Chapter 1

1.2 Technical Basics of Internet Communication
- ``Components of a Web Architecture in the Internet``: briefly read
- ``Development of World Wide Web``: briefly read
- ``Basic Components of a Web Architecture``: briefly read

1.2.1 The HTTP Protocol and its Evolution

- ``Basic Notions``: briefly read
- ``Addressing Objects in the Web``: understand three following terms: **URL**, **URI** and **URC**
- ``Client-Server Communication in the Web`` + ``HTTP Functionality``: comprehend the web communication procedure (how client and server exchange data, what **protocol** they use...)
- ``Tasks and Features of the HTTP Protocol``: understand the nature of **HTTP** protocol
- ``Persistent and Non-persistent TCP Connections`` + ``HTTP 2.0``: read thoroughly and learn the difference between 3 versions of HTTP protocols: **HTTP 1.0, 1.1 and 2.0**. A good reference can be found at: https://medium.com/@factoryhr/http-2-the-difference-between-http-1-1-benefits-and-how-to-use-it-38094fa0e95b

1.2.2 The TCP/IP Protocol Stack
- Remember the ``OSI`` and ``TCP/IP`` protocol suites' layers. **Slide Kap.1 69**
- Try to remember most of the common protocols in each of the ``TCP/IP`` layers. **Slide Kap.1 69**
- Understand the concepts and how the transport protocol is setup
- Understand how ``TCP`` initiates the connection (**TCP handshake**). **Slide Kap.1 75,76,77,79**
- Understand what and how ``TCP Sequence Numbering``, ``TCP Flows``, ``Multiplexing/Demultiplexing``, ``Port Numbers in TCP`` (especially the identification of **TCP endpoint** and **TCP connection**)

1.2.3 Name Resolution
- It is all about DNS, this part is not quite important but still worth a brief reading, in order to grasp the basic knowledge of how ``DNS`` works. A good reference can be found at the book **Computer Networking : A Top Down Approach** ``chapter 2.5 (130-133)``

1.3. Client-Server Communication in the World Wide Web

- Understand ``Switching and Forwarding in IP-Networks`` so it is required to learn about the ``ARP`` protocol. **Slide Kap 1. 113 -> 121**

Chapter 2

2.1 Protocol Structure of the Internet Communication
- Understand the ``Cross-Layer Communication of a Client-Server Example`` , ``Service Offering`` and the ``Transport of PDUs in a Protocol Stack``.
- Understand the basics of ``MAC address`` and the formats of ``Ethernet Frame``, ``IP Datagram`` and ``TCP Segment``
- Look at the sequence of activities regarding ``Sending a packet from Argon to Neon`` (how the two machine initiate, establish the connection and the resemble/dissemble the frame/datagram/segment at each layers of the TCP/IP protocol suite.

2.2 Data Link Layer of the Internet Communication Ethernet LANs

- Basic understanding of **Ethernet topologies** such as ``star, ring, bus``
- Basic understanding of **Ethernet devices** such as ``switch, hub``
- Basic understanding of the evolution of **Ethernet frame** from ``Ethernet II (RFC 894)`` to ``802.2(LLC-SNAP)/802.3(MAC)``

2.3 Address Resolution Protocol - ARP

- A good reference about ARP can be found at: https://www.practicalnetworking.net/series/arp/address-resolution-protocol/ => you should read at least 2 important articles: **Traditional ARP** and **Gratuitous ARP**.

2.4 VPN

- Understand basic terms about VPN such as ``VPN definition and its features`` (slide 4-5), ``usage scenarios`` (slide 2-3), ``VPN protocols`` slide 6
- A good reference about VPN can be found at: https://computer.howstuffworks.com/vpn.htm, https://www.cisco.com/c/en/us/support/docs/security-vpn/ipsec-negotiation-ike-protocols/14106-how-vpn-works.html

Chapter 3

3.1 Principles of Internet working in 1st Generation IP-Networks

3.1.1 TCP/IP Protocol Suite

- A promptly repetition of the formats of ``Ethernet Frame``, ``IP Datagram`` and ``TCP Segment`` (**Slide 10-13**) and the dependencies between protocols in the ``TCP/IP`` protocol suite (**Slide 8**)

3.1.2 Addressing in IPv4 Packet-Switched Networks

- Basic notions of ``IPv4 addresses and classes``: briefly read
- How ``DHCP`` works: briefly read

