

CCIE Enterprise Infrastructure, Revision 1.1

Blueprint Revisions

Today, products and technologies are evolving faster than ever before. To keep up with the fast pace, we are introducing a new certification lifecycle management process that will allow us to align our exams faster with these changes: *the certification roadmap*. The certification roadmap will provide us with an iterative agile model that will enable us to adjust our programs to match industry changes and the evolution of technologies. It will do so, by allowing us to update track details (exam blueprint, equipment list, and software) more frequently, keeping overall changes to a minimum (smaller than 20%), while still introducing larger changes (over 20%) when necessary. This not only allows us to ensure our content stays relevant, but also, minimizes learning curves in between revisions and helps candidates to better prepare for the future.

Today, we are revising the CCIE Enterprise Infrastructure exam.

CCIE Enterprise Infrastructure v1.1

The main objectives of this minor revision are to:

- Further scope out the exam blueprint, by ensuring exam objectives are clear.
- Introduce new blueprint tasks to ensure exam relevancy as relevant today.
- Phase out old(er) products and/or technology solutions that are less relevant today.
- Update equipment and software list.

Please, refer to <https://learningnetwork.cisco.com> for the list of exam topics covered in the updated CCIE Enterprise Infrastructure exam and for more information regards to CCIE certification program.

CCIE Enterprise Infrastructure, Revision 1.1

Changes - highlights

V1.0	V1.1
<p>2. Software Defined Infrastructure</p> <p>2.1 Cisco SD Access</p> <p>2.1.a Design a Cisco SD Access solution</p> <p>2.1.a i Underlay network (IS-IS, manual/PnP)</p> <p>2.1.a ii Overlay fabric design (LISP, VXLAN, Cisco TrustSec)</p> <p>2.1.a iii Fabric domains (single-site and multi-site using SD-WAN transit)</p> <p>2.1.b Cisco SD Access deployment</p> <p>2.1.b i Cisco DNA Center device discovery and device management</p> <p>2.1.b ii Add fabric node devices to an existing fabric</p> <p>2.1.b iii Host onboarding (wired endpoints only)</p> <p>2.1.b iv Fabric border handoff</p> <p>2.1.c Segmentation</p> <p>2.1.c i Macro-level segmentation using VNs</p> <p>2.1.c ii Micro-level segmentation using SGTs (using Cisco ISE)</p> <p>2.1.d Assurance</p> <p>2.1.d i Network and client health (360)</p>	<p>2. Software Defined Infrastructure</p> <p>2.1 Cisco SD Access</p> <p>2.1.a Underlay</p> <p>2.1.a i Manual</p> <p>2.1.a ii LAN automation/PnP</p> <p>2.1.a iii Device discovery and device management</p> <p>2.1.a iv Extended nodes / Policy extended nodes</p> <p>2.1.b Overlay</p> <p>2.1.b i LISP, BGP control planes</p> <p>2.1.b ii VXLAN data plane</p> <p>2.1.b iii Cisco TrustSec policy plane</p> <p>2.1.b iv L2 flooding</p> <p>2.1.b v Native multicast</p> <p>2.1.c Fabric Design</p> <p>2.1.c i Single site campus</p> <p>2.1.c ii Multi-site</p> <p>2.1.c iii Fabric in a box</p> <p>2.1.d Fabric Deployment</p> <p>2.1.d i Host onboarding</p> <p>2.1.d ii Authentication templates</p> <p>2.1.d iii Port configuration</p> <p>2.1.d iv Multi-site remote border</p> <p>2.1.d v Border priority</p> <p>2.1.d vi Adding devices to fabric</p> <p>2.1.e Fabric border handoff</p> <p>2.1.e i SDA, SDWAN, IP Transits</p> <p>2.1.e ii Peer device (Fusion router)</p> <p>2.1.e iii Layer 2 border handoff</p> <p>2.1.f Segmentation</p> <p>2.1.f i Macro segmentation using VNs</p>

