Cisco Certified Design Expert
CCDE

Gert De Laet
Business Development
Learning@Cisco
• High Level View
• CCDE Update
• CCDE Written Exam
• CCDE Practical Exam + demo
• Cisco Learning Network (CLN)
• Cisco Press
CCDE Overview

Gert De Laet
The Cisco Certified Design Expert

The CCDE certification is a certification that identifies those with expert-level knowledge and skills in Infrastructure Design.

CCDE is parallel to CCIE in terms of difficulty, and expertise.

Emphasizes network design expertise & knowledge to assess network business requirements and can translate them into technical specifications.

<table>
<thead>
<tr>
<th>Level</th>
<th>Experience</th>
<th>Prerequisites</th>
<th>Requirements</th>
<th>Roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCDA</td>
<td>3-5 yrs Networking experience</td>
<td>CCNA</td>
<td>(1) exam (DESIGN)</td>
<td>Network Design Individual Contributor, Network Design Lead in SMB, Operations</td>
</tr>
<tr>
<td>CCDP</td>
<td>5-7 yrs Networking experience</td>
<td>CCNA, CCDA</td>
<td>(3) exams ARCH, BCMSN, BSCI</td>
<td>Network Design Task Leader, SMB Lead Architect, Journeyman Contributor on Large Infrastructure Design</td>
</tr>
<tr>
<td>CCDE</td>
<td>7+ yrs Networking experience</td>
<td>NONE</td>
<td>(2) exams Qualification and Practical Exam</td>
<td>Sr. Network Designer &amp; Architect, Network Lead for Enterprise IT Infrastructure Team, Network Contributor for Enterprise Architecture team</td>
</tr>
</tbody>
</table>

More info: [www.cisco.com/go/learnnetspace](http://www.cisco.com/go/learnnetspace)
Cisco Certified Design Expert: Expanding the Certification Portfolio

- Cisco recognizes the critical importance of the network infrastructure designer
- The CCDE certification enables these highly experienced Network Infrastructure Designers to be identified in the marketplace

The CCDE certification is a certification that identifies those with expert-level knowledge and skills in Infrastructure Design. CCDE is parallel to CCIE in terms of difficulty, and expertise. It emphasizes network design principles at the routing layer and recognizes expertise of designers that have the knowledge to assess network business requirements and can translate them into technical specifications to be incorporated into successful designs.
Evolving Role: The Network Infrastructure Designer

Key takeaway about the network Designer:
• Predominantly proactive: only 25% reactionary vs. 75% for network ops
• Care about both network performance and security

Career path of the network Designer

Where network Designers spend their time

Performance optimization: 40%
- Security design: 25%
- Troubleshooting: 20%
- Strategic project work: 15%
Requirements for obtaining CCDE

**CCDE Qualification Exam**
- Advanced Network Infrastructure Design Theory and Principles
- Exam # 352-001 ADVDESIGN
- Multiple choice qualification exam
- 120 minute duration
- Available globally via Pearson VUE
- No prerequisite (recommended 7+ years in Networking)
- Meets CCIE Recertification Requirement

**CCDE Practical Exam**
- Scenario based advanced infrastructure design knowledge assessment
- 8 hour proctored practical exam
- Available at select locations in Fall 2008
- Requires passing score on qualifying exam to schedule
- Passing earns CCDE certification

CCDE is an expert level credential with expert level rules of engagement and benefits.
Where Does the CCDE Fit?

• The CCDE is Design Oriented

—What changes do I need to make to....
  • Merge these Networks?
  • Implement this Application?
  • Provide this Level of Security?
  • Prepare this Network for the Next Five Years?

—How do I transition the network?
  • Business hurdles?
  • Technical hurdles?
  • People hurdles?
Where Does the CCDE Fit?

- The CCDE is more horizontal to the business
  - Interacts with the business, rather than following the business
What the CCDE is Not

• You do not “go forth and configure”
  – This is higher level than the “?”

• This is not about choosing the right equipment in the right place
  – Hardware limitations only come in at a high level
  – Hardware changes occur on a daily basis

• The skills you demonstrate for this certification should be timeless
CCDE Witten Exam

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CCDE Written Exam

Why Are We Doing This?

