

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., *Telephony Networking v4.0 Update* is designed to be used only with v4.0 of the *Telephony 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 *Telephony 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.
- Pared down content to issues relevant specifically to telephony, resulting in four lessons instead of five.
- Enhanced coverage of Pulse Code Modulation and companding.
- Added content on voice services and features, including call/contact center elements.

- Moved sections on the digital signal hierarchy, T-carrier system, E-carrier system, SONET and Synchronous Digital Hierarchy to the Data Networking course.
- Moved sections on cable distribution, cabling procedures, wiring standards, and RJ-45 connectors and wiring to the Data Networking course.
- Moved sections on standards bodies to the Data Networking course.
- Reduced emphasis on voltages, wires, electrical properties and physical testing; increased emphasis on telephony concepts.
- Removed content on E&M lines, wink starts and ground-starts.
- Reduced emphasis on RFC and standard numbers (the CTP exam does not test these topics).

Released June 2006 (version 3.0)

This release is considered a course revision. The main differences between this *Telephony Networking* version 3.0 course and the previous version (version 2.1 released March 2003) are as follows:

- Moved material pertaining to telephony power issues and troubleshooting digital lines from Lesson 5 to Lesson 4 for improved instructional design.
- Reorganized material in Lesson 5 for improved instructional and logical flow.
- Removed material pertaining to telephone service providers in North America and the United Kingdom.
- Removed material pertaining to European Union Telecommunications Terminal Equipment Industries Directive, Electromagnetic Compatibility (EMC) Directive, Low Voltage Directive (LVD), British Approval Board for Telecommunications (BABT), Office of Telecommunications (OfTel), and additional telephony regulators and organizations.

Released March 2003 (version 2.1)

This release is considered an errata rollover. The main differences between this *Telephony Networking* version 2.1 course and the previous version (version 2.0 released December 2002) are as follows:

- Expanded or added content in various topic areas, including the European Union Telecommunications Terminal Equipment Directive, the Electromagnetic Compatibility (EMC) Directive 89/336/EEC, the Low Voltage Directive (LVD), the Independent Committee for the Supervision of Standards of Telephone Information Services (ICSTIS), serial cable termination, V communication standards, Link Access Procedure for Modems (LAPM), and the residual current device (RCD).
- Made minor changes to the text and some labs, including corrections of typographical and content errors.

Released December 2002 (version 2.0)

This release is considered a course enhancement. The main differences between this *Telephony Networking* version 2.0 course and the previous version (version 1.07 released July 2002) are as follows:

- Added standards specific to the United Kingdom, including:
 - Material concerning British Telecom (BT) connectors, including BT-431A and BT-631A.
 - Additional material concerning SONET networks, including a discussion of the Synchronous Digital Hierarchy (SDH).
 - Discussion of the British Specified Numbering Scheme (SNS).
 - Additional information concerning international exchanges and making phone calls.

- Labs concerning BT-style connectors and testing line voltages in the United Kingdom.
- An explanation of the Public Integrated Services Network (PISN).
- Material concerning the Digital Private Network Signaling Scheme (DPNSS) and QSIG.
- Material concerning SS7 and ISDN interaction.
- Discussion of earth-start testing.
- Correction of existing material concerning Ethernet standards, USOC/RJ-45 and crossover cables.

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.

Hardware

Computers are not required for this course, but are recommended for Internet research. The course focuses on hands-on labs using telephony equipment (see the Additional Hardware section).

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 instructor hardware

Instructors require the following hardware to complete this course. For more information on the additional hardware required for this course, see the Purchasing Telephony Hardware section of this Classroom Setup Guide.

- A working analog telephone line for conducting connectivity tests and analyzing concepts such as tip and ring voltage.
- A screwdriver

- Line-test handset (i.e., butt set). Note: An additional butt set is required if you want to perform Steps 3 and 4 in Optional Lab 3-2. These steps use a tone-and-probe kit to supply talk power between two butt sets.
- Tone-and-probe kit.
- One ready-made telephone patch cable.
- Cable (line) tester for RJ-11 connectors.
- Crimper for RJ-11 connectors.
- Category 3 station wire bundle (to be used to conduct wire bundle tests using the tone-and-probe kit).
- Category 3 station wire (at least 3 feet of wire, to be used in examining (and, optionally, creating) a telephone patch cable using RJ-11 connectors).
- RJ-11 connectors for creating the telephone patch cable.
- A standard RJ-11 wall jack.
- *Optional:* Punchdown tool, with 66- and 110-blade connectors.
- *Optional:* Modular breakout adapter (i.e., an adapter that plugs into a standard RJ-11 phone jack, but allows you to connect each wire to a connector using alligator clips).

Additional student hardware

Students require the following hardware to complete the course:

- Screwdriver
- Digital multimeter
- RJ-11 connectors for each student (if you want students to create a telephone patch cable as per an optional step in Lab 2-1)
- At least 3 feet of Category 3 station wire for each student (if you want students to create a telephone patch cable as per an optional step in Lab 2-1)
- Crimper for RJ-11 connectors for each student (if you want students to create a telephone patch cable as per an optional step in Lab 2-1)

Software

Computers are not required for this course, but are recommended for Internet research. The course focuses on hands-on labs using telephony equipment (hardware). The recommended operating system for this course is Microsoft Windows XP Professional (with a Web browser) because it is used in the two other CTP series courses (Data Networking and Convergence Technologies).

