TOMORROW starts here.
BRKCCIE-9162 Session Abstract

If you're starting the journey to gain your CCIE Routing and Switching number, this session is for you!

It introduces the new curriculum of the CCIE Routing and Switching Program and highlights the changes to both the training and the exams (written and lab).

The main objective of this session is to provide candidates with clear expectations of what to expect with the new training and exams.

While not covering or teaching detailed technical content, this includes some illustrations and sample questions.

There is no prerequisite to this session.
Agenda

- Overall CCIE Program
- New CCIE R&Sv5 Curriculum
- New CCIE R&Sv5 Exam Format
- Sample Questions
- Preparation Materials
- Questions & Answers
Cisco Certifications

Architect

CCIE | CCDE

CCNP

CCNA
CCENT

learningnetwork.cisco.com
CCIEs Worldwide

- Most highly respected IT certification since 20+ years!
- Industry standard validating expert skills and experience
- Demonstrate strong commitment and investment to networking career, life-long learning, and dedication to remaining an active CCIE
<table>
<thead>
<tr>
<th>Track</th>
<th>Expert Knowledge and Skills</th>
</tr>
</thead>
</table>
| **Routing & Switching** | • Expert level knowledge of networking across LAN and WAN interfaces and variety of routers and switches  
                           • Solve complex connectivity problems to increase bandwidth, improve response times, maximize performance, and support global operations |
| **Security**         | • Expert level knowledge of security and VPN solutions  
                           • Demonstrate in-depth understanding of Layer 2 and 3 network infrastructure; Solid understanding of Windows, Unix, Linux and HTTP, SMTP, FTP and DNS |
| **Voice**            | • Expert level knowledge of Cisco Voice over IP (VoIP) products and solutions  
                           • Capable of building and configuring complex end-to-end telephony network, troubleshooting and resolving VoIP-related problems |
| **Design**           | • Expert level knowledge of network design principles for the Layer 2 and 3 network infrastructure  
                           • Capable of assessing and translating network business requirements into technical designs |
| **Data Center**      | • Expert level knowledge of DC networking, storage, compute and virtualization  
                           • Capable of building, configuring, and troubleshooting an end-to-end virtualized Data Center using Cisco DC technologies |
| **Service Provider** | • Expert level knowledge of IP fundamentals and technologies  
                           Expertise in building an extensible service provider network  
                           • Expert level knowledge to troubleshoot and maintain complex service provider networks |
| **SP Operations**    | • Expert level knowledge of SP IP NGN technologies  
                           • Capable of troubleshooting SP networks, managing SP processes (incident, fault, change, configuration, and performance), and knowledge of NMS technology |
| **Wireless**         | • Expert level knowledge of WLAN technologies  
                           • Provides next step for individuals interested in a career in managing or working with Cisco wireless technologies |
Certification Process

Written Exam 400-YXZ
- Pearson
- 2 hours
- Multiple choices
- Flash items
- No documentation
- Immediately scored

Practical Exam
- Select Cisco locations
- 8 hours
- Configurations
- Troubleshooting
- Cisco documentation
- Scored within 48h

CCIE
Proactive and Holistic Candidate Feedback

Input
- Cisco Business Units
- Cisco Technology groups
- Cisco Technical Support teams (TAC, AS, ..)
- Cisco-Internal and Cisco-External Subject Matter Experts
- Customer Advisory Boards
- Customer Focus Groups
- Customer and Cisco field surveys (Marketing)
- Cisco Product Manager, Marketing Manager, Program Manager

Create or Refresh Exam Content

Feedback
- Candidate Exam and Item Comments
- Candidate Satisfaction Surveys
- Customer Service Cases
- EAG (Exam Advisory Groups)
- Cisco Learning Network
- Blogs

Exam Live
Launch Exam
Performance Assessment

- Validity
- Reliability
- Fairness

- Congruency
- Relevancy

- Intended use of the test scores
- Definition of Minimally Qualified Candidate
Agenda

- Overall CCIE Program
- **New CCIE R&Sv5 Curriculum**
- New CCIE R&Sv5 Exam Format
- Sample Questions
- Preparation Materials
- Questions & Answers
CCIE R&Sv5 Curriculum Overview

- Certification process unchanged
- Exam curriculum and format changed
- Designed and validated with industry experts (Cisco internals and externals)
- Aligned with evolution of job role and relevant technologies

Check the official information on CLN
https://learningnetwork.cisco.com/community/certifications/ccie_routing_switching

More coming soon, stay tuned!
CCIE R&Sv5 Curriculum Overview

- More emphasis on dual stack IPv4/IPv6 Layer 3 Technologies
- More emphasis on Troubleshooting methodologies
- New VPN Technologies domain
- Reduced emphasis on legacy technologies
CCIE R&Sv5 Curriculum Overview

- Assessment of platform-independent concepts
- Improved Certification’s validity, reliability, integrity and security
- Cisco IOS Software Release 15
  - 15.3T
  - 15.0S
- Equipment used in the exam are all virtual devices (routers and switches)
- Hardware equipment may be used to learn and practice
- Older equipment supports large portion of the new curriculum
- Refer to Feature Navigator
  - http://www.cisco.com/go/fn
CCIE R&Sv5 Curriculum Overview

