XE924M Base Access Point for Multiple Remote Machines

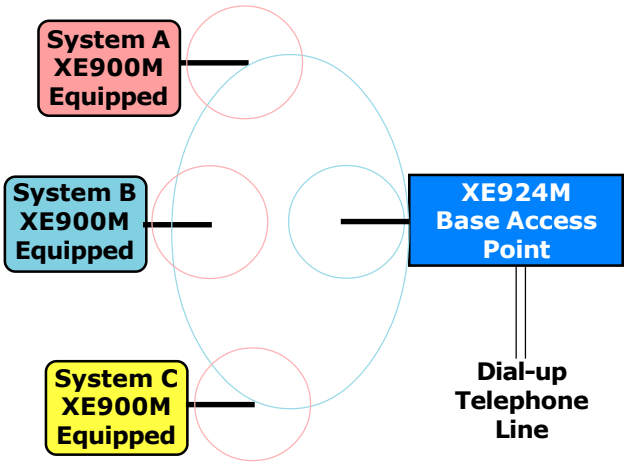
Description

Xecom combines proven embedded modem technology and a 900 MHz transceiver in the XE924M, Base Access Point. The Base Access Point is a simple scheme to connect up to 128 remote systems to a single dial-up telephone line. Each remote system communicates with the Base Access Point using Xecom's XE900M Smart Transceiver. The XE924M eliminates hardware redundancy, and therefore reduces both the initial investment and operating costs.

Xecom's Base Access Network significantly reduces hardware costs in locations with multiple systems. For example, credit card verification normally requires a dedicated modem and telephone line for each sales terminal. Each time a terminal is added another modem and another telephone line also need to be added. The Base Access Point connects all of the terminals through one shared modem and telephone line. The only hardware requirement is the addition of an XE900M Smart Transceiver to the terminal equipment.

This scheme eliminates the installation requirements of a wired network. Whether you add a system equipped with a Smart Transceiver to the network or build a new facility, the 900 MHz wireless link eliminates the need to install cables and configure a server. By virtue of its commonality with millions of cordless telephones the XE924M also offers the most cost effective wireless link available.

The XE924M reduces hardware costs in multiple system environments. Systems which now require a dedicated modem and telephone line for each unit can be connected through the shared modem and telephone line.

