

# *Prestige 941*

*Cable Modem*

## *User's Guide*

Version 2.37

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**ZyXEL**  
TOTAL INTERNET ACCESS SOLUTION

# Prestige 941

## Cable Modem

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# Preface

Congratulations on your purchase of the Prestige 941 Cable Modem.

This preface introduces you to your cable modem and discusses the user's guide and conventions. It also provides information on other related documentation.

## **About Your Cable Modem**

The Prestige 941 cable modem connects your 10/100Mbps LAN to the Internet through your television cable. Your P941 is primarily a bridge device. Your Prestige 941 is easy to install. Once you have installed it, your cable operator will configure it. You have to just plug and play.

## **About This User's Guide**

This manual is designed to give you an overview of your Prestige 941 Cable Modem. You can just connect your cable modem using the instructions given in chapter two, then plug, and play. For details about P941 with routing capabilities, please refer to P941 Routing Cable Modem User's Guide.

## **Syntax Conventions**

- For brevity's sake, we will use "e.g." as a shorthand for "for instance" and "i.e." for "that is" or "in other words" throughout this manual.
- The Prestige 941 will also be referred to as the Prestige or the P941 in this manual.

## **Related Documentation**

➤ *Supporting Disk*

More detailed information about the Prestige and examples of its use can be found in the Supporting Disk.

➤ *Packing List Card*

You should have a Packing List Card that lists all items that should have come with your Prestige.

➤ *ZyXEL Web Page and FTP Server Site*

You can access release notes for firmware upgrades and other information at ZyXEL web pages and FTP server sites. Refer to the *Customer Support* page in this User's Guide for more information.





# Chapter 1

## Getting to Know Your Cable Modem

This chapter provides overview of your Prestige 941 Cable Modem, its key features, applications and product specifications.

### 1.1 Prestige 941 Cable Modem

The Prestige 941 is a high bandwidth Internet access cable modem that connects your LAN to the Internet using the hybrid fiber coaxial (HFC) cable; the same cable that brings television into a cable television (CATV) subscriber's home. With the Prestige 941 cable modem, a personal computer can be connected to the HFC cable network for high-speed access to the Internet. It is ideal for cable users with more than one PC and is an excellent alternative to the more expensive leased lines.

The Prestige 941 cable modems are based on the Multimedia Cable Network System (MCNS) Data Over Cable Service Interface Specification (DOCSIS) standards specifications. MCNS is a consortium of cable television companies whose goal is to create standards for interoperable data-over-cable systems.

The Prestige 941 cable modem operates with one external AC-input power supply.

### 1.2 Overview of Cable Data System Operation

The Cable Data System includes CMTS (Cable Modem Termination System, or called Headend) at Cable Operator site, Cable Network Plant and Cable Modems. The cable headend must be properly configured to successfully install the Prestige 941 cable modem.

The Prestige 941 cable modem is configured automatically using a configuration file generated by the cable operator and delivered by the cable headend. The headend provides a path to the Prestige 941 cable modem for both the DHCP (Dynamic Host Control Protocol) server and IP address assignment.

The personal computer(s) connected to the cable modem must be configured for Internet Protocol (IP). In addition, your cable service provider must have a correctly configured DHCP server and EIA (Electronic Industries Administration) downstream channel. Using DHCP, headend assigns an IP address to your cable modem each time you connect to the network. The IP address identifies the computer on the network and enables the headend to route data to and from your computer.

When the cable modem is installed, the connected computer is configured for IP and has DHCP services enabled, and communication to the headend is established, and the headend downloads configuration information to the cable modem. The initial configuration connection to the headend can take several minutes.

### **1.3 Key Features of Prestige 941 Cable Modem**

The following are the key features of the Prestige 941 cable modem :

- DOCSIS compliant cable modem
- Peak downstream data rates of 43 Mbps and upstream data rates of 10 Mbps
- Auto-negotiating 10/100Mbps Ethernet
- 56-bit DES (Data Encryption Standard) Baseline Privacy
- MAC (Media Access Control) address filtering
- DHCP Client
- Logging and Tracing
- Built-in message logging and packet tracing.
- Unix syslog facility support
- Remotely Software Upgradeable
- Built-In Remote Diagnostic Features

## 1.4 Internet Access Applications for Prestige 941

Prestige 941 Cable Modem is basically a bridge device that will forward user's traffic between LAN and CMTS. According to DOCSIS specification, the cable modem can be configured to serve specific CPEs (Customer Premise Equipments) by provisioning their MAC addresses. Only the traffic to/from these CPE will be forwarded by Prestige 941. The others will be filtered.