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### 3.2  Routing Principles in IP-Networks

#### 3.2.1 Switching Functionality in IP-Networks

- 3 types of connections: **unicast, multicast and broadcast**
- ``Structure of an IPv4-Packet``: **important**. Read more about the meaning of each field at https://www.tutorialspoint.com/ipv4/ipv4_packet_structure.htm
  - Understand ``IPv4 fragmentation``
- Understand the differences between ``switching`` and ``routing`` (**Slide 9-12**)
- ``Routing tables + lookup algorithm`` **Slide 14-15;20-23** + ``IP-Packet Processing``
- ``ICMP Protocol``: Router discovery + its vulnerability

#### 3.2.2 Architecture of a Router

- Basic features: **Slide 3**.
- ``Physical components``: **Slide 6** + ``Logical components/layers``: **Slide 7**
- ``Router Inner Algorithms`` **Slide 8**
- ``Logical Architecture of a Router``: **Slide 10,12**
- ``Switching Fabrics``:  **important**
- ``Buffer Concepts and Design``: **important**
- ``Scheduling Disciplines``: understand 3 common principles

### 3.3 Private Address Assignments in IPv4-Networks and Network Address Translation

- ``Private IPv4-Addresses`` + ``NAT/PAT``: **Slide 3-15**
- A good reference about ``NAT Hole Punching`` can be found at: https://bford.info/pub/net/p2pnat/
- ``NAT/PAT Enhancements``: **STUN** + **DynDNS** briefly read

### 3.4 Protocol Functions of an IP-Network Layer Supporting Multi-Service Networks

- ``TCP Congestion Control``: **important**
- ``IPv4-Protocol Header Format``: **important** esp. about ``Options``,``DS/ECN`` fields
- ``Traffic Classification and Specification``:
- ``Buffer Management``: **important** esp. the ``RED(Random Early Detection``

### 3.5 IPv6 Networks
- ``IPv6``:
  - ``Format of IPv6 Addresses``: briefly read
  - ``Unicast & Multicast Addresses``: briefly read
  - ``IPv4/6 Packet Formats``: comparison between 2 type of header formats. **important**
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  - Understand the ``IPv6 Next Header``
  - ``ICMPv6``: read if you have spared time

### 3.7 IP Access Networks
- Read if you have spared time

### 3.8 Security in 2. Generation IP-Networks

- ``Basic concepts``: **slide 7**

#### 3.8.1 Measures for Local Security: Firewalls and Intrusion Detection Systems

- ``Firewall`` + ``Application Gateway``: **slide 14,15,18,25,26**
- ``Stateless/Stateful Packet Filtering``: A good reference can be found at: **Head First Networking: A Brain-Friendly Guide page 422-428**
- ``Intrusion Detection``: **slide 27,28,30**

#### 3.8.2 IPSecurity (IPSec) Protocol Architecture

- **must learn**
- A good reference about IPSec can be found at: **Computer Networking : A Top Down Approach** ``chapter 8.7 (718-725)``

## Chap 4

### 4.1 Routing-Software

- How to differentiate between ``switching`` and ``routing`` at ``network layer``:  **Slide 8**
- **Basic concepts** of routing in Cisco: read only if you have spared time

### 4.2 Routing Algorithms
- ``Distance Vector`` and ``Link State Protocols``: https://www.youtube.com/watch?v=ygxBBMztT4U

- ``Autonomous Systems`` + ``Routing Schemes``: **important**

- ``RIP – routing information protocol``: **must learn**
  - Some references:
    - https://www.youtube.com/watch?v=0efXawUgNZg
    - http://advanced-network-security.blogspot.com/2008/05/routing-information-protocol-rip.html
    - http://resources.intenseschool.com/rip-vs-ospf-which-is-better-for-your-network/

- ``OSPF – open shortest path first``: **must learn**
  - Some references:
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    - https://www.youtube.com/user/NetworkLessons/videos find all videos about
OSPF
    - https://sites.google.com/site/amitsciscozone/home/important-tips/ospf/
ospf-packet-types

- ``BGP – border gateway protocol``: **must learn**
   - Some references:
    - https://www.youtube.com/user/NetworkLessons/videos find all videos about
BGP

- - A good reference about ``Routing Algorithms`` can be found at: **Computer
Networking : A Top Down Approach** ``chapter 4.6 (383-390)``
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