11 IPv4 Addressing

11.1 IPv4 Address Structure

- IPv4-Address: Network Portion / Host Portion
- Subnetmask, z.B. 255.0.0.0
  - Konfiguration in Windows
- Prefix Length, z.B. /8
- Network Address: IP-Address AND Subnetmask
- Network
  - Network Address
  - First usable host
  - Last usable host
  - Broadcast Address
- 11.1.7 Activity - ANDing to Determine the Network Address

11.2 IPv4 Unicast, Broadcast, and Multicast

- Unicast
- Broadcast
  - Limited Broadcast: 255.255.255.255 (im eigenen Netz, wird nicht geroutet)
  - Directed Broadcast (in anderes Netzes)
- Multicast 224.0.0.0 - 239.255.255
  - OSPF 224.0.0.5
- 11.2.4 Activity - Unicast, Broadcast, or Multicast

11.3 Types of IPv4 Addresses

- Private Address Blocks (RFC 1918)
  - 10.0.0.0/8
  - 172.16.0.0/12
  - 192.168.0.0/16
- NAT (Fehler in Bildern!)
- 11.3.3 Activity - Pass or Block IPv4 Addresses
- Special Use IPv4 Addresses
  - 127.0.0.1, loopback
  - 169.254.0.0/16 APIPA (Automatic Private IP Addressing),Link-local
- Legacy Classful Addressing
  - Class A 0 – 127
  - Class B 128 – 191
  - Class C 192 – 223
  - Class D 224 –239 Multicast

  - Class E 240 – 255 Experimental
- IANA
  - AfriNIC: Africa
  - APNIC: Asia, Pacific
  - ARIN: North America
  - LACNIC: Latin America, Caribbean
  - RIPE: Europe, Middle East, Central Asia
- 11.3.7 Activity - Public or Private IPv4 Address

11.4 Network Segmentation

- Broadcast Domains
- Segmenting Networks
  - Location
  - Group or Function
  - Device Type

11.5 Subnet an IPv4 Network

- Subnet Masks on Octet Boundaries
  - Subnetting Network 10.0.0.0/8 using a /16
  - Subnetting Network 10.0.0.0/8 using a /24 Prefix
- Subnet within an Octet Boundary
  - Subnet a /24 Network: /25 - /30

11.6 Subnet a /16 and a /8 Prefix

- Subnet a /16 Network
- Create 100 Subnets with a Slash 16 prefix
- Create 1000 Subnets with a Slash 8 prefix
- 11.6.5 Activity - Calculate the Subnet Mask

11.7 Subnet To Meet Requirements

- Subnetting Network 10.0.0.0/8 using a /16
- Subnetting Network 10.0.0.0/8 using a /24
- Subnetting a /24 Network
- 11.7.4 Activity - Determine the Number of Bits to Borrow

11.8 Variable Length Subnet Masking

- IPv4 Address Conservation
- 11.8.6 Activity - VLSM Practice

11.9 Structured Design

- Device Address Assignment
  - End user clients: DHCP, DHCPv6, SLAAC
  - Servers and peripherals: static
  - Servers that are accessible from the internet: public, NAT
  - Intermediary devices: static
  - Gateway: lowest or highest