

ARCH (DESIGNING CISCO NETWORK SERVICE ARCHITECTURES)

Objetivo

Designing Network Service Architectures (ARCH) é um curso que apresenta o projeto de roteamento interno, roteamento BGP, WAN, conectividade para Data Center, segurança, QoS, transição para IPv6 e Multicast. Esse curso habilita o aluno para projetar redes que cumpra os requerimentos especificados pelo cliente, em segurança, eficiência, com alta disponibilidade e escalabilidade. Após completar este treinamento o aluno estará apto à:

- Projetar conectividade com alta disponibilidade em rede corporativa (Enterprise);
- Projetar conectividade utilizando BGP em redes corporativas (Enterprise);
- Projetar conectividade WAN em redes corporativas (Enterprise);
- Projetar a integração com Data Center em redes corporativas (Enterprise);
- Projetar serviços de segurança em redes corporativas (Enterprise);
- Projetar serviços de QoS para otimizar a experiência dos usuários;
- Projetar a transição para soluções em IPv6;
- Projetar redes Multicast em redes corporativas (Enterprise).

Público Alvo

O público inclui os profissionais em pré-vendas e pós-vendas que trabalham em projetos de soluções de redes corporativas (Enterprise), abrangendo projeto, planejamento e implantação. Os profissionais em pós-vendas envolvidos na implantação podem fornecer subsídios essenciais para os profissionais em pré-vendas para a correção de possíveis desvios entre o projeto e a real solução. Esse curso é também preparatório para os profissionais que buscam a certificação CCDP (Cisco Certified Design Professional).

Pré-Requisitos

Os conhecimentos necessários para um excelente aproveitamento deste curso são: Descrever e aplicar metodologias para projetos de redes; Descrever e aplicar conceitos em modularidade e hierarquia em projetos de redes; Projetar redes considerando resiliência e escalabilidade entre os componentes; Projetar conectividade para integração com internet e roteamento interno; Integrar soluções em colaboração e redes sem fio (Wireless); Projetar soluções em endereçamento IPv4 e IPv6; Operação em redes com múltiplos switches, configurando vlans, links troncos (trunk), STP (spanning-tree), DHCP e links agregados (Port Aggregation); Configurar e fornecer suporte em roteamento IPv4 e IPv6 em redes corporativas (rotas estáticas, protocolos EIGRP, OSPF multi-área e RIPng); Implantar conectividade internet para redes corporativas (rotas estáticas e BGP básico); Implantar mecanismos em redistribuição e filtragem de rotas; Implantar políticas para controle de seleção de caminhos (Policy Based Routing e IP SLA); Implantar redundâncias em ambientes IPv4 e IPv6 (First Hop Redundancy); Configurar equipamentos para processo SNMP, Syslog e NetFlow; Utilização das melhores práticas recomendadas em segurança. Recomendado o aluno ter participado ou possuir conhecimentos equivalentes abrangidos pelos cursos SWITCH v2.0, ROUTE v2.0, TSHOOT v2.0 e DESGN v3.0.

Carga Horária

40 horas (5 dias).

Conteúdo Programático

- Course Introduction
- Overview
- Course Goal and Objectives
- Course Flow
- Additional References

Enterprise Connectivity and High-Availability

- EIGRP Design Considerations
- Scaling EIGRP Designs
- EIGRP Fast Convergence
- EIGRP with Multiple Autonomous Systems
- Reasons for Multiple EIGRP Autonomous Systems
- Bidirectional Forwarding Detection
- EIGRP Graceful Restart/NSF Fundamentals
- EIGRP Hierarchical Design Basics
- Creating Choke Points
- EIGRP Two-Layer Hierarchy
- EIGRP Three-Layer Hierarchy
- EIGRP Hub and Spoke Design
- Summarization Challenges: Black Holes
- Summarization Challenges: Suboptimal Routing
- EIGRP Hub and Spoke Scaling
- EIGRP Stub Leaking
- Case Study: EIGRP DMVPN
- EIGRP DMVPN Scaling

