

# User's Guide for ZyXEL Omni 56K and Omni 56K Plus Modems

**ZyXEL**

TOTAL INTERNET ACCESS SOLUTIONS

*ZyXEL Communications Corporation*



## ***ZyXEL Omni 56K Modem***

## ***ZyXEL Omni 56K Plus Modem***

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# Preface

Thank you for purchasing ZyXEL Omni 56K/Omni 56K Plus modem.

## About ZyXEL Omni 56K/Omni 56K Plus

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The Omni 56K/Omni 56K Plus is an analog Data/Fax /Voice modem used for Internet access via PSTN line. It supports not only RS-232 com port interface but also Universal Serial Bus (USB) connection to PC. Users can plug and play USB cables without turning off the computer which makes it simple to install the modem. It can run upstream maximum rate at 33.6kbps and downstream rate at 56Kbps. The rate selection depends on the line quality, and server side configuration.

## How to Use This Guide

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This Guide is cataloged into 5 chapters. The first two chapters provide general information for ZyXEL Omni 56K/Omni 56K Plus modem, and the next three chapters provide advanced information for technical users who might need them for programming or other applications.

## Other Reference

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To quickly learn how to install and configure your Omni 56K/Omni 56K Plus modem, please refer to the *ZyXEL Omni 56K/Omni 56K Plus Modem Read Me First*.



# Chapter 1

## Introduction

This chapter introduces you to the features and specifications for the ZyXEL Omni 56K/Omni 56K Plus modem, and provides instructions for installing your modem.

### Main Features

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- ZyXEL forth generation data pump with V.90 capability.
- USB technology for easy installation.
- V.90 56K down-stream data transmission
- Fast retrain with auto fall-forward and fall-back.
- G3 14.4Kbps Fax send/receive.
- Support Fax class 1 and class 2.0 command set.
- Handset voice record and play. (Omni 56K Plus only)
- Voice digitization and compression.
- Voice record via IS101 Command Set
- Error correction & data compression.
- Microsoft 95/98 Windows plug and play compatible.
- Flash EPROM upgradeable.



# Chapter 2

## Installing ZyXEL Omni 56K/Omni 56K Plus

### Panel Description

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#### Front Panel LEDs

The description of front panel LEDs lists as below:

#### Front Panel LEDs for Omni 56K Plus

LED	Function	Description
USB	USB indication	ON: USB link is up and in use OFF: USB link is down or stays in RS-232 mode
OH	Hook Status	ON: off hook OFF: on hook
DATA	Data Traffic	ON: data transmission OFF: no data
MR	Modem Ready	ON: modem is ready OFF: modem is not ready

Table 1. Front Panel LEDs for Omni 56K Plus

## Front Panel LEDs for Omni 56K

LED	Function	description
V.90	V.90 mode	ON: connection V.90 mode OFF: none V.90 mode
OH	Hook Status	ON: off hook OFF: on hook
DATA	Data transmission	ON: data transmission OFF: no data
MR	Modem Ready	ON: modem is ready OFF: modem is not ready