- The network engineering field has split into many pieces.
- Implementation and design are almost completely different career paths.
  Operations and design are not normally both outsourced.
  Design is almost always global, while operations might be global or regional.
  Most people seem to move from operations to design work over time.

Why Are We Doing This?

- We seem to have lost our “roots.”
  We focus on specific technologies:
  Voice
  WAN Acceleration
  Security
  ….  
  We focus on “Places in the Network”:
  The data center
  The WAN
  The campus
  ….  

Welcome to the Human Network.
The Purpose of the Written

- Test Knowledge of Design Concepts
  - Theoretical Knowledge of Network Design Principles
- Test Technology Knowledge
  - No “Bit Level” Questions
  - No Configurations
  - Focused on Design Implications
- Show Qualification for the Practical
  - If you don’t know this stuff, you don’t have any hope of passing the practical....

The Written Exam

- The Purpose of the Written
- Written Outline
  - Design
  - Routing
  - Tunneling
  - QoS
  - Management
  - Security
Routing

Aggregation

- If Host A sends a packet to Host F, what will happen?
  - The packet will be discarded at B
  - The packet will be discarded at C
  - The packet will be received by D
  - The packet will be discarded at E
  - The packet will be received by F

Routing

Aggregation

- The packet is discarded at C
  - The destination address is 10.1.1.48
  - This falls within 10.1.1.0/24
  - So the traffic is routed to C
  - But C doesn’t have an ARP entry for this destination
  - So it ARPs and drops the packet

- Why do we care?
  - Overlapping destinations are a fact of life when you aggregate
  - You need to understand how they interact

Welcome to the Human Network.
Routing

Aggregation
- What justification would you give for configuring Router A as an ABR, with the Hub and Spoke area as an OSPF stub area, without route summarization?
  - To reduce the routing table size at Router B
  - To reduce the complexity of the full mesh in OSPF
  - To reduce the impact of Router B failing at Router C
  - To reduce SPF run time at Router A

Routing

Aggregation
- To reduce the impact of Router B failing at Router C
  - Router B failing would normally cause a full SPF run on all routers
  - If the Hub and Spoke area is a stub, routers within the area would not run SPF for a failure at B
- Why do we care?
  - Failure domains are intrinsically related to flooding domains in link state protocols
  - Failure domains are important in network design
Tunneling
Scalability

- What tunneling mechanism would you consider for connecting 1000 remote sites which need to be fully meshed, have layer 3 transport requirements only, and use OSPF routing?
  - VPLS
  - IPsec using AH
  - L3VPNs
  - GRE tunnels

Tunneling
Scalability

- L3VPNs
  - VPLS would require a full mesh of 1000 OSPF adjacencies
  - IPsec would require a full mesh of 1000 tunnels, and wouldn’t support OSPF (no multicast support)
  - GRE would require a full mesh of 1000 tunnels and OSPF adjacencies
  - L3VPNs allow you to carry routing information through the tunnel infrastructure without forming adjacencies through the tunnels

- Why do we care?
  - The tunnel infrastructure directly impacts the layer 3 and routing scalability
  - We need to choose the tunnel mechanisms we use with this in mind
Quality of Service
Performance Metrics

- Which of the following would you deploy to control delay along the path from A to B?
  - Head of queue dropping
  - Traffic policing
  - Tail of queue dropping
  - Traffic shaping

Quality of Service
Performance Metrics

- Traffic policing
  - Head of queue and tail of queue drops will drop random packets, so the delay will be random
  - Traffic shaping will try to keep the traffic in line, but will really tail drop in this case
  - Traffic policing will drop traffic which is out of policy, keeping the delay consistent

- Why do we care?
  - This is an interaction between layer 3 and transport behavior required by specific applications
Network Management

Management Tools

- If you wanted to determine the servers which transmit the most traffic to an external destination, which tool would be the most appropriate?
  
  - Packet level debugs filtered through an access list
  - SNMP traps set for traffic flows
  - Buffered Syslog based on packet event information
  - Netflow traffic flow statistics

Network Management

Management Tools

- Netflow traffic flow statistics
  - Packet level debugs? Right!
  - SNMP wouldn't be able to keep up with traffic flow information
  - Syslog would depend on debugs or some other information

- What other options are there here?
  
