



DESIGNING AND IMPLEMENTING HIGH- AVAILABILITY NETWORKS TRAINING COURSE

REF: #NO1828



COURSE INTRODUCTION / OVERVIEW:

In today's digitally-driven world, network downtime is not just an inconvenience; it is a direct threat to business continuity, revenue, and reputation. This course provides a comprehensive exploration of the principles, protocols, and practices required to engineer networks that deliver maximum uptime and resilience. Moving beyond basic redundancy, we delve into the sophisticated architectures that ensure seamless service delivery even in the face of hardware failures, software glitches, or catastrophic events. The curriculum is grounded in foundational concepts articulated by pioneers like Radia Perlman in her seminal work, "Interconnections: Bridges, Routers, Switches, and Internetworking Protocols," ensuring participants understand the theoretical underpinnings of modern network reliability. At BIG BEN Training Center, we have designed this program to equip professionals with the skills to design, implement, and manage fault-tolerant network infrastructures. Participants will learn to proactively identify single points of failure, implement robust failover mechanisms, and leverage load balancing to build scalable, high-performance networks that meet the stringent demands of modern enterprise and service provider environments, ensuring operational excellence and business continuity.

TARGET AUDIENCE / THIS TRAINING COURSE IS SUITABLE FOR:

- Network Engineers and Administrators.
- Network Architects and Designers.
- IT Infrastructure Managers.
- Systems Engineers.
- Solutions Architects.
- Data Center Operations Staff.
- IT professionals responsible for business continuity and disaster recovery.
- Cybersecurity professionals focused on network resilience.



TARGET SECTORS AND INDUSTRIES:

- Financial Services and Banking.
- Telecommunications and Internet Service Providers.
- Healthcare and Medical Facilities.
- E-commerce and Online Retail.
- Cloud Computing and Data Center Services.
- Government Agencies and Public Sector Organizations.
- Manufacturing and Industrial Control Systems.
- Media and Entertainment.

TARGET ORGANIZATIONS DEPARTMENTS:

- Information Technology (IT) Department.
- Network Operations Center (NOC).
- Infrastructure and Operations.
- Cybersecurity and Information Security.
- Cloud Engineering and Architecture.
- Disaster Recovery and Business Continuity Planning.
- Research and Development (R&D).



COURSE OFFERINGS:

By the end of this course, the participants will have able to:

- Design robust and resilient network architectures from the ground up.
- Implement and troubleshoot first-hop redundancy protocols like HSRP, VRRP, and GLBP.
- Configure and manage advanced link aggregation for increased bandwidth and fault tolerance.
- Deploy effective load balancing strategies for servers and applications.
- Develop comprehensive network disaster recovery and business continuity plans.
- Analyze and mitigate single points of failure across the network infrastructure.
- Utilize BGP for creating redundant and reliable internet connectivity.
- Integrate high-availability concepts into modern SD-WAN and cloud environments.
- Monitor network health and performance to proactively prevent outages.

COURSE METHODOLOGY:

This training course at BIG BEN Training Center employs a dynamic and immersive learning methodology designed to bridge the gap between theory and practical application. Our approach is centered on a blended learning model that combines expert-led instruction with extensive hands-on lab simulations. Participants will engage in interactive sessions, where complex concepts of fault tolerance and network redundancy are broken down into understandable components. The methodology emphasizes collaborative problem-solving through group discussions and team-based exercises, allowing participants to analyze real-world case studies of major network outages and design effective mitigation strategies. Each module is reinforced with practical scenarios that challenge participants to apply their knowledge in a controlled, simulated enterprise environment. Our instructors facilitate a continuous feedback loop, ensuring that every participant grasps the core concepts and can confidently apply them. The training fosters a deep understanding of not just how to configure high-availability solutions, but why specific designs are chosen to meet critical business objectives, ensuring skills are transferable to any network environment.



