

(v3.0) Exam Topics - Practical Exam

CCIE

Data Center

2024



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CCIE DATA CENTER (V3.0) EXAM TOPICS

PRACTICAL 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.

1. Data Center L2/L3 Connectivity

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 Multihop EBGP

1.2.c.vi Route aggregation/summarization

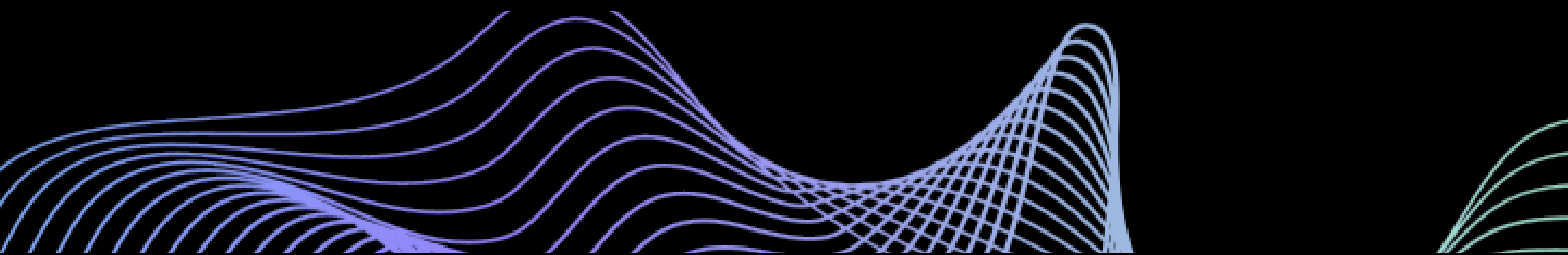
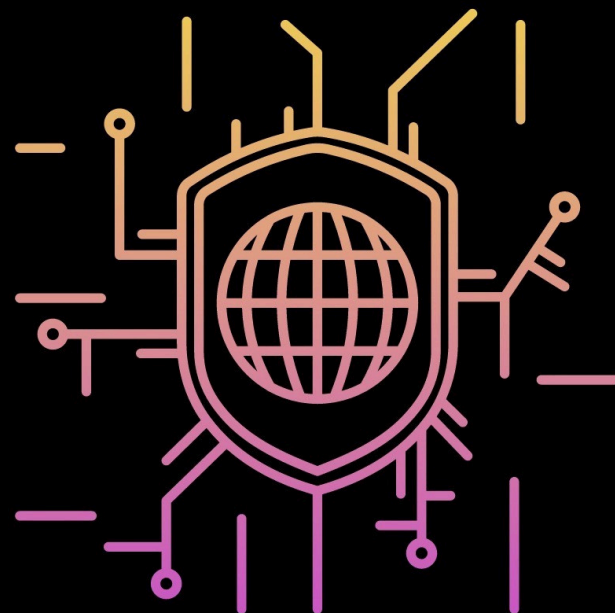
1.2.c.vii Route redistribution

