

Omni 56K Plus Series

DATA/FAX Modem

User's Guide

Version 1.0.0

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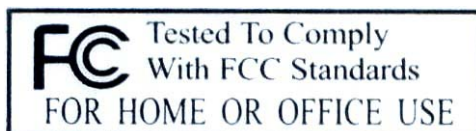
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Notice 1

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Please have the following information ready when you contact customer support.

- Product model and serial number.
- Warranty Information.
- Date that you received your device.
- Brief description of the problem and the steps you took to solve it.

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¹ “+” is the (prefix) number you enter to make an international telephone call.

Table of Contents

| | |
|--|------------|
| Copyright..... | ii |
| Federal Communications Commission (FCC) Interference Statement | iii |
| ZyXEL Limited Warranty | iv |
| Customer Support..... | v |
| Table of Contents | vi |
| List of Tables | vii |
| Preface..... | viii |
| Chapter 1 Introduction..... | 1-1 |
| 1.1 ZyXEL Omni 56K Plus modem Overview | 1-1 |
| 1.2 Main Features | 1-1 |
| Chapter 2 Specifications and Function Description | 2-1 |
| 2.1 Hardware Specifications..... | 2-1 |
| 2.2 Firmware Specifications | 2-1 |
| 2.3 Protocol Support..... | 2-2 |
| 2.4 Capability | 2-3 |
| 2.5 Data Function | 2-4 |
| 2.6 Fax function..... | 2-10 |
| 2.7 Voice Function | 2-10 |
| Chapter 3 Result Codes | 3-1 |
| Chapter 4 Command Sets..... | 4-1 |
| 4.1 Data command sets..... | 4-1 |
| 4.2 Fax command sets | 4-8 |
| 4.3 Voice AT Commands | 4-16 |
| 4.4 Voice Shielded DTE Commands..... | 4-18 |
| 4.5 Voice Shielded DTE Responses | 4-18 |
| 4.6 S-Register Descriptions | 4-19 |
| Chapter 5 Firmware Upgrade | 5-1 |
| 5.1 Upgrading by Utility..... | 5-1 |
| 5.2 Upgrading by Terminal Emulation Program | 5-2 |
| Index..... | i |

List of Tables

| | |
|---|------|
| Table 2-1 Hardware Specification | 2-1 |
| Table 2-2 Firmware Specification | 2-1 |
| Table 2-3 Feature Description | 2-4 |
| Table 2-4 Physical Layer Capacity | 2-4 |
| Table 2-5 Different Ring Types in Register S40 | 2-8 |
| Table 2-6 Fax Physical Layer Capacity | 2-10 |
| Table 3-1 Result Codes | 3-1 |
| Table 4-1 Basic AT Command Sets | 4-1 |
| Table 4-2 AT Command Sets Requiring an "AT" Prefix | 4-1 |
| Table 4-3 Extended AT& Command Sets | 4-3 |
| Table 4-4 Extended AT* Command Sets | 4-6 |
| Table 4-5 Extended AT# Command Sets | 4-8 |
| Table 4-6 Service Class 1 Commands | 4-8 |
| Table 4-7 The Value of <MOD> Parameters | 4-8 |
| Table 4-8 Command Syntax | 4-9 |
| Table 4-9 Supported Commands (per TIA PN2388 8/20/90)..... | 4-9 |
| Table 4-10 Class 2 Command Responses..... | 4-12 |
| Table 4-11 Service Class 2.0 Commands | 4-13 |
| Table 4-12 Voice AT Commands | 4-16 |
| Table 4-13 Voice Shielded DTE Commands | 4-18 |
| Table 4-14 Voice Shielded DTE Responses | 4-18 |
| Table 4-15 Basic S-Registers "ATS _n =x" | 4-19 |
| Table 4-16 Extended S-Registers "ATS _n =x" | 4-19 |

Preface

About This User's Manual

Congratulations on your purchase of the ZyXEL Omni 56K USB Plus or Omni 56K COM Plus modem.

This manual is designed to provide general information for Omni 56K USB Plus and Omni 56K COM Plus modems and advanced information for technical users who might need them for programming or other applications.

This manual may refer to the Omni 56K USB Plus and/or Omni 56K COM Plus modems as the Omni 56K Plus.

Related Documentation

- Support Disk
Refer to the included CD for support documents.
- Quick Start Guide
The Quick Start Guide is designed to help you quickly learn how to install your Omni 56K USB Plus or Omni 56K COM Plus modem.
- Packing List Card
The Packing List Card lists all items that should have come in the package.
- Certifications
Refer to the product page at www.zyxel.com for information on product certifications.
- ZyXEL Glossary and Web Site
Please refer to www.zyxel.com for an online glossary of networking terms and additional support documentation.

User's Guide Feedback

Help us help you. E-mail all User's Guide-related comments, questions or suggestions for improvement to techwriters@zyxel.com.tw or send regular mail to The Technical Writing Team, ZyXEL Communications Corp., 6 Innovation Road II, Science-Based Industrial Park, Hsinchu, 300, Taiwan. Thank you.

Syntax Conventions

- The version number on the title page is the latest firmware version that is documented in this *User's Guide*. Earlier versions may also be included.
- “Enter” means for you to type one or more characters and press the carriage return. “Select” or “Choose” means for you to use one of the predefined choices.
- The SMT menu titles and labels are in **Bold Times New Roman** font. Command and arrow keys are enclosed in square brackets. [ENTER] means the Enter, or carriage return key; [ESC] means the Escape key and [SPACE BAR] means the Space Bar.
- The choices of a menu item are in **Bold Arial** font.

- Mouse action sequences are denoted using a comma. For example, “click the Apple icon, **Control Panels** and then **Modem**” means first click the Apple icon, then point your mouse pointer to **Control Panels** and then click **Modem**.
- 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.

Chapter 1

Introduction

This chapter introduces you to the features and specifications for the ZyXEL Omni 56K USB Plus and Omni 56K COM Plus modems.

1.1 ZyXEL Omni 56K Plus modem Overview

The Omni 56K USB Plus or Omni 56K COM Plus is an analog Data/Fax modem used for Internet access via PSTN line. Models included in this series at the time of writing are the Omni 56K COM Plus and the Omni 56K USB Plus. The difference between these two models is: the Omni 56K COM Plus uses RS-232 Com port interface and the Omni 56K USB Plus uses Universal Serial Bus (USB) connection to a computer. Users can connect the cables without turning off the computer which makes it simple to install the modem. It can run upstream and downstream maximum rates of 56Kbps. The rate selection depends on the line quality, and server side configuration.

1.2 Main Features

- ZyXEL fifth generation data pump with V.92 capability.
- V.92 56K up/down-stream data transmission.
- Fast retrain with auto fall-forward and fall-back.
- Automatic Data/Fax call detection.
- G3 14.4Kbps Fax send/receive.
- Support Fax class 1, class 2 and class 2.0 command set.
- Handset voice record and play.
- Voice digitization and compression.
- Voice record via IS101 Command Set
- Error correction & data compression.
- Microsoft 95/98//98SEMe/2000/XP Windows plug and play compatible (Omni 56K COM Plus only).
- Microsoft 98SE/Me/2000/XP Windows USB plug and play compatible (Omni 56K USB Plus only).
- Flash EPROM upgradeable.

Chapter 2

Specifications and Function Description

This chapter introduces the specifications and functions of the Omni 56K Plus. This chapter and the next three chapters are designed for advanced users who might need more information about the Omni 56K Plus modem's specifications and functions when programming or other applications.

2.1 Hardware Specifications

Table 2-1 Hardware Specification

| ITEM | SPECIFICATION DESCRIPTION |
|------------------------|---|
| Power Requirements | 9V AC (Omni 56K COM Plus only) |
| Operating Requirements | Temperature: 0° C to 40° C Humidity: 20 to 90 % (non-condensing) |
| Weight | Omni 56K COM Plus: 194.6 g Omni 56K USB Plus: 170.4 g |
| Dimensions | 112.5 mm (W) x 29 mm (H) x 106 mm (L) |

2.2 Firmware Specifications

Table 2-2 Firmware Specification

| | |
|-------------------------------------|---|
| Physical layer for data mode | Multi-Auto V.92 V.90 V.34bis 33.6 Kbps to 2.4 Kbps V.34 28.8 Kbps to 2.4 Kbps V.32bis 14.4/12/9.6/7.2/4.8 Kbps V.32 9.6/4.8 Kbps V.23 1200/600/75 bps V.22bis 2.4 Kbps V.22/Bell 212A 1.2K bps V.21/Bell 103 300 bps Auto Fallback/Forward |
|-------------------------------------|---|

Table 2-2 Firmware Specification

| | |
|---------------------|--|
| Link layer | MNP 3-4 MNP 5 V42 V42bis V.44 |
| Flow Control | Hardware flow control: RTS/CTS Software flow control: XON/XOFF |
| Command set | Full AT command set Dialing type: DTMF/Pulse |
| Diagnostics | Power-on self-test Analog loop-back test Analog loop-back with self-test Local digital loop-back test Remote digital loop-back test Remote digital loop-back with self-test |
| Fax | V.17 FAX (send and receive) V.29 G3 FAX (send and receive) V.27ter G3 FAX (send and receive) EIA Class 1 Command Set EIA Class 2 Command Set EIA Class 2.0 Command Set |
| Voice | 4 bits / sample ADPCM, 9600 samples / second. On-line voice playback and recording. IS-101 voice command set. |

2.3 Protocol Support

■ Data Physical Layer

- ITU-T V.92
- ITU-T V.90
- ITU-T V.34bis/V.34
- ITU-T V.32bis/V.32
- ITU-T V.22bis/V.22
- ITU-T V.21
- ITU-T V.23
- Bell 212A
- Bell 103

■ Fax Physical Layer

- ITU-T V.17
- ITU-T V.29
- ITU-T V.27ter
- ITU-T V.21
- Error Control and Data Compression
 - ITU-T V.44
 - ITU-T V.42
 - ITU-T V.42bis
 - MNP3-5
- Command Set
 - Standard command set
 - EIA Class 1 Fax Command set
 - EIA Class 2 Fax Command set
 - EIA Class 2.0 Fax Command set
 - Basic AT Command set
 - ZyXEL AT Command set
 - Extended AT& Command Set
 - Extended AT* Command Set
 - Extended AT# Command Set
 - IS101 Voice Command set

For more information on detailed command sets, please refer to *Chapter 4*.

2.4 Capability

The data/fax/voice feature of the Omni 56K Plus is described as below.

Table 2-3 Feature Description

| FEATURE | DESCRIPTION |
|---------|---|
| Data | 2W Dial-Up Line Multi-auto/ V.92/V.90/V.34/V.32bis/V.32/V.22bis/V.22/V.21/Bell 103 Hardware/Software Flow Control Error Control/Data Compression ZyXEL AT Command Set External Plug and Play for Windows 95/98/98SE/Me/2000/XP in RS232 mode External Plug and Play for Windows 98SE/Me/2000/XP in USB mode Repeat Dial/Cyclic Dial Caller ID Distinctive Ring AT Protection for software application |
| Fax | V.17/V.29/V.27ter G3 T.30 Protocol EIA Class 1/Class 2/Class 2.0 command set |
| Voice | 4 bit IMA ADPCM Remote Recording on PC storage Play and record voice via the attached telephone set. IS-101 Command Set |

2.5 Data Function

2.5.1 Physical Layer Capability

The Omni 56K Plus is a high performance universal modem capable of transmission speed up to 56/48 Kbps full-duplex on a 2-wire dial-up line. Universal compatibility covers a broad range of ITU-T and BELL standards.

Table 2-4 Physical Layer Capacity

| STANDARD | BIT RATE [BPS] | BAUD RATE [BAUD] | MODULATION | CARRIER FREQUENCY [HZ] |
|----------------------|----------------|------------------|------------|------------------------|
| V.90 | 28000-56000 | 8000 | PCM | 0 |
| V.92 (upstream) | 24000-48000 | 8000 | PCM | 0 |
| V.92 (downstream) | 24000-56000 | 8000 | PCM | 0 |
| V.34bis/V.34 | 2400-33600 | multiple | TCM | multiple |
| V.32bis | 14400 | 2400 | 128-TCM | 1800 |
| V.32bis | 12000 | 2400 | 64-TCM | 1800 |
| V.32bis | 7200 | 2400 | 16-TCM | 1800 |
| V.32 | 9600 | 2400 | 32-TCM | 1800 |

Table 2-4 Physical Layer Capacity

| STANDARD | BIT RATE [BPS] | BAUD RATE [BAUD] | MODULATION | CARRIER FREQUENCY [HZ] |
|---------------------|----------------|------------------|------------|------------------------|
| V.32 uncoded | 9600 | 2400 | 16-QAM | 1800 |
| V.32 | 4800 | 2400 | 4-DPSK | 1800 |
| V.23 | 1200/75 | 1200/75 | FSK | |
| V.23 | 600/75 | 600/75 | FSK | |
| V.22bis | 2400 | 600 | 16-QAM | 1200 Call 2400 Ans |
| V.22 (BELL 212A) | 1200 | 600 | 4-DPSK | 1200 Call 2400 Ans |
| V.21 | 300 | 300 | FSK | |
| BELL 103 | 300 | 300 | FSK | |

2.5.2 Flow Control

This feature refers to stopping and restarting the flow of data into and out of the modem's transmission and receiving data buffers. Flow control is necessary so that a device does not receive more data than it can handle. The Omni 56K Plus provide two kinds of flow control methods.

2.5.3 Hardware CTS/RTS Flow Control

This is a bi-directional flow control where CTS and RTS are RS-232 signals which must be available on your computer. When the modem's transmission buffer is almost full, the modem will drop CTS to signal the DTE that it cannot accept data any more. Turn on the CTS to notify the DTE that it can keep sending data to the modem. On the computer software side, when the receiving buffer of the software is almost full, it will drop RTS to signal the modem to stop sending data to the DTE. Turn on the RTS and the modem will start sending data again to the DTE.

2.5.4 Software XON/XOFF Flow Control

This is a bi-directional flow control. XON and XOFF character defaults are decimals 17 and 19. These can be changed by modifying the S-Registers S31 and S32. Both the modem and the DTE will treat XOFF as a signal to stop transmitting data and will treat XON as a signal to restart sending data. Modems will not send these characters received from the local DTE to the remote modem.

2.5.5 Error Control

Error control keeps the modem data link error-free by detecting and re-transmitting erroneous data. The Omni 56K Plus modems support both MNP and V.42 error control protocols. The MNP protocol was an industry standard developed and licensed by Microcom, Inc. Omni 56K Plus modems support level 4 and 3 error control protocols, commonly denoted as MNP4 and MNP3.

V42 is a developed standard by CCITT. V.42 supports both LAPM and MNP4. A V.42 handshaking will try an LAPM connection first, and if not successful, it will try MNP4. The maximum data block size used in the Omni 56K Plus modem is 256 bytes.

2.5.6 Data Compression

In the modem, the data compression is activated in an attempt to reduce the number of bits actually sent. The receiving modem applies these techniques in reverse to recover the actual data from the compressed data stream.

Omni 56K Plus modems support V.44, V.42bis and MNP5 data compression protocols. Data compression needs an error-free data link to work correctly, otherwise the corrupted compressed data stream will ruin the decompression process. MNP5 is used with MNP4 error control. V.44 and V.42bis is used with V.42 error control. The compression efficiency of V.42bis is generally higher than that of MNP5. In some cases, V.42bis can be 50 % to 100% higher and in other cases it is just slightly higher. In general, it is about 50 % more efficient.

2.5.7 Repeat Dial

The modem will dial the default number stored in non-volatile RAM, EEPROM , repeatedly if not connected.(s38.0=1,*Dn)

2.5.8 Cyclic Dial

Dial the number stored in EEPROM at location n(0-3) if cyclic dial s44.3=1 is set.

If the first dial is not successful, the modem will cycle dial through the four numbers stored in memory.

2.5.9 Caller Number Delivery (Caller ID)

Caller Number Delivery (CND), commonly called **Caller ID**, is a new kind of phone service that may be offered by your local phone company. Check your phone company for availability. You must subscribe to it and usually pay an additional monthly service charge for this service.

With CND service, the phone company's central office will send the coded caller information to the called station. This information is sent once between the first and second ring. Your modem can decode this caller information and present it to the connected computer/terminal during the second ring period as part of the call progress ring message. The modem will also report the Caller ID information if asked by the command **AT*T**.

