Privat ip samt hvilke netværkskort er tilsluttet

**Ping:** Til at få ens ping til en adresse (URL) – man sender packets og ser om der er loss

*ping ip*

**Netstat:** Alt hvad der sker på netværket i realtime

**Tracert:** Spore ruten til en ip-adresse – Bliver ved med at spørge navne servere indtil man finder en DNS, som har info omkring den pågældende ip

*tracert ip*

**Telnet:** Bruges til at sende text filer eller lign. SSH bruges nu da det er mere sikkert

*telnet towel.blinkenlights.nl*

**Opgaver fra slides**

**On your linux server:**

**How to see all ports in use by programs** - *by typing sudo lsof -i*

**Descripe this command: ‘sudo lsof -i:3306’** - *shows all applications that are running on that port*

**Descripe how to kill a process** - *kill <PID>*

**How to scp a file from local machine to the server** – *scp file.txt username@host:/remote/directory*

**How to scp a file from server to local machine** – *scp* [*username@host:file.txt*](mailto:username@host:file.txt) */local/directory/*

**What is ufw and what do you get from: sudo ufw status** - *ufw is the firewall command and with status you can see what has access thru your firewall*

**How do you open a port on ufw** – *ufw portnumber*