- OSPF Design Considerations
- Factors Influencing OSPF Scalability
- OSPF Scalability: Adjacent Neighbors
- Routing Information in the Area and Domain
- OSPF Scalability: Routers in an Area
- OSPF Scalability: Areas per ABR
- Designing Areas
- OSPF Hierarchy
- Area and Domain Summarization
- OSPF Full Mesh Design
- OSPF Hub-and-Spoke Design
- OSPF Hub-and-Spoke ABR Placement
- Number of Areas in OSPF Hub-and-Spoke Design
- OSPF Hub-and-Spoke Network Types
- Improving OSPF Convergence
- Bidirectional Forwarding Detection
- OSPF Event Propagation
- OSPF Event Processing
- OSPF Flood Reduction

OSPF Database Overload Protection

- IS-IS Design Considerations
- Overview of IS-IS
- IS-IS Hierarchical Design
- IS-IS Router and Link Types
- IS-IS Adjacencies
- Integrated IS-IS Routing
- Similarities Between IS-IS and OSPF
- OSPF and IS-IS Characteristics
- Integrated IS-IS vs. OSPF: Area Design
- Case Study: IS-IS Addressing
- IS-IS Packets
- IS-IS Information Data Flow
- Case Study: IS-IS Routing Logic
- Route Leaking
- Route Leaking Loop Prevention
- Asymmetric vs. Symmetric IS-IS Routing
- IS-IS Network Types
- IS-IS Operations
- IS-IS LSP Flooding
- IS-IS LSDB Synchronization
- IS-IS Design Considerations
- IS-IS Summarization
- Integrated IS-IS for IPv6
- IS-IS Single Topology Restrictions
- Multitopology IS-IS for IPv6

BGP Design

- Designing IBGP Sessions
- IBGP Scalability Issues
- IBGP Scalability Solution: Route Reflectors
- BGP Route Reflector Definitions
- IBGP Scalability Solution: Confederations
- Comparing BGP Confederations to BGP Route Reflectors
- BGP Split-Horizon Rule
- Route Reflector Split-Horizon Rule
- BGP Split-Horizon Rules: Refresher
- Redundant Route Reflectors
- Route Reflector Clusters
- Route Reflector Clusters: Cluster ID
- Additional Loop-Prevention Mechanisms
- Loop-Prevention: Cluster-List
- Network Design with Route Reflectors
- Hierarchical Route Reflector Design
- Potential Network Issues

Designing BGP Communities
Single-Homing vs Multi-Homing
Dual-Homing and Multi-Homing Design Considerations
Load Sharing: Single-Homed, Multiple Links
Load Sharing: Dual-Homed to One ISP, Single Local Router
Load Sharing: Dual-Homed to One ISP, Multiple Routers
Load Sharing: Multihoming with Two ISPs, Single Local Router
Load Sharing: Multihomed, Two ISPs, Multiple Local Routers

Wide Area Networks Design

Service Provider Managed VPNs
Choosing Your WAN Connection
Layer 3 MPLS VPN
MPLS/VPN Architecture
PE Router Architecture
Route Distinguishers
Route Targets
Using EIGRP as the PE-CE Routing Protocol
Using OSPF as the PE-CE Routing Protocol
Using BGP as the PE-CE Routing Protocol
Case Study: MPLS/VPN Routing Propagation
Forwarding in MPLS VPN
VPWS Overview
VPWS Design
VPLS Design
VPLS vs. VPWS

Enterprise Managed VPNs
Enterprise Managed VPNs Overview
GRE Overview
Multipoint GRE Overview
IPsec Overview
IPsec and GRE
IPsec and Virtual Tunnel Interface
IPsec and Dynamic VTI
GETVPN
DMVPN Overview
DMVPN Phase 1
DMVPN Phase 2
DMVPN Phase 3
Case Study: MPLS/VPN over GRE/DMVPN
DMVPN and Redundancy
SSL VPN Overview
FlexVPN Overview
FlexVPN Architecture
FlexVPN Capabilities
FlexVPN Configuration Blocks

- WAN Resiliency Design
- WAN Remote-Site Overview
- Common MPLS WAN Design Models
- Common Layer 2 WAN Design Models
- Common VPN WAN Design Models
- 3G/4G VPN Design Models
- Remote-Site Using Local Internet
- Remote-Site LAN
- Case Study: Redundancy and Connectivity Use Cases
- Basic Traffic Engineering Techniques
- IWAN Solution Overview
- Intelligent WAN Design Overview
- IWAN Hybrid Design Model
- Cisco PfR Overview
- Cisco PfR Versions
- Cisco PfR Operations
- Multisite Cisco PfR
- Cisco PfR Design and Deployment Considerations