Table 2. Front Panel LEDs for Omni 56K



## Back Panel Switches

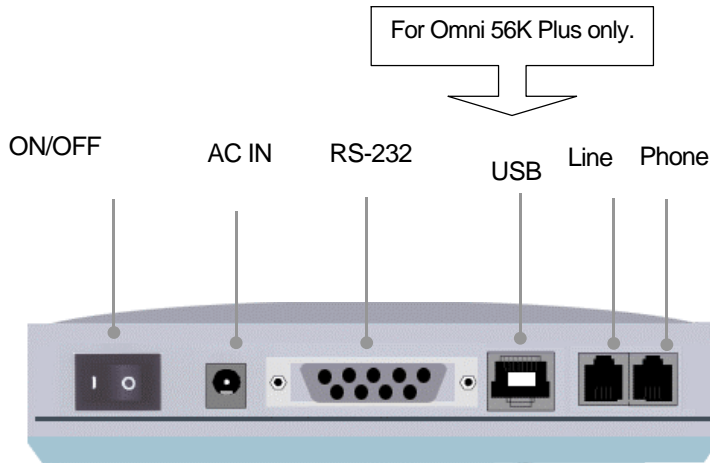


Figure 1. Back Panel

Switch	Description
<b>ON/OFF</b>	Power ON/OFF switch
<b>AC IN</b>	9V-AC power input socket to connect the AC power adapter.
<b>RS-232</b>	Serial port DB-9 female connector to plug the RS-232 cable and connect to the serial port of a DTE or computer.
<b>USB</b>	Universal series bus connector that connects to any one of your devices with USB port, such as your computer or USB hub. (Omni 56K Plus only)
<b>LINE</b>	Analog port RJ-11 terminal jack for connecting to wall jack.
<b>PHONE</b>	Analog port RJ-11 terminal jack for connecting to your phone set.

Table 3. Back Panel Description

## Connecting Your Omni 56K/Omni 56K Plus

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For connecting your Omni 56K/Omni 56K Plus modem, please refer the following figure:

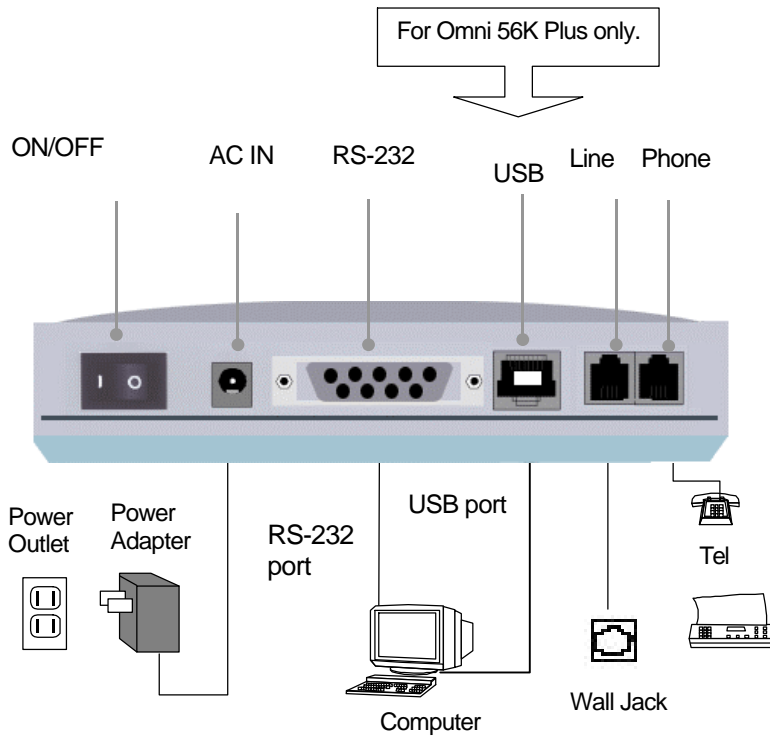


Figure 2. Back Panel Connections

### USB Connector (For Omni 56K Plus Users)

The Omni 56K Plus is an USB(Universal Serial Bus)-based modem, providing a USB connector on the back panel of the device.

## **Getting Started**

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For Omni 56K Plus users, you can make connection either via USB or via RS-232; for Omni 56K users, you can only use RS-232 to connect your modem to your PC.

For Omni 56K Plus users, when you plug the USB connector attached with your Omni 56K Plus to the USB series port of your PC, the Plug and Play function of the operating system will first detect if its driver has been installed. If not, Windows will prompt you for the USB device driver.

For more information on connecting and starting your modem, please refer to *ZyXEL Omni 56K/Omni 56K Plus Modem Read Me First* that is attached with your product package.