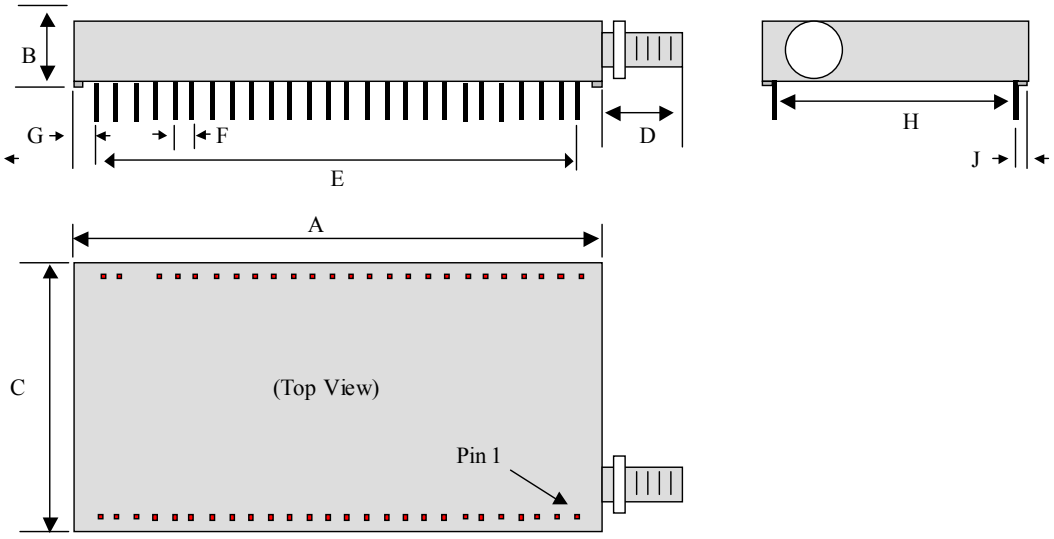


900MHz Base Access Network

Features

* Small Size: 2.75" by 1.38: by 0.500"
* Provides dial-up network access for up to 128 machines equipped with Xecom's XE900M Smart Transceiver.
* Count-off feature allows polling of all 128 nodes in less than 5 seconds
* Telephone Modem Data Transfer at 300, 1200, and 2400 BPS
* Telephone Modem Control and Configuration via industry standard AT Commands.
* Supports 126 Wireless Carrier Frequency from 902 to 928 MHz
* Wireless Range; maximum 150 Feet indoors
* Wireless Data Rate 9600 BPS, half-duplex
* Integrated communications controller regulates the wireless communications protocols, error correction and controls the wireless link to the modem.
* In circuit upgradeable firmware
* User Transferrable FCC Part 68 Registration
* FCC Part 15 Compliance

XE924M MECHANICAL SPECIFICATIONS



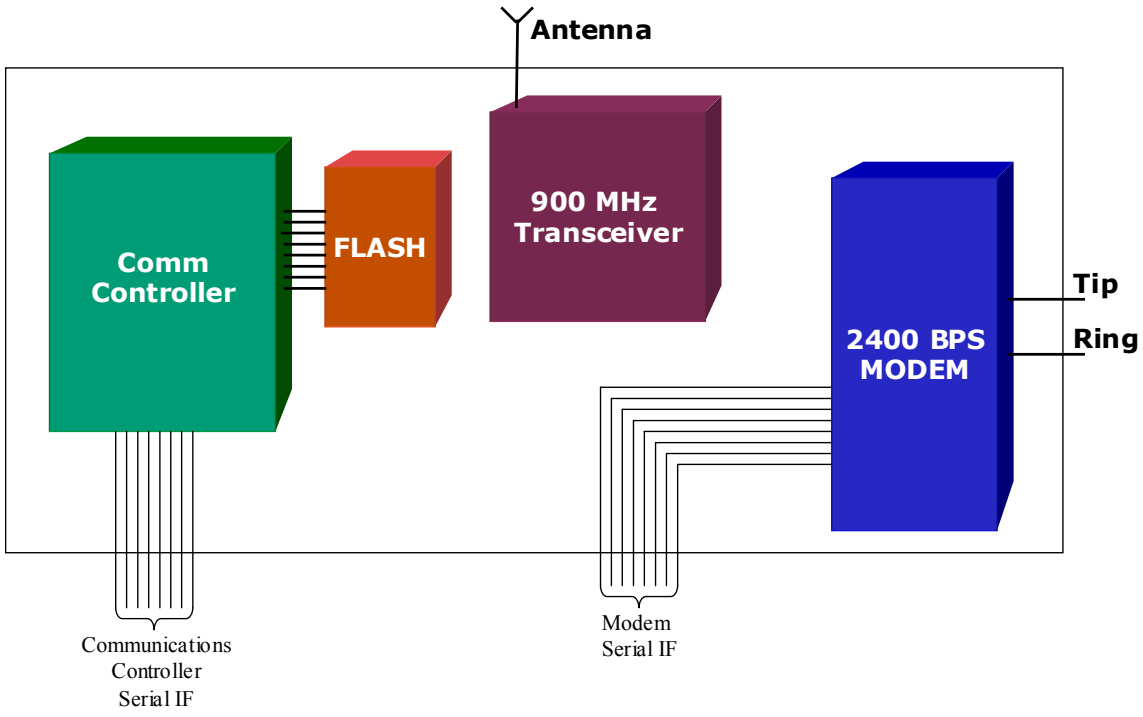
	Inches		MM	
PIN	MIN	MAX	MIN	MAX
A	2.740	2.760	69.60	70.10
B	0.500	0.520	12.70	13.21
C	1.370	1.390	34.80	35.31
D	5.300	0.510	13.46	12.95
E	2.490	2.510	63.25	63.37
F	0.090	0.110	2.29	2.79
G	0.115	0.135	2.92	3.43
H	1.190	1.210	30.23	30.73
J	0.130	0.150	3.30	3.81

Pin Description:

Pins are gold plated

Pin Dimensions .025 inches square, .minimum 0.120 inches long

XE924M BLOCK DIAGRAM

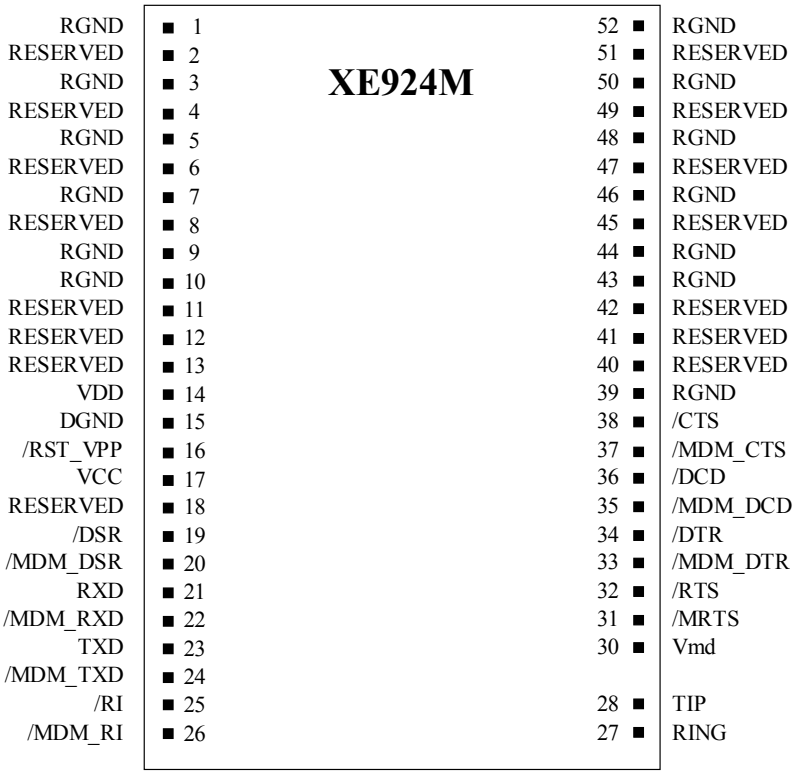


ABSOLUTE MAXIMUM RATINGS

Storage Temperature	-25^{O} C to +85^{O} C
Operating Temperature Range [1]	0^{O} C to +70^{O} C

[1] Units may be screened for operation from -40 to +85C. An extra charge will be applied for this screening.

XE924M PIN CONFIGURATION



XE924M PIN CONFIGURATION

SIGNAL	PINS	DESCRIPTION
RGND	1, 3, 5, 7, 9, 39, 43, 44, 46, 48, 50, 52	RFGND provides the common reference point for all high frequency signals.
RESERVED	2, 4, 6, 8, 11, 12, 13, 18, 40,41, 42, 45, 47, 49, 51	These pins are reserved for future use. No connections should be should be made to these pins.
VDD	14	VDD provides 3 volt power to the communications controller
DGND	15	DGND provides the ground reference for the modem and communications controller circuitry in the XE924M.
/RST_VPP	16	RST_PV provides a hardware reset line for the XE924M's communications controller.
VCC	17	VCC provides 3 volt power to the 900 MHz transceiver

XE924M PIN CONFIGURATION

SIGNAL	PINS	DESCRIPTION
/DSR	19	/DSR is the Data Set Ready input to the communications controller. This pin is normally tied to /MDSR, pin 20
/MDSR	20	/MDSR supplies the Data Set Ready output from the modem. /MDSR is an active low output. This pin is normally tied to /DSR, pin 19.
RXD	21	RXD is the serial data input to the communications controller. This pin is normally tied to /MRXD, pin 22.
/MRXD	22	/MRXD is the serial data output from the XE924M's internal modem. A Mark condition on /MRXD is active low. This pin is normally tied to RXD, pin 21.
TXD	23	TXD is the serial data output from the communications controller. It is normally tied to /MTXD, pin 24
/MTXD	24	/MTXD is the serial data input to the internal modem. A Mark condition on /MRXD is active low. TXD is normally tied to /MTXD, pin 23
/RI	25	/RI provides the Ring Indication input to the communications controller. /RI is normally tied to Pin 26
/MRI	26	/MRI supplies the Ring Indication output from the embedded modem in the XE924M. /MRI is active low. /MRI is normally tied to Pin 26
RING	27	The Ring and Tip signals provide the connection from the XE924M to the telephone line. FCC Part 68 Rules require a 1500 volt isolation barrier between the telephone line and all other circuits. This isolation must be preserved throughout the system. UL60950 requires minimum creepage and clearances distances be maintained between Tip and Ring and all other circuits. Clearance is the shortest distance between conductive circuits; creepage is the distance between conductive surfaces along the surface.
TIP	28	The Ring and Tip signals provide the connection from the XE924M to the telephone line. FCC Part 68 Rules require a 1500 volt isolation barrier between the telephone line and all other circuits. This isolation must be preserved throughout the system. UL60950 requires minimum creepage and clearances distances be maintained between the Tip and Ring traces and all other circuits. Clearance is the shortest distance between conductive circuits; creepage is the distance between conductive surfaces along the surface.
NO PIN	29	This pin is intentionally removed to improve the isolation from the local telephone line.
VMD	30	VMD provides 3.3 Volt power to the integral modem.