- Campus Edge and Connectivity to Partners
- Case Study: Campus Edge
- Challenges of Connecting External Partners
- Extranet Topology—Remote LAN Model
- Extranet Topology—Interconnect Model
- Security and Multitenant Segmentation

- SDN and APIC-EM
- SDN Overview
- SDN Challenges
- Direction of Nontraditional SDN
- SDN Requirements
- Cisco SDN Solutions
- Enterprise WAN and Access Management
- Cisco ONE: APIC-EM
- Design APIC-EM
- SDN Security Challenges
- SDN Security: DC and EM

- Enterprise Data Center Integration

- Modular and Scalable Data Center Network
- Case Study: Connecting Servers to Enterprise LAN
- Case Study: 2-Tier Data Center Network Architecture
- Case Study: 3-Tier Data Center Network Architecture
- Data Center Inter-VLAN Routing
- End of Row vs. Top of Rack Design
- Fabric Extenders
- Case Study: Data Center High-Availability

Network Interface Controller Teaming
Cisco FabricPath
Overlay Networking in Data Center

Multi-Tenant Data Center
Multi-Tenant Data Center Overview
Secure Tenant Separation
Layer 3 Separation with VRF-Lite
Virtual Device Contexts
Case Study: Multi-Tenant Data Center
Micro-Segmentation with Overlay Networks

Data Center Interconnections
Need for DCI
IP Address Mobility
Case Study: Dark Fiber DCI
Pseudowire DCI
Virtual Private LAN Service DCI
Any Transport over MPLS over GRE
Layer 2 DCI Caveats
Overlay Transport Virtualization DCI
Overlay Networking DCI

Data Center Traffic Flows
Traffic Flow Directions
Traffic Flow Types
Case Study: Separation of Application Tiers
Securing East-West Traffic

SDN and APIC-DC
Application Centric Infrastructure Data Center
Cisco ACI Fabric
Network Virtualization Overlays
Design Applications Using Cisco ACI
Design EPGs
Designing Applications
Application Network Profile Discovery
Application Network Profile Discovery—Unknown Applications

Design Security Services

Security Services Overview
Network Security Zoning
Cisco Modular Network Architecture
Cisco Next-Generation Security

Designing Infrastructure Protection
Cisco Network Infrastructure Protection
Infrastructure Device Access
Secure Management Access
Routing Infrastructure
Device Resiliency and Survivability
Network Policy Enforcement
Switching Infrastructure

Designing Firewall and IPS Solutions
Firewall Architectures
Case Study: Implementing Firewall in Data Center
Virtualized Firewalls
Case Study: Firewalls High Availability
IPS Architectures
IPS High Availability

Designing Network Access Control Solutions
IEEE 802.1X Overview
Case Study: Authorization Options
IEEE 802.1X Phased Deployment
Extensible Authentication Protocol
802.1X Supplicants
Cisco TrustSec

Design QoS for Optimized User Experience

QoS Overview
IntServ vs. DiffServ
Classification and Marking Tools
Layer 2 Marking: IEEE 802.1Q/p Class of Service
Layer 3 Marking: IP Type of Service
Layer 3 Marking: DSCP Per-Hop Behaviors
Layer 2.5 Marking: MPLS Experimental Bits
Mapping QoS Marking Between OSI Layers
Layer 7 Classification: NBAR/NBAR2
Policers and Shapers
Token Bucket Algorithms
Policing Tools: Single-Rate Three-Color Marker
Policing Tools: Two-Rate Three-Color Marker
Queuing Tools: Overview
Queuing Tools: Tx-Ring
Queuing Tools: Fair-Queuing
Queuing Tools: CBWFQ
Queuing Tools: LLQ
Dropping Tools: DSCP-Based WRED
Dropping Tools: IP ECN

- Recommended QoS Design Principles
- Classification and Marking Design Principles
- Policing and Remarking Design Principles
- Queuing Design Principles
- Dropping Design Principles
- Per-Hop Behavior Queue Design Principles
- RFC 4594 QoS Recommendations
- QoS Strategy Models
- 4-Class QoS Strategy
- 8-Class QoS Strategy
- 12-Class QoS Strategy

