

# 17 Build a Small Network

## 17.1 Devices in a Small Network

- Small Network Topologies
- Device Selection for a Small Network
  - Cost
  - Speed and Types of Ports/Interfaces
  - Expandability
  - Operating System Features and Services (Layer 3 switching, NAT, DHCP, Security, QoS, VoIP)
- IP Addressing for a Small Network (End user devices, Servers and peripherals devices, Intermediary devices (Switches, Access Points))
- 17.1.3 Etwas seltsames IP addressing scheme
- Redundancy in a Small Network: Servers, Links, Switches, Router
- Traffic Management: QoS

## 17.2 Small Network Applications and Protocols

- Windows Taskmanager: applications, processes, and services
- Server: Web, Email, FTP, DHCP, DNS
- Voice and Video Applications: Infrastructure, VoIP, IP Telephony, Real-Time Applications (RTP, RTCP)

## 17.3 Scale to Larger Networks

- Small Network Growth
  - Network documentation: Physical and logical topology
  - Device inventory: List of devices
  - Budget: Itemized IT budget
  - Traffic analysis: Protocols, applications, and services
- Protocol Analysis: Wireshark statistics
- Employee Network Utilization
  - OS and OS Version
  - CPU utilization
  - RAM utilization
  - Drive utilization
  - Non-Network applications
  - Network applications
  - Windows 10: Settings → Network + Internet → Data usage → network interface

## 17.4 Verify Connectivity

- ping
- Cisco IOS extended ping: parameter, z.B. Quell-IP, ping ipv6
- Windows tracert (ICMP Echo Request)
- IOS traceroute (UDP mit ungültigem Zielport, Abbruch mit Ctrl-Shift-6)
- Network Baseline: Round trip time mit ping

## 17.5 Host and IOS Commands

- IP Configuration
  - Windows: Network and Sharing Center, ipconfig /all /release /renew /displaydns
  - Linux: Connection Information, ifconfig, ip add
  - macOS: Network Preferences > Advanced, ifconfig en0, networksetup -listallnetworkservices, networksetup -getinfo
- arp -a, netsh interface ip delete arpccache
- IOS
  - show running-config
  - show interfaces
  - show ip interface
  - show arp
  - show ip route
  - show protocols
  - show version
  - show cdp neighbors
  - show ip interface brief

## 17.6 Troubleshooting Methodologies

- Basic Troubleshooting Approaches
  1. Identify the Problem
  2. Establish a Theory of Probable Causes
  3. Test the Theory to Determine Cause
  4. Establish a Plan of Action and Implement the Solution
  5. Verify Solution and Implement Preventive Measures
  6. Document Findings, Actions, and Outcomes
- Resolve or Escalate?
- debug
  - debug ip icmp
  - no debug ip icmp, undebug ip icmp, undebug all
  - terminal monitor (debug messages an vty weiterleiten)

## 17.7 Troubleshooting Scenarios

- Half-duplex vs. Full-duplex
- IP Addressing Issues (IOS Devices, End Devices)
- Default Gateway Issues
- Troubleshooting DNS Issues (nslookup)

## 17.8 Module Practice

- 17.8.1 Lab/PT - Design and Build a Small Business Network
- 17.8.2 Packet Tracer - Skills Integration Challenge
  - Subnetting
  - PC: IPv4, SM, GW, IPv6 Unicast, Link logical
  - Router: hostname, disable DNS lookup, enable secret, console password, minimale Passwortlänge, service password encryption, banner motd, IPv4, IPv6
  - Switches: hostname, SVI, GW, disable DNS lookup, enable secret, console password, service password encryption
- 17.8.3 Packet Tracer - Troubleshooting Challenge