

Classroom Setup Guide

The Classroom Setup Guide is divided into three sections:

1. **Before You Begin** — This section includes courseware update links for instructors, a revision history outlining the revisions made to a coursebook since the last version, an explanation of the requirements for preparing a classroom behind a proxy server, and additional notes that you should consider before you set up the classroom.
2. **Classroom Requirements** — This section lists the hardware, software, and network and connectivity requirements to implement this course.
3. **Setup Instructions** — This section includes the configuration requirements for both instructor and student systems, and a detailed list of required software installation procedures.

Before You Begin

This section includes courseware update links for instructors, a revision history outlining the revisions made to a coursebook since the previous version, an explanation of the requirements for preparing a classroom behind a proxy server, and additional notes that you should consider before you set up the classroom.

Courseware updates

Instructors must download the latest courseware updates from the CTP Web site (www.CTP-certified.com) before teaching the course. Prosoft's CTP courseware is updated continually, and the courseware updates provide the most current changes, revisions and notes for this courseware.

Courseware updates include feedback from partners, customers and instructors who implement Prosoft's CTP courseware. Feedback is reviewed and updates are posted in dynamic documents for both students and instructors. Each updates document correlates with the identical version of the coursebook (e.g., *Data Networking v4.0 Update* is designed to be used only with v4.0 of the *Data Networking* coursebook). Updates are available for both the current versions and the immediately previous versions of the coursebooks.

Revision history

Released April 2007 (version 4.0)

This release is considered a course revision and corresponds to the CTP 2007 exam, released February 2007.

The main differences between this *Data Networking* version 4.0 course and the previous version (version 3.0 released June 2006) are as follows:

- Created separate books for EMEA and North American standards, reducing the amount of comparative text in each course.
- Added content on Quality of Service (QoS) technologies, including Resource Reservation Protocol (RSVP), Differentiated Services (DiffServ), Multiprotocol Label Switching (MPLS), Integrated Services (IntServ), 802.1q and 802.1p.
- Added content on Virtual Private Networks (VPNs), including protocol tunneling, IPsec and compatibility issues with VPN clients.

- Added content on cable distribution schemes.
- Enhanced content on Spanning Tree Protocol (STP).
- Centralized content on industry bodies and standards.
- Centralized and enhanced content on E-carrier, T-carrier, Synchronous Optical Network/Synchronous Digital Hierarchy (SONET/SDH) and Integrated Services Digital Network (ISDN).
- Enhanced content on wireless technologies, including QoS on wireless networks, client and access point settings, and security issues.
- Enhanced content on Virtual LANs (VLANs), including VLAN tagging, frame formats, colors and membership.
- Enhanced content on Domain Name System (DNS), including zone transfers, DNS security, and SRV and NAPTR records.
- Enhanced content on firewalls and Network Address Translation (NAT).

Released June 2006 (version 3.0)

This release is considered a course revision. The main differences between this *Data Networking* version 3.0 course and the previous version (version 1.2 released March 2003) are as follows:

- Standardized labs to Windows XP Professional Service Pack 2.
- Added labs for Knoppix.
- Added Case Studies that discuss real-world applications of skills.
- Added content on Bluetooth, Radio Frequency Identification (RFID), cellular networks, operating system logs and embedded operating systems.
- Enhanced coverage of wireless networking.

Released March 2003 (version 1.2)

This release is considered an errata rollover. The main differences between this *Data Networking* version 1.2 course and the previous version (version 1.1 released November 2002) are as follows:

- Expanded or added content in various topic areas, including Protocol Data Unit (PDU) and Service Data Unit (SDU), PDU names, peer entities, partial mesh networks, point-to-point topologies, collision domain, switch types, DCE and DTE devices, V.24 standard, Data Link Connection Identifier (DLCI), RFC updates, distance-vector routing protocols, Interior Gateway Routing Protocol (IGRP), RIP and RIPv2, link-state routing protocols, Intermediate-System-to-Intermediate-System (IS-IS) Protocol, Network Address Translation (NAT) types, and Session Initiation Protocol (SIP).
- Incorporated minor changes to the text and some labs, including corrections of typographical and content errors.

Released November 2002 (version 1.1)

This release is considered a course enhancement. The main differences between this *Data Networking* version 1.1 course and the previous version (version 1.07 released July 2002) are as follows:

- Applied new publishing template to give the course a more professional look and feel.

Released July 2002 (version 1.07)

This release was a new course offering. Therefore, no revision history exists.

Classroom Requirements

This section lists the hardware, software and connectivity requirements to implement this course. Before class, the instructor should install and configure the instructor and student systems using the following instructions.

Hardware

Each classroom should be equipped with an individual computer workstation for each student and the instructor. The following table summarizes the hardware requirements for all courses in the CTP program.