- 6 main domains in Written exam
- 5 main domains in Lab exam, all common with the Written exam
- New weighting factors
- 4 levels of details, help scoping the expected knowledge
  - Domain
  - Sub-domain
  - Task
  - Sub-task
- Two documents: Written exam Topics (blueprint) + Lab exam Topics
  - https://learningnetwork.cisco.com/community/certifications/ccie_routing_switching
  - https://learningnetwork.cisco.com/docs/DOC-22705
  - https://learningnetwork.cisco.com/docs/DOC-22706
- No more “Checklist”
## CCIE R&Sv5 Curriculum Overview

<table>
<thead>
<tr>
<th>CCIE R Sv4</th>
<th>CCIE R Sv5</th>
<th>% WR</th>
<th>% LAB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00 Implement Layer 2 Technologies</td>
<td>1.0.0 Network Principles</td>
<td>10</td>
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<tr>
<td>2.00 Implement IPv4</td>
<td>2.0.0 Layer 2 Technologies</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>3.00 Implement IPv6</td>
<td>3.0.0 Layer 3 Technologies</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>4.00 Implement MPLS Layer 3 VPNs</td>
<td>4.0.0 VPN Technologies</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>5.00 Implement IP Multicast</td>
<td>5.0.0 Infrastructure Security</td>
<td>5</td>
<td>5</td>
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<tr>
<td>6.00 Implement Network Security</td>
<td>6.0.0 Infrastructure Services</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>7.00 Implement Network Services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.00 Implement Quality of Service</td>
<td></td>
<td></td>
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<tr>
<td>9.00 Troubleshoot a Network</td>
<td></td>
<td></td>
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<tr>
<td>10.00 Optimize the Network</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>11.00 Evaluate proposed changes to a Network (Written only)</td>
<td></td>
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</table>
## CCIE R&Sv5 Lab Curriculum Alignment

Blueprint sections = Exam sections = Score report sections

### CCIE RSv5 Lab Topics domains

<table>
<thead>
<tr>
<th>Domain</th>
<th>Weight</th>
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<tbody>
<tr>
<td>1.0.0 Layer 2 Technologies</td>
<td>20</td>
</tr>
<tr>
<td>2.0.0 Layer 3 Technologies</td>
<td>40</td>
</tr>
<tr>
<td>3.0.0 VPN Technologies</td>
<td>20</td>
</tr>
<tr>
<td>4.0.0 Infrastructure Security</td>
<td>5</td>
</tr>
<tr>
<td>5.0.0 Infrastructure Services</td>
<td>15</td>
</tr>
</tbody>
</table>

### CCIE RSv5 Lab Exam sections

<table>
<thead>
<tr>
<th>Section</th>
<th>Weight</th>
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<tbody>
<tr>
<td>1.0.0 Layer 2 Technologies</td>
<td>20</td>
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<tr>
<td>2.0.0 Layer 3 Technologies</td>
<td>40</td>
</tr>
<tr>
<td>3.0.0 VPN Technologies</td>
<td>20</td>
</tr>
<tr>
<td>4.0.0 Infrastructure Security</td>
<td>5</td>
</tr>
<tr>
<td>5.0.0 Infrastructure Services</td>
<td>15</td>
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</table>

### CCIE RSv5 Score report sections

<table>
<thead>
<tr>
<th>Section</th>
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<tbody>
<tr>
<td>1.0.0 Layer 2 Technologies</td>
<td>85%</td>
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<tr>
<td>2.0.0 Layer 3 Technologies</td>
<td>45%</td>
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<tr>
<td>3.0.0 VPN Technologies</td>
<td>15%</td>
</tr>
<tr>
<td>4.0.0 Infrastructure Security</td>
<td>0%</td>
</tr>
<tr>
<td>5.0.0 Infrastructure Services</td>
<td>20%</td>
</tr>
</tbody>
</table>

Candidate: John Smith  
Exam date: 02/30/2015

or...

Passed! 😊 Your CCIE# is 1025

Failed 😞
<table>
<thead>
<tr>
<th>ID</th>
<th>Sub-Domains</th>
<th>Task</th>
<th>Sub-Task</th>
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<tbody>
<tr>
<td>1.0.0</td>
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<td>Network Principles</td>
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</tr>
<tr>
<td>1.1.0</td>
<td></td>
<td>Network Theory</td>
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<tr>
<td>1.1.1</td>
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<td>Describe basic software architecture differences between IOS and IOS XE</td>
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<tr>
<td>1.1.1a</td>
<td>Sub-Domains</td>
<td>Control plane and Forwarding plane</td>
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</tr>
<tr>
<td>1.1.1b</td>
<td></td>
<td>Impact to troubleshooting and performances</td>
<td></td>
</tr>
<tr>
<td>1.1.1c</td>
<td></td>
<td>Excluding specific platform's architecture</td>
<td></td>
</tr>
<tr>
<td>1.1.2</td>
<td></td>
<td>Identify Cisco Express Forwarding concepts</td>
<td></td>
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<tr>
<td>1.1.2a</td>
<td>Sub-Domains</td>
<td>RIB, FIB, LFIB, Adjacency table</td>
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<tr>
<td>1.1.2b</td>
<td></td>
<td>Load balancing Hash</td>
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</tr>
<tr>
<td>1.1.2c</td>
<td></td>
<td>Polarization concept and avoidance</td>
<td></td>
</tr>
</tbody>
</table>

**CCIE R&Sv5 Curriculum’s Details**

1.0.0 | Network Principles (Written only)
2.0.0 | Layer 2 Technologies
3.0.0 | Layer 3 Technologies
4.0.0 | VPN Technologies
5.0.0 | Infrastructure Security
6.0.0 | Infrastructure Services
CCIE R&Sv5 Key Topic Changes

