(CCIE Enterprise Infrastructure)

(Cisco (Lab) Certification Mapped Curriculum)

IP Addressing (v4/v6) & Intro. to Routing

Network Types, IP Addressing, Subnetting,
Auto & Manual Summarization, CIDR
Routing Process, Routing Table Components,
Static Route, Floating Static Route
Default Route with static

Dynamic Routing:

EIGRP (v4/v6)

EIGRP Features (DUAL Algorithm)
Address families (IPv4, IPv6)
Neighbor relationship and authentication
Loop-free path selections (RD, FD, FC, successor, feasible successor, stuck in active)
Stubs with Macros
Load balancing (equal and unequal cost)
Metrics, Manual and auto-summarization
Leak map, EIGRP (classic and named mode)

OSPF (v2/v3)

Address families (IPv4, IPv6)
Neighbor relationship and authentication
Network types, area types, and router types
Point-to-point, multipoint, broadcast, non-broadcast
Area type: Backbone, Normal, Transit, Stub, NSSA,
Totally Stub, Totally NSSA, Internal router, backbone router, ABR, ASBR, Virtual link,
Path preference
OSPF Default, Manual summarization and filtering

Compare routing concepts of EIGRP and OSPF (advanced distance vector vs. linked state, load balancing, path selection, path operations and metrics)

Route Optimization

Redistribution between any routing protocols
Troubleshoot administrative distance (all routing protocols)
Route map for any routing protocol (attributes, tagging, filtering)
Loop prevention mechanisms (filtering, tagging, split horizon, route poisoning)
Manual and auto-summarization with any routing protocol
Configure and verify policy-based routing
Describe Bidirectional Forwarding Detection

BGP / MP BGP (Internal and External)

Address families (IPv4, IPv6)
Neighbor relationship and Authentication (next-hop, mulithop, 4-byte AS, private AS, route refresh, synchronization, operation, Peer-group/update-group, template, Active and Passive states and timers)
Configure and verify eBGP between directly connected neighbors (best path selection algorithm and neighbor relationships), Load balancing, Policies (inbound/outbound filtering, path manipulation), Path preference (attributes and best-path) Route reflector (excluding multiple route reflectors, confederations, dynamic peer), Routing Policies, As path manipulations, Convergence and Scalability, Other BGP feature sets, Summarization Features
Diagnose network problems using tools such as debugs, conditional debugs, trace route, ping and syslog

VPN Technologies

Describe MPLS operations
MPLS Layer 3 VPN
VRF-Lite
Label stack, LSR, LSP, LDP
MPLS ping, MPLS traceroute
PE-CE routing
MP-BGP VPNv4/VPNv6
Extranet (route leaking)
Configure and verify DMVPN (single hub)
GRE/mGRE
NHRP
IPsec
Dynamic neighbor
Spoke-to-spoke

IPv6

Describe IPv6 First Hop security features (RA guard, DHCP guard, binding table, ND inspection/snooping, source guard)

Access Control List

IPv4 access control lists (Numbered, Named, Standard, Extended, Time-based)
IPv6 traffic filter

QoS

Describe concepts of wired and wireless QoS
QoS components and policies
End to end L3 QoS using MQC
Differentiated Services (DiffServ)
CoS and DSCP Mapping
Classification
Network Based Application Recognition (NBAR)
Marking using IP Precedence, DSCP, CoS
Congestion management and avoidance
Policing, shaping

Multicast

Layer 2 multicast
IGMPv2, IGMPv3
IGMP Snooping, PIM Snooping
IGMP Queries , MLD
PIM Sparse Mode,Dense Mode
Static RP, BSR, AutoRP
Group to RP Mapping
Bidirectional PIM
Source-Specific Multicast
Multicast boundary, RP announcement filter
PIM Anycast RP, IPv4 Anycast RP using MSDP
Multicast multipath
Reverse path forwarding check

Network Address Translation (NAT)

Static NAT, PAT
Dynamic NAT, PAT
Policy-based NAT, PAT
VRF-aware NAT, PAT

Layer 2:

Explain design principles used in an enterprise network
Enterprise network design such as Tier 2, Tier 3, and Fabric Capacity planning,
Managing MAC address table
Intro. To Switch, VLAN, Native VLAN, Manual VLAN pruning , Normal range and extended range VLANs, Voice VLAN,
VTP ver2, ver3
Troubleshoot static and dynamic 802.1q trunking protocols
DTP, CDP/LLDP, L2 MTU, UDLD
Configure and verify Spanning Tree Protocols, PVST+, Rapid PVST+, MST, Switch priority, port priority, path cost, STP timers, PortFast, BPDU Guard, BPDU Filter, Loop Guard, Root Guard, Troubleshoot static and dynamic Ether Channels, LACP, Layer 2, Layer 3, Load balancing, EtherChannel Misconfiguration Guard, MLS, Inter-Vlan Routing,
Differentiate between hardware and software switching mechanisms, Process and CEF, CAM and TCAM, FIB vs. RIB
Switch Security: DHCP Snooping, Dynamic ARP Inspection, Errdisable recovery

IP Services & Network Assurance

Describe Network Time Protocol (NTP)
SNMP (v2c, v3)
Configure first hop redundancy protocols, such as HSRP, VRRP, GLBP and SSO
Troubleshoot device management
Console and VTY, Telnet, SSH, (T)FTP
NetFlow (v5, v9, flexible NetFlow)
Troubleshoot IPv4 and IPv6 DHCP (DHCP client, IOS DHCP server, DHCP relay, DHCP options) Troubleshoot network performance issues using IP SLA (jitter, tracking objects, delay, connectivity)

Configure and verify device monitoring using syslog for remote logging

Troubleshoot network problems using logging (local, syslog, debugs, conditional debugs, timestamps)
Configure and verify SPAN/RSPAN/ERSPAN
Describe Cisco DNA Center workflows, NETCONF and RESTCONF

Infrastructure Security

Configure and verify device access control
Lines and password protection
Troubleshoot device security using IOS AAA (TACACS+, RADIUS, local database)
Troubleshoot router security features
Unicast reverse path forwarding (uRPF)
Troubleshoot control plane policing (CoPP)
Describe the components of network security design
Threat defense
Endpoint security
Next-generation firewall
TrustSec, MACsec
Network access control with 802.1X, MAB, and WebAuth

Wireless:

Wireless Intro, Describe Layer 1 concepts, such as RF power, band and channels, and wireless client devices capabilities
Describe AP modes and antenna types
Describe access point discovery and join process (discovery algorithms, WLC selection process)
Describe the main principles and use cases for Layer 2 and Layer 3 roaming,
Configure and verify wireless security features, EAP, WebAuth, PSK
Troubleshoot WLAN configuration and
Wireless client connectivity issues
Analyze design principles of a WLAN deployment
Wireless deployment models (centralized, distributed, controller-less, controller based, cloud, remote branch)
Location services in a WLAN design

Virtualization

Describe device virtualization technologies
Virtual machine, Virtual switching, Hypervisor type 1 and 2
Data path virtualization technologies
VRF, GRE and IPsec tunneling
Describe network virtualization concepts
LISP, VXLAN
Differentiate between on-premises and cloud infrastructure deployments
SDN, Describe REST API security
Explain the working principles of the Cisco SD-WAN solution
SD-WAN control and data planes elements
Traditional WAN and SD-WAN solutions

Explain the working principles of the Cisco SD-Access solution
SD-Access control and data planes elements
Traditional campus inter-operating with SD-Access

Automation

Interpret basic Python components and scripts
Valid JSON encoded file
Describe the high-level principles and benefits of a data modeling language, such as YANG
Describe APIs for Cisco DNA Center and vManage
Cisco DNA Center assurance (connectivity, monitoring, device health, network health)
Construct EEM applet to automate configuration, troubleshooting, or data collection
Compare agent vs. agentless orchestration tools, such as Chef, Puppet, Ansible, and SaltStack