There are two kinds of caller information message formats sent by the phone company.

One is the single message format which includes date, time, and caller ID

The other is the multiple message format which also includes the caller name as registered with the phone company.

The command **ATS40.2=n** is used to enable (**n=1**) or disable (**n=0**) the Caller ID detection function. The default is disabled. Enable it only when you have this service and want to enable its detection.



The Caller ID message may cause some communication software that is not expecting it to become confused. If you plan to use the Caller ID feature, be sure you are using software that supports it.

In single message format, the modem will send a ring message to the terminal as follows:

RING

TIME: <MM-DD hh:mm>

CALLER NUMBER: <CALLER_ID> or CALLER NAME:<CALLER_NM>

RING

MM is the two-digit month message, DD is the two-digit date message, hh is the hour and mm is the minute of the time, and CALLER_ID is the phone number of the caller or CALLER_NM his/her name.

The following is an example of a caller ID message as it might appear on your screen:

RING

TIME: 04-28 12:30

CALLER NUMBER: 7135551414 or CALLER NAME: Brent Harper

RING

In the multiple message format, if the caller's number and name are available, the ring message will display both:

RING

TIME: MM-DD hh:mm

CALLER NUMBER: <Caller_ID>

CALLER NAME: <Caller_Name>

RING

Here is an example:

RING

TIME: 04-28 12:30

CALLER NUMBER: 7135551414

CALLER NAME: Tracy Huang

RING

If the caller number and name are not available, the ring message will appear as follows:

RING

TIME: 04-28 12:30

REASON FOR NO NUMBER: OUT_OF_AREA

REASON FOR NO NAME: PRIVACY

RING

The last CND message that the modem received can be displayed by using the AT*T command.

Setting **S48.0=1** will cause the modem to report CND information in its ASCII coded hexadecimal raw data format. The DTE software is responsible for explaining the data.



Please refer to the Bellcore Technical Advisory document TR-NWT-000030 for the exact data format. The above Caller ID scheme applies to the North America area. Different countries may employ different Caller ID schemes, check if the scheme used in your country is supported before using the Caller ID feature. For most other Caller ID schemes, only the Caller telephone number is provided.

2.5.10 Distinctive Ring

Distinctive Ring is a phone service that may be offered by your phone company. Check your phone company for availability. With this service, you can have several phone numbers assigned to the same phone line. The phone company will send a different type of ring signal for each phone number being called. The subscriber can distinguish which number is called by which type of ring is received.

One benefit of this feature is the ability to have three numbers on the same line allowing you to list the three numbers for voice, data, and fax, respectively. You can then have your fax machine answer only the ring corresponding to the fax number and have your modem answer only the ring corresponding to the data number. A voice call will not be answered by either fax machine or data modem and it will only be answered when someone picks up the phone. You can also have the answering machine answer only the voice ring. A more complicated use is that you can have one number for multiple uses, such as one number for both data and fax.

A ring signal is a composition of repeated on and off states. Different types of rings usually correspond to different compositions of the "on" part (cadence) of the ring. Your modem can distinguish up to four types of ring signals and can be commanded to answer or not answer any one of these four types of ring signals. Following is a list of these four types of ring signals. These are the ring types used in the USA. The difference among the ring types is the two-second ON part of the ring signal. It comprises a long, double short, or triple short ring.

S-register **S40 bits 3-6** are used for distinctive ring control. Each bit controls the answering of a particular ring type. Setting a bit to "1" enables answering, setting it to "0" rejects the ring. Note that the ring may still be heard even if it is not counted as an accepted ring by the modem.

The control relationships between bits 3-6 in register S40 and the different ring types are:

Table 2-5 Different Ring Types in Register S40

| TYPE | BIT (ON) | RING SEQUENCE |
|------|----------|---|
| 1 | 3 | 1.2s or 2s on; 4s off |
| 2 | 4 | 0.8s on, 0.4s off, 0.8s on; 4s off |
| 3 | 5 | 0.4s on, 0.2s off, 0.4s on, 0.2s off, 0.8s on; 4s off |
| 4 | 6 | 0.3s on, 0.2s off, 1s on, 0.2s off, 0.3s on; 4s off |

2.5.11 Security Function

The Omni 56K Plus modem provides a security function, that (when enabled) prevents an unauthorized user from making a connection. Two types of security function are provided. Type 1

security is used when the remote modem is also a ZyXEL modem; type 2 security is used when the remote modem is any other brand of modem.

With the type 1 connection, the dial-in (remote) modem will send in its supervisor password for checking at the initial connection handshake, and the local modem will check this password against its pre-stored acceptable password list. With a type 2 connection, the remote terminal will be prompted to enter the password at the initial connection and the local modem will do the password checking.

Two levels of security are provided. With level 1 security, the local modem will maintain the connection if the password check is OK, otherwise the line will be disconnected. With level 2 security, the local modem will disconnect the line if the password has been found in its pre-stored acceptable list and then will dial back the phone number corresponding to the dial-in password. The line will be simply disconnected if the password does not march.

4 user passwords may be defined. The corresponding 4 dial-back numbers are the modem's 4 stored phone numbers. Any character (ASCII 0-127) can be used in the password, the maximum password length is 8 characters.

The security functions are only accessible through AT commands in terminal mode. Any access attempt will result in the modem's prompting to enter the supervisor password. The attempt will be rejected if the entered password is not correct. The default supervisor password is ZyXEL when the modem is shipped from the factory. This supervisor password is also the password sent for automatic password checking in a type 1 connection. To modify the supervisor password, use

AT*HS

You will be asked for the original password and a new password and then to re-enter the new password for verification. For example:

PASSWORD (Enter supervisor password)

PASSWORD (Enter new supervisor password)

Verify (Enter the new supervisor password again)

OK

The command AT*Hn will modify the nth user password and the supervisor password on the screen for viewing. Again, you will be prompted to enter the supervisor password first.

The commands below will enable different types and levels of security:

| CODE | DESCRIPTION |
|------|--|
| *G0 | Disable security function (Default). |
| *G1 | Enable type 1 security with password check. (ZyXEL to ZyXEL only) |
| *G2 | Enable type 1 security with password check and call-back (ZyXEL to ZyXEL only) |
| *G3 | Enable type 2 security with password check. |
| *G4 | Enable type 2 security with password check and call-back. |
| *G5 | Enable type 2 security with password check and call-back, remote site enters the call-back number. |



Before the security type or level can be changed, the modem requires the supervisor password.

For type2 security, the remote site will be prompted to enter the user password. A maximum of 3 tries in 40 seconds is allowed. If a correct password is not entered within this time limit, the line will be disconnected. If the remote site is to enter the call-back number, it will be prompted to do so.

2.6 Fax function

2.6.1 Fax Physical Layer Protocol

Table 2-6 Fax Physical Layer Capacity

| STANDARD | BIT RATE [BPS] | BAUD RATE [BAUD] | MODULATION | CARRIER FREQUENCY [HZ] |
|----------|----------------|------------------|------------|------------------------|
| V.17 | 14400-7200 | 2400 | TCM | 1800 |
| V.29 | 9600-4800 | 2400 | QAM/DPSK | 1700 |
| V.27ter | 4800-2400 | 1600/1200 | PSK/DPSK | 1800 |
| V.21 | 300 | 300 | FSK | |

2.6.2 EIA Class 1/Class 2/Class 2.0 Command Set

Please refer to Fax Command Set in *Chapter 4*.

2.6.3 ITU-T T.30 Fax Protocol

The ITU-T T.30 fax protocol is known as the G3 fax handshake signals and procedures. The modem takes full control of this protocol - initiating and terminating fax calls, managing the communication session, and transporting the image data. Therefore, the modem relieves the computer fax software of the T.30 protocol handling.

Your modem allows for fax speeds up to 14400 bps when transmitting to a fax machine which complies with the V.17 fax standard. Speeds will fall back to 12000, 9600, or 7200 bps in poor line conditions. When connecting to a G3 fax device, your modem allows for fax speeds up to 9600 bps and will automatically fall back to 7200, 4800, and 2400 bps if the line quality is poor.

2.7 Voice Function

Voice capability stands for the modem's ability to digitize incoming voice messages, which the computer stores and forwards. It also means that the modem can playback the recorded digitized voice on line for a message announcement.

2.7.1 Voice IS-101 Command Set

Please refer to the Voice command sets in *Chapter 4*.

2.7.2 4-bit Voice Data Compression

The main issue in the digitized voice mode is the amount of storage required. A relatively simple ADPCM algorithm can reduce the speech data rate to half the rate and maintain about the same voice

quality. This algorithm can also be used to reduce the speech data rate to 1/3 or 1/4 of the original rate, but with voice quality degradation. Only 4-bit ADPCM is used in the Omni 56K Plus.

Chapter 3

Result Codes

A result code is the command response or the connect message to the DTE. The format of the result code is dependent on Xn and Vn command. The result codes are shown in the following table.

Table 3-1 Result Codes

| Result Code for ATV0 | ATV1 | X0 | X1 | X2 | X3 | X4 | X5 | X6 | X7 |
|-------------------------|----------------|----|----|----|----|----|----|----|----|
| 0 | OK | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | CONNECT | 0 | 0 | 0 | 0 | 0 | X | X | X |
| 2 | RING | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | NO CARRIER | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | ERROR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | CONNECT 1200 | | 0 | 0 | 0 | 0 | X | X | X |
| 6 | NO DIAL TONE | | | 0 | | 0 | 0 | 0 | 0 |
| 7 | BUSY | | | | 0 | 0 | 0 | 0 | 0 |
| 8 | NO ANSWER | | | | 0 | 0 | 0 | 0 | 0 |
| 9 | RINGING | | | | 0 | 0 | 0 | 0 | 0 |
| 10 | CONNECT 2400 | | 0 | 0 | 0 | 0 | X | X | X |
| 11 | CONNECT 4800 | | 0 | 0 | 0 | 0 | X | X | X |
| 12 | CONNECT 9600 | | 0 | 0 | 0 | 0 | X | X | X |
| 13 | CONNECT 300 | | 0 | 0 | 0 | 0 | X | X | X |
| 14 | CONNECT 19200 | | 0 | 0 | 0 | 0 | X | X | X |
| 15 | CONNECT 7200 | | 0 | 0 | 0 | 0 | X | X | X |
| 16 | CONNECT 12000 | | 0 | 0 | 0 | 0 | X | X | X |
| 17 | CONNECT 14400 | | 0 | 0 | 0 | 0 | X | X | X |
| 18 | CONNECT 16800 | | 0 | 0 | 0 | 0 | X | X | X |
| 19 | CONNECT 38400 | | 0 | 0 | 0 | 0 | X | | |
| 20 | CONNECT 57600 | | 0 | 0 | 0 | 0 | X | | |
| 21 | CONNECT 76800 | | 0 | 0 | 0 | 0 | X | | |
| 22 | CONNECT 115200 | | 0 | 0 | 0 | 0 | X | | |
| 23 | CONNECT 230400 | | 0 | 0 | 0 | 0 | X | | |
| 24 | CONNECT 460800 | | 0 | 0 | 0 | 0 | X | | |
| 25 | CONNECT 921600 | | 0 | 0 | 0 | 0 | X | | |
| 26 | CONNECT 307200 | | 0 | 0 | 0 | 0 | X | | |
| 27 | CONNECT 153600 | | 0 | 0 | 0 | 0 | X | | |
| 27 | CONNECT 102400 | | 0 | 0 | 0 | 0 | X | | |
| 29 | CONNECT 61440 | | 0 | 0 | 0 | 0 | X | | |
| 30 | CONNECT 51200 | | 0 | 0 | 0 | 0 | X | | |

Table 3-1 Result Codes

| Result Code for ATV0 | ATV1 | X0 | X1 | X2 | X3 | X4 | X5 | X6 | X7 |
|-------------------------|---------------|----|----|----|----|----|----|----|----|
| 31 | CONNECT624000 | 0 | 0 | 0 | 0 | 0 | | | |
| 32 | CONNECT124800 | 0 | 0 | 0 | 0 | 0 | | | |
| 33 | CONNECT 62400 | 0 | 0 | 0 | 0 | X | | | |
| 34 | CONNECT 41600 | 0 | 0 | 0 | 0 | X | | | |
| 35 | CONNECT 31200 | 0 | 0 | 0 | 0 | X | X | X | |
| 36 | CONNECT 24960 | 0 | 0 | 0 | 0 | X | | | |
| 37 | CONNECT 20800 | 0 | 0 | 0 | 0 | X | | | |
| 38 | CONNECT 33600 | 0 | 0 | 0 | 0 | X | X | X | |
| 39 | CONNECT 28800 | 0 | 0 | 0 | 0 | X | X | X | |
| 40 | CONNECT 26400 | 0 | 0 | 0 | 0 | X | X | X | |
| 41 | CONNECT 24000 | 0 | 0 | 0 | 0 | X | X | X | |
| 42 | CONNECT21600 | | | | | | | | |
| 100 | CONNECT 56000 | 0 | 0 | 0 | 0 | X | X | X | |
| 101 | CONNECT 54666 | 0 | 0 | 0 | 0 | X | X | X | |
| 102 | CONNECT 53333 | 0 | 0 | 0 | 0 | X | X | X | |
| 103 | CONNECT 52000 | 0 | 0 | 0 | 0 | X | X | X | |
| 104 | CONNECT 50666 | 0 | 0 | 0 | 0 | X | X | X | |
| 105 | CONNECT 49333 | 0 | 0 | 0 | 0 | X | X | X | |
| 106 | CONNECT 48000 | 0 | 0 | 0 | 0 | X | X | X | |
| 107 | CONNECT 46666 | 0 | 0 | 0 | 0 | X | X | X | |
| 108 | CONNECT 45333 | 0 | 0 | 0 | 0 | X | X | X | |
| 109 | CONNECT 44000 | 0 | 0 | 0 | 0 | X | X | X | |
| 110 | CONNECT 42666 | 0 | 0 | 0 | 0 | X | X | X | |
| 111 | CONNECT 41333 | 0 | 0 | 0 | 0 | X | X | X | |
| 112 | CONNECT 40000 | 0 | 0 | 0 | 0 | X | X | X | |
| 113 | CONNECT 38666 | 0 | 0 | 0 | 0 | X | X | X | |
| 114 | CONNECT 37333 | 0 | 0 | 0 | 0 | X | X | X | |
| 115 | CONNECT 36000 | 0 | 0 | 0 | 0 | X | X | X | |
| 116 | CONNECT 34666 | 0 | 0 | 0 | 0 | X | X | X | |
| 117 | CONNECT 33333 | 0 | 0 | 0 | 0 | X | X | X | |
| 118 | CONNECT 32000 | 0 | 0 | 0 | 0 | X | X | X | |
| 119 | CONNECT 30666 | 0 | 0 | 0 | 0 | X | X | X | |
| 120 | CONNECT 29333 | 0 | 0 | 0 | 0 | X | X | X | |
| 121 | CONNECT 28000 | 0 | 0 | 0 | 0 | X | X | X | |

If error control result codes are enabled (X4, X5, X6, X7), the resulting message will be formatted as:

X4: **CARRIER** Rx Rate.

PROTOCOL: Error Control Level

COMPRESSION: Compression Level

CONNECT DTE Speed

X5: **CONNECT DTE** Speed/Protocol Rx Rate/Error control level

X6: **CONNECT** Rx Rate/ARQ

X7: **CONNECT** Rx Rate/ARQ/Error control level

Where ARQ denotes that **A**utomatic **R**etransmission **r**e**Q**uest type of error control is enabled.

Chapter 4

Command Sets

This chapter lists the command set the Omni 56K Plus supports. These commands include data command sets, fax command sets and voice command sets.

4.1 Data command sets

The basic AT command sets and extended AT& command sets are shown in the following tables.