- **New topics**
  - Written: **IOS-XE, VSS, ISIS, EIGRP OTP*, L2VPN, GETVPN**
  - Written & Lab: **Packet capture analysis, DMVPN, IPsec, IPv6 FHS**

- **Topics moved from v4 Lab to v5 Written**
  - PfR, L2QoS, IPv6 Multicast, 802.1x

- **Topics retired**
  - Frame-Relay, FRTS, LFI, WRR/SRR, ZBF, IPS, RSVP, WCCP

Check the official Topics on CLN

[https://learningnetwork.cisco.com/community/certifications/ccie_routing_switching](https://learningnetwork.cisco.com/community/certifications/ccie_routing_switching)

EIGRP OTP = Over The toP
CCIE R&Sv5 New Topics on Written exam

- Network Principles
  - Network Theory
    - Describe basic software architecture differences between IOS and IOS XE
    - Identify Cisco Express Forwarding concepts
    - Explain general network challenges
    - Explain IP, TCP, UDP operations
CCIE R&Sv5 New Topics on Written exam

- Layer 2 Technologies
  - LAN Switching technologies
    - Describe Chassis Virtualization and Aggregation Technologies
  - Layer 2 Multicast
    - Explain PIM Snooping
  - Layer 2 WAN Circuit technologies
    - Describe WAN rate-based ethernet circuits
CCIE R&Sv5 New Topics on Written exam

- Layer 3 Technologies
  - BGP
    - Describe BGP fast convergence features
  - ISIS
    - Describe basic ISIS network
    - Describe neighbor relationship
    - Describe network types, levels and router types
    - Describe operations
    - Describe optimization features
CCIE R&Sv5 New Topics on Written exam

- **VPN Technologies**
  - Tunneling
    - Describe basic layer 2 VPN – wireline
      - L2TPv3, ATOM General principals
    - Describe basic layer 2 VPN – LAN services
      - VPLS, OTV General principals
  - Encryption
    - Describe GETVPN

- **Infrastructure Services**
  - Network Services
    - Describe IPv6 Network Address Translation
      - NAT64, NPTv6
CCIE R&Sv5 New Topics on Written & Lab exams

- Applicable to **all** lab domains

- Network Troubleshooting
  - Use IOS troubleshooting tools
  - Apply troubleshooting methodologies
  - Interpret packet capture
CCIE R&Sv5 New Topics on Written & Lab exams

- Layer 3 Technologies
  - Fundamental routing concepts
    - Implement and Troubleshoot Bidirectional Forwarding Detection
  - EIGRP
    - Implement EIGRP (multi-address) Named Mode
    - Implement, troubleshoot and optimize EIGRP convergence and scalability
  - OSPF
    - Implement, troubleshoot and optimize EIGRP convergence and scalability
CCIE R&Sv5 New Topics on Written & Lab exams

- VPN Technologies
  - Tunneling
    - Implement and Troubleshoot DMVPN (single hub)
  - Encryption
    - Implement and Troubleshoot IPsec with pre-shared key
CCIE R&Sv5 Topics moved from v4 Lab to v5 Written

- Describe IPv6 Multicast
- Describe RIPv6 (RIPng)
- Describe IPv6 Tunneling Techniques
- Describe Device Security using IOS AAA with TACACS+ and RADIUS
- Describe 802.1x
- Describe Layer 2 QoS
- Identify Performance Routing (PfR)
CCIE R&Sv5 Topics removed from v4 Exams

- Flexlink, ISL, Layer 2 Protocol Tunneling
- Frame-Relay (LFI, FR Traffic Shaping)
- WCCP
- IOS Firewall and IPS
- RITE, RMON
- RGMP
- RSVP QoS, WRR/SRR
Agenda

- Overall CCIE Program
- New CCIE R&Sv5 Curriculum
- **New CCIE R&Sv5 Exam Format**
- Sample Questions
- Preparation Materials
- Questions & Answers
CCIE R&Sv5 Written exam

- New Number: 400-101
- 120 minutes, 90 – 110 independent items
  - MC-SA/MA; DnD; Point & Click
- English only
- Pearson VUE
- Closed-book
- Score directly available
CCIE R&Sv5 Lab exam

- 480 minutes, multiple exam modules
  - Configure, Troubleshoot scenarios to given specifications
- English only
- Cisco Lab locations
- Open-book (Cisco Documentation)
- Score available within 48h
CCIE R&Sv5 Lab Exam Format

- 100% virtual
- New DIAG module
- Flexible time in TS
- Overall cut-score AND per-module minimum score

Web-based delivery

- Troubleshooting (2h) with Virtual devices and minScore
- Optional 30min to add to Troubleshooting
- DIAG (30min) with No Device and minScore
- Optional 30min to add to DIAG
- Configuration (5h30) with Virtual devices and minScore

Cut Score
CCIE R&Sv5 Delivery System

- Identical to CCIE RSv4’s
- Separate TS and CFG topologies
- Check the WISP labs in the WoS!
- Try CLL online via CLN’ Store
- Stay tuned for the additional demo content
- CFG is now virtual, like TS
- DIAG do not use any device
- Virtual router: IOL (IOS on Linux) & virtual switch: L2IOL (Layer 2 IOL)
- Option to reload initial configuration if needed, very fast reload
- Ethernet and Serial interfaces only, Layer 1 simulation available
CCIE R& Sv5 New Diagnostic module