# Chapter 3

## Specifications & Function Description

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

### Specifications

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#### Hardware Specification

<b>Item</b>	<b>Specification Description</b>
Power Requirements	9V AC
Operating Requirements	Temperature: 0° C to 40° C Humidity: 5 to 90 % ( non-condensing )
Weight	220.5g
Dimensions	166mm (W) x 40mm (H) x 84mm(L)

Table 4. Hardware Specifications

## Firmware Specification

<b>Physical layer for data mode</b>	Multi-Auto 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
<b>Link layer</b>	MNP 3-4 MNP 5 V42 V42bis V42 SREJ
<b>Flow Control</b>	Hardware flow control: RTS/CTS Software flow control: XON/XOFF
<b>Command set</b>	Full AT command set Dialing type :DTMF/Pulse
<b>Diagnostics</b>	Poweron selftest 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
<b>FAX</b>	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 2.0 Command Set
<b>Voice</b>	4 bits / sample ADPCM,9600 samples / second. On-line voice playback and recording.(Omni 56K Plus only) IS-101 voice command set.

Table 5. Firmware Specifications

## **Protocol Support**

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- Data Physical Layer
  - . 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.42
  - . ITU-T V.42bis
  - . MNP3-5
- Command Set
  - . Standard command set
  - . EIA Class 1 Fax Command set
  - . EIA Class 2.0 Fax Command set
  - . ZyXEL AT Command set
  - . IS101 Voice Command set

For more information on detailed command sets, please refer to *Chapter 5*.

## **Omni 56K/Omni 56K Plus Capability**

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

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<b>Feature</b>	<b>Description</b>
Data	.2W Dial-Up Line .Multi-auto/V.90/V.34bis/V.34/V.32bis/V.32/V.22bis/V.22/ Bell212A .Hardware/Software Flow Control .Error Control/Data Compression .ZyXEL AT Command Set .External Plug and Play for Windows 31/95/98 in RS232 mode External Plug and Play for Windows 98 /2000 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 2.0 command set
Voice	.4 bit IMA ADPCM .Remote Recording on PC storage. .Play and record voice via the attached telephone set. (Omni 56K Plus only) .IS-101 Command Set

Table 6. Feature Description

## Data Function

### Physical Layer Capability

Omni 56K/Omni 56K Plus modem is a high performance universal modem capable of transmission speed up to 56/33.6 Kbps full-duplex on a 2-wire dial-up line. Universal compatibility covers a broad range of ITU-T and BELL standards.

<b>Standard</b>	<b>Bit Rate [bps]</b>	<b>Baud Rate [baud]</b>	<b>Modulation</b>	<b>Carrier Frequency [Hz]</b>
V.90	28000-56000	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
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	

Table 7. Physical Layer Capacity

## 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/Omni 56K Plus provide two kinds of flow control methods.

### 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.

### 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.

## **Error Control**

Error control keeps the modem data link error-free by detecting and re-transmitting erroneous data. Omni 56K/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/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.

## **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/Omni 56K Plus modems support both 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 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.

## **Repeat Dial**

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

## **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.

## 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.



**NOTE:** 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

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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.



**NOTE:** 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.

---

## 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:

Type	Bit (on)	Ring Sequence
1	3	1.2s on; 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

Table 8. Different Ring Types in Register S40

## Security Function

The Omni 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 match.

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	Disables security function.
*G1	Enables type 1 and level 1 security, with password check.
*G2	Enables type 1 and level 2 security, with password check and call-back.
*G3	Enables type 1 and level 1 security, with password check.
*G4	Enables type 1 and level 2 security, with password check and call-back.
*G5	Enables type 2 and level 2 security, with password check and call-back, remote site enters the call-back number.

NOTE: 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.

## Fax function

### Fax Physical Layer Protocol

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	

Table 9. Fax Physical Layer Capacity



## **EIA Class 1/Class 2.0 Command Set**

Please refer to Fax Command Set in *Chapter 5*.

## **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.

## **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.

## **Voice IS-101 Command Set**

Please refer to the Voice command sets in *Chapter 5*.