4.1.1 Basic AT Command Sets

Table 4-1 Basic AT Command Sets

| COMMAND | OPTIONS | FUNCTION & DESCRIPTION | REF. |
|-----------|---------|--|------|
| A/ | | Re-execute the last command once. | |
| A> | | Re-execute the last command once or repeat the last call up to 9 times. (See also S8) | |
| <any key> | | Terminate current connection attempt when entered in handshaking state. | |
| +++ | | Escape sequence code, entered in data state, wait for modem to return to on line command mode. | |

All the Following Commands Require an "AT" Prefix:

Table 4-2 AT Command Sets Requiring an "AT" Prefix

| COMMAND | OPTIONS | FUNCTION & DESCRIPTION | REF. |
|---------|-------------------------|---|-------|
| A | | Go on-line in answer mode. (See also S39.2, S43.6) | |
| Bn | | Handshake option. | S28.7 |
| | B0 * | Select CCITT V.22 for 1200 bps | |
| | B1 | Select Bell 212A for 1200 bps communication. | |
| Ds | | Dial s (numbers and options) that follow (see also S38.0, S35.4). The options of s are listed as follows: | |
| | 0-9, A, B, C, D #, * | Digits for dialing | |
| | P | Pulse dialing | S23.1 |
| | T | Tone dialing | S23.1 |
| | , | Pause for a time specified in S8. Remaining digits will be dialed as in-band DTMF. | |
| | ; | Return to command state after dialing. | |
| | ! | Hook flash | S56 |
| | @ | Wait for a 5 second silence before proceeding , otherwise return NO ANSWER. | |
| | R | Reverse handshake. (go on-line in Answer mode) | S17.5 |

Table 4-2 AT Command Sets Requiring an "AT" Prefix

| COMMAND | OPTIONS | FUNCTION & DESCRIPTION | REF. |
|----------------|--------------|--|---------|
| | W | Wait for the second dial tone. Remaining digits will be dialed as in-band DTMF. | |
| DL | | Dials the last-dialed number. | |
| DS <i>n</i> | n=0-3 | Dial the number stored in non-volatile RAM at location 'n.' | S44.3 |
| En | | Command mode local echo of keyboard commands. | S23.0 |
| | E0 | Echo off | |
| | E1 * | Echo on | |
| H <i>n</i> | | On/off hook control. | |
| | H0 * | Hang up (on-hook) the modem or ISDN, same as 'ATH. | |
| | H1 | Off hook the modem. | |
| In | | Display inquired information. | |
| | I0 | Display numerical product code, same as 'ATI.' | |
| | I1 | Display product information and ROM checksum. | |
| | I2 | Display modem link status report. | |
| | I12 | Display physical layer status. | |
| | I13 | Display channel response for V.34 | |
| L <i>n</i> | n=0-7 4 * | Speaker volume control. The higher the value, the higher the volume. | S24.4-6 |
| M <i>n</i> | | Speaker control | S21.1-2 |
| | M0 | Speaker is always OFF. | |
| | M1 * | Speaker is ON until carrier detected. | |
| | M2 | Speaker is always ON. | |
| | M3 | Speaker is ON after the last digit is dialed out Tone dialing is not heard. | |
| N <i>n</i> | n=0-7 5 * | Ring volume control. 'N0' will disable the audio ring function. | S24.1-3 |
| O | | Return to on-line state. | |
| O1 | | Force modem to request a retrain. | |
| Q <i>n</i> | | Result code displayed. | S23.7 |
| | Q0 * | Modem returns result code. | |
| | Q1 | Modem does not return result code. | |
| | Q2 | Modem returns result code but quiet after answering on a RING. (see also S42.2) | S40.1 |
| Sr.b= <i>n</i> | | Set bit 'b' of S-register 'r' to value 'n'. 'n' is a binary digit '0' or '1' | |
| Sr.b? | | Display value of bit 'b' of S-register 'r' | |
| Sr= <i>n</i> | | Set S-register 'r' to value 'n'. 'n' must be a decimal number between 0 and 255. | |

Table 4-2 AT Command Sets Requiring an "AT" Prefix

| COMMAND | OPTIONS | FUNCTION & DESCRIPTION | REF. |
|---------|--------------|---|---------|
| Sr? | | Display value stored in S-register 'r' | |
| T | | Tone dial | S23.1 |
| UPX | | Download firmware to the Flash EPROM by using Xmodem protocol. | |
| Vn | | Sets display type for Result Codes. | S23.6 |
| | V0 | Display result code in numeric form. (See also S35.7 and the result code table of 'ATXn') | |
| | V1 * | Display result code in verbose form. | |
| Xn | n=0-7 5 * | Result code options, see the Options Table. | S23.3-5 |
| Zn | n=0-2 | Reset modem and set power-on profile. | S15.5-7 |
| | Zn | Reset modem and load user profile n (0-1). | |
| | Z2 | Reset modem and load factory settings. | |
| \$ | | Basic command summary help | |
| &\$ | | Extended 'AT&' command summary help | |
| *\$ | | Extended 'AT*' command summary help | |
| +++ | | Escape sequence code, entered in data state, wait for modem to return to command state. | |

4.1.2 Extended AT& Command Sets

Table 4-3 Extended AT& Command Sets

| COMMAND | OPTIONS | FUNCTION & DESCRIPTION | REF. |
|---------|---------|--|---------|
| &Bn | | Data rate, terminal-to-modem. (DTE/DCE) | S28.6 |
| | &B0 | DTE rate follows connection rate. (See also S44.6) | |
| | &B1 * | DTE/DCE rate fixed at DTE setting (See also S18, S20, and S44.6) | |
| &Cn | | Carrier Detect (CD) options | S21.4 |
| | &C0 | CD always ON (See also S42.7) | |
| | &C1 * | CD tracks presence of carrier (See also S38.3, S42.7) | |
| &Dn | | Data Terminal Ready (DTR) options. (See also S25) | S21.6-7 |
| | &D0 | Ignore DTR signal, assume DTR is always ON. | |
| | &D1 | 108.1, DTR OFF-ON transition causes dial of the default number. (See also 'AT*Dn' and S48.4) | |
| | &D2 * | 108.2, Data Terminal Ready, DTR OFF causes the modem to hang up. | |
| | &D3 | Same as &D2 but DTR OFF causes the modem to hang up and reset from profile 0. | |
| &F | | Load factory settings to RAM as active configuration. | |

Table 4-3 Extended AT& Command Sets

| COMMAND | OPTIONS | FUNCTION & DESCRIPTION | REF. |
|---------|---------|---|---------|
| &Gn | | Guard tone options | S28.4-5 |
| | &G0 * | No guard tone (within USA, Canada). | |
| | &G2 | 1800 Hz guard tone. | |
| &Hn | | Data flow control, DTE/DCE. | S27.3-5 |
| | &H0 | Flow control disabled. | |
| | &H3 * | Hardware (CTS/RTS) flow control. | |
| | &H4 | Software (XON/XOFF) flow control. | |
| &Kn | | Modem error control and data compression. | S27.0-2 |
| | &K0 | No error control.(Same as AT&K) | |
| | &K1 | MNP4 (See also S41.0).(include MNP3) | |
| | &K2 | MNP4+MNP5 (See also S38.5, S41.0). | |
| | &K3 | V.42+MNP4. | |
| | &K4 * | V.42+V.42bis, compatible with &K2 (See also S38.5). | |
| | &K5 | V.42+V.44 | |
| &Nn | | Modem link mode options (DCE/DCE). (See also S43.7, S48.1) | S19 |
| | &N0 * | Multi-Auto, auto negotiate highest possible link rate: V.92, V.90, V.34bis, V.32bis, V.32, V.22bis, V.22 and Bell 212A, G3 Fax V.17/V.29/V.27ter. | |
| | &N3 | V.32 9600T/9600/7200T/4800 | |
| | &N4 | V.32 9600/7200/4800 | |
| | &N5 | V.32 4800 | |
| | &N12 | V.23 1200/75 | |
| | &N13 | V.23 600/75 | |
| | &N14 | V.22bis 2400/1200 | |
| | &N15 | V.22 1200 | |
| | &N16 | V.21 300 | |
| | &N17 | V.32bis 14400/12000/9600/7200/4800 | |
| | &N18 | V.32bis 12000/9600/7200/4800 | |
| | &N19 | V.32bis 7200/4800 | |
| | &N24 | BELL 212A 1200 | |
| | &N25 | BELL 103 300 | |
| | &N60 | V.34 33600 | |
| | &N61 | V.34 31200 | |
| | &N62 | V.34 28800 | |
| | &N63 | V.34 26400 | |
| | &N64 | V.34 24000 | |

Table 4-3 Extended AT& Command Sets

| COMMAND | OPTIONS | FUNCTION & DESCRIPTION | REF. |
|---------|---------|---|-------|
| | &N65 | V.34 21600 | |
| | &N66 | V.34 19200 | |
| | &N67 | V.34 16800 | |
| | &N68 | V.34 14400 | |
| | &N69 | V.34 12000 | |
| | &N70 | V.34 9600 | |
| | &N71 | V.34 7200 | |
| | &N72 | V.34 4800 | |
| | &N73 | V.34 2400 | |
| | &N99 | V.90 28000 | |
| | &N98 | V.90 29333 | |
| | &N97 | V.90 30666 | |
| | &N96 | V.90 32000 | |
| | &N95 | V.90 33333 | |
| | &N94 | V.90 34666 | |
| | &N93 | V.90 36000 | |
| | &N92 | V.90 37333 | |
| | &N91 | V.90 38666 | |
| | &N90 | V.90 40000 | |
| | &N89 | V.90 41333 | |
| | &N88 | V.90 42666 | |
| | &N87 | V.90 44000 | |
| | &N86 | V.90 45333 | |
| | &N85 | V.90 46666 | |
| | &N84 | V.90 48000 | |
| | &N83 | V.90 49333 | |
| | &N82 | V.90 50666 | |
| | &N81 | V.90 52000 | |
| | &N80 | V.90 53333 | |
| | &N79 | V.90 54666 | |
| | &N78 | V.90 56000 | |
| &Pn | | Pulse dial make/break ratio. | S23.2 |
| | &P0 * | make / break=39% / 61% | |
| | &P1 | make / break=33% / 67% | |
| &Rn | | RTS (Request To Send) function selection. | S21.5 |

Table 4-3 Extended AT& Command Sets

| COMMAND | OPTIONS | FUNCTION & DESCRIPTION | REF. |
|---------|---------|--|---------|
| | &R0 | CTS tracks RTS, response delay is set in S26. | |
| | &R1 * | Ignore RTS, assumes RTS always ON. | |
| &Sn | | Data Set Ready (DSR) function selection. | S21.3 |
| | &S0 * | DSR overridden, DSR always ON. | |
| | &S1 | DSR according to CCITT (ITU-TSS). (See also S41.5, S44.4) | |
| &Tn | | Modem testing. | S16 |
| | &T0 | Terminate test in progress. | |
| | &T1 | Initiate Analog Loop-back (ALB) test. | |
| | &T3 | Initiate Local Digital Loop-back (LDL) test. | |
| | &T4 | Grant Remote Digital Loop-back request from remote modem. | S14.1 |
| | &T5 | Deny Remote Digital Loop-back request from remote modem. | S14.1 |
| | &T6 | Initiate Remote Digital Loop-back (RDL) test. | |
| | &T7 | Initiate Remote Digital Loop-back with self test. (RDL+ST) | |
| | &T8 | Initiate Analog Loop-back with self test. (ALB+ST) | |
| &Vn | | View profile settings. | |
| | &V0 | View current active settings. | |
| | &Vn | View the (n-1) user profile settings (n=1-2) | |
| | &V3 | View factory default settings. | |
| &Wn | n=0-1 | Save current settings to user profile n in non-volatile RAM. (See also S35.6) | |
| &Yn | | Break handling. Destructive Break clears the buffer. Expedited Break is sent immediately to the remote system. | S28.2-3 |
| | &Y0 | Destructive, expedited. | |
| | &Y1 * | Nondestructive, expedited. | |
| | &Y2 | Nondestructive, unexpedited. | |
| &Z? | | Display all the phone numbers stored in non-volatile RAM. | |
| &Zn=s | n=0-3 | Store phone number/s to NVRAM at location n (n=0-3) use AT*Dn or ATS29=n to set the default dial pointer. | |

4.1.3 Extended AT* Command Sets

Table 4-4 Extended AT* Command Sets

| COMMAND | OPTIONS | FUNCTION & DESCRIPTION | REF. |
|---------|---------|---|---------|
| *Cn | | Character length, including start, stop and parity bit. | S15.3-4 |
| | *C0 * | 10-bit character length | |
| | *C1 | 11-bit character length | |
| | *C2 | 9-bit character length | |

Table 4-4 Extended AT* Command Sets

| COMMAND | OPTIONS | FUNCTION & DESCRIPTION | REF. |
|---------|---|--|---------|
| | *C3 | 8-bit character length | |
| *Dn | n=0-3 | Set default dial pointer at telephone directory location 'n.' | S29 |
| | *D0 * | (See also S35.4 and S38.0) | |
| *En | | Modem error control negotiation. | S21.0 |
| | *E0 * | if error control negotiation fails, keep the non-error control connection. | |
| | *E1 | If error control negotiation fails, disconnect the call (hang-up). | |
| *Gn | *G0 | Disables security function. (Default) | |
| | *G1 | Enables type 1 security, with password check. | |
| | *G2 | Enables type 1 security, with password check and call back. | |
| | *G3 | Enables type 2 security, with password check. | |
| | *G4 | Enables type 2 security, with password check and call back. | |
| | *G5 | Enables type 2 security, with password check and call back; remote site enters the call-back number. | |
| | *G9 | Reset the supervisor password to "ZyXEL". | |
| | <p>Note:</p> <p>The command *Gn requests supervisor password checking.</p> <p>In security type 1, the remote site must be a ZyXEL modem.</p> <p>In security type 2, the remote site can be any other type of modem.</p> <p>The modem can store 4 (0-3) telephone numbers. If call back security is disabled, the modem will search the password table to check the remote modem's password. If they match, the modem will keep the connection, otherwise the modem will hand up. If call back security is enabled, the modem will complete the password checking. If there is no match, the modem will disconnect the line, otherwise the modem will disconnect the line, find the corresponding phone number and call back immediately. The remote modem should be set to auto-answer the call and response.</p> | | |
| *HS | | Modifies supervisor password. | |
| | Note: The default supervisor password is ZyXEL. | | |
| *Hn | N=0-3 | Modifies the user password table at location 'n.' | |
| *In | | Command set selection | S17.6-7 |
| | *I0 * | AT command set | |
| | *I2 | Dumb mode | |
| *Pn | n=0-15 *Pg * | Set transmission power level; ranges from -8 dBm to -15 dBm. (Default: -11 dBm) | S17.1-4 |
| *Qn | | Action taken when line quality changes. | S27.6-7 |
| | *Q0 | No action to poor signal quality. | |
| | *Q1 | Retrain action taken if signal quality is poor. (See also S41.2) | |
| | *Q2 * | Adaptive rate, automatic fall-back or forward. | |

Table 4-4 Extended AT* Command Sets

| COMMAND | OPTIONS | FUNCTION & DESCRIPTION | REF. |
|---------|---------|--|-------|
| | *Q3 | Disconnect if signal quality is poor. | |
| *T | | Recall the last CND (Caller ID) information. | S40.2 |
| *V | | Views password table. | |

4.1.4 Extended AT# Command Sets

Table 4-5 Extended AT# Command Sets

| COMMAND | OPTIONS | FUNCTION & DESCRIPTION | REF. |
|---------|---------|--|------|
| #En | | Modem status in escape state | |
| | #E0 | Disable the report of modem status in escape state | |
| | #E1 | Enable the report of modem status in escape state | |

4.2 Fax command sets

4.2.1 Service Class 1 Commands

Table 4-6 Service Class 1 Commands

| COMMAND | DESCRIPTION | VALUE |
|------------|--|--|
| +FCLASS=n | Service Class Identification and Control | n=0:Sets to modem mode n=1:Sets to Class 1 mode n=2.0:Sets to Class 2.0 mode n=8:Sets to Voice mode |
| +FTS=n | Stop Transmission and pauses | n=0-255 in 10 ms units. |
| +FRS=n | Wait for Silence | n=0-255 in 10 ms units. |
| +FTM=<MOD> | Transmit Data with <MOD> Carrier | See table 16 |
| +FRM=<MOD> | Receive Data with <MOD> Carrier | See table 16 |
| +FTH=n | Transmit HDLC Data with <MOD>=3 Carrier | n=3 |
| +FRH=n | Receive HDLC Data with <MOD>=3 Carrier | n=3 |

The value of <MOD> parameters lists as below:

Table 4-7 The Value of <MOD> Parameters

| VALUE | MODULATION | SPEED |
|-------|------------|-------|
| 3 | V.21 ch 2 | 300 |
| 24 | V.27ter | 2400 |
| 48 | V.27ter | 4800 |
| 72 | V.29 | 7200 |
| 73 | V.17 | 7200 |

Table 4-7 The Value of <MOD> Parameters

| VALUE | MODULATION | SPEED |
|-------|------------------|-------|
| 74 | V.17 short train | 7200 |
| 96 | V.29 | 9600 |
| 97 | V.17 | 9600 |
| 98 | V.17 short train | 9600 |
| 121 | V.17 | 12000 |
| 122 | V.17 short train | 12000 |
| 145 | V.17 | 14400 |
| 146 | V.17 short train | 14400 |

4.2.2 Service Class 2 Commands

The following Class 2 commands are supported and implemented as per TIA PN2388 (8/20/90):

Table 4-8 Command Syntax

| COMMAND SYNTAX | DESCRIPTION |
|--------------------|---------------------------------------|
| +<command>=<value> | Execute a command or set a parameter. |
| +<command>=? | Read permissible settings. |
| +<command>? | Read current setting. |

Table 4-9 Supported Commands (per TIA PN2388 8/20/90)

| COMMAND | DESCRIPTION | VALUE |
|-------------------|--|-------|
| +FAA= <i>n</i> | Auto-answer mode parameter: | |
| | Answer as set by +FCLASS. | n=0 |
| | DCE answers and auto-determines type. | n=1 |
| +FBADLIN= <value> | Bad line threshold (number of consecutive bad lines for a bad page parameter): Determine if Copy Quality OK on the T.30 flow chart. <value>=0 to 255; a value of 0 implies that error checking is disabled. | 0-255 |
| +FBOR= <i>n</i> | Phase C data bit order: | |
| | Select direct bit order. | n=0 |
| | Select reversed bit order in receiving mode for phase C data. | n=1 |
| +FBUF? | Buffer size; read only parameter: Allow DTE to determine the characteristics of the DCE's buffer size. | |
| +FCIG="string" | Local fax station ID string, for polling Rx. | |
| +FCLASS= <i>n</i> | Service class selection: Refer to +FCLASS Class 1 command in previous section. | |
| +FCON | DCE responds fax connection. | |
| +FCQ= <i>n</i> | Copy quality check capability parameter | |
| | No copy quality check capability. | n=0 |

Table 4-9 Supported Commands (per TIA PN2388 8/20/90)

| COMMAND | DESCRIPTION | VALUE |
|--|--|-------|
| | Only check 1D phase C data. | n=1 |
| | Check both 1D and 2D phase C data. | n=2 |
| +FCR= <i>n</i> | "Capability to receive" parameter | |
| | DCE will not receive message data or poll a remote device. | n=0 |
| | DCE receives message data or polls a remote device. | n=1 |
| +FDCC= <i>vr,br,wd,ln,d f,ec,bf,st</i> | DCE capabilities parameters. | |
| | Vertical resolution: Normal; 98 lpi. | vr=0 |
| | Vertical resolution: Fine; 196 lpi. | vr=1 |
| | Bit rate: 2400 bit/s; V.27ter. | br=0 |
| | Bit rate: 4800 bit/s; V.27ter. | br=1 |
| | Bit rate: 7200 bit/s; V.29 or V.17. | br=2 |
| | Bit rate: 9600 bit/s; V.29 or V.17. | br=3 |
| | Bit rate: 12000 bit/s; V.17. | br=4 |
| | Bit rate: 14400 bit/s; V.17. | br=5 |
| | Page width: 1728 pixels in 215mm. | wd=0 |
| | Page width: 2048 pixels in 255mm. | wd=1 |
| | Page width: 2432 pixels in 303mm. | wd=2 |
| | Page length: A4; 297mm. | ln=0 |
| | Page length: B4; 364mm. | ln=1 |
| | Page length: unlimited length. | ln=2 |
| | Data compression format: 1-D; modified Huffman. | df=0 |
| | Data compression format: 2-D; modified Read. | df=1 |
| | Error correction disabled. | ec=0 |
| | Disable binary file transfer. | bf=0 |
| | Minimum scan time/line: 0 ms. | st=0 |
| | Minimum scan time/line: 5 ms. | st=1 |
| | Minimum scan time/line:10 ms (normal); 5 ms (fine). | st=2 |
| | Minimum scan time/line:10 ms. | st=3 |
| | Minimum scan time/line:20 ms (normal); 10ms (fine). | st=4 |
| | Minimum scan time/line:20 ms. | st=5 |
| | Minimum scan time/line:40 ms (normal); 20ms (fine). | st=6 |
| | Minimum scan time/line:40 ms. | st=7 |
| +FDCS= <i>vr,br,wd,ln,d f,ec,bf,st</i> | Current session parameter; refer to +FDCC command. | |
| +FDIS= <i>vr,br,wd,ln,df, ec,bf,st</i> | Current session negotiation parameter; refer to +FDCC command. | |

Table 4-9 Supported Commands (per TIA PN2388 8/20/90)

| COMMAND | DESCRIPTION | VALUE |
|---------------------|--|-------|
| +FDR | Receive phase C data command; initiates document reception. | |
| +FDT=df,vr,wd, ln | Transmit phase C data command: release the DCE to proceed with negotiation. | |
| +FET=n | End of page or document command: | |
| | More pages; same document. | n=0 |
| | End of document; another document follows. | n=1 |
| | No more pages or documents. | n=2 |
| | Procedure interrupt; another page follows. | n=4 |
| | Procedure interrupt; end of document, another document follows. | n=5 |
| | Procedure interrupt; end of document. | n=6 |
| +FK | Regular fax abort command. | |
| +FLID="string" | Local ID string parameter. | |
| +FLO=n | Flow control options: | |
| | No flow control. | n=0 |
| | Set XON/XOFF software flow control. | n=1 |
| | Set CTS/RTS hardware flow control. | n=2 |
| +FLPL=n | Document for polling command: | |
| | The DTE has no document available for polling. | n=0 |
| | Indicate a document available for polling. | n=1 |
| +FMDL? | Request DCE model. | |
| +FMFR? | Request DCE manufacturer. | |
| +FMINSP=n | Minimum phase C speed parameter: | |
| | 2400 bps. | n=0 |
| | 4800 bps. | n=1 |
| | 7200 bps. | n=2 |
| | 9600 bps. | n=3 |
| | 12000 bps. | n=4 |
| | 14400 bps. | n=5 |
| +FPHCTO= <value> | DTE Phase C response time-out: Determine how long the DCE will wait for a command after reaching the end of data when transmitting in Phase C. <value>=0 to 255; 100 ms units. | 0-255 |
| +FPTS=n | Page transfer status | |
| | Received page good. | n=1 |
| | Page bad; retrain requested. | n=2 |
| | Page good; retrain requested. | n=3 |

Table 4-9 Supported Commands (per TIA PN2388 8/20/90)

| COMMAND | DESCRIPTION | VALUE |
|---------|---|-------|
| | Page bad; procedure interrupt requested. | n=4 |
| | Page good; procedure interrupt requested. | n=5 |
| +FREL=n | Phase C received EOL alignment: | |
| | The EOL patterns are bit aligned as received. | n=0 |
| | The last received bits of EOL patterns are byte aligned by the DCE, with necessary zero fill bits inserted. Refer to TIA PN-2388 for details. | n=1 |
| +FREV? | Request the DCE revision identification. | |
| +FSPL=n | "Enable polling" command: | |
| | Disable polling. | n=0 |
| | Enable polling. | n=1 |

All other +F commands are not supported, but the modem will respond OK. In many cases this means "don't care".

Table 4-10 Class 2 Command Responses

| RESPONSE | VALUE | FUNCTION AND DESCRIPTION |
|-------------------------------|-------|--|
| +FCFR | | Confirmation . |
| +FCIG:"string" | | Report remote ID response CIG. |
| +FCON | | Facsimile connection response. |
| +FCSI:"string" | | Report remote ID response CSI. |
| +FDCC:vr,br,wd,ln,df,ec,bf,st | | Report session parameters response; refer to +FDCC=.... command. |
| +FDCS:vr,br,wd,ln,df,ec,bf,st | | Report session negotiation parameters response; refer to +FDCC=.... command. |
| +FDTC:vr,br,wd,ln,df,ec,bf,st | | Report remote capabilities response; refer to +FDCC=.... command. |
| +FET:n | | Post page message response; refer to the +FET=n command. |
| +FHNG:n | | Call termination status response. |
| | n=00 | Normal and proper end of connection. |
| | n=10 | Transmit error on phase A hang up code. |
| | n=20 | Transmit error on phase B hang up code. |
| | n=40 | Transmit error on phase C hang up code. |
| | n=50 | Transmit error on phase D hang up code. |
| | n=70 | Receive error on phase B hang up code. |
| | n=90 | Receive error on phase C hang up code. |
| | n=100 | Receive error on phase D hang up code. |
| +FNSC:"HEX string" | | Report the non-standard facilities command frame. |
| +FNSF:"HEX string" | | Report the non-standard facilities frame response. |
| +FNSS:"HEX string" | | Report the non-standard setup frame response. |

Table 4-10 Class 2 Command Responses

| RESPONSE | VALUE | FUNCTION AND DESCRIPTION |
|----------------|-------|--|
| +FPOLL | | Remote polling indication. |
| +FPTS:n | | Receive page transfer status response; refer to +FPTS=n command. |
| +FTSI:"string" | | Report remote ID response TSI. |
| +FVOICE | | Transition to Voice response. |

Class 2 Flow Control

Flow control is necessary to match the DTE-DCE data rate to the line-signaling rate while transmitting or receiving Group 3 (T.4) data. In Class 2 fax mode, both hardware (RTS/CTS) and software (XON/XOFF) flow control are enabled.

4.2.3 Service Class 2.0 Commands**Table 4-11 Service Class 2.0 Commands**

| COMMAND | DESCRIPTION | VALUE |
|------------------------------|--|--|
| ATD | Dial and originate a call | |
| ATA | Answer a call | |
| +FDT | Transmit phase C data command: releases the DCE to proceed with the negotiation. | |
| +FDR | Receive phase C data command: initiates document reception. | |
| +FKS | Terminate a Session, orderly fax abort. | |
| +FIP | Initialize Service Class 2.0 Parameters. | |
| +FCLASS=n | Service Class Identification and Control | n=0,1,2,0,8;refer to the +FCLASS Class 1 command |
| +FMI? | Identify DCE Manufacturer | ZyXEL |
| +FMM? | Identify DCE | Omni 56K Plus |
| +FMR? | Identify DCE Revision | Vx.x |
| +FCC=vr,br,wd,ln,df,ec,bf,st | Establish DCE Capabilities | |
| | Vertical Resolution | vr=0:Normal;98 lpi vr=1:Fine;196 lpi |
| | Bit Rate | br=0:2400 bps br=1:4800 bps br=2:7200 bps br=3:9600 bps br=4:12000 bps br=5:14400 bps |

Table 4-11 Service Class 2.0 Commands

| COMMAND | DESCRIPTION | VALUE |
|------------------------------|--|---|
| | Page Width | wd=0:1728 pixels in 215mm wd=1:2048 pixels in 255mm wd=2:2432 pixels in 303mm |
| | Page Length | ln=0:A4;297mm ln=1:B4;364mm ln=2:unlimited length |
| | Data Compression Format | df=0:1-D df=1:2-D |
| | Error Correction | ec=0:Disable |
| | Binary File Transfer | bf=0:Disable |
| | Minimum Scan Time/Line | st=0:0 ms st=1:5 ms st=2:10 ms (normal); 5 ms (fine) st=3:10 ms st=4:20 ms (normal); 10 ms (fine) st=5:20 ms st=6:40 ms (normal);20 ms (fine) st=7:40 ms |
| +FIS=vr,br,wd,ln,df,ec,bf,st | Current Session negotiating parameters | The same as above |
| +FCS=vr,br,wd,ln,df,ec,bf,st | Current Session Parameters | The same as above |
| +FLI="string" | Local Facsimile station ID String, TSI/CSI | |
| +FPI="string" | Local Facsimile station ID String, CIG | |
| +FLP=n | Indicate Document available for polling | n=0:No document n=1:A document is available |
| +FSP=n | Enable/Disable polling | n=0:Disable n=1:Enable |
| +FNR=rpr,tpr,idr,nsr | Negotiation Reporting Enable | rpr= 0:Receiver parameters are not reported. rpr=1:Receiver parameters are reported. tpr= 0:Transmitter parameters are not reported. tpr=1:Transmitter parameters are reported. idr= 0: ID Strings are not reported. idr=1: ID Strings are reported. nsr= 0:Non-standard frames are not reported. |

Table 4-11 Service Class 2.0 Commands

| COMMAND | DESCRIPTION | VALUE |
|-----------------|--------------------------------|--|
| | | nsr= 1:Non-standard frames are reported. |
| +FIE=n | Procedure Interrupt parameter | n=0:Disable n=1:Enable |
| +FPS=n | Page Transfer Status | n=1:Received page is good. n=2:Page is bad; retrain is requested. n=3:Page is good; retrain is requested. n=4:Page is bad; procedure interrupt is requested. n=5:Page is good; procedure interrupt is requested. |
| +FLO=n | Flow Control Select | n=0:No flow control n=1:Sets XON/ XOFF software flow control n=2:Sets CTS/RTS hardware flow control |
| +FPR=n | Serial Port Rate Control | n=0:Automatic DTE rate detection by the DCE n>0:Serial rate is fixed at the value multiplied by 2400 bps. |
| +FBO=n | Phase C Data Bit Order | n=0:Selects direct bit order n=1:Selects reversed bit order |
| +FEA=n | Phase C Received EOL alignment | n=0:EOL patterns are as received |
| +FCR=n | Capability to Receive | n=0:Not receive message data or poll a remote device. n=1: Receives message data or poll a remote device. |
| +FCQ=<rq>, <tq> | Copy Quality disable/enable | rq= 0:Receive copy quality check is disable. rq=1:Receive copy quality check is enable. tq= 0:Transmit copy quality check is disable. tq=1:Transmit copy quality check is enable. |
| +FRQ=pql,cbl | Receive Quality Thresholds | pql= 0-64h:Specifies the percentage of good lines cbl= 0-ffh:Specifies the maximum tolerable number of consecutive bad lines. |

Table 4-11 Service Class 2.0 Commands

| COMMAND | DESCRIPTION | VALUE |
|---------|-----------------------|--|
| +FAA=n | Adaptive Answer Mode | n=0: Answers as set by +FCLASS n=1: Answers and auto-determines the call type. |
| +FCT=n | Phase C Timeout | n=0-ffh, 1 sec units |
| +FMS=n | Minimum Phase C Speed | n=0: 2400 bps n=1: 4800 bps n=2: 7200 bps n=3: 9600 bps n=4: 12000 bps n=5: 14400 bps |
| +FBS? | Buffer Size | 512,256 |

4.3 Voice AT Commands

Table 4-12 Voice AT Commands

| COMMAND | FUNCTION | OPTION | DEFAULT | DESCRIPTION |
|---------|--------------------------|-----------|----------|--|
| +FLO | Flow control select. | 0,1,2 | 2 | 0: NO flow control. 1: (XON/XOFF) Software flow control. 2: (RTS/CTS) Hardware flow control. |
| +VIP | Initialize parameters. | N/A | N/A | +VSD=15,70 (15*4, 7 second) +VTD=100 (1 second) +VRN=10 (10 second) +VRA=70 (7 second) +VGR=0 (Enable AGC) +VGT=128 +FLO=2 (RTS/CTS) +VIT=70 (7 second) |
| +FCLASS | Voice/data/fax selection | 0,1,2,0,8 | 0 | 0: DATA. 1: CLASS 1 FAX. 2,0: CLASS 2.0 FAX. 8: VOICE. |
| +FMI? | Manufacturer ID. | N/A | ZyXEL | |
| +FMM? | Model ID | N/A | Omni 56K | |
| +FMR? | Revision | N/A | Vx.xx | |
| +VRX | Voice recording | N/A | N/A | Start recording. |