- Assessing new skills
  - Analyzing, correlating and discerning multiple sources of documentation
- Support ticket scenario
- Fixed 30 minutes, 100% Web-based, no device needed
- Deterministic grading
  - Item format similar to multiple choices item
CCIE R&Sv5 Flexible TS time

- Optional time extension of 30 min in TS
- TS designed for 2h
- Any extra time used, up to 30 min is reduced from CFG time credit
CCIE R&Sv5 Scoring Logic

- Module-level minimum score
- Lab-level cut-score

if \( \forall \text{mod}: (\text{mod\_Score} \geq \text{mod\_minScore}) \) && \( \sum(\text{mod\_Score}) \geq \text{Lab\_CutScore} \); then PASS
**CCIE R&Sv5 Lab Skills Assessment**

**TS**
- **Skills tested:**
  - Resolve networking problems
  - Use IOS Troubleshooting tools
  - Apply Troubleshooting methodologies
  - Troubleshoot Network technologies (any topic on the blueprint)
  - Implement and verify working solution of networking issues

**DIAG**
- **Skills tested:**
  - Perceive problem areas
  - Analyze symptoms of networking issues, identify and describe root cause
  - Correlate information from multiple sources
  - Discern appropriate solution
  - Apply Troubleshooting Methodologies
  - Troubleshoot Network technologies (any topic on the blueprint)

**CFG**
- **Skills tested:**
  - Abstract functional element of complex network environment
  - Understand how infrastructure components interoperate
  - Implement Network technologies (any topic on the blueprint)
  - Design appropriate solutions to network infrastructure’s challenges within constraints and verify functionality
### CCIE R&Sv5 Lab Modules Design

#### Incident format:
- All incidents visible at start
- Score visible
- Virtual devices
- Single topology/scenario
- Independent incidents
- Troubleshoot, configure and verify solution
- Per-incident constraints

#### Ticket format:
- All tickets visible at start
- Score visible
- No devices
- Multiple scenarios
- Independent tickets
- Analyze & correlate info and make a choice between options

#### Item format:
- All tickets visible at start
- Score visible
- Virtual devices
- Single topology/scenario
- Inter-dependent items
- Implement, configure and verify working scenario
# CCIE R&Sv5 Lab Modules Design

<table>
<thead>
<tr>
<th>TS</th>
<th>DIAG</th>
<th>CFG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Incident format:</strong></td>
<td><strong>Ticket format:</strong></td>
<td><strong>Item format:</strong></td>
</tr>
<tr>
<td>• All incidents visible at start</td>
<td>• All tickets visible at start</td>
<td>• All tickets visible at start</td>
</tr>
<tr>
<td>• Score visible</td>
<td>• Score visible</td>
<td>• Score visible</td>
</tr>
<tr>
<td>• Virtual devices</td>
<td>• No devices</td>
<td>• Virtual devices</td>
</tr>
<tr>
<td>• Single topology/scenario</td>
<td>• Multiple scenarios</td>
<td>• Single topology/scenario</td>
</tr>
<tr>
<td>• Independent incidents</td>
<td>• Independent tickets</td>
<td>• Inter-dependent items</td>
</tr>
<tr>
<td>• Troubleshoot, configure and verify solution</td>
<td>• Analyze &amp; correlate info and make a choice between options</td>
<td>• Implement, configure and verify working scenario</td>
</tr>
<tr>
<td>• Per-incident constraints</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CCIE R&Sv5 Troubleshooting module’s Format

- Network topology of ~30 virtual routers and switches
- Scenario is fully preconfigured but contains faults
- 2h30 maximum (visible countdown timer + 30 min warning after 2h)
- Content designed to be doable within 2h
- Incidents’ stem are “symptom-based”
- Verifications are “result-based” + constraints
- No partial scoring
CCIE R&Sv5 Troubleshooting module’s Format

- Main IGP topology diagram (high res)
  - Two+ enterprises with remote sites
  - Three+ Service Providers
  - Host/Server simulated by IOS
  - Preconfigured scenario
  - Multiple faults injected

- Console access via
  - Main diagram
  - Device manager (menu)
CCIE R&Sv5 Troubleshooting module’s Format

- Layer 2 diagrams
  - Any region/AS with switches
  - Mixing L2 and L3 links
CCIE R&Sv5 Troubleshooting module’s Format

- BGP diagram
  - Only the BGP speakers
  - iBGP, eBGP, MP-BGP
  - Default originate
CCIE R&Sv5 Troubleshooting module’s Format

- MPLS VPN diagram
  - Only the VPN sites and backbone
  - VRF RD, RT, Interfaces
  - PE-CE RP
CCIE R&Sv5 Troubleshooting module’s Format

- Mostly independent incidents
  - Isolated in one domain/region of the topology
  - Most incidents do not depend on resolution of another one
  - Mini-diagrams help locate which domain(s) is impacted in each incident (low res)
CCIE R&Sv5 Troubleshooting Incident’s Format

- **Incident#1**

  Hosts that are connected to the interface E1/0 of R19 are not able to use Telnet to connect to the server R50, which is located in VLAN_100.

  Fix the problem so that the following Telnet session establishes:

  ```
  R19#telnet 200.100.200.200 /so e1/0
  Trying 200.100.200.200 ... Open
  User Access Verification
  Password:
  R50>
  ```

  While resolving this issue, you are not allowed to create any new interface. Refer to the Troubleshooting guidelines to determine if your solution is appropriate. Make sure that you disconnect the telnet session after verification.
### Incident#1

Hosts that are connected to the interface E1/0 of R19 are not able to use Telnet to connect to the server R50, which is located in VLAN_100.

