

**REVIEW LESSON**

MTA Course: 98-366 Networking Fundamentals  
Lesson name: Understanding Network Hardware 2.2  
Topic: Understand routers  
(One 50-minute class period)  
File name: NetFund\_RL\_2.2

**Lesson Objective**

**2.2:** Understand routers. *This objective may include but is not limited to:* transmission speed considerations, directly connected routes, static routing, dynamic routing (routing protocols), default routes; routing table and how it selects best routes; routing table memory, NAT, software routing in Windows<sup>®</sup> Server<sup>®</sup>.

**Preparation Details****Prerequisite student experiences and knowledge**

This MTA Certification Exam Review lesson is written for students who have learned about networking fundamentals. Students who do not have the prerequisite knowledge and experiences cited in the objective will find additional learning opportunities using resources such as those listed in the Microsoft<sup>®</sup> resources and Web links at the end of this review lesson.

**Instructor preparation activities**

- Make copies of Student Activity NetFund\_SA\_2.2

**Resources, software, and additional files needed for this lesson**

- NetFund\_PPT\_2.2
- NetFund\_SA\_2.2
- NetFund\_SA\_2.2\_Key

## **Teaching Guide**

### **Essential Vocabulary**

**default routes**—the network route used by a router when no other known route exists for a given packet's destination address.

**directly connected routes**—considered to be the static routes that point to an interface by the routing table.

**dynamic routing (routing protocols)**—software applications that dynamically discover network destinations and how to get to them.

**NAT**—the network address translation is the process of modifying network address information in datagram (IP) packet headers while in transit across a traffic routing device.

**router**—a router is a device that selectively interchanges packets of data in two or more computer networks while connecting the networks.

**routing protocol**—passing data from one subnet (interface) to another subnet (interface) and both subnets are handled by the same router.

**routing table**—Routing information base (RIB) is an electronic table (*file*) or database type object that is stored in a networked computer or a router.

**routing table memory**—the table is an in-memory database file managed by the router's built-in hardware and software.

**RRAS**—Routing and remote access service (RRAS) is the server role that provides VPN services and the routing service, which provides software-based routing capabilities on the server itself.

**software routing in Windows Server**—RRAS is an open platform for routing and networking and a software router. It uses a virtual private network (VPN) or dial-up connections in Windows Server and supports remote user or site-to-site connectivity.

**static routing**—manually configured routes that do not change unless a user changes them. It is not a protocol.

**transmission speed considerations**—data can be transmitted through the router from place to place at a measured kilobits transmission speed called the bandwidth—each interface on a router will impact overall performance, especially WAN connections.

## **Lesson Sequence**

### **Activating prior knowledge/lesson staging (Anticipatory Set: 10 minutes)**

1. Student prompt (PowerPoint® slide 3):
  - Be creative and think about what a “route” means to you and what controls your route through life. There is probably a router telling you what to do such as a traffic light that tells you to go, slow down, or stop.
  - Give other examples of routers and their applications that you have encountered.
  - Share your answers with two others. Does everyone have router experiences?
  - Begin brainstorming how you would use a router in the computer industry.
2. Give students a few minutes to respond, allowing them to work until they have finished.
3. As time permits, call on a few students to report to the group with their responses.

### **Lesson activity (30 minutes)**

1. Teacher Instruction (30 minutes)  
Use the included PowerPoint slideshow to review routers, transmission speed considerations, directly connected routes, static routing, dynamic routing (routing protocols), default routes, routing table and how it selects best routes, routing table memory, NAT, and software routing in Windows Server.

### **Student Assessment SA\_2.2 Lesson reflection (10 minutes)**

1. Instruct students to complete NetFund\_SA\_2.2.
2. Students exchange papers and check the answers as the instructor reviews them. Students should keep their work for later review.

### **Microsoft resources and Web links**

- **About.com: Routers**  
*[http://compnetworking.about.com/cs/routers/g/bldef\\_router.htm](http://compnetworking.about.com/cs/routers/g/bldef_router.htm)*
- **Bytepile: Data Speed**  
*[http://bytepile.com/data\\_speed.php](http://bytepile.com/data_speed.php)*
- **CCNA Cisco Answers: Routers**  
*<http://answersforccna.blogspot.com/2009/04/erouting-v40-final-pattern1.html>*
- **Cisco – NAT**  
*[http://www.cisco.com/en/US/tech/tk648/tk361/technologies\\_tech\\_note09186a0080094831.shtml](http://www.cisco.com/en/US/tech/tk648/tk361/technologies_tech_note09186a0080094831.shtml)*

- **Inetdaemon: Dyamic vs. Static**  
*[http://www.inetdaemon.com/tutorials/internet/ip/routing/dyamic\\_vs\\_static.shtml](http://www.inetdaemon.com/tutorials/internet/ip/routing/dyamic_vs_static.shtml)*
- **Mindprod: Transmission Speed**  
*<http://mindprod.com/jgloss/transmissionspeed.html>*
- **Microsoft: TechNet: Routing Table**  
*<http://technet.microsoft.com/en-us/library/cc958823.aspx>*
- **Microsoft: TechNet: RRAS**  
*[http://technet.microsoft.com/en-us/library/cc754634\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/cc754634(WS.10).aspx)*
- **Wikipedia: Default Route**  
*[http://en.wikipedia.org/wiki/Default\\_route](http://en.wikipedia.org/wiki/Default_route)*
- **Wikipedia: Network Address**  
*[http://en.wikipedia.org/wiki/Network\\_address\\_translation](http://en.wikipedia.org/wiki/Network_address_translation)*
- **Wikipedia: Routing Table**  
*[http://en.wikipedia.org/wiki/Routing\\_table](http://en.wikipedia.org/wiki/Routing_table)*