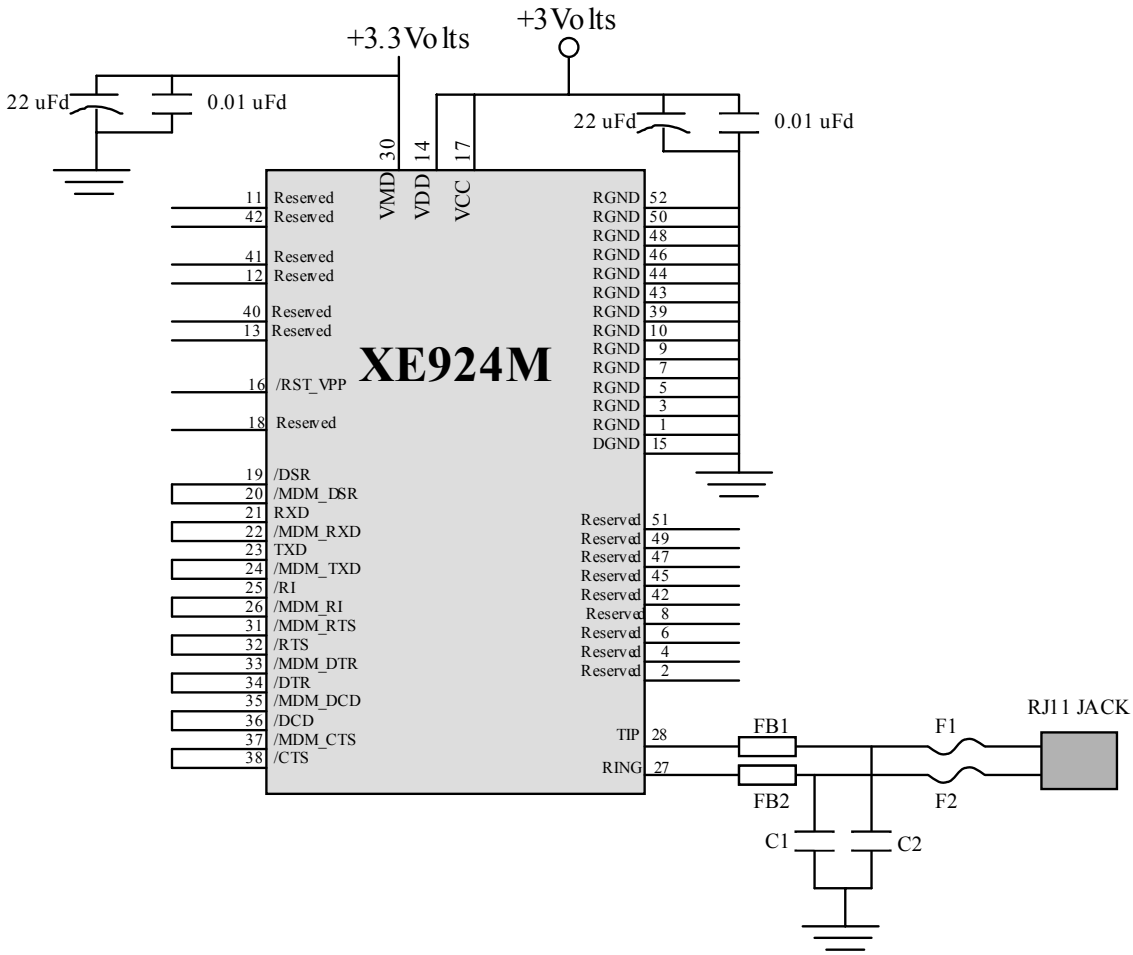
XE924M PIN CONFIGURATION

/MRTS	31	/MRTS provides the Request to Send output from the modem inside XE924M. This is an active low output. /MRTS is normally tied to /RTS, pin 32.
/RTS	32	/RTS supplies the Request to Send out put from the communications controller. /RTS is an active low output.
/MDTR	33	/MDTR connects to the modems Data terminal Ready line. It is an active low input to the XE924M. /MDTR is normally tied to /DTR, pin 34.
/DTR	34	/DTR provides the Data Terminal Ready output from the communications controller. /DTR is normally tied to /MDTR, pin 33. This is an active low output.
/MDCD	35	/MDCD provides the Data Carrier Detect output from the modem inside XE924M. This is an active low output. /MDCD is normally tied to /DCD, pin 36.
/DCD	36	/DCD is the Data Carrier detect input to the communications controller. / DCD is normally tied to /MDCD, pin 35.
/MCTS	37	/MCTS provides the Clear to Send output from the modem inside XE924M. This is an active low output. /MCTS is normally tied to /CTS, pin 38.
/CTS	38	/CTS is the Clear to Send input to the XE924M communications controller. /CTS is normally tied to Pin 37.
RA1/AN1	40	Programmable I/O pin from the embedded communications controller. Can be used as an analog input (AN1), Digital output, or digital input.
RB3	41	RB3 from XE900M internal micro-controller.

XE924M ELECTRICAL SPECIFICATIONS

Parameter	Min	Typ	Max	Units	Comments
VCC	2.85	3.0	3.15	Volts	Transceiver Power
ICC		TBD		ma	
VMD	3.0	3.3	3.6	Volts	Modem Power
ICC		TBD		ma	Modem On Line
VDD	2.85	3.0	3.15	Volts	Comm. Controller Power
IDD		TBD		ma	
Output Power	-12	-10	-6	dBm	50 Ohm Load
Wireless Receive Sensitivity		-94		dBm	
Antenna Output		50		Ohms	
RX to TX reversal		3	5	ms	
TX to RX reversal		4	6	ms	
Telephone Ring Sensitivity	38		150	VRMS	Type B Ringer
Ring Frequency Detected	15.3		68	Hz	Type B Ringer
Telephone Loop Current	10	40	100	ma	
Line Impedance		600		Ohms	
Data Transmit level	-12	-10	-9	dBm	
DTMF Transmit Level		-2.5	0	dBm	Avg over 3 second interval
Voh	2.4			Volts	
Vol			0.4	Volts	
Vih	2.0		VCC+0.3	Volts	