Fix the problem so that the following Telnet session establishes:

```
R19#telnet 200.100.200.200 /so e1/0
Trying 200.100.200.200 ... Open
User Access Verification
Password:
R50>
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R19#telnet 200.100.200.200 /so e1/0
Trying 200.100.200.200 ... Open
User Access Verification
Password:
R50>

While resolving this issue, you are not allowed to create any new interface. Refer to the Troubleshooting guidelines to determine if your solution is appropriate. Make sure that you disconnect the telnet session after verification.
CCIE R&Sv5 Troubleshooting Incident’s Format

- Incident#1

Hosts that are connected to the interface E1/0 of R19 are not able to use Telnet to connect to the server R50, which is located in VLAN_100.

Fix the problem so that the following Telnet session establishes:

```bash
R19#telnet 200.100.200.200 /so e1/0
Trying 200.100.200.200 ... Open
User Access Verification
Password:
R50>
```

Validation test

While resolving this issue, you are not allowed to create any new interface. Refer to the Troubleshooting guidelines to determine if your solution is appropriate. Make sure that you disconnect the telnet session after verification.
Incident#1

Hosts that are connected to the interface E1/0 of R19 are not able to use Telnet to connect to the server R50, which is located in VLAN_100.

Fix the problem so that the following Telnet session establishes:

```
R19#telnet 200.100.200.200 /so e1/0
Trying 200.100.200.200 ... Open
User Access Verification
Password:
R50>
```

Additional guidelines and constraints

While resolving this issue, you are not allowed to create any new interface. Refer to the Troubleshooting guidelines to determine if your solution is appropriate. Make sure that you disconnect the telnet session after verification.
CCIE R&Sv5 Lab Modules Design

**TS**
- Incident format:
  - All incidents visible at start
  - Score visible
  - Virtual devices
  - Single topology/scenario
  - Independent incidents
  - Troubleshoot, configure and verify solution
  - Per-incident constraints

**DIAG**
- Ticket format:
  - All tickets visible at start
  - Score visible
  - No devices
  - Multiple scenarios
  - Independent tickets
  - Analyze & correlate info and make a choice between options

**CFG**
- Item format:
  - All tickets visible at start
  - Score visible
  - Virtual devices
  - Single topology/scenario
  - Inter-dependent items
  - Implement, configure and verify working scenario
CCIE R&Sv5 New Diagnostic module

- **Independent** scenarios putting candidate into the role of a Network Support engineer who **diagnoses** networking issues
  - Analyze, identify, locate and explain the root cause
  - Recommend optimal troubleshooting procedures leading to the root cause
  - Recommend network changes isolating the issue without causing more harm
  - Etc…

- **Analyzing, correlating** and **discerning** multiple sources of documentation
  - Email threads
  - Network topology diagrams
  - Console sessions log
  - Syslogs, Monitoring charts, …
  - Network traffic captures
CCIE R&Sv5 New Diagnostic module

- Format similar to written exam items (MC-MA) with huge exhibits 😊
  - Deterministic grading
  - No living devices
  - MC-SA (Radio buttons) and MC-MA (Checkboxes)
  - Drop-down(s)
  - Drag and Drop
  - Point and Click / Hotspot

- Designed to be doable within 30 minutes
- Tickets stem are very generic
- Scenarios provided by additional documentation
- Verifications are “deterministic”
- Partial scoring possible per ticket
CCIE R&Sv5 Format of New Diagnostic module

Multiple Choice – Single Answer

Task #1: Multiple Choice - Single Answer

A new service request was escalated to you and the following information was provided to help you understand, diagnose and help resolve the issue:

- Email thread between customer and helpdesk
- Network topology diagram
- Router configuration
- EIGRP Topology
- Google

Some post-resources waffle

Considering all information provided, which one of the following options is the only possible cause of this issue?

Select an answer:

- Access-list Configuration mistake on R15 or R16
- Access-list Configuration mistake on R9
- EIGRP Configuration mistake on R9
- Local Policy based routing configuration mistake on R17
- Policy based routing configuration mistake on R9
- EIGRP Configuration mistake on R15 or R16
- Local Policy based routing configuration mistake on R9
- Local Policy based routing configuration mistake on R15 or R16
- EIGRP Configuration mistake on R17
- Policy based routing configuration mistake on R15 or R16
- Policy based routing configuration mistake on R17
- Access-list Configuration mistake on R17
CCIE R&Sv5 Format of New Diagnostic module
Multiple Choice – Multiple Answers

Task #2: Multiple Choice - Multiple Answer

A new service request was escalated to you and the following information was provided to help you understand, diagnose and help resolve the issue:

- Network topology of RandomOffice.org
- Email thread between customer and helpdesk
- Google

Considering all information provided, which two of the following options are the only possible causes of this issue?

Select 2 answers:

- Wrong access-list configuration on R20
- Too many users on the network
- Not enough memory on the R20
- Wrong NAT configuration on R20
- Virus on a user’s workstation opening too many connections
- Routing issue on the ISP network
- Peer-to-peer traffic on a user’s workstation
- Slow uplink to the ISP
Task #3: MC-SA With Dropdown

A new service request was escalated to you and the following information was provided to help you understand, diagnose and help resolve the issue:

- Email thread between customer and helpdesk
- Network topology diagram
- Syslog from the Monitoring station
- Traffic Capture

Considering all information provided, select the **ID of the frame** as well as the **field** of the packet that indicate the root cause of this issue.

Fields of the IP Header:  

Frame ID:  

Select answer...
Task #4: Drag And Drop

A new service request was escalated to you and the following information was provided to help you understand, diagnose and help resolve the issue:

- Email thread between customer and helpdesk
- Network topology diagram
- Syslog from the Monitoring station

Considering all information provided, which sequence of five actions should be recommended to the customer? Select and drag four measures on the left to the appropriate steps on the right:
CCIE R&Sv5 Format of New Diagnostic module

Documentation

Task #1: Multiple Choice - Single Answer

A new service request was escalated to you and the following information was provided to help you understand, diagnose and help resolve the issue:

- Email thread between customer and helpdesk

Ticket #2: Email thread between customer and helpdesk

Initial Email request from the customer

From: Bob <bob@iptables.org>
To: Support <help@support.org>
Subject: Hosts can't ping Internet

Hi,
We just configured EIGRP and the EIGRP routes appear in the routing table of our gateway router R17.