1.2.c.viii Local-AS number

1.2.d BFD

1.2.e FHRP

NETWORK



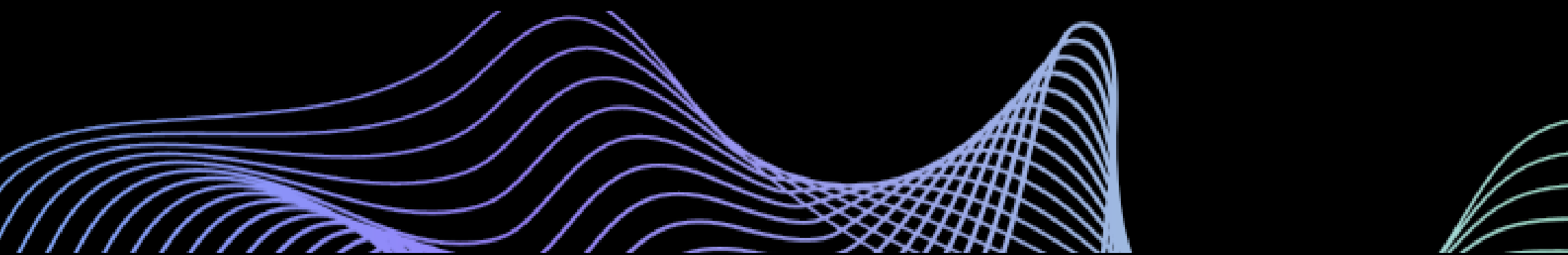
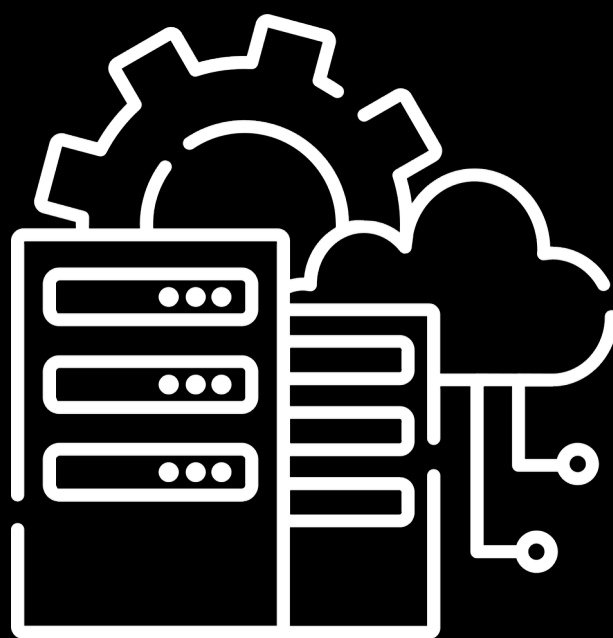
- 1.3 Multicast protocols
 - 1.3.a PIM
 - 1.3.a.i Sparse mode
 - 1.3.a.ii BIDIR
 - 1.3.a.iii Static RP, BSR, Auto-RP, phantom RP
 - 1.3.a.iv IPv4 PIM Anycast
 - 1.3.a.v IPv4 Anycast-RP using MSDP
 - 1.3.b IGMP
 - 1.3.b.i IGMPv2, IGMPv3
 - 1.3.b.ii IBMP snooping
 - 1.3.b.iii IGMP querier