The Prestige 941 can also be configured to serve certain number of CPEs. It will learn the MAC addresses from the LAN traffic. The Prestige will not forget this learnt address unless you reboot the Prestige 941. When the number of learnt MAC addresses exceed the configured limitation, the Prestige 941 will stop learning and serve only those learnt MAC addresses.

Before installing your Prestige 941, do contact your cable operator to provide them your PC's MAC address or tell them how many PC will be connected.

A typical Internet Access application is shown below.

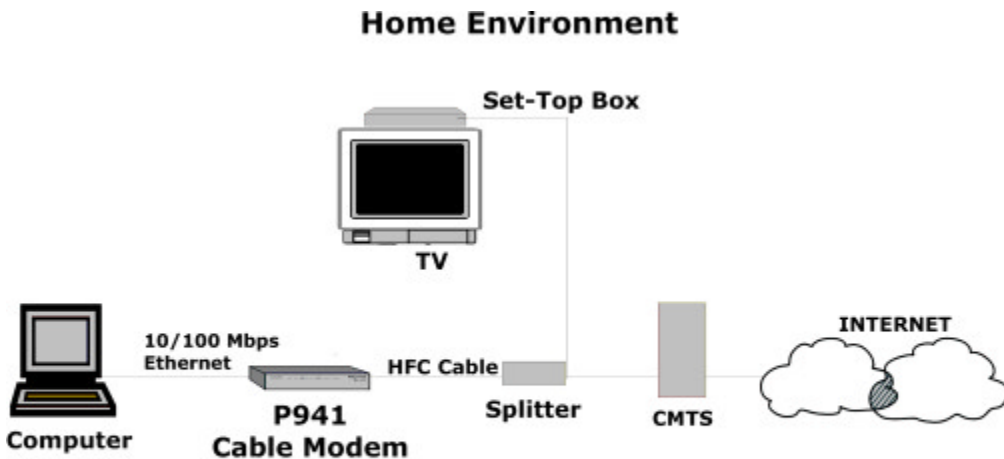
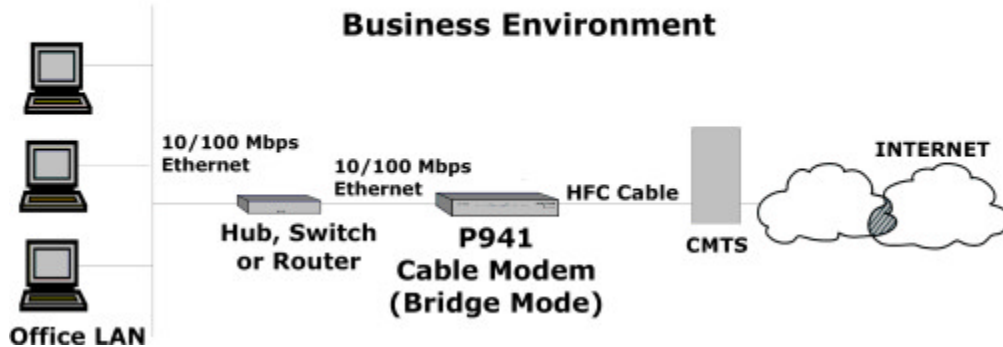


Figure 1-1



**Figure 1-2 Cable Modem Application and Network Architecture**

For Internet Access applications, the highlights of the Prestige 941's distinguished features are described as follows :

**High Speed Access to the Internet**

Downstream(receive) connection speeds of up to 43 Mbps, and upstream (send) connection speeds of up to 2 Mbps (Note)

**Multicast messages**

Multiple users can receive important information at the same time

**User Data Privacy**

Upstream and downstream data is encrypted to provide data privacy protection

**10/100 Mbps Ethernet Interface**

10/100 Mbps Ethernet interface provides high speed and high flexibility LAN interface

**Downloadable Software**

Software and configuration information is downloadable from cable headend to the cable modem for future software upgrade. Your cable operator will help you in future software upgrade.