CCIE Enterprise Infrastructure, Revision 1.1

<ul style="list-style-type: none"> 2.1.d ii Monitoring and troubleshooting 2.2 Cisco SD-WAN <ul style="list-style-type: none"> 2.2.a Design a Cisco SD-WAN solution <ul style="list-style-type: none"> 2.2.a i Orchestration plane (vBond, NAT) 2.2.a ii Management plane (vManage) 2.2.a iii Control plane (vSmart, OMP) 2.2.a iv Data plane (vEdge, cEdge) 2.2.b WAN edge deployment <ul style="list-style-type: none"> 2.2.b i Onboarding new edge routers 2.2.b ii Orchestration with zero-touch provisioning/Plug-And-Play 2.2.b iii OMP 2.2.b iv TLOC 2.2.c Configuration templates 2.2.d Localized policies 2.2.e Centralized policies 	<ul style="list-style-type: none"> 2.1.f ii Micro-level segmentation using SGTs and SGACLs 2.2 Cisco SD-WAN <ul style="list-style-type: none"> 2.2.a Controller Architecture <ul style="list-style-type: none"> 2.2.a i Management plane (vManage) 2.2.a ii Orchestration plane (vBond) 2.2.a iii Control plane (vSmart) 2.2.b SD-WAN Underlay <ul style="list-style-type: none"> 2.2.b i WAN Cloud Edge Deployment (AWS, Azure, Google Cloud) 2.2.b ii WAN Edge Deployment (hardware) 2.2.b iii Greenfield, Brownfield, and Hybrid deployments 2.2.b iv System Configuration (system IP, Site-ID, Org Name, vBond) 2.2.b v Transport configuration (underlay and tunnel interfaces, allowed services, TLOC extension) 2.2.c Overlay Management Protocol (OMP) <ul style="list-style-type: none"> 2.2.c i OMP attributes 2.2.c ii IPsec key management 2.2.c iii Route aggregation 2.2.c iv Redistribution 2.2.c v Additional features (BGP AS Path propagation, SDA integration) 2.2.d Configuration Templates <ul style="list-style-type: none"> 2.2.d i CLI templates 2.2.d ii Feature templates 2.2.d iii Device templates 2.2.e Centralized policies <ul style="list-style-type: none"> 2.2.e i Data policies 2.2.e ii Application-aware routing policies
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CCIE Enterprise Infrastructure, Revision 1.1

	<ul style="list-style-type: none"> 2.2.e iii Control policies 2.2.f Localized policies <ul style="list-style-type: none"> 2.2.f i Access List 2.2.f ii Route policies
<p>3. Transport Technologies and Solutions</p> <p>3.1 MPLS</p> <ul style="list-style-type: none"> 3.1.a Operations <ul style="list-style-type: none"> 3.1.a i Label stack, LSR, LSP 3.1.a ii LDP 3.1.a iii MPLS ping, MPLS traceroute 3.1.b L3VPN <ul style="list-style-type: none"> 3.1.b i PE-CE routing 3.1.b ii MP-BGP VPNv4/VPNv6 3.1.b iii Extranet (route leaking) <p>3.2 DMVPN</p> <ul style="list-style-type: none"> 3.2.a Troubleshoot DMVPN Phase 3 with dual-hub <ul style="list-style-type: none"> 3.2.a i NHRP 3.2.a ii IPsec/IKEv2 using pre-shared key 3.2.a iii Per-Tunnel QoS 3.2.b Identify use-cases for FlexVPN <ul style="list-style-type: none"> 3.2.b i Site-to-site, Server, Client, Spoke-to-Spoke 3.2.b ii IPsec/IKEv2 using pre-shared key 3.2.b iii MPLS over FlexVPN 	<p>3. Transport Technologies and Solutions</p> <p>3.1 Static point-to-point GRE tunnels</p> <p>3.2 MPLS</p> <ul style="list-style-type: none"> 3.2.a Operations <ul style="list-style-type: none"> 3.2.a i Label stack, LSR, LSP 3.2.a ii LDP 3.2.a iii MPLS ping, MPLS traceroute 3.2.b L3VPN <ul style="list-style-type: none"> 3.2.b i PE-CE routing using BGP 3.2.b ii MP-BGP VPNv4/VPNv6 <p>3.3 DMVPN</p> <ul style="list-style-type: none"> 3.3.a Troubleshoot DMVPN Phase 3 with dual-hub <ul style="list-style-type: none"> 3.3.a i NHRP 3.3.a ii IPsec/IKEv2 using pre-shared key 3.3.a iii Per-Tunnel QoS
<p>5. Infrastructure Automation & Programmability</p> <p>5.1 Data encoding formats</p> <ul style="list-style-type: none"> 5.1.a JSON 5.1.b XML <p>5.2 Automation and scripting</p> <ul style="list-style-type: none"> 5.2.a EEM applets 	<p>5. Infrastructure Automation & Programmability</p> <p>5.1 Data encoding formats</p> <ul style="list-style-type: none"> 5.1.a JSON 5.1.b XML 5.1.c YAML 5.1.d Jinja