Vil	-0.3		0.8	Volts	

XE924M Typical Application Schematic



Parts List for XE924M Application Schematic

Reference Designation	Qty	Description
C1, C2	2	Cap. 470 pfd 2600V
F1, F2	2	PTC, TR600-150
FB1, FB2	2	Ferrite, ACB2012L-120

Antenna - Xecom recommends the Linx Technologies right angle antenna, ANT-916-CS-RCL-ND

XE924M COMMUNICATIONS CONTROLLER

Hardware:
A low-cost micro-controller performs the duties of the communications controller in the XE924M. This micro-controller manages the 900 MHz network and the data translation between the 900 MHz transceiver and the embedded modem.

The embedded modem is Xecom's XE2420, 2400 BPS modem. This modem includes its own dedicated controller for the modem functions including the AT commands. The serial interface signals from the XE2420 are brought out to the XE924M's I/O pins for diagnostic purposes.

900 MHz Network
The 900 MHz network controlled by the XE924M supports nodes on up to eight remote systems. All of these systems communicate with the XE924M using Xecom's XE900M Smart Transceiver. The XE924M and XE900M utilize a half-duplex channel on a single carrier frequency, 916.48 MHz. The XE924M communications controller manages this channel preventing collisions, correcting errors, and reversing channels.

Carrier Sense Multiple Access (CSMA)
The primary tool used to prevent collisions between systems is a CSMA protocol for each of the 900 MHz transceivers. All XE900M and XE924M units in the network listen for communications activity on the 916.48 MHz band before initiating a session.

Count-off Function
The count-off function permits the Base Access Point to quickly check the status of all network nodes. When the count-off command, AT#C: or AT#C=, is broadcast by the Base Access Point each node responds in a predetermined time slot. The time slot is determined by the address assigned to the node. The node's response to the count-off command contains a user-programmable 8 byte data packet. This data packet is programmed with the AT#E: or AT#E= command. The count-off function can also be initiated from an XE900M acting as the network hub.

