# 11. *TESTING AND DOCUMENTING THE DESIGN*

## CHAPTER 11

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# Reasons to Test

- Verify that the design meets key business and technical goals
- Validate LAN and WAN technology and device selections
- Verify that a service provider provides the agreed-up service
- Identify bottlenecks or connectivity problems
- Proving that your design is better than a competing design
- Determine optimization techniques that will be necessary

# *Testing Your Design*

- Use industry testing services
- Build and test a prototype system
- Use third-party and Cisco tools

# *Industry Testing Services*

Some respected, independent testing labs include:

- UNH-IOL: Go to http://www.iol.unh.edu
- ICSA Labs: Go to http://www.icsalabs.com.
- Miercom: Go to http://www.miercom.com.
- AppLabs: Go to http://www.applabs.com
- The Tolly Group: Go to http://www.tolly.com

# Prototype System

- It's not generally practical to implement a full-scale system.

- A prototype should verify important capabilities and functions that might not perform adequately.

- A prototype can be implemented and tested in three ways:
  - As a test network in a lab
  - Integrated into a production network but tested during off hours
  - Integrated into a production network and tested during normal business hours

# *Test Plan for network Design*

- Test objectives and acceptance criteria
- The types of tests that will be run
- Network equipment and other resources required
- Testing scripts
- The timeline and milestones for the testing project

# Test Objectives and Acceptance Criteria

- Specific and concrete
- Based on business and technical goals
- Clear criteria for declaring that a test passed or failed
- Avoid biases and preconceived notions about outcomes
- If appropriate, reference a baseline

# *Types of Tests*

In general, tests should include performance, stress, and failure analyses.

- Application response-time tests
- Throughput tests
- Availability tests
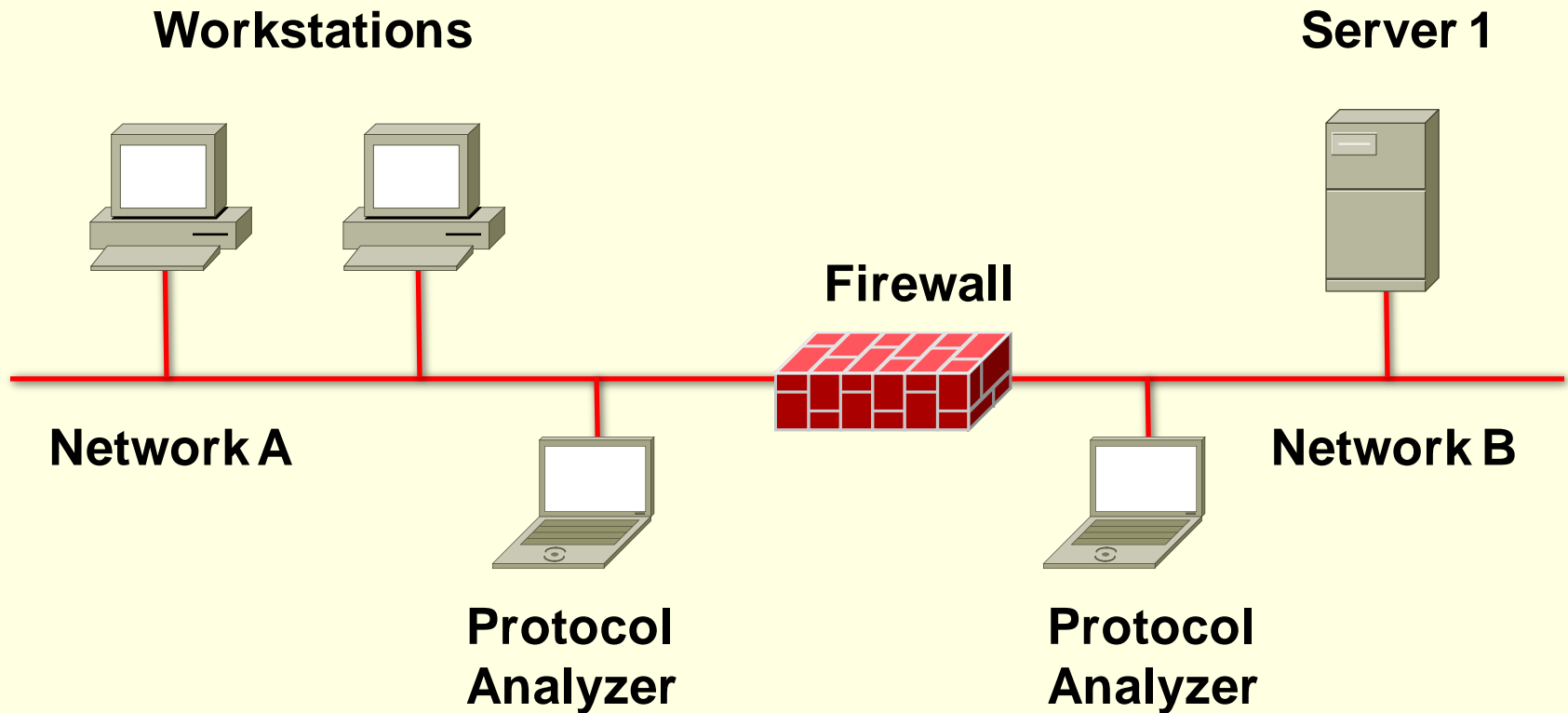- Regression tests (focus on existing applications)