CCIE Enterprise Infrastructure, Revision 1.1

<ul style="list-style-type: none"> 5.2.b Guest shell <ul style="list-style-type: none"> 5.2.b i Linux environment 5.2.b ii CLI Python module 5.2.b iii EEMP Python module 5.3 Programmability <ul style="list-style-type: none"> 5.3.a Interaction with vManage API <ul style="list-style-type: none"> 5.3.a i Python requests library and Postman 5.3.a ii Monitoring endpoints 5.3.a iii Configuration endpoints 5.3.b Interaction with Cisco DNA Center API <ul style="list-style-type: none"> 5.3.b i HTTP request (GET, PUT, POST) via Python requests library and Postman 5.3.c Interaction with Cisco IOS XE API <ul style="list-style-type: none"> 5.3.c i Via NETCONF/YANG using Python ncclient library 5.3.c ii Via RESTCONF/YANG using Python requests library and Postman 5.3.d Deploy and verify model-driven telemetry <ul style="list-style-type: none"> 5.3.d i Configure on-charge subscription using gRPC 	<ul style="list-style-type: none"> 5.2 Automation and scripting <ul style="list-style-type: none"> 5.2.a EEM applets 5.2.b Guest shell <ul style="list-style-type: none"> 5.2.b i Linux environment 5.2.b ii CLI Python module 5.2.b iii EEMP Python module 5.3 Programmability <ul style="list-style-type: none"> 5.3.a Interaction with vManage API <ul style="list-style-type: none"> 5.3.a i Python requests library and Postman 5.3.a ii Monitoring endpoints 5.3.a iii Configuration endpoints 5.3.b Interaction with Cisco DNA Center API <ul style="list-style-type: none"> 5.3.b i HTTP request (GET, PUT, POST) via Python requests library and Postman
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CCIE Enterprise Infrastructure, Revision 1.1

Compared to v 1.0, the new v1.1 revision maintains the current 5 main domain names and domain weightings. However, changes have been introduced in all 5 domains of the blueprint, paying special focus to core essential topics that are more relevant in the industry today and providing additional context to better understand the scope of each individual task.

1. Network Infrastructure

In task 1.1.c the following topics were removed:

- VLAN database
- VTP

In task 1.1.d the following topic was added:

- Identify Multi-chassis EtherChannel use cases

In task 1.2 the following topics were added:

- Route leaking between VRFs using route maps and VASI
- L3 MTU

The whole of task 1.3.d was removed and, in 1.3.f, the following topics were also removed:

- Fast convergence requirements
- IP FRR (single hop)

In task 1.4 the following topic was added:

- OSPFv3 address family support

In task 1.4.f the following topic was added:

- Loop-free alternate

In task 1.5.f the following topic was removed:

- Multipath, add-path

2. Software Defined Infrastructure

This whole section had a comprehensive overhaul. Both Cisco SD Access and Cisco SD-WAN tasks were re-structured with the aim of providing candidates with a more concise list of what knowledge is expected around both these topics. The updated structure within the sub-tasks aims at providing additional clarity. For detailed information, please refer to the table above.

3. Transport Technologies and Solutions

For this domain, other than “Static point-to-point GRE tunnels”, there were no new topics added. There was, however, a significant reduction of this section depth, where the following topics were removed:

CCIE Enterprise Infrastructure, Revision 1.1

- Task 3.2.b iii Extranet (route leaking)
- Task 3.3.a iii Per-Tunnel QoS
- The whole of 3.3.b Identify use-cases for FlexVPN was also removed

4. Infrastructure Security and Services

This domain had some minor modifications and clarifications, but overall remains pretty much as it was in v1.0. Please note that the “4.2.d IEEE 802.1X Port-Based Authentication” topics haven’t really been removed from the blueprint. Instead, they are now implicitly covered under some of the “2.1 Cisco SD Access” topics.

5. Infrastructure Automation and Programmability

In task 5.1 the following topics were added:

- YAML
- Jinja

Under task 5.3, Programmability, the following sub-tasks were removed in their entirety:

- Interaction with Cisco IOS XE API
- Deploy and verify model-driven telemetry

Hardware and Software Equipment

In support of the updated CCIE Enterprise Infrastructure revision 1.1, lab environment changes were made to both the equipment and software releases used. Candidates who want to prepare for the exam are now advised to use the following Cisco equipment and software releases. Please, take a moment to visit CCIE Enterprise Infrastructure v1.1 – Equipment and Software list [<link to new page>](#) for a complete overview.

Changes – Highlights

- Cisco IOS XE 17.9
- Cisco SD-WAN, Software Release 20.9
- Cisco DNA Center, Release 2.3

Exam format

No changes have been made to the lab exam format for this minor revision. Please visit the CCIE Enterprise Infrastructure Lab Exam format [<link to existing page>](#) for more information about the CCIE lab exam format.

CCIE Enterprise Infrastructure Minor Revision v1.1 Summary



CCIE Enterprise Infrastructure, Revision 1.1

The new minor revision for CCIE Enterprise Infrastructure allows us to keep the exam closely aligned with today's commonly adopted Cisco Enterprise technologies and solutions. To achieve this, some topics have been removed and, a few new technologies/topics have been introduced. There has also been some re-shuffling and rephrasing of some of the existing topics, as outlined above. The overall (technical) change between the Enterprise Infrastructure revision v1.0 and v1.1 is less than 20%.

