

# 11 Network Design

## 11.1 Hierarchical Networks

### Borderless Switched Networks

- connect anyone, anywhere, anytime, any device
- connect securely, reliably, seamlessly
- hierarchical, modular, resilient, flexible

### Hierarchy

Two-Tier	Three-Tier	Funktion	Devices
Collapsed Core	Core Layer	high-speed backbone connectivity	Router
	Distribution Layer	routing, QoS, security	L3-Switch
Access Layer	Access Layer	network access to the user	L2-Switch, AP, End devices

## 11.2 Scalable Networks

- Redundancy
  - Redundant switches and router
- Multiple Links
  - Redundant paths: STP (Spanning Tree Protocol)
  - Link Aggregation: Etherchannel
- Scalable Routing protocol
  - OSPF: Multitarea
- Wireless Connectivity
  - WLAN
- Reduce Failure Domain Size: Switch Block (Paare von Distribution-L.-Switches)

## 11.3 Switch Hardware

- Switch Platform
  - Campus LAN Switches: 2960, 3560, 3650, 3850, 4500, 6500, 6800
  - Cloud-Managed Switches: Cisco Meraki
  - Data Center Switches: Cisco Nexus: scalability
  - Service Provider Switches: aggregation switches / Ethernet access switches
  - Virtual Networking: Cisco Nexus virtual networking switch
- Switch Form Factors
  - fixed configuration / modular configuration
  - stackable / non-stackable
  - thickness: rack units (1U = 1,75 inch = 44,45 mm)
  - port density (Catalyst 3850: 12, 24, 48 Ports, Catalyst 9400: 384 Ports)
  - forwarding rates (100 Mbps, 1 Gbps, 10 Gbps 100 Gbps)
  - PoE (Power over Ethernet), PoE pass-through (Switch wird selbst mit PoE versorgt , 2960-C)
  - Multilayer Switch (ASIC: application-specific integrated circuits)

## 11.4 Router Hardware

- Cisco Routers
  - Branch (simple configuration and management): Cisco ISR 4000
  - Network Edge (fast performance, high security): Cisco ASR 9000
  - Service Provider (end-to-end delivery of subscriber services): Cisco NCS 6000
  - Industrial (harsh environments): Cisco 1100
  - Cisco Nexus virtual networking
- Router Form Factors
  - Cisco 900: small branch office router
  - Cisco ASR 9000 and 1000: network edge
  - Cisco Network Convergence System 5500: large data centers
  - Cisco 800 Industrial Integrated Services Router: harsh environments