The router can ping the Internet but the hosts connected behind the router can not get passed the router to get to the Internet.
When pinging from the Internet the pings can not get passed the router either to the hosts.
Please help!
Thanks!
Bob.
CCIE R&Sv5 Format of New Diagnostic module

Navigation aids:

- Enables candidate to focus on content (not on navigation!)

- Left menu always visible
  - Easy back’n forth between multiple doc sources

- Updating dynamically (depending on cursor location)

- Development still ongoing
  - More features coming in soon!
CCIE R&Sv5 Format of New Diagnostic module

Input validation

Considering all information provided, which two of the following options are the only possible causes of this issue?

Select 2 answers:

- Routing issue on the ISP network
- Too many users on the network
- Peer-to-peer traffic on a user’s workstation

⚠️ 2 choices are required for this question!
## CCIE R&Sv5 Lab Modules Design

<table>
<thead>
<tr>
<th>TS</th>
<th>DIAG</th>
<th>CFG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Incident format:</strong></td>
<td><strong>Ticket format:</strong></td>
<td><strong>Item format:</strong></td>
</tr>
<tr>
<td>• All incidents visible at start</td>
<td>• All tickets visible at start</td>
<td>• All tickets visible at start</td>
</tr>
<tr>
<td>• Score visible</td>
<td>• Score visible</td>
<td>• Score visible</td>
</tr>
<tr>
<td>• Virtual devices</td>
<td>• No devices</td>
<td>• Virtual devices</td>
</tr>
<tr>
<td>• Single topology/scenario</td>
<td>• Multiple scenarios</td>
<td>• Single topology/scenario</td>
</tr>
<tr>
<td>• Independent incidents</td>
<td>• Independent tickets</td>
<td>• Inter-dependent items</td>
</tr>
<tr>
<td>• Troubleshoot, configure and verify solution</td>
<td>• Analyze &amp; correlate info and make a choice between options</td>
<td>• Implement, configure and verify working scenario</td>
</tr>
<tr>
<td>• Per-incident constraints</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CCIE R&Sv5 Configuration module’s Format

- Network topology with virtual routers and switches
- Scenario is partly preconfigured and items are inter-dependent!
  - Item#10 may require Item#1 to be completed! And Vice versa!!
  - Sequence of items is not aligned to the implementation sequence!!
  - May include implicit troubleshooting

- 5h30 maximum (no visible countdown timer, refer to proctor’s clock)
- Items’ stem are based on requirements and constraints
- Verification rules check for functionalities, not specific configurations
  - Validate alternate solution configurations

- No partial scoring
**CCIE R&Sv5 Configuration module’s Format**

- **Main IGP topology diagram**
  - One enterprise/corporation
  - Multiple remote sites
  - Multiple Service Providers
  - Host/Server simulated by IOS

- **Console access via**
  - Main diagram
  - Device manager (menu)
CCIE R&Sv5 Configuration module’s Format

- Layer 2 diagram
  - Any region/AS with switches
  - Mixing L2 and L3 links
CCIE R&Sv5 Configuration module’s Format

- BGP diagram
  - Any region/AS with switches
  - Mixing L2 and L3 links
CCIE R&Sv5 Configuration module’s Format

- VPN diagram
  - Any region/AS with switches
  - Mixing L2 and L3 links
Agenda

- Overall CCIE Program
- New CCIE R&Sv5 Curriculum
- New CCIE R&Sv5 Exam Format
- **Sample Questions**
- Preparation Materials
- Questions & Answers
Multiple-choice Single-Answer

Which statement is true about IS-IS?

a) IS-IS provides direct support for NBMA networks.
b) IS-IS has a “virtual-link” concept similar to OSPF.
c) IS-IS packets are directly encapsulated in the data-link layer.
d) IS-IS is a hybrid between distance-vector protocol and link-state protocol.
Which two of these statements about CBWFQ are correct? (Choose two)

a) The CBWFQ scheduler provides a guaranteed minimum amount of bandwidth to each class.
b) CBWFQ services each class queue using a strict priority scheduler.
c) The class-default queue only supports WFQ.
d) Inside a class queue, processing is always FIFO, except for the class-default queue.
e) Each CBWFQ traffic class is policed using a congestion-aware policer.
Refer to the exhibit. R6 (in Area 1) is redistributing routes learned from BGP into the OSPF process. Which three OSPF LSA types will R3 advertise into Area 0? (Choose three)
Refer to the exhibit. R6 (in Area 1) is redistributing routes learned from BGP into the OSPF process. Which three OSPF LSA types will R3 advertise into Area 0? (Choose three)

a) Type 1 - Router LSAs
b) Type 2 - Network LSAs
c) Type 3 - Network summary LSAs
d) Type 4 - ASBR Summary LSAs
e) Type 5 - AS external LSAs
f) Type 7 - NSSA external LSAs
## Drag and Drop

Drag the options on the left to the correct order on the right:

- **Output ACLs are checked on the outbound interface.**
  - Step 1

- **CEF table (FIB) lookup is carried out for packet forwarding.**
  - Step 2

- **The packet is forwarded.**
  - Step 3

- **Unicast RPF checks to see if the packet has arrived on the best return path to the source; it does this by doing a reverse lookup in the FIB table.**
  - Step 4

- **Input ACLs configured on the inbound interface are checked.**
  - Step 5
CCIE R&Sv5 Lab Exam Sample Items

- Troubleshooting
- Diagnostic
- Configuration
CCIE R&Sv5 Lab Exam’ TS Sample Topology
CCIE R&Sv5 Lab Exam’ TS Sample Layer 2 Diagram
CCIE R&Sv5 Lab Exam’ TS Sample BGP Topology
Virtual Routing & Forwarding

Name: BigIndustry
Route-Distinguisher: 65100:1
Route-Target Import: 65100:1
Route-Target Export: 65100:1
Incident#1

Hosts that are connected to the interface E1/0 of R19 are not able to use Telnet to connect to the server R50, which is located in VLAN_100.

Fix the problem so that the following Telnet session establishes:

```
R19#telnet 200.100.200.200 /so e1/0
Trying 200.100.200.200 ... Open
User Access Verification
Password:
R50>
```

While resolving this issue, you are not allowed to create any new interface. Refer to the Troubleshooting guidelines to determine if your solution is appropriate. Make sure that you disconnect the telnet session after verification.
CCIE R&Sv5 Lab Exam’ TS Sample Incident#1

- Zoom on Logical Diagram
Layer 2 Diagram
A new service request was escalated to you and the following information was provided to help you understand, diagnose and help resolve the issue:

- *Email thread between the first-line support and the customer*
- *Network topology*
- *Router configurations*

Considering all information provided:

1. Identify the device and command that provides the most relevant output leading to the root cause.

2. Identify the option and device that is the only effective solution to this issue.
1. Identify the device and command that provides the most relevant output leading to the root cause.

<table>
<thead>
<tr>
<th>Device</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW1</td>
<td>sh cdp n</td>
</tr>
<tr>
<td>SW2</td>
<td>sh vlan br</td>
</tr>
<tr>
<td>SW3</td>
<td>sh int trunk</td>
</tr>
<tr>
<td>SW4</td>
<td>sh span vlan 501</td>
</tr>
<tr>
<td></td>
<td>sh ip ro 192.168.111.0</td>
</tr>
<tr>
<td></td>
<td>sh ip ro 192.168.113.0</td>
</tr>
</tbody>
</table>
Identify the option and device that is the only effective solution to this issue.

<table>
<thead>
<tr>
<th>Device</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW1</td>
<td>Configure as root switch for VLAN 501</td>
</tr>
<tr>
<td>SW2</td>
<td>Configure as root switch for VLAN 503</td>
</tr>
<tr>
<td>SW3</td>
<td>Configure interface E1/0 as access switchport in VLAN 501</td>
</tr>
<tr>
<td>SW4</td>
<td>Configure interface E1/0 as access switchport in VLAN 503</td>
</tr>
<tr>
<td></td>
<td>Configure HSRP in VLAN 501 with the virtual IP address as 192.168.111.1</td>
</tr>
<tr>
<td></td>
<td>Configure HSRP in VLAN 503 with the virtual IP address as 192.168.113.1</td>
</tr>
<tr>
<td></td>
<td>Configure two default routes pointing to 192.168.111.11 and 192.168.113.12</td>
</tr>
<tr>
<td></td>
<td>Configure interfaces E2/0 and E2/1 as dot1q trunks</td>
</tr>
<tr>
<td></td>
<td>Configure interfaces E2/2 and E2/3 as dot1q trunks</td>
</tr>
</tbody>
</table>
A new service request was escalated to you and the following information was provided to help you understand, diagnose and help resolve the issue:

- Email thread between the first-line support and the customer
- Syslogs
- Network topology
- Router configurations
- Debugs

Considering all information provided, point and click on the location in the topology that is causing the reported symptoms.
Considering all information provided, point and click on the location in the topology that is causing the reported symptoms.
ACME Headquarters
Layer 2 ports

ACME Regional Office
Layer 2 ports
CCIE R&Sv5 Lab Exam’ CFG Sample BGP Topology
CFG Sample Item: Layer 2 Technologies
Spanning-Tree (part 1)

- Configure the ACME Headquarters network as per the following requirements:
  - Configure SW1 as the root switch for VLANs 501 and 502 and as the backup switch for VLANs 503 and 504.
  - Configure SW2 as the root switch for VLANs 503 and 504 and as the backup switch for VLANs 501 and 502.
  - Ensure that all four switches are running the IEEE 802.1w Spanning Tree.
  - Configure SW1 so that the port E2/1 is forwarding for VLAN 504 but blocking for VLAN 503.

(…)
CFG Sample Item: Layer 2 Technologies
Spanning-Tree (part 2)

(…)

- Configure the ACME Main Regional Office network as per the following requirements:
  - SW5 must be the root switch for the whole range of possible VLANs.
  - SW5 must have the best chance of being elected the root switch in case a new switch was added to the network in the future.
  - SW5 must run the IEEE 802.1w Spanning Tree.

4 points
Refer to “Diagram 2: IGP Routing”.

Configure the ACME network as per the following requirements:

- Configure a static default route on R1 pointing to 123.99.1.1.
- Configure a static default route on R2 pointing to 123.99.2.1.
- Configure a static default route on R5 pointing to 123.99.5.1.
- Configure a static default route on R6 pointing to 123.99.6.1.
- SW5 must install two equal-cost external default routes into its routing table.
- SW6 must receive only an internal default route from R5, no other EIGRP prefix must be propagated to SW6.
- SW7 must receive only an internal default route from R6, no other EIGRP prefix must be propagated to SW7.
Configure the ACME network as per the following requirements:

- (…)
- R1 and R2 must propagate a default route into the EIGRP domain as an external route.
- R3 and R4 must receive the external default route from R1 and R2.
- The headquarters must have reachability to all access VLANs of all remote sites (VLAN 601, 602, 701 and 801) via either the DMVPN cloud or via the MPLS VPN.

4 points
Deploy DMVPN phase 3 in the ACME network as per the following requirements:

- R1 must be the hub. R3, R4, R5 and R6 must be the spokes.
- Configure the following parameters for the interface Tunnel0 of all five routers:
  - IP MTU is 1400, TCP adjust-MSS is 1360.
  - Authenticate NHRP using the key 11111.
  - Set the NHRP holdtime to 5 minutes.
- Ensure that spoke-to-spoke tunnels are dynamically provisioned when needed.
- All three spokes must establish an EIGRP peering with the hub and via the interface Tunnel0.

4 points
Agenda

- Overall CCIE Program
- New CCIE R&Sv5 Curriculum
- New CCIE R&Sv5 Exam Format
- Sample Questions
- Preparation Materials
- Questions & Answers
CCIE Exam Preparation, General

LEARN
- READ
- UNDERSTAND
- REMEMBER

PRACTICE
- BASIC SCENARIO
- INCREASE DIFFICULTY

PRACTICE
- EXPLORE
- OBSERVE
- INVENT

TROUBLESHOOT
- VERIFY
- ANTICIPATE
- VALIDATE
CCIE R&Sv5 Preparation Materials

- Cisco Expert-level Training Program for CCIE RS
- Cisco Learning Network (CLN)
- New Ciscopress titles
- Cisco.com Products and Technology documentation
- Cisco.com Whitepapers, Design Zone, …
- Cisco Forums (supportforums.cisco.com)
- Cisco Tools
- External Resources
Cisco Expert-level Training Program for CCIE RS

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- Cisco Learning Network
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- Community
- Topics (Blueprints)
  - Written exam
  - Lab exam
- Equipment List
- Study Group
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- CCIE RSV5.0 Configuration Practice Labs (2/21)
- CCIE RSV5.0 Troubleshooting Practice Labs (3/31)
- CCIE RSV5.0 Configuration and Troubleshooting Practice Labs Bundle (3/31)
- CCIE RSV5.0 Official Cert Guide, Volume 1 (5/9)
- CCIE RSV5.0 Official Cert Guide, Volume 2 (5/9)
- CCIE RSV5.0 Official Cert Guide Library (5/16)

- CCIE page on Ciscopress.com
Cisco.com Products and Technology documentation

- Cisco documentation
  - [http://www.cisco.com/go/documentation](http://www.cisco.com/go/documentation)

- IOS 15.3M&T Configuration Guides
Cisco.com Whitepapers, Design Zone, ...

- White papers on (m)any technologies

- Cisco Validated Design
  - http://www.cisco.com/go/cvd

- Enterprise Design Zone
Cisco Forums and Wiki

- Cisco Support Community
  - https://supportforums.cisco.com

- CLN Study Group for CCIE RS

- Doc Wiki
  - http://docwiki.cisco.com
Cisco Tools

- Cisco Feature Navigator
  - www.cisco.com/go/fn
- Command Lookup Tool
- Error Message Decoder
  - https://www.cisco.com/cgi-bin/Support/Errordecoder/index.cgi
- Output Interpreter
  - https://www.cisco.com/pcgi-bin/Support/OutputInterpreter/home.pl
- Bug Search Tool
  - https://tools.cisco.com/bugsearch
- Cisco Notification Service, Software Advisor
Agenda

- Overall CCIE Program
- New CCIE R&Sv5 Curriculum
- New CCIE R&Sv5 Exam Format
- Sample Questions
- Preparation Materials
- Questions & Answers
Got a question after the session?

- Join the CCIE R&S Study Group on CLN
  - Ask technical questions
  - Find study partner(s)


- Send me an email at brunov@cisco.com
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- Use and sharpen technical expertise
- Collaborate and network with other engineers

SME= Subject Matter Expert
Q&A

- What questions do you have about the new CCIE R&S v5 exams?
  - Exam Curriculum?
  - Exam Format?
  - Exam Deliveries?
  - Case Studies?
  - Preparation Materials?
  - Exam Strategy?
  - Anything else?

“Questions are never indiscreet, answers sometimes are.”
Oscar Wilde
Call to Action…

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- **Meet the Engineer**
  Wednesday, Thursday and Friday (at CCIE Lounge if not at MTE village)

- **Lunch Time Table Topics**, held in the main Catering Hall

- **Recommended Reading**: For reading material and further resources for this session, please visit [www.pearson-books.com/CLMilan2014](http://www.pearson-books.com/CLMilan2014)
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