  - IP Accounting?
  - ACLs with logging?

- Why do we care?
  
  A network design engineer must know when to specify and use the various management tools available
  
  A network design engineer must know what sorts of information to expect from each tool when looking at a design or problem.
**Security**

Control Plane Protection

- What attacks would configuring unicast RPF at A and B prevent?
  - False routing protocol adjacencies from B, C, D, and E
  - DoS attacks against A and B from B, C, D, and E
  - Attacks from spoofed sources originating from B, C, D, and E
  - Layer 2 based attacks against A and B sourced from B, C, D, and E

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**Security**

Control Plane Protection

- Attacks from spoofed sources originating from B, C, D, and E
  - uRPF would prevent spoofed packets from entering the network
  - uRPF does not manage routing adjacencies
  - uRPF does not block DoS attacks
  - uRPF does not operate at layer 2

- Why do we care?
  - A design engineer must be able to plan in mitigations against various attacks
Secure Professional Testing

- Testing will be administered only in certified secure professional testing centers
- Testing will be available at specific dates and locations

Enhanced security, comfort and value
CCDE Practical Exam

- **Content:** The CCDE practical exam is a performance-based, design-scenario exam that tests design analysis, design requirements, and implementation based on best practices.

**Methodology:** The CCDE practical exam does not require configuration or manipulation of networking devices. The exam includes reference materials for the design scenarios, which are displayed on a standard personal computer.

- **Delivery:** The delivery of the CCDE practical exam takes place on specific dates and at predetermined locations.

- **Exam topics:** The practical exam measures the ability of the individual to interpret design scenarios by gathering and reviewing technical and business documentation and communications.
An Overview

- What about multiple good solutions?
  Aren't there bound to be a bunch of good solutions for any given problem?

- Two Solutions
  The scenarios are tightly scripted
  Business and technical requirements strongly bound the solution set
  In some places, there are multiple right answers
  When the requirements leave multiple solutions open, provisions are made to account for all right solutions
  Some right solutions might be worth more points than other right solutions, however

Analysis

- Determine Network Expectations
  Examine and understand business goals
  Examine and understand application requirements
  Examine and understand the implications of network failures

- Gather and Validate Information
  Determine missing information
  Determine additional required tests

Design

- Focus on Technology
  Understand technical/functional tradeoffs between solutions

- Reduce or Eliminate the Impact on Existing Services

- Focus on Scalability

- Common Cases verses the Worst Case
  Determine what is likely, and plan for that, rather than for the worse case

- Focus on Elegance and Supportability
  Know what’s necessary and what’s unnecessary
  Consider operational expenses (OPEX)

- Minimize Impact of Network Failures

Implementation

- Develop an Implementation Plan
  Consider interactions between the phases of implementation
  Minimize impact on services during implementation

- Develop a Contingency Plan
Justification

• Justify Technologies Chosen
• Justify Changes in the Design
  Based on functional requirements
  Based on technical requirements
• Consider Alternate Options
  Justify moving or not moving to an alternate

Abstraction

• Underlies Many of the Concepts
  Analysis, Scalability, Elegance,
  Supportability, Resiliency, etc.
• Deploy a New Data Center
  The Data Center as a Network
  Capacity, Addressing, etc.
  The Data Center as an Object
  Placement, Capacity, etc.

The Practical Format

• You Begin with a Set of Documents
  Background documents
  Network diagrams
  Email threads
• You then get a Set of Questions
  Network diagram drag and drop/modify attributes
  Multiple choice
  Ordering a list
  Match two lists

The Practical Format

• As You Complete Questions You Gain Access to More Information
  Decisions made in the design process
  New information about the network
  Changes in the network state

Welcome to the Human Network.
Computer Based Exam Environment - Demo

The rich media environment enables a much more interactive testing experience.

A static menu bar will always be present to navigate the exam and its contents.

The exam includes all necessary material to answer the questions in this simple documents area.

Welcome to the Human Network.
Cisco Learning Network (CLN)

Gert De Laet
Developing a World of Talent Through Collaboration

- Scale
- Reach
- Online Mentoring
- Social Learning
- Online Assessments

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Q & A

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