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

2.4 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

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

3.2.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

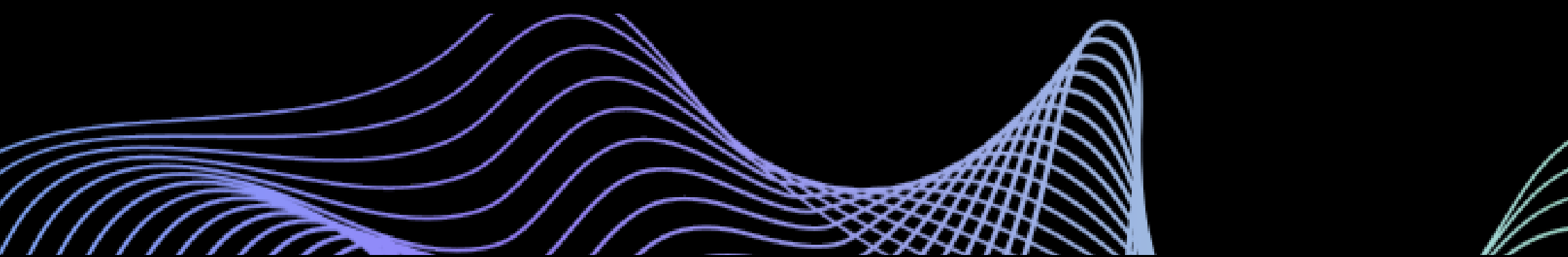
3.2.d Transit routing

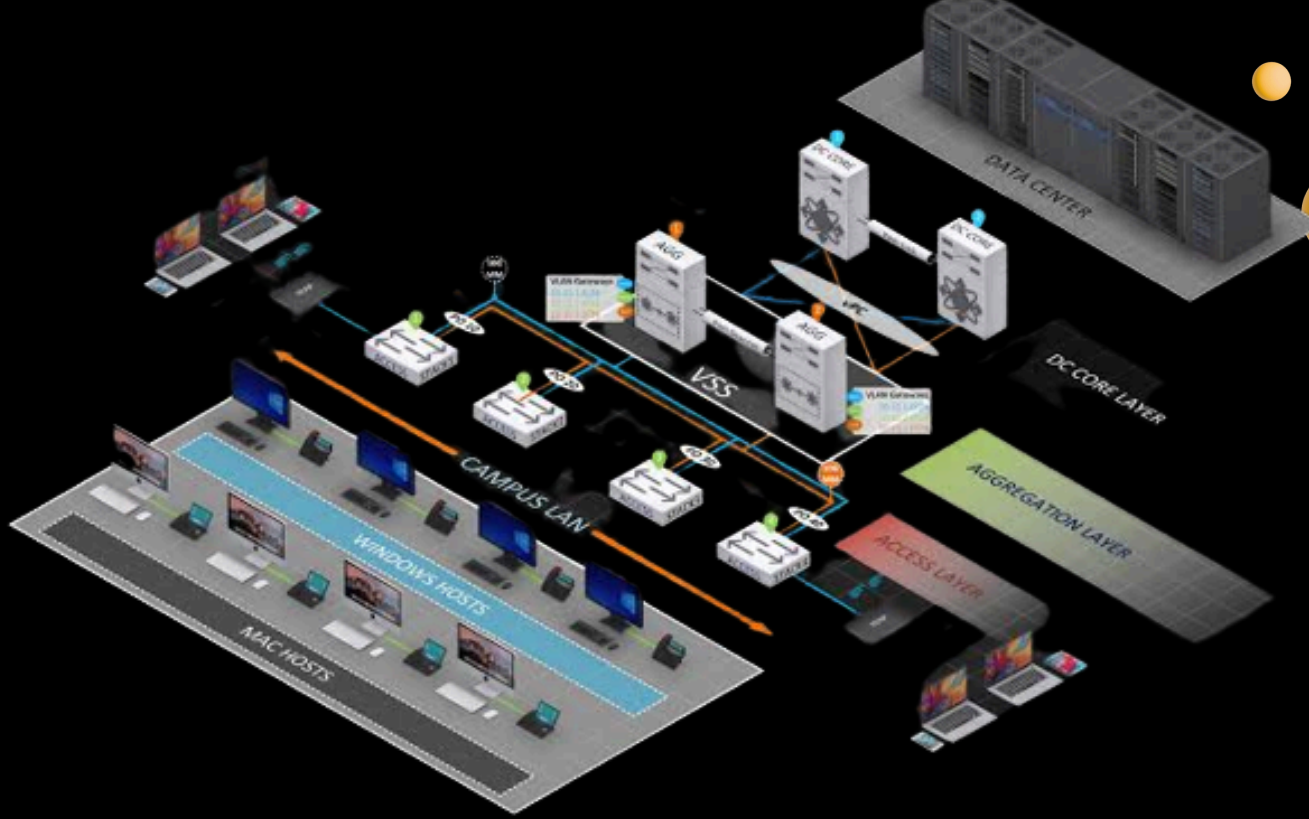
3.3 Inter-fabric connectivity

3.3.a Multi-Site: ACI or VXLAN EVPN

3.3.b ACI Multi-Pod

3.3.c ACI remote leaf





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

5.0 Data Center Storage Protocols

- 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

6.0 Data Center Security and Network Service

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/marking
 - 6.5.d Scheduling
 - 6.5.e CoPP

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





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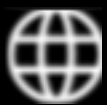
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