**Note:** DOCSIS cable Systems are capable of providing access speed up to 43 Mbps and 10 Mbps for downstream and upstream respectively. The bandwidth, however, is shared by several subscribers because there are very few computers today that can connect to a network at such high speeds. Typical connection speeds to be expected are 5 Mbps downstream and 1 Mbps upstream.

## 1.5 Product Specifications

Table 1-1 lists the P941 specifications.

**Table 1-1 Product Specifications**

| <b>Class</b>        | <b>Features</b>                         |
|---------------------|---|
| <b>Downstream</b>   |   |
| Center Frequency    | 91 MHz ~ 857 MHz                        |
| Modulation          | 64 QAM and 256 QAM                      |
| Channel Width       | 6 MHz                                   |
| Receive Input Level | -15 dBmv to +15 dBmv                    |
| Maximum Data Rates  | 30.34 Mbps (64QAM), 42.88 Mbps (256QAM) |
| FEC                 | Reed Solomon Decoder                    |
| Encryption          | 56-bit DES                              |
| <b>Upstream</b>     |   |
| Operation Frequency | 5 ~ 42 MHz                              |
| Modulation          | QPSK and 16 QAM                         |
| Channel Width       | Variable, 200kHz ~ 3.2 MHz              |

|   |  |
|---|--|
| Transmit Output Power                       | +8 ~ +58 dBmv (QPSK)<br>+8 ~ +55 dBmv (16 QAM)                             |
| Data Rates                                  | 320 kbps ~ 5.12 Mbps (QPSK)<br>640 kbps ~ 10.24 Mbps (16 QAM)              |
| FEC   | Reed Solomon Encoder   |
| Encryption                                  | 56-bit DES   |
| Numbers of LAN Users<br>(with external hub) | up to 16   |
| Power Requirements                          | 9VDC @ 1.2 Amps Max.   |
| Operating Requirements                      | Temperature : 0°C to +40°C (Note)<br>Humidity : 5 to 90 % (non-condensing) |
| Dimensions                                  | 23cm x 16cm x 3.45cm   |
| Weight                                      | 510g   |
| Power Supply Adapter                        | 100 Volts ~ 240 Volts, 50 ~ 60 Hz  |

**Note:** To keep the Prestige cable modem operating at optimal internal temperature, keep the bottom, sides, and rear of the cable modem clear of obstructions and away from the exhaust of other equipment.

# Chapter 2

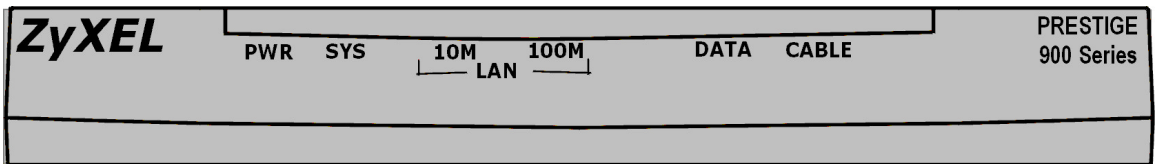
## Hardware Installation & Initial Setup

This chapter shows the procedures for installing and operating the Prestige 941 cable modem.

### 2.1 Front Panel LEDs and Back Panel Ports

#### 2.1.1 Front Panel LEDs

The LEDs on the front panel indicate the operational status of the Prestige 941.



**Figure 2-1 Prestige 941 Front Panel**

The following table describes the LED functions:

**Table 2-1 LED Functions**

| Function | Naming | Color | LED description  |
|----------|--------|-------|--|
| Power    | PWR    | Green | On : Power On<br>Off :Power Off  |
| System   | SYS    | Green | On: System ready and running OK<br>Flashing: System rebooting<br>Off: System not ready |

|          |         |        |  |
|----------|---------|--------|--|
| LAN 10M  | LAN10M  | Orange | On: Ethernet link OK<br>Flashing: Sending and Receiving<br>Off: Ethernet not ready   |
| LAN 100M | LAN100M | Green  | On: Ethernet link OK<br>Flashing: Sending and Receiving<br>Off: Ethernet not ready   |
| DATA     | DATA    | Green  | Flashing: Upstream or Downstream Channel is transmitting data.<br>Off: Connection is idle.   |
| CABLE    | CABLE   | Green  | On: P941 is registered successfully with CMTS<br>Slow Flash (2 seconds interval) : P941 is scanning downstream channel<br>Fast Flash (1 second interval) : P941 is locked on to downstream channel and is ranging and registering with Cable Modem Terminal System (CMTS). |

## 2.2 Prestige 941 Rear Panel and Connections

The figure below shows the rear panel of your Prestige 941 and the connection diagram.