## **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 Omni 56K/Omni 56K Plus.



# Chapter 4

## Result Codes

### Result Codes

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The 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 lists are as following:

Result Code for		X0	X1	X2	X3	X4	X5	X6	X7
ATV0	ATV1								
0	OK								
1	CONNECT								
2	RING								
3	NO CARRIER								
4	ERROR								
5	CONNECT 1200								
6	NO DIAL TONE								
7	BUSY								
8	NO ANSWER								
9	RINGING								
10	CONNECT 2400								
11	CONNECT 4800								
12	CONNECT 9600								
14	CONNECT 19200								
15	CONNECT 7200								
16	CONNECT 12000								
17	CONNECT 14400								
18	CONNECT 16800								
19	CONNECT 38400								
20	CONNECT 57600								
21	CONNECT 76800								
22	CONNECT 115200								

Result Code for		X0	X1	X2	X3	X4	X5	X6	X7
ATV0	ATV1								
23	CONNECT 230400								
24	CONNECT 460800								
25	CONNECT 921600								
26	CONNECT 307200								
27	CONNECT 153600								
28	CONNECT 102400								
29	CONNECT 61440								
30	CONNECT 51200								
31	CONNECT624000								
32	CONNECT124800								
33	CONNECT 62400								
34	CONNECT 41600								
35	CONNECT 31200								
36	CONNECT 24960								
37	CONNECT 20800								
38	CONNECT 33600								
39	CONNECT 28800								
40	CONNECT 26400								
41	CONNECT 24000								
42	CONNECT21600								
100	CONNECT 56000								
101	CONNECT 54666								
102	CONNECT 53333								
103	CONNECT 52000								
104	CONNECT 50666								
105	CONNECT 49333								
106	CONNECT 48000								
107	CONNECT 46666								
108	CONNECT 45333								
109	CONNECT 44000								
110	CONNECT 42666								
111	CONNECT 41333								
112	CONNECT 40000								
113	CONNECT 38666								
114	CONNECT 37333								
115	CONNECT 36000								
116	CONNECT 34666								
117	CONNECT 33333								
118	CONNECT 32000								

Result Code for	X0	X1	X2	X3	X4	X5	X6	X7
<b>ATV0</b>								
<b>ATV1</b>								
119								
120								
121								

Table 10. Result Codes

Note: 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 Automatic **R**etransmission re**Q**uest type of error control is enabled.



# Chapter 5

## Command Sets

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

### Data command sets

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#### 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.	

Table 11. Basic AT Command Sets

All the Following Commands Require 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.	

Command	Options	Function & Description	Ref.
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
	W	Wait for the second dial tone. Remaining digits will be dialed as in-band DTMF.	
DL		Dials the last-dialed number.	
DSn	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	
Hn		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	
Ln	n=0-7 4 *	Speaker volume control. The higher the value, the higher the volume.	S24.4-6
Mn		Speaker control	S21.1-2
	M0	Speaker is always OFF.	



Command	Options	Function & Description	Ref.
	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.	
O		Return to on-line state.	
O1		Force modem to request a retrain.	
Qn		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=n		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=n		Set S-register 'r' to value 'n'. 'n' must be a decimal number between 0 and 255.	
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	Result code options, see the Options Table.	S23.3-5
	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.	
+++		Escape sequence code , entered in data state , wait for modem to return to command state.	

Table 12. AT Command Sets Requiring an "AT" Prefix

## 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.	
&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).	
&Nn		Modem link mode options (DCE/DCE). (See	S19

Command	Options	Function & Description	Ref.
		also S43.7, S48.1)	
	&N0 *	Multi-Auto, auto negotiate highest possible link rate: 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	
	&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	

Command	Options	Function & Description	Ref.
	&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
	&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.	

Command	Options	Function & Description	Ref.
		(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.	

