

Cheat Sheet for comprehensive Cisco Certified Design Expert (CCDE)

Network Design Principles

- Scalability

- Design for future growth
- Use modular architecture
- Implement hierarchical design models

- Reliability

- Redundant paths and components
- Use of protocols like HSRP, VRRP, GLBP
- Regularly test failover mechanisms

- Performance

- Optimize routing protocols (EIGRP, OSPF, BGP)
- Use QoS to prioritize critical traffic
- Implement traffic shaping and policing

- Security

- Segment networks using VLANs and firewalls
- Implement AAA (Authentication, Authorization, Accounting)
- Use encryption (IPsec, SSL/TLS) for sensitive data

Hierarchical Network Design

- Core Layer

- High-speed, low-latency routing
- Minimal processing (routing, switching)
- Use of high-capacity links (10G, 40G, 100G)

- Distribution Layer

- Policy-based routing
- Aggregation of access layer devices
- Use of VLANs and VRFs

- Access Layer

- Direct connection to end devices
- Implement access control lists (ACLs)

- Use of PoE (Power over Ethernet) for IP phones

Routing Protocols

- EIGRP

- **Features:** Fast convergence, low overhead
- **Commands:** ``show ip eigrp neighbors``, ``show ip eigrp topology``
- **Configuration:** ``router eigrp ASN``, ``network NETWORK_ADDRESS``

- OSPF

- **Features:** Link-state protocol, hierarchical design
- **Commands:** ``show ip ospf neighbor``, ``show ip ospf database``
- **Configuration:** ``router ospf PROCESS_ID``, ``network NETWORK_ADDRESS AREA AREA_ID``

- BGP

- **Features:** Path vector protocol, used for Internet routing
- **Commands:** ``show ip bgp summary``, ``show ip bgp neighbors``
- **Configuration:** ``router bgp ASN``, ``neighbor IP_ADDRESS remote-as ASN``

Quality of Service (QoS)

- Classification

- **Commands:** ``class-map``, ``match access-group``, ``match protocol``
- **Example:** ``class-map match-all VOICE``

- Marking

- **Commands:** ``set ip dscp``, ``set ip precedence``
- **Example:** ``policy-map VOICE_POLICY``, ``class VOICE``, ``set ip dscp ef``

- Queuing

- **Commands:** ``queue-limit``, ``random-detect``
- **Example:** ``policy-map QUEUE_POLICY``, ``class VOICE``, ``bandwidth percent 20``

Security Features

- Firewalls

- **Types:** Stateful, Stateless, Next-Gen
- **Commands:** `show access-lists`, `show firewall`
- **Configuration:** `access-list`, `firewall enable`

- VPNs

- **Types:** Site-to-Site, Remote Access
- **Commands:** `show crypto isakmp sa`, `show crypto ipsec sa`
- **Configuration:** `crypto isakmp policy`, `crypto ipsec transform-set`

- AAA

- **Protocols:** TACACS+, RADIUS
- **Commands:** `show aaa servers`, `show aaa methods`
- **Configuration:** `aaa new-model`, `aaa authentication login`

Network Automation and Programmability

- Python for Networking

- **Libraries:** Netmiko, Paramiko, NAPALM
- **Example:** `from netmiko import ConnectHandler`

- REST API

- **Commands:** `curl -X GET`, `curl -X POST`
- **Example:** `curl -X GET "https://api.example.com/devices"`

- Ansible for Network Automation

- **Modules:** ios_command, ios_config
- **Example:** `name: Gather IOS facts`, `ios_facts:`

Troubleshooting and Monitoring

- Common Commands

- **Ping:** `ping IP_ADDRESS`

- **Traceroute:** `traceroute IP_ADDRESS`
- **Show Commands:** `show interfaces`, `show ip route`
- **Logging**
 - **Commands:** `logging buffered`, `logging trap`
 - **Example:** `logging 192.168.1.2`
- **SNMP**
 - **Commands:** `snmp-server community`, `snmp-server host`
 - **Example:** `snmp-server community public RO`

Best Practices

- **Documentation**
 - Maintain detailed network diagrams
 - Regularly update configuration backups
- **Change Management**
 - Implement a change control process
 - Test changes in a lab environment before deployment
- **Training and Development**
 - Stay updated with the latest technologies
 - Obtain relevant certifications (CCNP, CCIE)

Example Network Design

- **Core Layer**
 - **Devices:** Cisco Nexus 9000
 - **Links:** 100G Ethernet
- **Distribution Layer**
 - **Devices:** Cisco Catalyst 9500
 - **Links:** 40G Ethernet
- **Access Layer**
 - **Devices:** Cisco Catalyst 9300

- **Links:** 10G Ethernet

Summary

- **Key Takeaways**

- Focus on scalability, reliability, performance, and security
- Use hierarchical design models
- Implement QoS, security features, and network automation
- Regularly monitor and document the network

This cheat sheet provides a comprehensive overview of essential concepts and tools for a Cisco Certified Design Expert (CCDE). Use it as a quick reference guide for designing, implementing, and managing complex network infrastructures.

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