Figure 2-2 Prestige 941 Rear Panel and Connections

## 2.3 Initializing the Cable Modem

This section outlines how to connect your Prestige 941 to the LAN and the cable network.

### Step 1. Preparing the CATV Coaxial Cable connection

Locate the coaxial cable at the installation site and move the cable end, or install a two-way splitter as necessary, to provide a connection near the Prestige 941 cable modem router location.

### **Step 2. Connecting the Prestige to the Cable System**

Connect the Prestige 941 to cable port on the cable modem using F-type connector.

(If the quality or general condition of the coaxial cable at the installation site is in question, we recommended that you replace the coaxial cable).The cable port on the cable modem is labeled "CABLE".

### **Step 3. Connecting Ethernet Cables to the Prestige 941**

If you have more than one PC, you must use an external hub. Connect the 10/100M LAN port on the Prestige to a port on the hub using a cross-over Ethernet cable. If you only have one PC, you can connect the Prestige to the PC directly without a hub. For a single PC, connect the 10/100M LAN port on the Prestige to the Network Adapter on the PC using a straight through cable.

### **Step 4. Connecting the Prestige 941 to the Computer(s)**

Locate the unconnected end of the Ethernet cable that you just connected to the Prestige 941 and connect this end to the Ethernet port on the personal computer.

### **Step 5. Connecting the Power Adapter to your Prestige**

Connect the power adapter to the port labeled **POWER** on the rear panel of your Prestige.

### **Step 6. Cable Modem Initialization**

Power on the Prestige 941 cable modem. It will initialize the system and start to connect with Headend CMTS. After the RDY light becomes solid, the P941 is ready to transfer data traffic.

**Note: For P941 Cable Modem, you need not connect the console port to the PC. No configuration is required on your part through the console port. You can plug and play.**

## **2.4 Configuration Overview**

The Prestige 941 cable modem is configured automatically using a configuration file generated by the cable modem operator and delivered by the cable headend. The headend provides a path to the Prestige 941 cable modem for both the DHCP server and PC address assignment.

The personal computer(s) connected the cable modem must be configured for Internet Protocol (IP). In addition, your cable service provider must have a correctly configured Dynamic Hierarchical Control Protocol (DHCP) server and EIA downstream channel. Using DHCP, headend assigns an IP address to your cable modem each time you connect to the network. The IP address identifies the computer on the network and enables the headend to route data to and from your computer.

When the cable modem is installed, the connected computer is configured for IP and has DHCP services enabled, and communication to the headend is established, the headend downloads configuration information to the cable modem. The initial configuration connection to the headend can take several minutes.

## **2.5 Additional Installation Requirements**

In addition to the contents of your package, there are other hardware and software requirements you need before you can install and use your Prestige. These requirements include:

1. A computer with an Ethernet NIC (Network Interface Card) installed.
2. An ISP account.

After the Prestige is properly set up, you can make future changes to the configuration through telnet connections.

## **2.6 Stacking ZyXEL Cable Modems**

Your Prestige has legs that fit together for sturdy stacking. You should not stack more than four cable modems for maximum stack stability.

## **2.7 Power On Your Prestige**

At this point, you should have connected the console port, the LAN port, the cable port and the power port to the appropriate devices or lines. Plug the power adapter into a wall outlet.

When connected and powered on, the cable modem executes an automatic installation procedure:

1. Scans and locks on to the service provider's downstream frequency.
2. Obtains timing, signal, power level, authentication, addressing, and other operational parameters from the CATV CMTS/headend.
3. Downloads its configuration file and is then operational.