Table 13. Extended AT& Command Sets

## 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	
	*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".	

Command	Options	Function & Description	Ref.
	Note: 1. The command *Gn requests supervisor password checking. 2. In security type 1, the remote site must be a ZyXEL modem. 3. In security type 2, the remote site can be any other type of modem. 4. 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.		
*HS		Modifies supervisor password.	
	Note: The default supervisor password is ZyXEL.		
*Hn	N=0-3	Modifies the user password table at location 'n.'	
*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.	
	*Q3	Disconnect if signal quality is poor.	
*T		Recall the last CND (Caller ID) information.	S40.2
*V		Views password table.	

Table 14. Extended AT\* Command Sets

## 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	

Table 15. Extended AT# Command Sets



## Fax command sets

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### 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

Table 16. Service Class 1 Commands

The value of <MOD> parameters lists as below:

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
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

Table 17. The Value of <MOD> Parameters

## Service Class 2.0 Commands

Command	Description	Value
+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/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
	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. 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.

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		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.
+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

Table 18. Service Class 2.0 Commands

## 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.
+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 (Omni 56K Plus only), 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. (Omni 56K Plus only) 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.

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+VRA	Ring back goes away timer	0 – 255	70	0 : turn off the timer 1-255: Defines the period without ringback (after at least 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
+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.

Table 19. Voice AT Commands

## 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.

Table 20. Voice Shielded DTE Commands

## 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>s	Silence detected
<DLE>H	The local handset on hook
<DLE>u	Transmission Under run in playback state
<DLE><ETX>	End of stream

Table 21. Voice Shielded DTE Responses

## 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.

### 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 22. Basic 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')	



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Command	bit	dec	hex	Function and description	Ref.
				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	2	Deny Remote Digital Loop-back test request.	&T5*
S15=	bit	dec	hex	Bit-mapped register.	+066
	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	Factory default as active settings after power on.	Z2*	
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
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
		0	0	230400 bps	
		1	1	115200 bps (Default)	

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Command	bit	dec	hex	Function and description	Ref.
		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. (Default)	*E0
		1	1	Drop connection when modem error control handshake fails.	*E1
	1-2	0	0	Speaker is always OFF.	M0
		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

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Command	bit	dec	hex	Function and description	Ref.	
	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	
	5	0	0	CTS Follows RTS in synchronous mode. Response delay set in S26.	&R0	
		32	20	Ignore RTS (CTS always ON) in synchronous mode. (Default)	&R1	
	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, 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	
6		56	38	ATX7, error control result code is enabled.	X7	
		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.		
	6-4	16-112	10-70	Speaker volume control, increments of 16 in decimal value.	L0-7	

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Command	bit	dec	hex	Function and description	Ref.
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
S26=		dec	hex	RTS/CTS delay.	+000
		0-255	0-FF	Set the delay, in 10 millisecond units between the RTS and modem's CTS response in synchronous mode. (see '&Rn' command)	&Rn
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*
	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	
192		C0	Disconnect when signal quality is poor.	*Q3	
S28=	bit	dec	hex	Bit mapped register.	+068
	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	550 Hz guard tone.	&G1
		32	20	1800 Hz guard tone.	&G2
	6	0	0	DTE/DCE rate follows link rate. (See also S18, S44b6)	&B0
1		64	DTE/DCE rate is fixed at the DTE setting, range from 300-460.8 Kbps. (default, also see S18, S44b6)	&B1	
S29=		0-3	0-3	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

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Command	bit	dec	hex	Function and description	Ref.
	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
S36=	bit	dec	hex	Bit mapped register.	
	7-5	0	0	No security function. (Default)	*G0
		32	20	Type 1* security, with password check.	*G1
		64	40	Type 1* security, with password check and call back.	*G2
		96	60	Type 2* security, with password check.	*G3
		128	80	Type 2* security, with password check and call back.	*G4
160	A0	Type 2* security, with password check and call back; call-back number from remote.	*G5		
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. (Default)	&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
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.	
	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.	