Hardware Specifications	Minimum Requirements
Processor	Intel Pentium III processor (or equivalent) with 300-MHz processor clock speed recommended; 233-MHz minimum required (single or dual processor system)
L2 cache	256 KB
Hard disk	8 GB
RAM	128 MB
CD-ROM	32X
Network interface card (NIC)	10BaseT or 100BaseTX (10 or 100 Mbps)
Sound card/speakers	Required for instructor station, optional for student stations
Video adapter	4 MB
Monitor	Super VGA (800 x 600) resolution video graphics card and monitor with 256 colors
Network hubs	Enough 10-port 10BaseT or 100BaseTX (10 or 100 Mbps) hubs to allow classroom computers to communicate
Router	Multi-homed system with three NICs (Windows XP Professional SP2)

Additional hardware requirements

The following additional equipment is necessary to complete the labs in this book.

- **Cable and connectors** — at least 6 feet of Cat 5 or Cat 5e Ethernet cable, four RJ-45 connectors, wire cutters and a crimper for each student.
- **Wireless components** — a wireless access point (AP) and two wireless NICs.
- **A switch** — must be capable of supporting VLANs, and also an interface cable for the switch if a Web interface is not available.

Software

The recommended software configurations for computers used to complete the labs in this book are as follows.

To be installed before class:

- **Microsoft Windows XP Professional SP2** — typical installation. Disable the Windows Firewall before class begins or labs will not work as written.

To be installed during class:

- **Phex** — executable file located on the supplemental CD-ROM.
- **Java 2 Runtime Environment** — executable file located on the supplemental CD-ROM.

- **Ethereal** — executable file located on the supplemental CD-ROM.

Network and connectivity

For the labs in this course to work properly, all systems used in class must be configured as follows.

- Ethernet/IEEE 802.3 or IEEE 802.3u (Fast Ethernet) is required.
- TCP/IP is the network protocol used in the course. It is the default networking protocol for Windows XP Professional.
- Manually configure the classroom with at least three physical networks, connected by an IP router. For simplicity, it is recommended that you use a multi-homed Windows XP Professional computer with three NICs and IP forwarding enabled as your router. The three NIC addresses will be the default gateways for each network:
 - 192.168.3.1
 - 192.168.4.1
 - 192.168.2.1
- Subnet A (192.168.3.0) students will use odd-numbered IP addresses.
- Subnet B (192.168.4.0) students will use even-numbered IP addresses.
- The instructor will use a third subnet with the network address 192.168.2.0. The instructor's IP address will be 192.168.2.100.
- The subnet mask for all subnets is 255.255.255.0. The classroom configuration is illustrated in Figure CS-1.

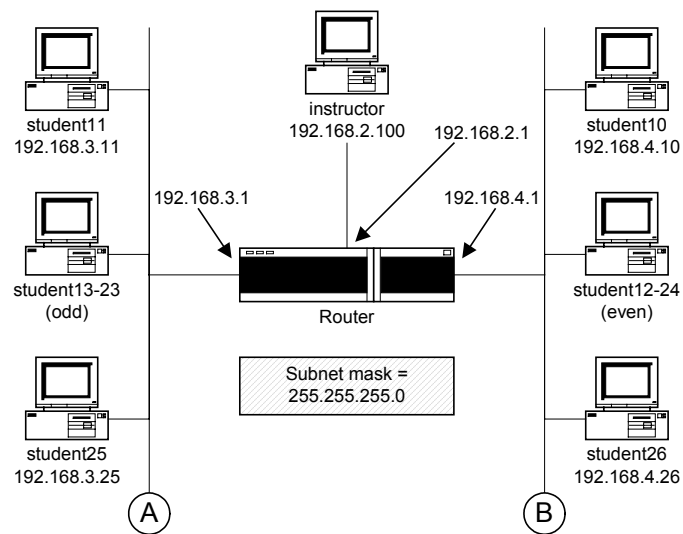


Figure CS-1: Required classroom configuration

- Use static IP numbers for every system.
- Internet connectivity is recommended for researching RFCs on the Web, but not required for the course (you may skip labs that require Internet connectivity if necessary). If Internet connectivity is available, configure student computers with valid IP addresses. These addresses can be obtained by your ISP or network administrator. For instance, configure your systems as DHCP clients and obtain valid IP addresses from a DHCP server. When you are finished, restore the original classroom configuration, as displayed in Figure CS-1.

- Students should be divided into pairs on each network. Some labs require students to work as teams.
- The instructor's computer must be able to communicate with all the others through a router. The easiest solution might be to use a Windows XP Professional system as a multi-homed router with IP forwarding enabled.
- To enable IP forwarding in Windows XP Professional, open Regedit from the Start | Run command. Find the following key:
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters
subkey: "IPEnableRouter." Change the setting from zero (0) to one (1), then reboot the system. Test using ping and tracert.
- If you do not have a Windows XP Professional system acting as a multi-homed router, use whatever router you have.

Preparing the classroom behind a proxy server

If Internet access is required (or preferred) for a class and the classroom is behind a proxy server, you may have problems downloading programs during classroom setup and completing certain labs during class. Most proxy servers already allow HTTP traffic. Difficulties may arise when you require additional services, such as e-mail, FTP and program downloads.

The following two suggestions are offered.

