

Lab – CCIE Service Provider



Online Course

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Course Modules



1. Core Routing

- Interior Gateway Protocol
 - IS-IS
 - OSPFv2 and OSPFv3
 - Optimize IGP scale and performance
- Border Gateway Protocol
 - IBGP, EBGP, and MP-BGP
 - BGP route policy enforcement
 - BGP path attribute
 - BGP scale and performance
 - BGP labeled unicast and linked state
- Multicast
 - Design PIM (PIM-SM, PIM-SSM, and BIDIR-PIM)
 - Design RP (Auto-RP, BSR, static, anycast RP, and MSDP)
 - Design IGMP and MLD
 - MLDP
 - Tree-SID
- Multiprotocol Label Switching
 - MPLS forwarding and control plane mechanisms
 - LDP
 - LDP scale and performance

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- MPLS traffic engineering
 - IS-IS and OSPF extensions
 - RSVP-TE
 - MPLS TE policy enforcement
 - MPLS LSP attributes
 - Optimize MPLS TE scale and performance
- Segment routing
 - IS-IS segment routing control plane for IPv4 and IPv6
 - OSPFv2 and OSPFv3 segment routing control plane
 - BGP SR
 - SR (SRGB and max label depth)
 - SR-TE
 - LDP and SR interworking, segment routing mapping server
 - PCE and PCEP technology
 - Flexible algorithm
 - SRv6 locator
 - SRv6 micro-segment (uSID)
 - SRv6 encapsulation functions
 - SRv6 interworking gateway



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2. Architectures and Services

- Mobile infrastructure architecture
 - o Design 5G vRAN and ORAN transport
 - o Design 5G converged packet transport architecture
 - o Design clocking and synchronization
 - o Design multi-access edge computing (MEC)
 - o Design transport network slicing
 - o Design telco hybrid and multi-cloud
- Optical architecture
 - o Design routed optical network (RON)
- Large-scale MPLS architecture
 - o Unified MPLS
 - o Multi-domain segment routing with SR-PCE
 - o SLA based on IGP/TE metrics and disjoint paths
- Carrier Ethernet
 - o E-Line, E-LAN, and E-TREE
 - o VPWS, VPLS, and H-VPLS
 - o EBPN (single-homed and multi-homed)
 - ☒ EVPN-VPWS
 - ☒ EVPN ELAN
 - ☒ EVPN-IRB
 - o L2VPN service auto steering into segment routing policy



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- L3VPN
 - L3VPN
 - PE-CE routing protocols (OSPF and BGP)
 - Loop prevention techniques in multi-homed environments
 - Inter-AS L3VPN
 - Shared services, for example: extranet and internet access
 - L3VPN service auto steering into segment routing policy
- Internet service
 - IPv4 translation mechanism, such as: NAT44, CGNAT
 - IPv4 translation mechanism, such as: NAT64, MAP-T
 - Internet peering route and transit policy enforcement
- Multicast VPN
 - NG mVPN (profile 0, 3, 6, 7, 11, 12, 13, 14, 27, 28, and 29)
- Quality of service for core, distribution, and access
 - Classification and marking
 - Congestion management and scheduling
 - Congestion avoidance
 - MPLS QoS models (pipe, short pipe, and uniform)
 - MPLS TE QoS (MAM, RDM and PBTS)





3. Access Connectivity

- BNG connectivity
 - Design cloud-native BNG
 - Design control and user plan separation
- Layer 2 connectivity
 - IEEE 802.1ad (Q-in-Q) and ITU G.8032
 - Spanning Tree Access Gateway (MST-AG and PVST-AG)
 - Design and operate MC-LAG

4. High Availability and fast Convergence

- High availability
 - SSO/NSF, NSR, and GR
- Routing/fast convergence
 - IGP convergence
 - LDP convergence
 - BGP Prefix Independent Convergence (BGP-PIC)
 - BFD
 - LFA-FRR (LFA, remote LFA, and TI-LFA)
 - MPLS TE FRR

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5.Security

- Control plane security
 - Control lane protection techniques (LPTS and CoPP)
 - Routing protocol and LDP authentication and security
 - BGP prefix-based and attribute-based filtering
 - BGP-RPKI (origin AS validation)
- Management plane security
 - Implement and troubleshoot device managemnt (MPP, SSH)
 - Implement and troubleshoot logging and SNMP security
 - Implement and troubleshoot AAA
- Infrastructure security
 - ACL compression and object groups
 - uRPF
 - RTBH and router hardening
 - BGP Flowspec
 - TLS and mTLS certificates using gRPC and gNMI
 - Design MACsec



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6.Assurance and Automation

- Network assurance
 - o Syslog and logging functions
 - o SNMP traps and RMON
 - o NetFlow and IPFIX
 - o Segment routing performance monitoring
 - o IP performance monitoring (TWAMP)
 - o Y.1731 performance monitoring and Y.1564
- Network automation
 - o Design, deploy, and optimize NSO service packages
 - o Design & deploy model-driven telemetry tmpls on XR devices
 - o Deploy and optimize Ansible playbook and Python scripts
 - o IOS XR app hosting using native and container-based apps
 - o Secure ZTP

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