



CCIE Data Center v3.1 Lab Exam

Exam Description: The CCIE Data Center (v3.1) Lab Exam is an 8-hour, hands-on lab exam that requires a candidate to plan, design, deploy, operate, and optimize complex Data Center networks.

Candidates are expected to program and automate the network within their exam, as per exam topics below. The exam is a closed book, and no outside reference materials are allowed.

The following topics are general guidelines for the content likely to be included on the exam. However, other related topics may also appear on any specific delivery of the exam. To better reflect the contents of the exam and for clarity purposes, the guidelines below may change at any time without notice.

- 20% 1.0 Data Center L2/L3 Connectivity**
 - 1.1 Layer 2 technologies
 - 1.1.a Link aggregation
 - 1.1.a.i Virtual PortChannel
 - 1.1.a.ii PortChannel
 - 1.1.b Tagging/trunking
 - 1.1.c Static path binding
 - 1.1.d Spanning Tree Protocol
 - 1.1.d.i PVST and Rapid PVST
 - 1.1.d.ii MST
 - 1.2 Route protocols and features
 - 1.2.a OSPF (v2 and v3)
 - 1.2.a.i Authentication
 - 1.2.a.ii Adjacencies
 - 1.2.a.iii Network types and area types
 - 1.2.a.iv LSA types
 - 1.2.a.v Route aggregation/summarization
 - 1.2.a.vi Route redistribution
 - 1.2.b ISIS
 - 1.2.b.i Adjacencies
 - 1.2.b.i.1 Single area, single topology
 - 1.2.b.ii Network types, levels, and router types
 - 1.2.b.ii.1 NSAP addressing
 - 1.2.b.ii.2 Point-to-point, broadcast links
 - 1.2.c BGP
 - 1.2.c.i Path selection
 - 1.2.c.ii External and internal peering
 - 1.2.c.iii Route reflector and route server

		1.2.c.iv	Peer templates
		1.2.c.v	Mulihop EGBP
		1.2.c.vi	Route aggregation/summarization
		1.2.c.vii	Route redistribution
		1.2.c.viii	Local-AS number
	1.2.d		BFD
	1.2.e		FHRP
1.3			Multicast protocols
	1.3.a		PIM
		1.3.a.i	Sparse mode
		1.3.a.ii	BIDIR
		1.3.a.iii	Static RP, BSR, Auto-RP, phantom RP
		1.3.a.iv	IPv4 PIM Anycast
		1.3.a.v	IPv4 Anycast-RP using MSDP
	1.3.b		IGMP
		1.3.b.i	IGMPv2, IGMPv3
		1.3.b.ii	IBMP snooping
		1.3.b.iii	IGMP querier
15%	2.0		Data Center Fabric Infrastructure
	2.1		Physical fabric components
		2.1.a	Fabric discovery
		2.1.b	Controllers
		2.1.c	Switches
		2.1.d	Multi-tier architecture
	2.2		ACI policies
		2.2.a	Access policies
		2.2.b	Fabric policies
		2.2.c	Multi-tenancy
	2.3		Overlay policies
		2.3.a	Tenants, application profiles, EPGs and ESGs
		2.3.b	Networking (VRFs, bridge domains)
		2.3.c	Security (contracts, filters, vzAny)
	2.4		Fabric monitoring
		2.4.a	Faults
		2.4.b	Events
		2.4.c	Health indicators
		2.4.d	Audit logs
	2.5		Virtual networking
		2.5.a	vSphere VDS with or without VMM integration

15%	3.0	Data Center Fabric Connectivity
	3.1	Overlay fabrics
	3.1.a	ACI
	3.1.b	VXLAN EVPN
	3.2	External connectivity
	3.2.a	VRF Lite
	3.2.b	OSPF
	3.3.b.i	Authentication
	3.3.b.ii	Adjacencies
	3.3.b.iii	Network types and area types
	3.3.b.iv	Route redistribution
	3.2.c	BGP
	3.3.c.i	AS manipulation
	3.3.c.ii	External and internal peering
	3.3.c.iii	Route reflectors
	3.3.c.iv	Route redistribution
	3.2.d	Transit routing
	3.3	Inter-fabric connectivity
	3.3.a	Multi-Site: ACI or VXLAN EVPN
	3.3.b	ACI Multi-Pod
	3.3.c	ACI remote leaf
15%	4.0	Data Center Compute
	4.1	Compute resources
	4.1.a	Compute policies, profiles, and templates
	4.1.b	Nutanix
	4.2	Compute connectivity
	4.2.a	SAN/LAN uplinks
	4.2.b	Rack server integration
	4.2.c	Port modes
	4.3	Compute management
	4.3.a	UCS Manager
	4.3.b	Intersight
10%	5.0	Data Center Storage Protocols and Features
	5.1	FC and FCoE
	5.1.a	Zoning
	5.1.b	NPV/NPIV
	5.1.c	Trunking
	5.1.d	PortChannel
	5.1.e	Load balancing

	5.2	RoCE v2 transport for high performance networks, such as for AI/ML workloads
	5.2.a	DCQCN congestion control
	5.2.a.i	PFC
	5.2.a.ii	ECN
10%	6.0	Data Center Security and Network Services
	6.1	Security features
	6.1.a	ACLs
	6.1.b	First Hop Security
	6.1.c	Port security
	6.1.d	Private VLANs
	6.1.e	Contracts
	6.2	RBAC
	6.2.a	RADIUS
	6.2.b	TACACS+
	6.2.c	LDAP
	6.2.d	AAA
	6.3	Network services insertion and redirection
	6.3.a	Policy-based routing
	6.3.b	Policy-based redirect
	6.3.c	Inter VRF communication
	6.3.d	Route targets
	6.3.e	Prefix lists
	6.4	Services
	6.4.a	Flow/telemetry export
	6.4.b	(R)SPAN/ERSPAN
	6.4.c	SNMP
	6.4.d	Syslog
	6.4.e	DHCP
	6.4.f	NTP/PTP
	6.5	Traffic management
	6.5.a	Queueing
	6.5.b	Policing
	6.5.c	Classification/marketing
	6.5.d	Scheduling
	6.5.e	CoPP
15%	7.0	Data Center Automation and Orchestration
	7.1	Data center tasks using scripts (Python, Ansible, and Terraform)
	7.1.a	Create, read, update, delete using RESTful APIs
	7.1.b	Deploy and modify configurations
	7.1.c	Statistics and data collection

- 7.2 Data center automation and orchestration tools
 - 7.2.a Nexus Dashboard
 - 7.2.a.i Orchestrator
 - 7.2.a.ii Fabric Controller
 - 7.2.a.iii Insights
 - 7.2.b Cloud Network Controller