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Command	bit	dec	hex	Function and description	Ref.
	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.	
	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
S45=		dec 0-255	hex 0-FF	Delay during which the CND silence detection is disabled, in 20 ms units. (See also S46)	+100
S46=		dec 0-255	hex 0-FF	CND silence detection interval. To process the CND, silence must be detected for the specified interval, in 20 ms units.	+028
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

Command	bit	dec	hex	Function and description	Ref.
	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.	
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=?	

Table 23. Extended S-Registers "ATSn=x"

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





# Chapter 6

## Firmware Upgrade

The ZyXEL Omni 56K/Omni 56K Plus provides firmware upgrade function that you can upgrade the firmware either by upgrade software provided in the CD-ROM that comes with your modem package, or by terminal program such as Bitware or Hyperterminal. To obtain the latest firmware version, please go to ZyXEL's website site at <http://www.zyxel.com>.

### Upgrading by Software

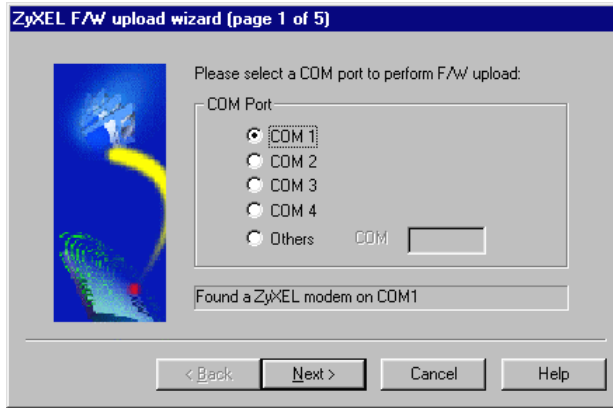
To upgrade the firmware by provided software, follow the steps listed below:

**Step 1.** Insert the CD-ROM that comes with your modem package into your CD-ROM driver.

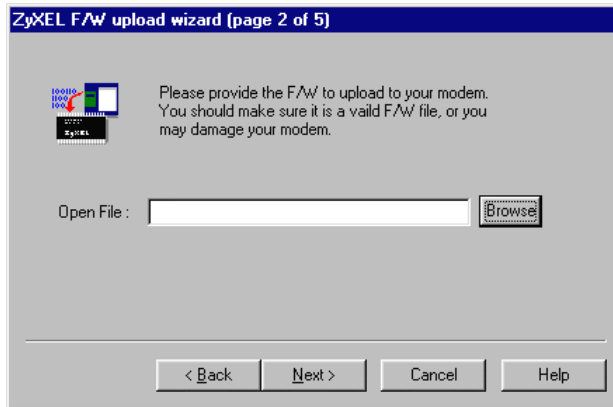
**Step 2.** Double-click on Zyfwm.exe icon, as shown below, in your CD-ROM.



**Step 3.** You will see the first screen of ZyXEL F/W upload wizard as shown below. Select COM Port that is connecting with your modem, then click on **Next**.



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



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



**NOTE:** To obtain the latest firmware version, please go to ZyXEL's website site at <http://www.zyxel.com>.

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## Upgrading by Terminal Program

To upgrade the firmware by terminal program, you have to prepare a terminal program first, such as terminal function in Bitware or Hyperterminal in Windows, then follow the instructions listed below. For more information on how to install Bitware on your computer, please refer to the *Read Me First* that comes with your modem package.

**Step 1.** Start your terminal program.

**Step 2.** Type in 'atupx' it will show a message as below:

You have chosen XModem protocol with 128 byte block length and  
checksum tail to upload the firmware file to update your modem,  
data in Flash ROM will be erased!!  
Are you sure (Y/N)?

**Step 3.** Be sure you have a new version of firmware file on hand, then click 'Y.'

The terminal will response:

Erase the flash ROM now. Please wait.

Then, it will continue to show:

Ready to program to flash. Please start upload.

**Step 4.** Now, select XModem checksum mode to send the new firmware to your modem. Enter the file name then start uploading.



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