Table 4-12 Voice AT Commands

| COMMAND | FUNCTION | OPTION | DEFAULT | DESCRIPTION |
|------------------|--|--|---------|---|
| +VGR | Set the gain for the received voice sample. | 0 | 0 | 0: Automatic gain control(AGC) |
| +VGT | Set the gain for the transmitted voice sample. | 0-255 | 128 | 0: Silence 1-255: The larger the value, the louder the voice will be. |
| +VLS | Select a voice I/O device. | 0,1, 2 | 0 | 0: The DCE is on hook. Local phone connected to Telco line. 1: The DCE is on-hook and is connected to the local phone. The local phone is also provided with power. The modem can record/play through the local phone set. 2: The DCE is off-hook and is connected to the Telephone line. The local phone is provided with power. The modem can record/play through the local telephone line. |
| +VRA | Ring back goes away timer | 0 – 255 | 70 | 0: turn off the timer 1-255: Defines the period without ringback (after at lease one ringback has been detected) in 100 -ms units. |
| +VRN | Ring back never come timer | 0 – 255 | 10 | 0: turn off the timer 1-255: Defines the period without ringback after dialing in 1 sec unit. |
| +VTX | Voice transmit mode | NA | NA | Switches to voice transmit mode. |
| +VSD | Silence detection | Threshold, Period (0-255), (0-255) | 15,70 | Threshold: 0: Disable silence detection. 1-255: The smaller the value, the more sensitive to the silence detection it will be. Period: 1-255: The required period of silence detection before DCE reporting the silence event. 0: Disable silence detection. Unit: 0.1 second |
| +VSM | Selection of compression method | 4;ZyXEL ADPCM; 4 Bit;(9600) | 4,9600 | IMA 4 bit ADPCM. Sample rate: 9600 |
| +VTS= [x,y,z] | Dual Tone Generation | x: 0-3000 Hz y: 0-3000 Hz z: 0- 1000(10ms) | NA | x: first tone frequency y: second tone frequency z: duration in 10ms unit |
| +VTS= {x,y} | DTMF Tone Generation | x:0-9,*,#, A-D y:0-1000 (10ms) | NA | x: DTMF digits (0-9,*,#, A,B,C,D) y: duration in 10ms unit |

Table 4-12 Voice AT Commands

| COMMAND | FUNCTION | OPTION | DEFAULT | DESCRIPTION |
|-----------------|--|----------------|---------|--|
| +VTS= x,x... | DTMF Tone Generation | x:0-9,*,#, A-D | NA | x: DTMF digits (0-9,*,#, A,B,C,D) Duration:+VTD setting. (in 10ms unit) |
| +VTD | Set default duration of DTMF tone. | 1-255 | 100 | Unit: 0.01 second. |
| +VIT | Inactivity timer. | 0-255 | 70 | Unit: 0.1 second. |

4.4 Voice Shielded DTE Commands

Table 4-13 Voice Shielded DTE Commands

| COMMAND | DESCRIPTION |
|------------|--|
| <DLE>p | Pause, suspend voice data to the output device in playback state. |
| <DLE>r | Resume, resume suspended voice data in playback state. |
| <DLE><ETX> | Terminate voice playback state, switch to online voice command mode after completing remaining data in buffer. |

4.5 Voice Shielded DTE Responses

Table 4-14 Voice Shielded DTE Responses

| RESPONSE CODE | DESCRIPTION |
|--|---|
| <DLE>0 - <DLE>9 <DLE>*, <DLE># <DLE>A-<DLE>D | DTMF digit detected |
| <DLE>a | Answer Tone detected |
| <DLE>b | Busy detected |
| <DLE>c | Calling Tone detected |
| <DLE>d | Dial tone detected |
| <DLE>e | European Data Modem Calling Tone detected |
| <DLE>f | Bell Answer Tone detected |
| <DLE>h | The local handset on hook |
| <DLE>q | Quiet detected |
| <DLE>s | Silence detected |
| <DLE>H | The local handset on hook |
| <DLE>u | Transmission Under run in playback state |
| <DLE><ETX> | End of stream |

4.6 S-Register Descriptions

In most bit-mapped S-registers, the default bit value is 0. Non-0 default values are followed by an asterisk. In some cases, default values are shown in the reference column preceded by +. Some bits are reserved for factory use and should not be changed.



S-Register default values may vary depending on the country.

Table 4-15 Basic S-Registers "ATSn=x"

| COMMAND | FUNCTION & DESCRIPTION | +REF. |
|---------|---|-------|
| S0= | Sets the number of rings on which the modem will answer. 0 value disables auto-answer. | +000 |
| S1= | Counts and stores number of rings from an incoming call. | +000 |
| S2= | Defines escape code character, default '+' (43 dec.). A value of 128-255 disables the escape code. | +043 |
| S3= | Defines ASCII Carriage Return. | +013 |
| S4= | Defines ASCII Line Feed. | +010 |
| S5= | Defines ASCII Backspace. A value of 128-255 disables the Backspace key's delete function. | +008 |
| S6= | Sets the number of seconds the modem waits before dialing if 'X0' or 'X1' is selected. If a setting of 'X2,' 'X7' is selected, the modem will dial as soon as it detects a dial tone. This register also sets the time-out interval for the "W" dial modifier to wait for the dial tone. (See also S41b4) | +003 |
| S7= | Sets duration, in number of seconds modem waits for a carrier. | +060 |
| S8= | Sets duration, in seconds, for pause (,) option in Dial command and pause between command re-executions for Repeat (>) command. | +002 |
| S9= | Sets duration, in tenths of a second of remote carrier signal before recognition. (Ignored if in non-FSK or half-duplex operation) | +006 |
| S10= | Sets duration, in tenths of a second, modem waits after loss of carrier before hanging up. | +007 |
| S11= | Sets duration and spacing, in milliseconds, of dialed Touch-Tones. | +070 |

Table 4-16 Extended S-Registers "ATSn=x"

| COMMAND | BIT | DEC | HEX | FUNCTION AND DESCRIPTION | REF. |
|---------|-----|-----|-----|---|------|
| S13= | bit | dec | hex | Bit-mapped register. | +000 |
| | 1 | 2 | 2 | Capture modem manufacturer information during V.42 handshake, can be displayed at AT12 <Last Speed/Protocol> line if available ('Flash' or 'ZyXEL' stands for ZyXEL connection) | |
| S14= | bit | dec | hex | Bit-mapped register: | +002 |
| | 1 | 0 | 0 | Grant Remote Digital Loop-back test request. | &T4 |
| | | 2 | 2 | Deny Remote Digital Loop-back test request. (Default) | &T5* |
| S15= | bit | dec | hex | Bit-mapped register. | +066 |

Table 4-16 Extended S-Registers "ATS_n=x"

| COMMAND | BIT | DEC | HEX | FUNCTION AND DESCRIPTION | REF. |
|---------|------|------|------|---|----------|
| | 0,1 | 0 | 0 | Even parity | |
| | | 1 | 1 | Odd parity | |
| | | 2 | 2 | No parity | * |
| | 2 | 0 | 0 | 1 stop bit | * |
| | | 4 | 4 | 2 stop bits | |
| | 4,3 | 0 | 0 | 10 bit character length | *C0* |
| | | 8 | 8 | 11 bit character length | *C1 |
| | | 16 | 10 | 9 bit character length | *C2 |
| | | 24 | 18 | 8 bit character length | *C3 |
| | 7-5 | 0 | 0 | Profile 0 as active settings after power on. | Z0 |
| | | 32 | 20 | Profile 1 as active settings after power on. | Z1 |
| | | 64 | 40 | Profile 2 as active settings after power on. | Z2 |
| | | 96 | 60 | Profile 3 as active settings after power on | Z3 |
| | | 128 | 80 | Factory default as active settings after power on | Z4* |
| S16= | | dec | hex | Test status register. | +000 |
| | | 0 | 0 | No test in progress. | &T0 |
| | | 1 | 1 | Analog Loop-back test in progress. | &T1 |
| | | 3 | 3 | Local Digital Loop-back test in process. | &T3 |
| | | 6 | 6 | Remote Digital Loop-back test in process. | &T6 |
| | | 7 | 7 | Remote Digital Loop-back with self-test in process. | &T7 |
| | | 8 | 8 | Analog Loop back with self-test in progress. | &T8 |
| S17= | bit | dec | hex | Bit-mapped register. | +022 |
| | 4-1 | 0-30 | 0-1E | Set transmit power level from 0 to -15 dBm. (See also S35b3) (Default *P11) | *Pn |
| | 5 | 0 | 0 | Normal dial. (Default) | D |
| | | 32 | 20 | Reverse dial, go on-line in answer mode. | DR |
| | 7, 6 | 0 | 0 | AT Commands set | *I0* |
| | | 64 | 40 | V.25bis command set | *I1 |
| | | 128 | 80 | Dumb mode (no command accepted) | *I2 |
| S18= | | dec | hex | Force modem to fix baud rate when answering. | +000 |
| | | 0 | 0 | Disable fixed baud function. | * |
| | | 1-46 | 1-2E | Enable baud rate to be fixed when answering. Baud rate value settings (n) the same as S20 | |
| S19= | | dec | hex | Modem connection mode, same | +000/&Nn |
| | | 0-99 | 0-63 | Setting value as 'AT&Nn' command. | |
| S20= | | dec | hex | DTE speed (bps). Auto detected from AT Command. | +001 |

Table 4-16 Extended S-Registers "ATSn=x"

| COMMAND | BIT | DEC | HEX | FUNCTION AND DESCRIPTION | REF. |
|---|-----|-----|-----|---|------|
| | | 0 | 0 | 230400 bps | |
| | | 1 | 1 | 115200 bps (Default) | * |
| | | 2 | 2 | 76800 bps | |
| | | 3 | 3 | 57600 bps | |
| | | 4 | 4 | 38400 bps | |
| | | 5 | 5 | 19200 bps | |
| | | 6 | 6 | 16800 bps | |
| | | 7 | 7 | 14400 bps | |
| | | 8 | 8 | 12000 bps | |
| | | 9 | 9 | 9600 bps | |
| | | 10 | A | 7200 bps | |
| | | 11 | B | 4800 bps | |
| | | 12 | C | 2400 bps | |
| | | 13 | D | 1200 bps | |
| | | 14 | E | 460800 bps | |
| | | 15 | F | 300 bps | |
| | | 16 | 10 | 307200 bps | |
| | | 17 | 11 | 153600 bps | |
| | | 18 | 12 | 102400 bps | |
| | | 20 | 14 | 61440 bps | |
| | | 21 | 15 | 51200 bps | |
| | | 22 | 16 | 624000 bps | |
| | | 24 | 18 | 124800 bps | |
| | | 25 | 19 | 62400 bps | |
| | | 26 | 1A | 41600 bps | |
| | | 27 | 1B | 31200 bps | |
| | | 28 | 1C | 24960 bps | |
| | | 29 | 1D | 20800 bps | |
| | | 46 | 2E | 921600 bps | |
| Note: Only the speeds up to S20=15 are supported by auto speed detection. | | | | | |
| S21= | bit | dec | hex | Bit mapped register. | +178 |
| | 0 | 0 | 0 | Maintain a non-error control connection when modem error control handshake fails. | *E0* |
| | | 1 | 1 | Drop connection when modem error control handshake fails. (Default) | *E1 |
| | 1-2 | 0 | 0 | Speaker is always OFF. | M0 |

Table 4-16 Extended S-Registers "ATS_n=x"

| COMMAND | BIT | DEC | HEX | FUNCTION AND DESCRIPTION | REF. |
|---------|-----|-----|-----|---|------|
| | | 2 | 2 | Speaker is ON until carrier is detected. (Default) | M1* |
| | | 4 | 4 | Speaker is always ON. | M2 |
| | | 6 | 6 | Speaker is ON after last digit is dialed out until carrier detected. | M3 |
| | 3 | 0 | 0 | DSR is always ON. (Default) | &S0* |
| | | 8 | 8 | According to CCITT. (see also S44.4, S41.5) | &S1 |
| | 4 | 0 | 0 | CD is always ON. | &C0 |
| | | 16 | 10 | CD tracks presence of data carrier. (see also S38.3) (Default) | &C1* |
| | 6-7 | 0 | 0 | Assume DTR always On. | &D0 |
| | | 64 | 40 | 108.1, DTR OFF-ON transition causes dial of the default number. | &D1 |
| | | 128 | 80 | 108.2 Data Terminal Ready, DTR OFF causes the modem to hang up and return to command state. (Default) | &D2* |
| | | 192 | C0 | 108.2+RST, DTR OFF causes the modem to hang up and reset the modem to profile 0 after DTR dropped. | &D3 |
| S23= | bit | dec | hex | Bit mapped register. | +105 |
| | 0 | 0 | 0 | Command echo disabled. | E0 |
| | | 1 | 1 | Command echo enabled. (Default) | E1* |
| | 1 | 0 | 0 | Tone dial. (Default) | T* |
| | | 2 | 2 | Pulse dial. | P |
| | 2 | 0 | 0 | Pulse dial make/break ratio = 39% / 61% (Default) | &P0* |
| | | 4 | 4 | Pulse dial make/break ratio = 33% / 67% | &P1 |
| | 3-5 | 0 | 0 | ATX0 (See result code table) | X0 |
| | | 8 | 8 | ATX1 | X1 |
| | | 16 | 10 | ATX2 | X2 |
| | | 24 | 18 | ATX3 | X3 |
| | | 32 | 20 | ATX4 | X4 |
| | | 40 | 28 | ATX5, error control result code is enabled. (Default) | X5* |
| | | 48 | 30 | ATX6, error control result code is enabled. | X6 |
| | | 56 | 38 | ATX7, error control result code is enabled. | X7 |
| | 6 | 0 | 0 | Display result code in numeric format. (see S35.7) | V0 |
| | | 64 | 40 | Display result code in verbose format. (Default) | V1* |
| | 7 | 0 | 0 | Modem returns result code. (Default) | Q0* |
| | | 128 | 80 | Modem does not return result code. (see also S40.1) | Q1 |
| S24= | bit | dec | hex | Bit mapped register. | |

Table 4-16 Extended S-Registers "ATS_n=x"

| COMMAND | BIT | DEC | HEX | FUNCTION AND DESCRIPTION | REF. |
|---------|-----|--------|-------|---|---------------|
| | 6-4 | 16-112 | 10-70 | Speaker volume control, increments of 32 in decimal value. | L0-7 |
| S25= | | 0-255 | 0-FF | Specify the time delay that DTR signal needs to be OFF before it will be recognized, in 10 ms units. If S25=0, the delay time is set to 4 ms. | +000 |
| S27= | bit | dec | hex | Bit mapped register. | +156 |
| | 0-2 | | | Modem error control. | |
| | | 0 | 0 | No error control. | &K0 |
| | | 1 | 1 | MNP4 + MNP3 (see also S41.0) | &K1 |
| | | 2 | 2 | MNP4 + MNP5 (see also S38.5, S41.0) | &K2 |
| | | 3 | 3 | V.42+MNP4 | &K3 |
| | | 4 | 4 | V.42 + V.42bis (compatible with &K2) (Default) | &K4* |
| | | 5 | 5 | V.44 | &K5 |
| | 3-5 | 0 | 0 | Flow control disabled. | &H0 |
| | | 24 | 18 | Hardware (RTS/CTS) flow control. (Default) | &H3* |
| | | 32 | 20 | Software (XON/XOFF) flow control. | &H4 |
| | | 40 | 28 | Reserved. | &H5 |
| | 6-7 | | | Signal quality. | |
| | | 0 | 0 | No response to poor signal quality. | *Q0 |
| | | 64 | 40 | Retrain action taken if signal quality is poor. | *Q1 |
| | | 128 | 80 | Adaptive rate (auto fall-back /forward) when signal quality changes. (Defaults) | *Q2* S41.2 |
| | | 192 | C0 | Disconnect when signal quality is poor. | *Q3 |
| S28= | bit | dec | hex | Bit mapped register. | +068 |
| | 0 | 0 | 0* | Single line RJ-11 phone jack (Default) | &J0* |
| | | 1 | 1 | Multiple phone/modem line, RJ12/RJ13 phone jack | &J1 |
| | 1 | 0 | 0* | Panel key is normal (Default) | *L0* |
| | | 2 | 2 | Panel key is locked | *L1 |
| | 2-3 | 0 | 0 | Destructive, expedited break. | &Y0 |
| | | 1 | 4 | Non-destructive, expedited break. (Default) | &Y1* |
| | | 10 | 8 | Non-destructive, un-expedited break. | &Y2 |
| | 4-5 | 0 | 0 | No guard tone. (Default) | &G0* |
| | | 16 | 10 | Reserved | &G1 |
| | | 32 | 20 | 1800 Hz guard tone. | &G2 |
| | 6 | 0 | 0 | DTE/DCE rate follows link rate. (See also S18, S44b6) | &B0 |
| | | 64 | 40 | DTE/DCE rate is fixed at the DTE setting, range from 300-460.8 Kbps. (Default, also see S18, S44b6) | &B1* |