Network and connectivity

Internet connectivity is not required for this course, but it is highly recommended. You will find Internet access useful for technology demonstrations, online experimentation, and further study and research.

Setup Instructions

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

To set up the hardware

Set up the computer 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 Windows XP Professional is located at www.microsoft.com/hcl/.

- 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.
- Accept the licensing agreement by pressing F8.
- 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>
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.

Supplemental CD-ROM

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

Preparing for Telephony Labs

The following table will help you prepare for labs designed to be conducted in the EMEA countries. See the Additional Instructor Hardware section requirements for telephony equipment needed to teach this course.

Lab	Required Tools
Lab 1-1: Investigating a local telephone connection (<i>instructor-led</i>)	A working telephone line with a handset.
Optional Lab 1-1: Viewing telco equipment (<i>instructor-led</i>)	Access to a wiring closet or server room containing telephony equipment.
Lab 2-1: Examining a telephone cable (<i>instructor-led</i>)	Crimper, at least 3 feet of Cat 3 station wire, at least two RJ-11 connectors. If you want students to create a telephone patch cable (as per an optional step in this lab), obtain and distribute cable, connectors and crimpers to each student.
Optional Lab 2-1: Generating and viewing DTMF tones	A standard Internet-ready PC, with a media player (e.g., Windows Media Player or Winamp) and speakers.
Optional Lab 2-2: Studying a phone jack (<i>instructor-led</i>)	A standard telephone wall jack, and a screwdriver.
Lab 3-1: Checking local loop voltage (<i>instructor-led</i>)	A digital multimeter; a standard, working analog local loop line; and a screwdriver (to detach the wall plate to expose wiring).
Optional Lab 3-1: Using a butt set on an analog line (<i>instructor-led</i>)	A screwdriver (to detach the wall plate to expose wiring) and a butt set, complete with clips ("bed of nails" clips are recommended).
Optional Lab 3-2: Using a tone-and-probe kit (<i>instructor-led</i>)	A tone-and-probe kit (i.e., fox and hound), and a wire bundle to have students determine where a wire is located. The wire will have to be connected to ground. You will need two butt sets to use the tone generator's talk battery power.
Optional Lab 3-3: Using a line tester (<i>instructor-led</i>)	A line tester (often in two parts, one for each end of the cable) and patch cables that have RJ-11 endings.
Optional Lab 4-1: Investigating convergence connections (<i>instructor-led</i>)	Access to a convergence connection room (you will probably have to obtain permission from a systems administrator). Be extremely careful that you do not interrupt telephony service for your company.

Note: You are encouraged to create your own labs. However, make sure that all labs you create correspond to course objectives.

Purchasing Telephony Hardware

Following is a description of the telephony equipment required for teaching the CTP courseware in North America. You can purchase this equipment at the Home Depot hardware store (www.homedepot.com). This hardware is in addition to the student and instructor computers, and is specific to hands-on telephony fundamentals. The specific equipment listed was used to develop the course, but you can use the equipment of your choice.

- **Line-test handset**, also called a butt set (Harris TS19 with alligator clips, model 19800-HD9, SKU 164911).
- **Tone-and-probe kit** (Haris Pro 2000, model 26000-800, SKU 165280).
- **Line tester for RJ-45 and RJ-11 connectors** (Ideal LinkMaster, model 62-200, SKU 513606).

- **Crimper for both RJ-11 and RJ-45 connectors** (Ideal Ratchet Telemaster, model 30696, SKU 388438). Alternatively, you can use the Telephone Installation Kit (model 33700, SKU 324978), which is the same thing with 10 RJ-11 and 10 RJ-45 connectors.
- **Digital multimeter** (Sperry, model DM350A, SKU 276539).
- **At least 3 feet of standard Category 3 station wire**, to be used in examining (and, optionally, creating) a telephone patch cable using RJ-11 connectors. *Note: The Home Depot Web site is not the best place to obtain this wire because it is expensive. Contact Home Depot directly, or work with another vendor).*
- **A Category 3 station wire bundle**, to be used to conduct wire bundle tests using the tone-and-probe kit. *(Note: The Home Depot Web site is not the best place to obtain this wire because it is expensive. Contact Home Depot directly, or work with another vendor).*
- **A standard RJ-11 wall jack** (RCA, model TP 247X, SKU 116059). *(Note: The Home Depot Web site is not the best place to obtain this wire because it is expensive. Contact Home Depot directly, or work with another vendor).*
- **Several RJ-11 connectors** for creating a telephone patch cable. The Home Depot Web site has only packages with 25 RJ-11s. Model 85345, SKU 324778. Use 6-position.
- **Optional: Punchdown tool with 66- and 110-blade connectors.** This coursebook does not contain labs on using a punchdown tool because the classroom is not required to have a 66 or 110 punchdown block present. However, instructors may want to bring one to class (Punchmaster™ II Turn-Lock Punch Down Tool, model 35485, SKU 279343).

You can also visit www.phonegeeks.com to review products and prices.