# Resources Needed for Testing

- Scheduled time in a lab either at your site or the customer's site
- Power, air conditioning, rack space, and other physical resources
- Help from coworkers or customer staff
- Help from users to test applications
- Network addresses and names

# *Testing Topology*

**Workstations**

**Server 1**

**Firewall**

**Network A**

**Network B**

**Protocol Analyzer**

**Protocol Analyzer**

# *Test objectives*

- Test objective. Assess the firewall's capability to block Application ABC traffic, during both light and moderately heavy load conditions.

- Acceptance criterion. The firewall should block the TCP SYN request from every workstation on Network A that attempts to set up an Application ABC session with Server 1 on Network B. The firewall should send each workstation a TCP RST (reset) packet.

# *Test Script*

1. Start capturing network traffic on the protocol analyzer on Network A.

2. Start capturing network traffic on the protocol analyzer on Network B.

3. Run Application ABC on a workstation located on Network A and access Server 1 on Network B.

4. Stop capturing network traffic on the protocol analyzers.

5. Display data on Network A's protocol analyzer and verify that the analyzer captured a TCP SYN packet from the workstation. Verify that the network layer destination address is Server 1 on Network B, and the destination port is port 1234 (the port number for Application ABC). Verify that the firewall responded to the workstation with a TCP RST packet.

# *Test Script (continued)*

6. Display data on Network B's protocol analyzer and verify that the analyzer did not capture any Application-ABC traffic from the workstation.

7. Log the results of the test in the project log file.

8. Save the protocol-analyzer trace files to the project trace-file directory.

9. Gradually increase the workload on the firewall, by increasing the number of workstations on Network A one at a time, until 50 workstations are running Application ABC and attempting to reach Server 1. Repeat steps 1 through 8 after each workstation is added to the test.

# Network Design Testing Tools

- Network-management and monitoring tools
  - CiscoWorks or the HP Operations Manager, alert you to problems on your test network.
  - protocol analyzer can generate traffic analyze: traffic, utilization, efficiency, errors, and rates of broadcast and multicast packets.
- Modeling and simulation tools
  - To develop a model of a network, estimate the performance of the network, and compare alternatives for implementing the network
- QoS and service-level management tools
  - analyze end-to-end performance for network applications.

# More Testing Tools

- Big Brother Professional Edition
- Ixia IxN2X Multiservice Test Solution
- LANSurveyor
- Multi Router Traffic Grapher
- Nagios
- NetIQ
- Online Erlang Traffic Calculators
- OPNET
- Orion NetFlow Traffic Analyzer (NTA)
- NetMRI
- Tivoli
- Visio Enterprise Network Tools
- WANDL's Network-Planning and Analysis Tools
- WhatsUp Gold

# *Documenting Your Design*

- If you are given a request for proposal (RFP), respond to the request in the exact format that the RFP specifies

- If no RFP, you should still write a design document

  - Describe your customer's requirements and how your design meets those requirements

  - documents the existing network, the logical and physical design.

  - Document the budget for the project

  - Explain plans for implementing the design

# Typical RFP Response Topics

- A network topology for the new design
- Information on the protocols, technologies, and products that form the design
- An implementation plan
- A training plan
- Support and service information
- Prices and payment options
- Qualifications of the vendor or supplier
- Recommendations from other customers
- Legal contractual terms and conditions

# *The Design Document Contents*

- Executive summary
- Project goal
- Project scope
- Design requirements
- Current state of the network
- New logical and physical design
- Results of network design testing
- Implementation plan
- Project budget

# *Design Requirements*

- Business goals explain the role the network design will play in helping an organization succeed

- Technical goals include scalability, performance, security, manageability, usability, adaptability, and affordability

# *Logical and Physical Design*

- Logical design
  - Topology
  - Models for addressing and naming
  - Switching and routing protocols
  - Security strategies
  - Network management strategies
- Physical design
  - Actual technologies and devices

# *Implementation Plan*

- Recommendations for deploying the network design
- Project schedule
  - Including any dates and times for service provider installations
- Any plans for outsourcing
- Training
- Risks
- A fallback plan if the implementation should fail
- A plan for evolving the design as new requirements arise

# Possible Appendixes

- Detailed topology maps
- Device configurations
- Addressing and naming details
- Network design testing results
- Contact information
- Pricing and payment options
- More information about the company that is presenting the design
  - Annual reports, product catalogs, etc.
- Legal contractual terms and conditions