- Campus QoS Design
- Why Do We Need QoS in Campus?
- VoIP vs. Video
- Buffers and Bursts
- Trust States and Boundaries
- Trust States and Boundaries Example
- Dynamic Trust State
- Classification/Marking/Policing QoS Model
- Queuing/Dropping Recommendations
- EtherChannel QoS Design
- Example: Campus QoS Design

- Data Center QoS Design
- Need for QoS in Data Center
- Example: High Performance Trading Architecture
- Example: Big Data Architecture
- Example: Virtualized Multiservice Architectures
- Data Center Bridging Toolset
- Example: DC QoS Application

- WAN QoS Design
- Need for QoS in MPLS VPN
- L2 Private WAN QoS Administration
- Fully Meshed MPLS VPN QoS Administration
- MPLS DiffServ Tunneling Modes
- Example: MPLS VPN QoS Roles

- IPsec VPN QoS Design
- Need for QoS in IPsec VPN
- VPN Use Cases and Their QoS Models
- IPsec Refresher
- IOS Encryption and Classification Order of Operations
- MTU Considerations
- DMVPN QoS Considerations
- GET VPN QoS Considerations

Transition to IPv6

Deploying IPv6

IPv6: Why?

IPv6 Phased Approach

IPv6 Phased Approach: Business and Network Discovery Phase

IPv6 Phased Approach: Assessment

IPv6 Phased Approach: Planning and Design

IPv6 Phased Approach: Implementation and Optimization

First Steps Towards IPv6

Provider Independent vs. Provider Assigned

Where to Start the Migration

IPv6 Islands

IPv6 WAN

Transition Mechanisms

NAT64 and DNS64

Manual Tunnels

Tunnel Brokers

6 Rapid Deployment

DS-Lite

LISP

Dual-Stack

Challenges with Transition to IPv6

IPv6 Services

Link Layer Security Considerations

Application Support

Application Adaptation

Application Workarounds

Control Plane Security

Dual Stack Security Considerations

Tunneling Security Considerations

Multihoming

Design Enterprise IPv6 Network

Design Transition to IPv6

IP Multicast Design

Defining Multicast Distribution Trees and Forwarding

How Does IP Multicast Work?

Multicast Group

IP Multicast Service Model

Functions of a Multicast Network

Multicast Protocols

Multicast Forwarding and RPF Check

Case Study: RPF Check Fails and Succeeds

Multicast Protocol Basics

Multicast Distribution Trees Identification

Introducing PIM-SM Protocol and PIM-SM Enhancements

PIM-SM Overview

Receiver Joins PIM-SM Shared Tree

Source Is Registered to RP

PIM-SM SPT Switchover

Multicast Routing Table

Basic SSM Concepts

SSM Scenario

Bidirectional PIM

PIM Modifications for Bidirectional Operation

DF Election

DF Election Messages

Case Study: DF Election

Rendezvous Point Distribution Solutions

Rendezvous Point Discovery

Rendezvous Point Placement

Auto-RP

Auto-RP Candidate RPs

Auto-RP Mapping Agents

Auto-RP Other Routers

Case Study: Auto-RP Operation

Auto-RP Scope Problem

PIMv2 BSR

PIMv2 BSR—Candidate RPs

PIMv2 BSR—Bootstrap Router

PIMv2 BSR—All PIMv2 Routers

BSR Flooding Problem

IPv6 Embedded Rendezvous Points

Anycast RP Features

Anycast RP Example

MSDP Protocol Overview

MSDP Neighbor Relationship

Case Study: MSDP Operation

IP Multicast Security

Multicast Security Challenges

Problems in the Multicast Network

Multicast Network Security

Network Element Security

Security at the Network Edge

Securing Auto-RP and BSR

Internal Multicast Security

Sender Control

Receiver Control

Admission Control

MSDP Security

Labs

Challenge 1: Design Enterprise Connectivity

Challenge 2: Design Enterprise BGP Network with Internet Connectivity

Challenge 3: Design Resilient Enterprise WAN

Challenge 4: Design Enterprise Data Center Connectivity

Challenge 5: Design Secure Enterprise Network

Challenge 6: Design QoS in Enterprise Network

Challenge 7: Design Enterprise IPv6 Network