Table 4-16 Extended S-Registers "ATS_n=x"

| COMMAND | BIT | DEC | HEX | FUNCTION AND DESCRIPTION | REF. |
|---------|-----|-------|------|--|---------------|
| | 7 | 0 | 0 | Select V.22 for 1200 bps communication | B0* |
| | | 128 | 80 | Select Bell 212A for 1200 bps communication | B1 |
| S29= | | 0-49 | 0-31 | Set default dial phone number pointer, use AT&Zn=s to store phone numbers in EEPROM. | +000 *D |
| S31= | | 0-255 | 0-FF | Holds the ASCII decimal value of the XON . | +017 |
| S32= | | 0-255 | 0-FF | Holds the ASCII decimal value of the XOFF. | +019 |
| S35= | bit | dec | hex | Bit mapped register. | +032 |
| | 1 | 2 | 2 | Disable aborting from terminal during modem handshaking. | |
| | 3 | 8 | 8 | Add 16dB attenuation to the leased line transmission power. | |
| | 5 | 32 | 20 | Enable Selective Reject in V.42. (Default) | * |
| | 7 | 128 | 80 | Enable extended numerical result codes from 50-65 when an error corrected connection is made. Use with ATV0. (see result code table) | V0 S23.6 |
| S38= | bit | Dec | hex | Bit mapped register. | +000 |
| | 0 | 1 | 1 | Repeatedly dialing default number if not connected. | *Dn, S29 |
| | 3 | 0 | 0 | CD tracks the carrier. (Default) | &C0 |
| | 3 | 8 | 8 | DCD ON/OFF sequence follows UNIX standard, DCD ON before connect message is sent, DCD off after last DCE response is sent. | &C1, S21.4 |
| | 4 | 16 | 10 | Auto-mode fax receiving disabled, hang up if a fax call is received. | &N0 |
| | 5 | 32 | 20 | Disable MNP5 negotiation. | &Kn |
| S39= | bit | dec | hex | Bit mapped register. | +032 |
| | 2 | 4 | 4 | Reverse the answers. Answer in originating mode. | ATA |
| | 3 | 8 | 8 | Class 2 Fax Bitfax compatibility: +FCON at 2400; next phase at 19200 | |
| | 4 | 16 | 10 | Class 2 Fax mode DTE shifting: +FCON at current DTE rate, shift to 19,200 when entering into the next phase | |
| | 5 | 32 | 20 | Disable scrambler/descrambler in V.26bis mode. Enables compatibility with older V.26bis modems which have no such unit (Default) | * |
| S40= | bit | dec | hex | Bit mapped register. | +000 |
| | 1 | 2 | 2 | No result code is displayed in answer mode. | Q2 |
| | 2 | 4 | 4 | Enables caller ID detection. | |
| | 3 | 8 | 8 | Enables type 1 ring detection. | |
| | 4 | 16 | 10 | Enables type 2 ring detection. | |
| | 5 | 32 | 20 | Enables type 3 ring detection. | |

Table 4-16 Extended S-Registers "ATSn=x"

| COMMAND | BIT | DEC | HEX | FUNCTION AND DESCRIPTION | REF. |
|---------|-----|--------------|-------------|---|------|
| | 6 | 64 | 40 | Enables type 4 ring detection. | |
| S41= | bit | dec | hex | Bit mapped register. | +000 |
| | 0 | 1 | 1 | Special MNP compatibility. (see also S27.0, S38.5) | &Kn |
| | 3 | 8 | 8 | Enable CCITT signals 140 and 141 on EIA-232D interface. | |
| | 4 | 16 | 10 | In X2-X7 setting, modem waits for S6 seconds before dialing and ignores dial tone detection. | |
| | 5 | 32 | 20 | DSR follows DCD and pulses for 0.5 sec after DCD on-off transition. | &Sn |
| | 6 | 64 | 40 | Force S0>=2; doesn't answer on the first ring. | S0 |
| | 7 | 128 | 80 | Ignore calling tone, not to be used as fax detection. | |
| S42= | bit | dec | hex | Bit mapped register. | +000 |
| | 1 | 2 | 2 | Enables throughput averaging. | |
| | 2 | 4 | 4 | CND message will be forced on even if ATQ2 is set. | |
| | 3 | 8 | 8 | Disable escape sequence code in answer mode. | |
| | 4 | 16 | 10 | Disable V.17 14,400 Fax in calling mode, no effect to answering mod. | |
| | 5 | 32 | 20 | Disable Data/Voice button switch. | |
| | 6 | 64 | 40 | Disable 'RINGING' result code. | Xn |
| | 7 | 128 | 80 | DCD forced on but pulse off for 0.5 seconds at carrier loss. | &C0 |
| S43= | bit | dec | hex | Bit mapped register. | +008 |
| | 6 | 64 | 40 | Enable 1.5 sec. pause between off-hook and modem answering. | |
| | 7 | 128 | 80 | Modem hang-up if the line condition does not permit modem to run at the highest speed set by '&Nn' command. | |
| S44= | bit | dec | hex | Bit mapped register. | +000 |
| | 3 | 8 | 8 | ATDSn initiates auto-dial of the stored numbers consecutively until connection is made (cyclic dial). | DSn |
| | 4 | 16 | 10 | DSR follows DTR. (See also S41.5) | &S1 |
| | 6 | 64 | 40 | When selected with '&B0', DTE speed fixed at 38400 when the link speed is above 9600. DTE speed fixed at 9600 if link speed is 7200. If it is below 7200, DTE speed follows link speed. When selected with &B1, DTE speed fixed at current rate when an ARQ connection is made, when a non-ARQ connection is made, DTE speed follows the link speed. (See also S18) | &Bn |
| | 7 | 128 | 80 | Enable UK (Australian, Singapore, Indian, etc..) type "short-short ring" ring-back detection. | |
| S45= | | dec 0-255 | hex 0-FF | Delay during which the CND silence detection is disabled, in 20 ms units. (See also S46) | +100 |

Table 4-16 Extended S-Registers "ATSn=x"

| COMMAND | BIT | DEC | HEX | FUNCTION AND DESCRIPTION | REF. |
|---------|-----|-------|------|---|------|
| S46= | | dec | hex | CND silence detection interval. | +028 |
| | | 0-255 | 0-FF | To process the CND, silence must be detected for the specified interval, in 20 ms units. | |
| S48= | bit | dec | hex | Bit-mapped register. | +000 |
| | 0 | 1 | 1 | Cause CND information to be reported in raw format. | |
| | 2 | 4 | 4 | Enable data calling tone (CNG) sending. | |
| | 3 | 8 | 8 | Reverse the V.23 channel speed. Originate mode modem speed (Send/Receive) 1200/75; Answer mode modem speed (Send/Receive) 75/1200. | &N12 |
| | 4 | 16 | 10 | (Work with &D1 command) DTR ON will have the modem dial the default number and DTR OFF will have the modem hang-up and reset to profile 0. When the modem is idle (waiting for command), it will not dial any number when DTR changes from ON to OFF. | |
| S49= | bit | dec | hex | Bit-mapped register | +006 |
| | 7 | 0 | 0 | For cellular mode only. Modem is installed in office (Default) | * |
| | | 128 | 80 | For cellular mode only. Modem is connected to a mobile phone | |
| S52= | bit | dec | hex | Bit-mapped register. | +000 |
| | 7 | 0 | 0 | Select 'Mark' as the first signal of the V.23 handshaking sequence. (Default) | &N12 |
| | | 128 | 80 | Select 'Space' as the first signal of the V.23 handshaking sequence. | &N12 |
| S56= | | dec | hex | | +000 |
| | | 0-255 | 0-FF | Hook flash detect time, in units of 10ms. A value of zero use country-specific default duration. | |
| S57= | bit | dec | hex | Bit-mapped register. | +016 |
| | 4 | 16 | 10 | Enables the reporting of Class 1 capability in the response to +FCLASS=? | |
| | 6 | 0 | 0 | Disabled busy detection when dialing is proceeding (Default) | |
| | | 64 | 40 | Enables busy detection in dialing period | |

| | |
|--------------|--|
| Bit | S-register bit number, 'b', used in 'ATSr.b=n' and 'ATSr.b=?' |
| dec | Decimal value, 'x', used in 'ATSn=x' |
| hex | Equivalent Hexadecimal value. |
| +nnn | Factory default when listed in 'Reference' column. |
| Note: | 'AT' is omitted when an AT command is referred to in the 'Reference' column. |

Chapter 5

Firmware Upgrade

You can upgrade modem firmware either by using the software utility provided in the CD-ROM that comes with your modem package, or by terminal emulation program such as Bitware or Hyperterminal. To obtain the latest firmware version, please go to ZyXEL's website site at <http://www.zyxel.com>.

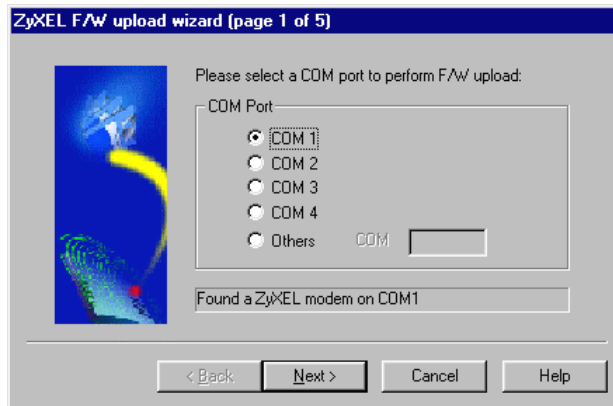
5.1 Upgrading by Utility

To upgrade the firmware by using the software utility on the included CD, follow the steps listed below:

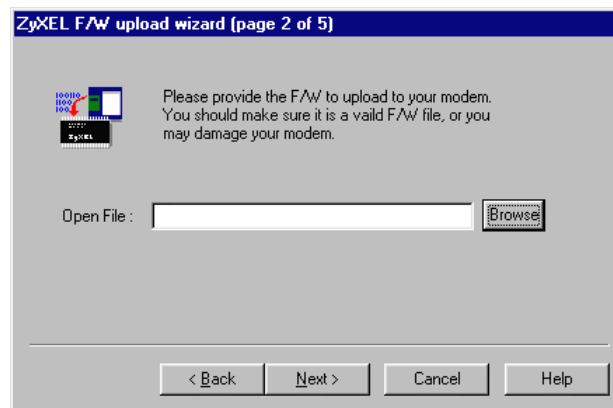
1. Insert the CD-ROM that comes with your modem package into your CD-ROM driver.
2. Double-click on the **Zyfwm.exe** icon, as shown below, in your CD-ROM.



3. You will see the first screen of ZyXEL F/W upload wizard as shown below. Select the COM port that is connected to your modem, then click **Next**.



4. Click **Browse** to find the directory that your latest firmware file is located, then click **Next** to start uploading.



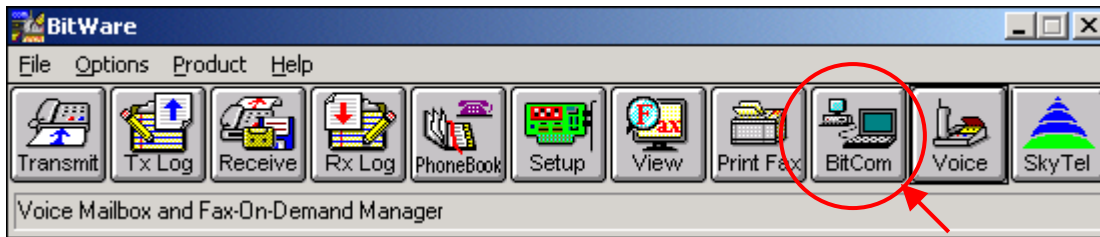
5. Follow the upload wizard to complete upgrade process. After finishing, you may use your modem again.

5.2 Upgrading by Terminal Emulation Program

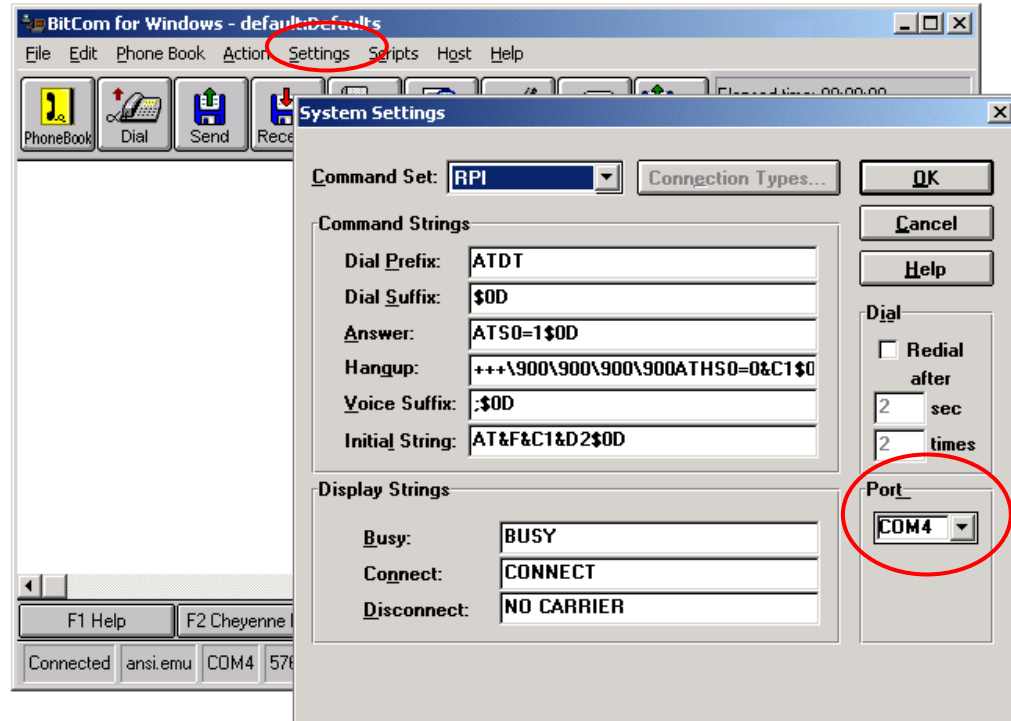
To upgrade modem firmware by terminal emulation program, you need a terminal emulation program first, such as Bitware or Hyperterminal (Windows). For more information on how to install Bitware on your computer, please refer to the *Quick Start Guide* that comes with your modem package.