COURSE AGENDA (COURSE UNITS):

UNIT ONE: FUNDAMENTALS OF NETWORK HIGH AVAILABILITY

- Introduction to High Availability (HA) Concepts.
- Calculating Availability and Understanding Uptime Metrics (e.g., 99.999%).
- Mean Time Between Failures (MTBF) and Mean Time To Repair (MTTR).
- Identifying and Eliminating Single Points of Failure (SPOFs).
- Business Continuity vs. Disaster Recovery.
- Component-Level Redundancy (Power Supplies, Fans, Supervisors).
- Overview of HA Network Design Topologies.

UNIT TWO: LAYER 2 AND LAYER 3 REDUNDANCY PROTOCOLS

- Spanning Tree Protocol (STP) Enhancements for Resiliency.
- Link Aggregation (EtherChannel) using LACP and PAGP.
- Stacking and Chassis Aggregation Technologies.
- First-Hop Redundancy Protocols (FHRP) Overview.
- Hot Standby Router Protocol (HSRP) Configuration and Operation.
- Virtual Router Redundancy Protocol (VRRP) Implementation.
- Gateway Load Balancing Protocol (GLBP) for Active-Active Forwarding.

UNIT THREE: ADVANCED ROUTING AND WAN RESILIENCY

- Designing Redundant Routing Topologies with OSPF and EIGRP.
- Graceful Restart and Non-Stop Forwarding (NSF).
- Bidirectional Forwarding Detection (BFD) for Fast Failure Detection.
- Using Border Gateway Protocol (BGP) for Multi-homing.
- BGP Path Attributes for Traffic Engineering and Failover.
- High Availability in Software-Defined WAN (SD-WAN).
- Implementing Resilient VPN and Remote Access Solutions.



UNIT FOUR: DATA CENTER AND SERVICE-LEVEL HIGH AVAILABILITY

- Server Load Balancing (SLB) Architectures and Methods.
- Global Server Load Balancing (GSLB) for Geographic Redundancy.
- Application Delivery Controllers (ADCs) in HA Designs.
- Data Center Interconnect (DCI) Technologies.
- Designing Active-Active and Active-Passive Data Centers.
- Virtualization and Cloud High-Availability Features.
- Database Clustering and Storage Replication Concepts.

UNIT FIVE: NETWORK MONITORING, MANAGEMENT, AND SECURITY FOR HA

- Proactive Network Monitoring with SNMP, NetFlow, and Syslog.
- Implementing Network Management Systems (NMS) for HA.
- Developing a Zero-Downtime Network Maintenance Strategy.
- Change Management Processes in a High-Availability Environment.
- Security Considerations for Redundant Architectures.
- Incident Response Planning for Network Outages.
- Course Review, Final Lab Scenario, and Q&A Session.

FAQ:

QUALIFICATIONS REQUIRED FOR REGISTERING TO THIS COURSE?

There are no requirements.

HOW LONG IS EACH DAILY SESSION, AND WHAT IS THE TOTAL NUMBER OF TRAINING HOURS FOR THE COURSE?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

SOMETHING TO THINK ABOUT:

How does the principle of "five nines" availability change when applied to ephemeral, container-based microservices versus traditional monolithic applications?



WHAT UNIQUE QUALITIES DOES THIS COURSE OFFER COMPARED TO OTHER COURSES?

This course distinguishes itself by focusing on the holistic engineering mindset required for true network resilience, rather than merely teaching protocol configuration. While other programs may focus on vendor-specific commands, our curriculum emphasizes the vendor-neutral principles of fault-tolerant design, enabling participants to build robust networks regardless of the hardware or software vendor. We move beyond the data center to address high availability across the entire enterprise, including the WAN, cloud interconnects, and remote access. A key differentiator is our emphasis on the direct link between technical implementation and business continuity objectives. Participants learn not just how to implement a failover mechanism, but how to evaluate the business impact of downtime and select the appropriate technology to meet specific recovery time objectives (RTO) and recovery point objectives (RPO). The course integrates practical case studies of both successful and failed HA implementations, providing invaluable lessons from real-world scenarios. This strategic, business-aware approach ensures that graduates are not just network technicians, but architects of truly resilient and dependable digital infrastructures.