During the initialization:

1. The Power LED should be on. The SYS LED will come on after the system tests are complete and then stays on when the automatic installation procedure is complete.
2. The CABLE LED will be flashing for 2 seconds on/off cyclic duration while scanning downstream channel and then with 1 second on/off cyclic duration when it has locked on to downstream channel and is communicating with headend CMTS. Once the cable connection is complete it will remain ON.
3. The DATA LED will be flashing when the cable downstream, cable upstream or LAN is receiving and transmitting data. It will OFF when the connection is idle.
4. The LAN10M LED or LAN100M LED (depending on the Ethernet Speed connected) will be ON if Ethernet link is successful and flashing while sending/receiving.

# Chapter 3

## Troubleshooting

This chapter covers the potential problems you may run into and the possible remedies. After each problem description, some instructions are provided to help you to diagnose and to solve the problem.

### 3.1 Problems Starting Up the Prestige

**Table 3-1 Troubleshooting the Start-Up of your Prestige 941**

| <b>Problem</b>   | <b>Corrective Action</b>   |
|--|--|
| None of the LEDs are on when you power on the Prestige | Check the connection between the AC adapter and the Prestige.<br><br>If the error persists, you may have a hardware problem. In this case, you should contact technical support. |

### 3.2 Problems with the Coaxial Cable

**Table 3-2 Troubleshooting the Coaxial Cable**

| <b>Problem</b>   | <b>Corrective Action</b>  |
|--|---|
| CABLE LED is always flashing (Can't lock on to downstream channel) | Check the conditions of coaxial cable connected to the back cable modem and the quality of the cable tap. If not, improve connection condition and cable tap quality.<br><br>Check with your cable operator to see if your account has been activated for registration. |

### 3.3 Problems with the LAN Interface

**Table 3-4 Troubleshooting the LAN Interface**

| <b>Problem</b>                        | <b>Corrective Action</b>   |
|---------------------------------------|--|
| Both 10M and 100M LAN LED are off     | <p>Check the 10M/100M LEDs on the front panel. One of these LEDs should be on. If they are both off, check the cables between your Prestige and Hub or the CPE.</p> <p>For CPE connection, a straight RJ45 Ethernet cable should be used. For Hub connection, a cross-over cable should be used.</p> |
| Can not get connected to the Internet | <p>Check with your service provider to see if your account has been activated.</p> <p>Check if your PC's network configuration is correct. For dynamic IP address assignment, you have to activate your PC's DHCP client. And, you might need to assign the DNS server address.</p>                  |



# Appendix A

## Acronyms and Abbreviations

|        |   |
|--------|---|
| CATV   | Cable TV  |
| CM     | Cable Modem                                     |
| CMTS   | Cable Modem Termination System                  |
| CPE    | Customer Premises Equipment                     |
| DB     | Decibel   |
| DCE    | Data Communications Equipment                   |
| DES    | Data Encryption Standard                        |
| DHCP   | Dynamic Host Configuration Protocol             |
| DOCSIS | Data Over Cable Service Interface Specification |
| DNS    | Domain Name System                              |
| DTE    | Data Terminal Equipment                         |
| FEC    | Forward Error Correction                        |
| FTP    | File Transfer Protocol                          |
| HFC    | Hybrid Fiber/Coaxial                            |
| HTTP   | Hyper Text Transfer Protocol                    |
| IANA   | Internet Assigned Number Authority              |
| ICMP   | Internet Control Message Protocol               |
| IGMP   | Internet Group Management Protocol              |
| IP     | Internet Protocol                               |
| ISDN   | Integrated Services Digital Network             |
| ISP    | Internet Service Provider                       |

|       |   |
|-------|---|
| LAN   | Local Area Network                            |
| MAC   | Media Access Control                          |
| Mbps  | Megabits per second                           |
| MCNS  | Multimedia Cable Network System Partners Ltd. |
| MHz   | Megahertz                                     |
| NIC   | Network Interface Card                        |
| QAM   | Quadrature Amplitude Modulation               |
| QPSK  | Quaternary Phase Shift Keying                 |
| RF    | Radio Frequency                               |
| SNMP  | Simple Network Management Protocol            |
| SOHO  | Small Office / Home Office                    |
| TFTP  | Trivial File Transfer Protocol                |
| TCP   | Transmission Control Protocol                 |
| UDP   | User Datagram Protocol                        |
| UTP   | Unshielded Twisted Pair (cable)               |
| WAN   | Wide Area Network                             |
| ZyNOS | ZyXEL Network Operating System                |