5.2.1 Upgrading Using Bitware Example

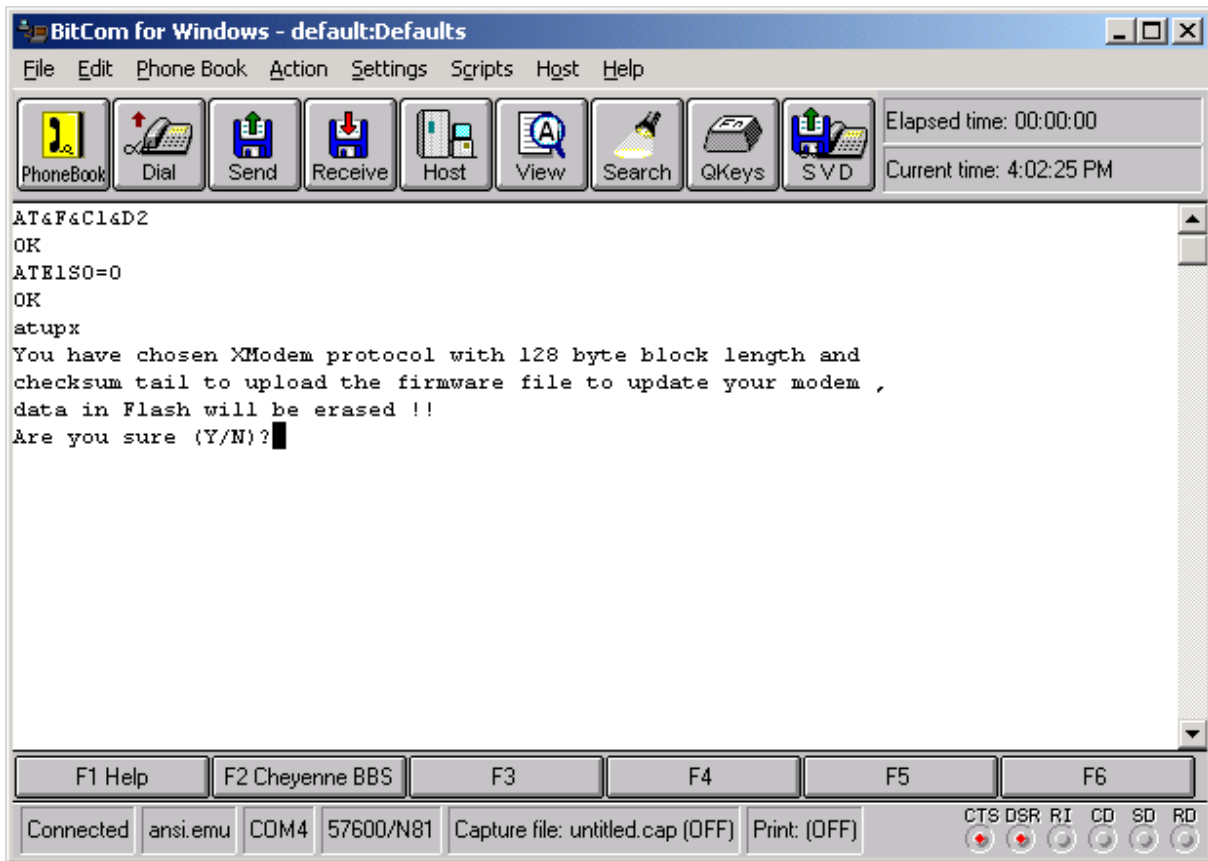
1. Turn on your computer and connect your modem to the computer. For the Omni 56K COM Plus, you also need to connect the modem to a power supply and push in the power button to turn on the modem.
2. Start your Bitware program.
3. The BitWare tool bar appears. Click the **BitCom** icon.



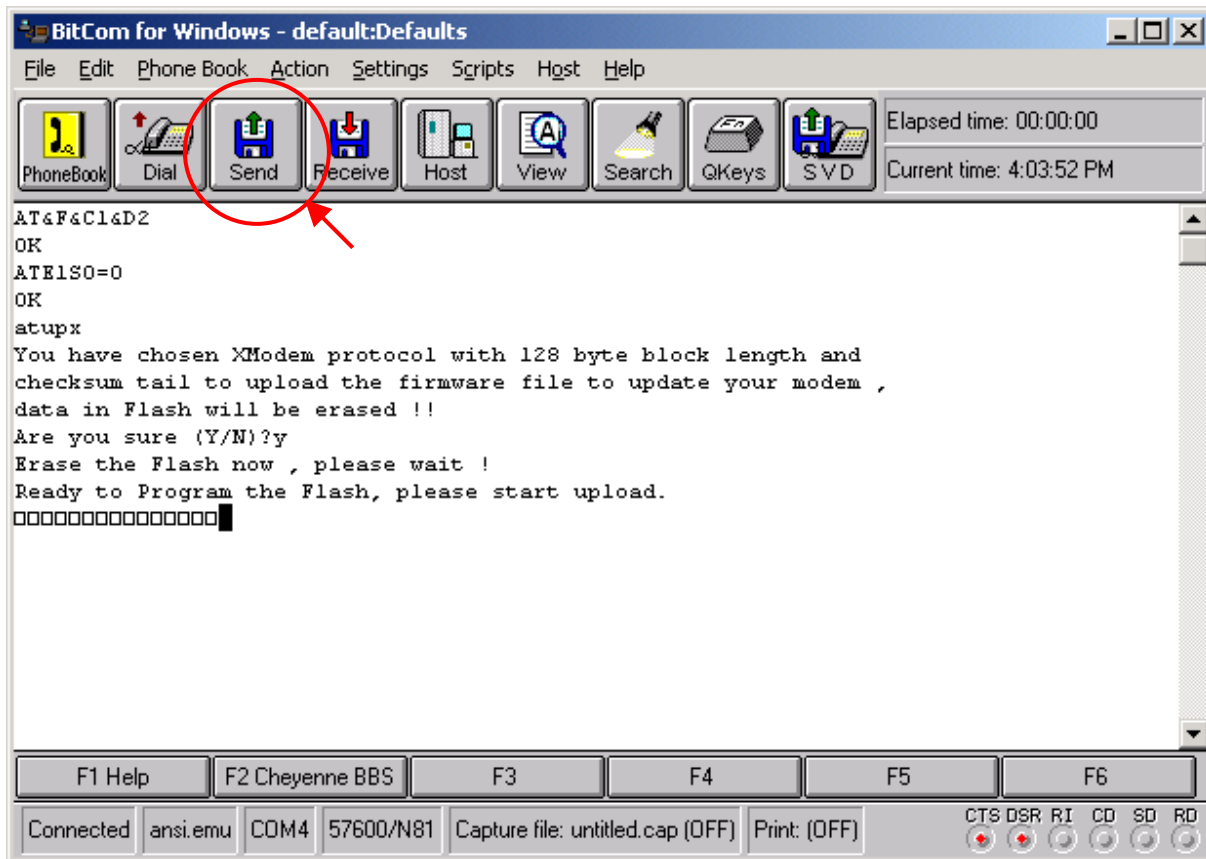
4. In the **BitCom for Windows** screen, click **Settings** then **System** to open the **System Settings** screen shown next. Select the COM port to which the modem is connected. Click **OK** to continue.
(To see which COM port the modem is attached, click **Start**, select **Settings** to enter **Control Panel**. Double-click on the **Phone and Modem Options** icon (or the **Modems** icon) and click the **Modems** tab (and the **Properties** button).)



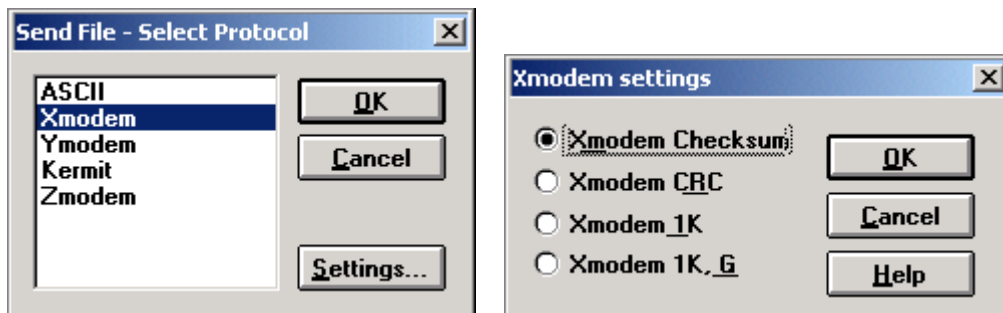
5. Type in `atupx` it will show a message in the next screen.



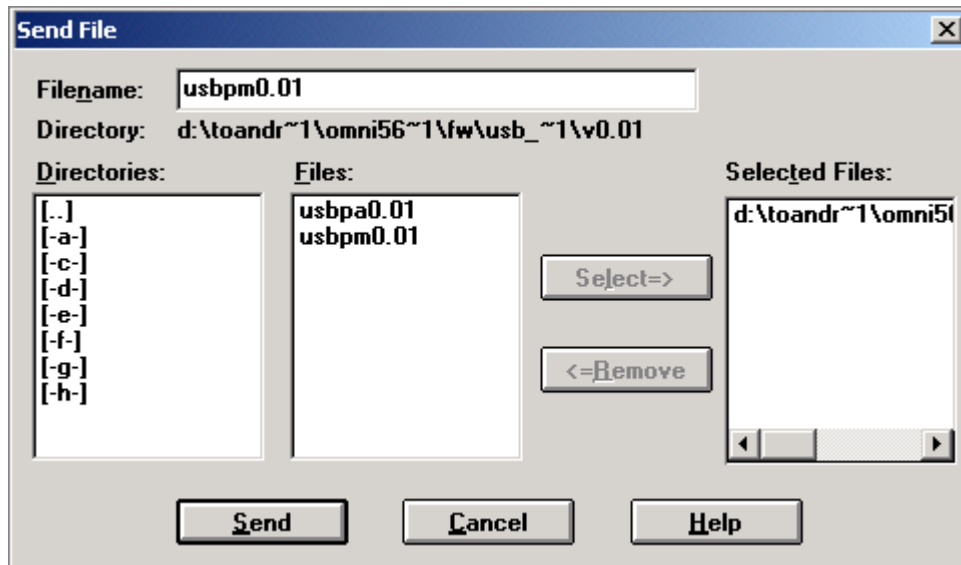
- Be sure you have the new firmware file on hand, then enter Y. The terminal will response as shown next. Remember that you must decompress compressed (.zip) files before you can upload them.



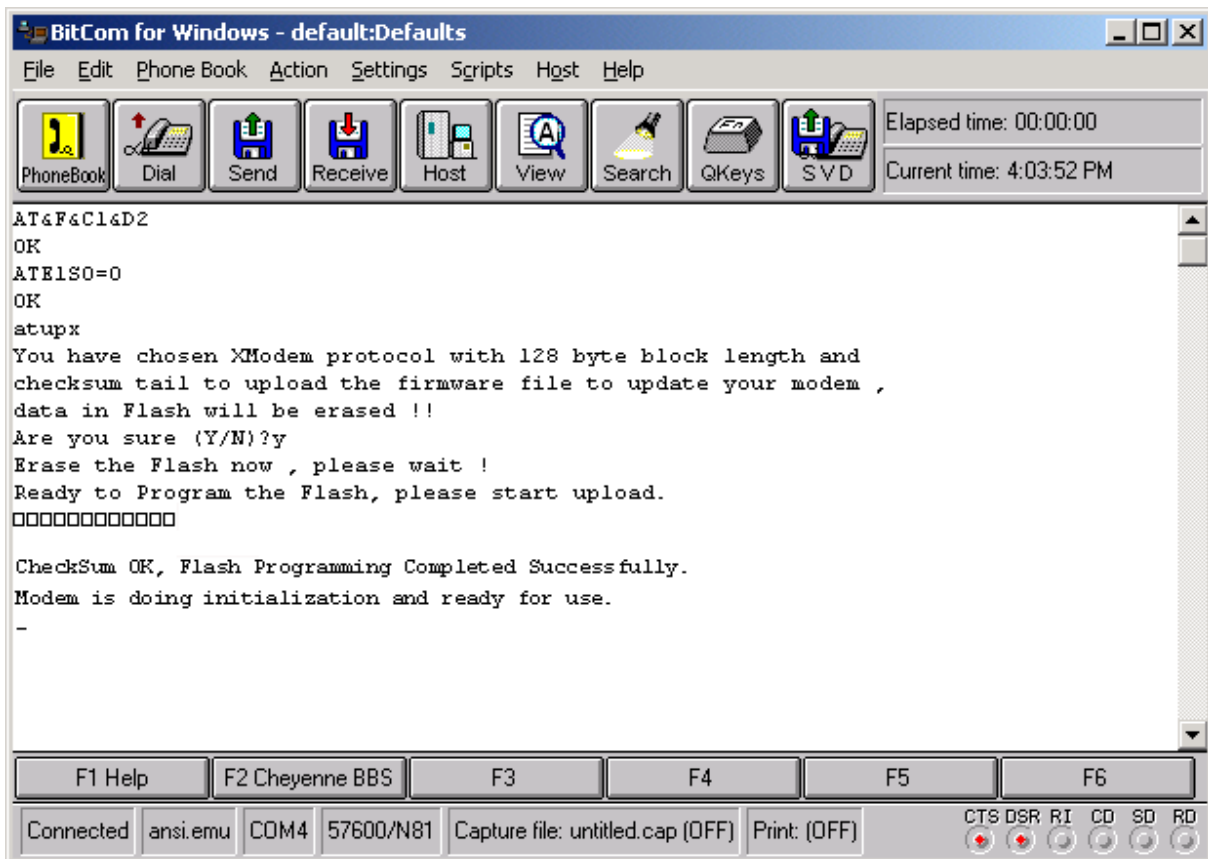
- Click the **Send** icon to display the **Send file – Select Protocol** screen. Select **Xmodem** and click **Settings...**. Select **XModem Checksum** and click **OK** to go back to the **Send file – Select Protocol** screen. Click **OK** to display the **Send file** screen.



- Select the firmware file's location in the **Directories** box and click the file name in the **Files** box to select it. Then click **Send**.



- After the firmware upload process has completed, you can use the modem again.



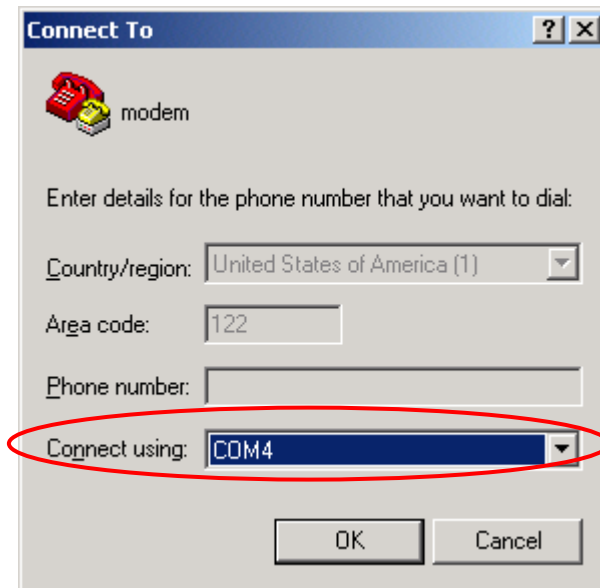
5.2.2 Upgrading Using HyperTerminal Example

- Open the HyperTerminal program in Windows. For example, in Windows 2000 click **Start**, **Programs**, **Accessories**, **Communications**, **HyperTerminal**.

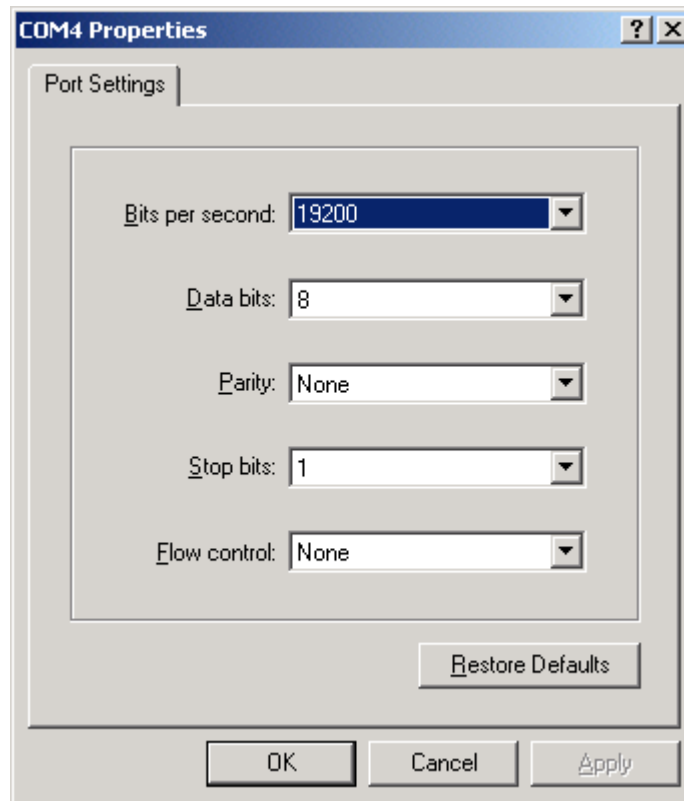
2. Enter a descriptive name and select an icon in the **Connection Description** screen. Click **OK** to display the **Connect to** screen.