1. Talk with the network administrator at the location and make sure that:
 - a. The classroom has proper access to all Internet-related protocols used in the class. Examples include HTTP (TCP/UDP port 80), SSL (TCP/UDP port 443), FTP (TCP/UDP port 20, 21), Telnet (TCP/UDP port 23), POP3 (TCP/UDP port 110), SMTP (TCP/UDP port 25), NNTP (TCP/UDP port 119) and Gopher (TCP/UDP port 70). For certain services, such as FTP, you will need all ports above 1023 (registered ports).
 - b. The IP addresses assigned to the computers in your classroom have permission to access the Internet.
2. Download all the required software (with proper licensing) for the course before you arrive at the site, and place the source files on the instructor computer. Students can then access all source files from shares that you create. Consider creating a CD with the required software source files. This will not solve the issues addressed in Suggestion 1, but will solve any download problems.

Alternative classroom setup

If your classroom cannot be divided into subnets, obtain TCP/IP configurations from a DHCP server. If a DHCP server is not available, contact your network administrator for valid TCP/IP configurations. Please note that if your classroom does not have subnets, some of the labs may not function as written.

Setup Instructions

Use the following procedures to set up the computers for class.

To set up the hardware

Set up the hardware according to the manufacturer's instructions. (Refer to the requirements listed in the Hardware section of this Classroom Setup Guide.)

To set up Windows XP Professional SP2

Before installing Windows XP Professional, consult the hardware compatibility list (HCL). The HCL for Microsoft XP Professional is located at www.microsoft.com/hcl/.

1. Begin setup by setting the boot sequence for your computer so that it will boot from the CD drive, then insert the Windows XP Professional CD-ROM and reboot.
2. Accept the licensing agreement by pressing **F8**.
3. Use the following parameters to perform a typical installation of Windows XP Professional SP2 (if installing Windows XP Professional, go to the Microsoft Web site after installation to download and install Service Pack 2).

When This Information Is Required	Use
Phase 1	
Where to install Windows XP	Select or create a partition
Specify file system and format	NTFS
Phase 2	
Regional and Language Options	Customize for your location.
Name	Your name
Organization	Your organization
Product Key	The CD Key for your copy of Windows XP Professional
Computer Name	<i>Instructor or StudentX (where X is the assigned student number, such as Student13) Note: If several classrooms are connected, you may encounter name conflicts. If so, add a number or letter to the name. For example, name the instructor computer instructor1 and a student13 computer student13a.</i>
Type Administrator Password	password (all lowercase letters)
Confirm password	password (all lowercase letters)
Date and Time Settings	Customize for your location
Network Settings (Custom or Typical)	Typical
Workgroup or Domain	Workgroup

To install Service Pack 2, go to the Microsoft Update Web page at <http://update.microsoft.com>, and download and install Service Pack 2. Service Pack 2 includes several security enhancements and a firewall. Although the firewall is disabled for this class, all labs have been written to Service Pack 2. If you do not install Service Pack 2, some labs may not work as written.

Configure Windows XP Professional for use in your classroom by specifying the following settings:

- Specify a static IP address:
 1. Log on as Administrator.
 2. Select **Start | Control Panel**, then double-click **Network Connections**.

3. Right-click your LAN connection, then click **Properties** to open the Local Area Connection Properties dialog box.
4. In the list box, click **Internet Protocol (TCP/IP)**, then click **Properties** to open the Internet Protocol (TCP/IP) Properties dialog box.
5. Select **Use The Following IP Address**, then specify the following information in the appropriate text boxes.

Text Box	Information to Supply
Instructor System	
IP Address	192.168.2.100
Subnet Mask	255.255.255.0
Default Gateway	192.168.2.1
Student Systems on Subnet A (192.168.3.0)	
IP Address	Use odd-numbered IP addresses. (see information listed in the Network And Connectivity section of this Classroom Setup Guide)
Subnet Mask	255.255.255.0
Default Gateway	192.168.3.1
Student Systems on Subnet B (192.168.4.0)	
IP Address	Use even-numbered IP addresses. (see information listed in the Network And Connectivity section of this Classroom Setup Guide)
Subnet Mask	255.255.255.0
Default Gateway	192.168.4.1

Note: Do not enter DNS configurations unless you have a DNS server.

6. Click **OK**, click **Close**, then close the Network Connections window.
- Specify the CLASSROOM workgroup:
 1. Select **Start | Control Panel**, then double-click **System** to open the System Properties dialog box.
 2. Click the **Computer Name** tab, then click the **Change** button.
 3. In the Member Of section, select the text in the Workgroup field, type **classroom**, click **OK** four times, then click **Yes** to restart.

Note: If several classrooms are connected, you may encounter name conflicts. If so, add a number to the name. For example, name the workgroup Classroom1.

- Disable the Windows XP firewall on each system in the network:
 1. Select **Start | Control Panel**, then double-click **Windows Firewall** to open the Windows Firewall dialog box.

2. Select **Off (Not Recommended)**, then click **OK**.
3. Close the Control Panel.

Supplemental CD-ROM

Each coursebook includes a supplemental CD-ROM. The files on the CD-ROM are referenced and used throughout the course.