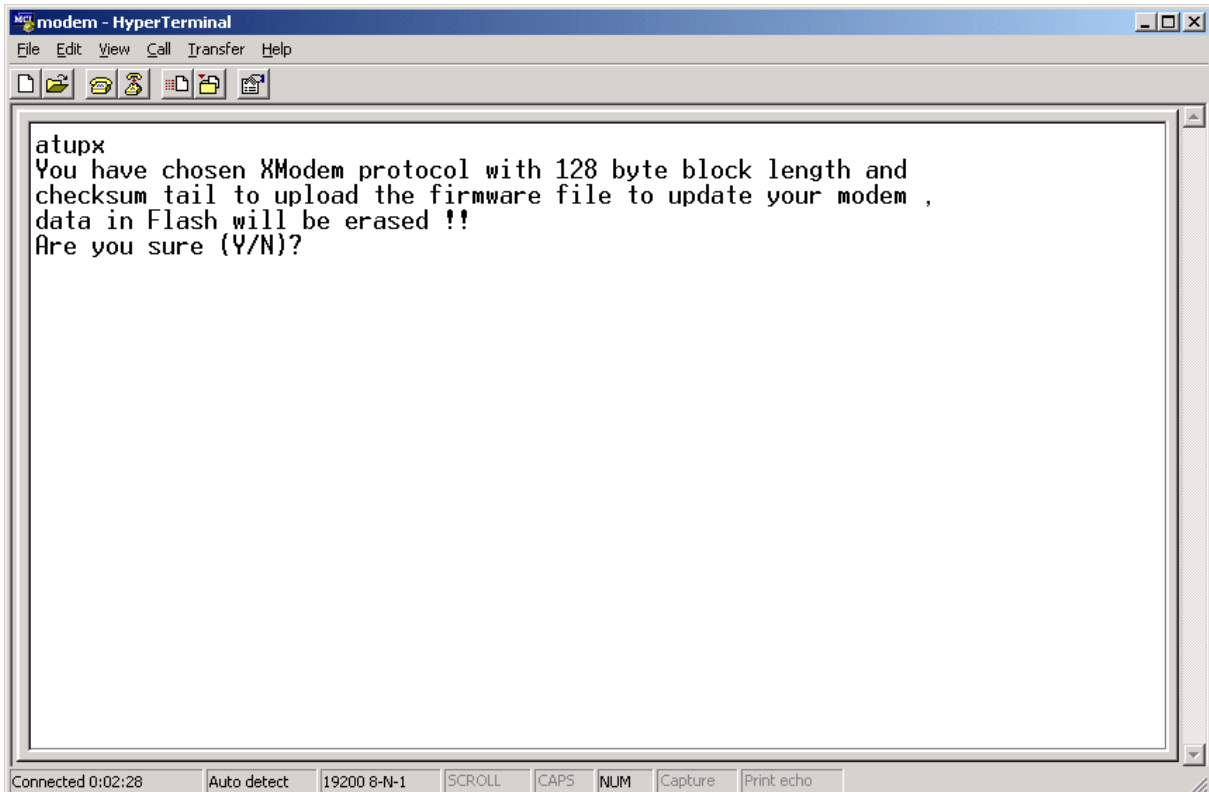
3. Select the COM port to which the modem is connected. Click **OK** to continue.



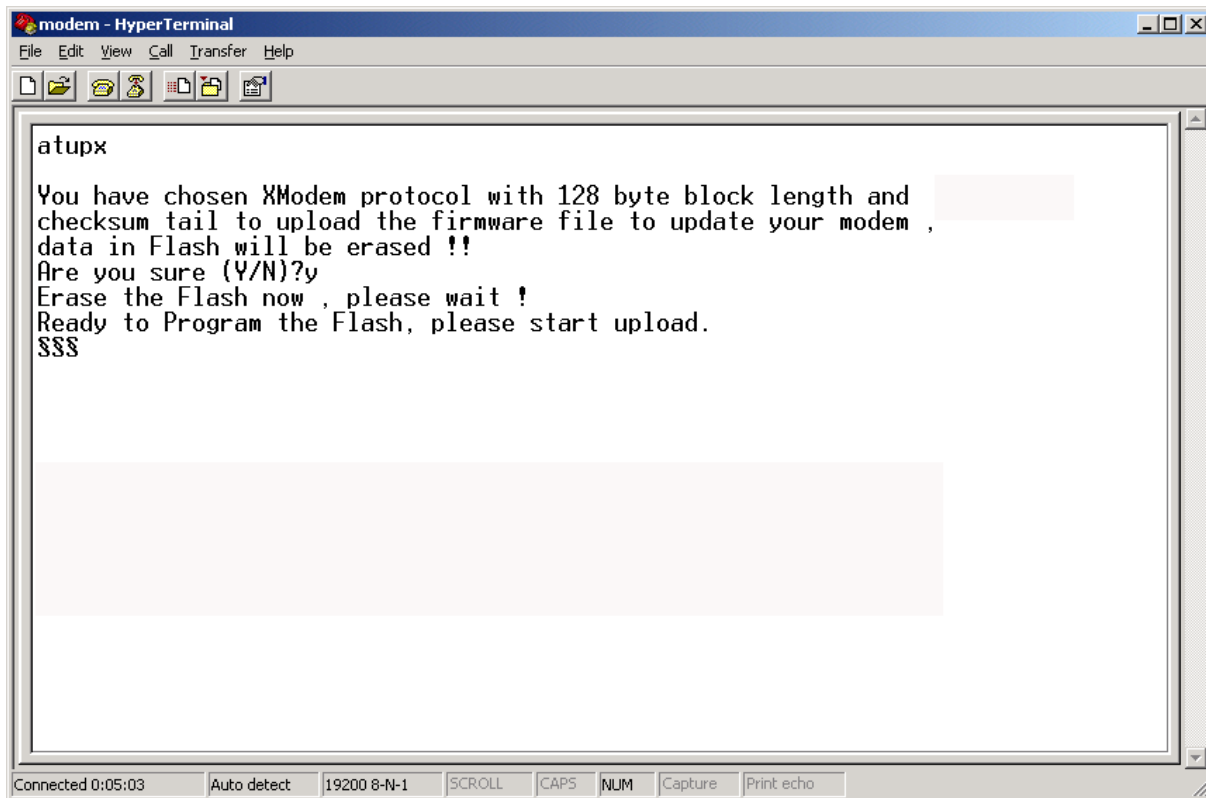
4. In the **COM Properties** screen, click **OK** after configuring the following parameters:
 - VT100 terminal emulation.
 - 19200 Baud. (Default)
 - No parity, 8 data bits, 1 stop bit, flow control set to none.



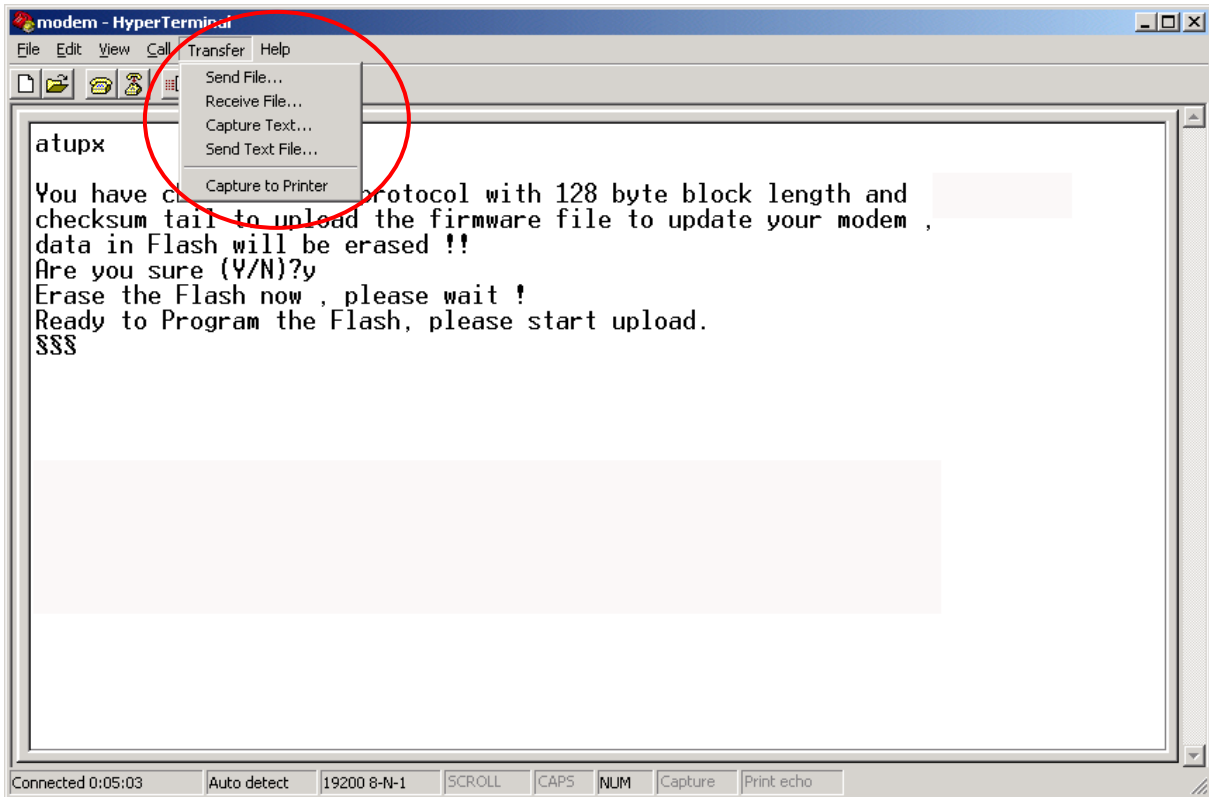
5. Type in `atupx` it will show a message in the next screen.



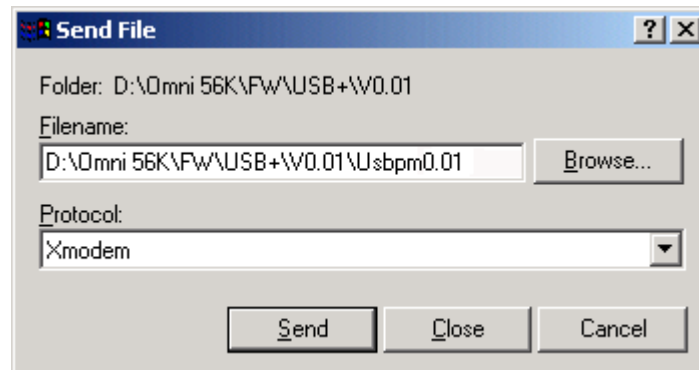
6. Be sure you have the new firmware file on hand, then enter `Y`. The terminal will response as shown next. Remember that you must decompress compressed (.zip) files before you can upload them.



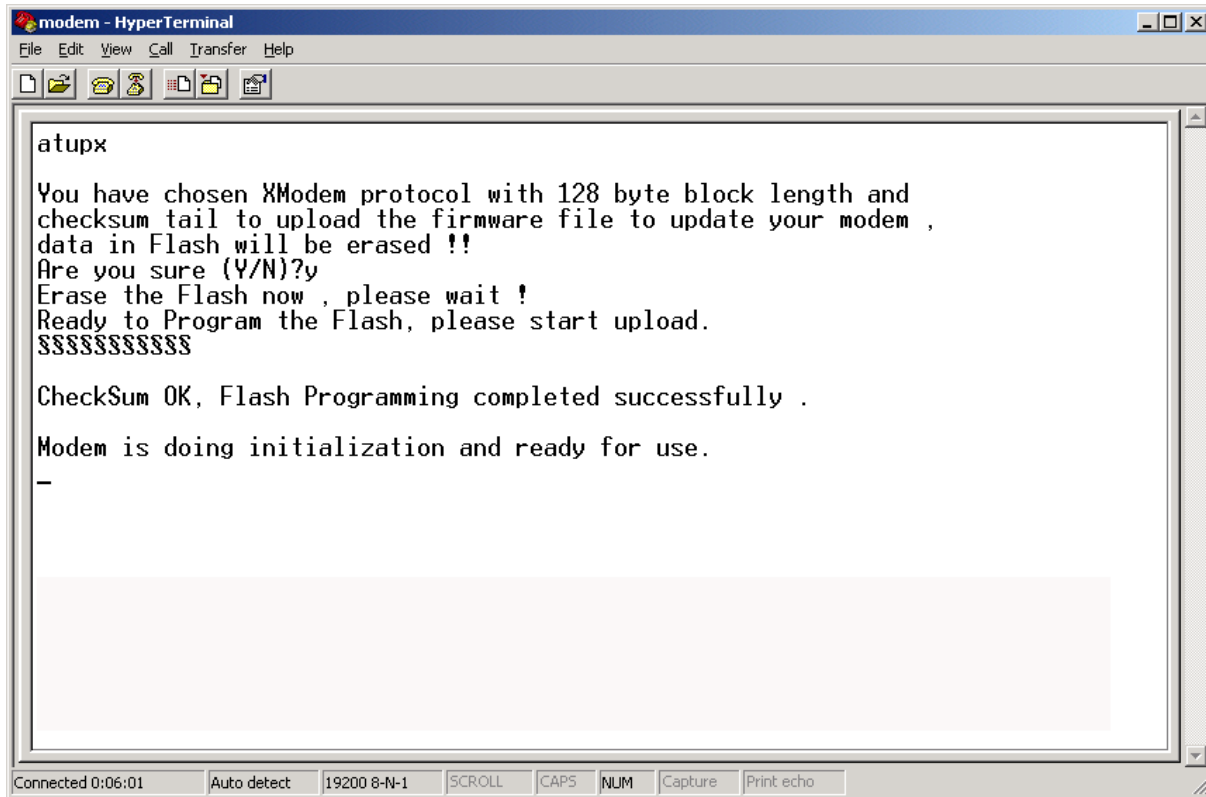
7. Click **Transfer**, then **Send File** to display the **Send File** screen.



8. Choose the **Xmodem** protocol. Type the firmware file's location, or click **Browse** to search for it. Then click **Send**.



9. After the firmware upload process has completed, you can use the modem again.



Index

| | |
|---|---|
| 4 | I |
| 4-bit Voice Data Compression 2-10 | i.e..... <i>See Syntax Conventions</i> |
| B | Internet Security Appliance.....viii |
| Basic AT Command Sets..... 4-1 | ITU-T T.30 Fax Protocol.....2-10 |
| C | K |
| Caller ID 2-6, 4-8 | Key Features 1-1 |
| Caller Number Delivery 2-6 | N |
| Capability..... 2-3 | Notice.....iii |
| Command Sets 4-1 | O |
| Copyright..... ii | Online Registration iv |
| Customer Support..... v | P |
| Cyclic Dial..... 2-6 | Packing List Card.....viii |
| D | Physical Layer Capability 2-4 |
| Data command sets 4-1 | Protocol Support 2-2 |
| Data Compression..... 2-6 | R |
| Data Function..... 2-4 | Related Documentation.....viii |
| Disclaimer..... ii | Repairs iv |
| Distinctive Ring..... 2-8 | Repeat Dial..... 2-6 |
| E | Replacement..... iv |
| e.g. <i>See Syntax Conventions</i> | Result Codes 3-1, 4-19 |
| Echo feature 4-2 | Return Material Authorization Number iv |
| EIA Class 1/Class 2.0 Command Set..... 2-10 | S |
| Enter..... <i>See Syntax Conventions</i> | Security Function 2-8 |
| Error Control..... 2-5 | Select..... <i>See Syntax Conventions</i> |
| Extended AT# Command Sets 4-8 | Service..... iv |
| Extended AT& Command Sets 4-3 | Service Class 1 Commands..... 4-8 |
| Extended AT* Command Sets 4-6 | Service Class 2.0 Commands..... 4-13 |
| F | Software XON/XOFF Flow Control..... 2-5 |
| Fax command sets..... 4-8 | S-Register..... 4-3, 4-19 |
| Fax function 2-10 | Support Diskviii |
| Fax Physical Layer Protocol..... 2-10 | Syntax Conventionsviii |
| FCC..... iii | T |
| Firmware Specification..... 2-1 | Trademarks..... ii |
| Flash EPROM..... 4-3 | V |
| Flow Control..... 2-5 | V.25bis..... 4-21 |
| H | |
| Hardware CTS/RTS Flow Control..... 2-5 | |
| Hardware Specification 2-1 | |

Voice AT Commands..... 4-16
Voice Function 2-10
Voice IS-101 Command Set..... 2-10
Voice Shield DTE Commands 4-18
Voice Shield DTE Responses..... 4-18

W

www.zyxel.com.....iv

Z

ZyXEL Limited Warranty
Note.....iv
ZyXEL website.....iv