Data Packets
The XE924M places all data incoming across the modem link into packets. Likewise the XE900M places all of the data arriving through its serial port into packets. These packets providing addressing and error correction for the wireless communications link. The communications controllers in the XE900M and XE924M place the data in packets only for the wireless link. The data is extracted from the packets before being sent to the modem or to the XE900M serial port.

Wireless Link to Modem Link Translation
Data on the wireless link travels in packets at 9600 BPS. The communications controller strips the data from the packets before transmitting it through the modem. Because the maximum data rate of the modem connection is 2400 BPS, the communications controller buffers the data, and sends it to the modem at 2400 BPS. While this is happening any incoming data from the modem has to be buffered and held until the wireless channel can be reversed. When the wireless channel is available to transmit, the data in the buffer is put into packets and transmitted over the 900 MHz transceiver at 9600 BPS.

The communications controller also manages the modem's connections. AT commands entered at the remote node are placed in packets and passed across the wireless link by the XE900M. The XE924M Communications Controller removes the command from the packet, passes it to the modem, and waits for a modem response. The modem response is put in a packet and returned to the XE900M equipped node.

The routing of incoming modem calls will also be handled by the communications controller. After the modem answers the incoming call and establishes the connection, the XE924M Communications Controller waits for entry of the desired node address before directing the call to the proper node.

XE924M EMBEDDED MODEM

The modem embedded in the XE924M includes FCC Part 68 Registration. This registration can be applied to user equipment without additional certification testing.

Modem Control

Industry standard AT Commands perform the control and configuration of the embedded modem. To change modem configuration or to initiate call, the remote node on the 900 MHz network sends the desired AT commands across the wireless link as data. The XE924M communications controller passes the AT commands to the modem where they are executed. The modem responses are returned across the wireless link to the remote node.

Command Line Format

Command lines issued to the modem follow a strict format. Each command begins with the prefix AT and ends with a Carriage Return. The XE924M communications controller sends all commands to the embedded modem at 2400 BPS. The modem uses the AT command prefix to automatically determine the parity of the incoming characters.

Command Prefix - Each command, except the A/ command, begins with the AT prefix. The "A" and "T" may be either both upper case or both lower case but cannot be of different cases. The prefix identifies the speed and parity of the commands sent to the modem by the host. Speed is determined by measuring the width of the incoming bits. Parity is determined by comparing the parity bit of the "A" and the "T."

Command Line - Commands may be strung together in a single command line of up to 36 characters. The modem executes the commands in the command string in the sequence they appear. Spaces inserted into the command line do not fill space in the modem's command buffer. A Carriage Return terminates the command line and causes the commands to be executed. Register S3 allows the user to select a character other than a Carriage Return to terminate the command line.

Re-Execute Last Command - The A/ command re-executes the last command line. This is the only command which does not require the "AT" prefix.

Omitted Parameters - Most commands include a parameter which determines the function setting. When the command parameter is omitted from the command string, it is assumed to be a 0.

Result Codes - The modem normally issues a result code after each action. Result codes may be provided as full words, one or two digit numeric codes, or may be disabled. Each result code ends with a Carriage Return when numeric result codes are chosen. When full word result codes are chosen, a Line Feed and Carriage Return precede and follow each result code.

Escape Sequence - A specific character repeated three times ins succession switches the modem from data mode to command mode. The character used in this sequence is defined by register S2. The default sequence is "+++." An AT Command must be entered within the period defined by S12 to complete the switch to command mode.

Embedded Modem AT Commands

An asterisk indicates the factory default

A - Answer Command - forces the modem to go off-hook in answer mode

Bn - Select Communications Standard

n=0 Selects CCITT standards
n=1 Selects Bell standards*
n=2 Selects V.23/Bell 202 (see S37)

D - Dial Command -

0-9, A-D, #, * = Dialing Digits
P = Pulse dial
T = Tone dial
R = Connect as an answering modem
W = Wait for dial tone
, = Pause for the duration of S8
@ = Wait for silence
! = Switch hook flash
; = Return to the command state
S=n = Dial Stored Number n

En - Command Echo

Enabling the command echo on the embedded modem will reduce the efficiency of the wireless link and is not recommended

Hn - Switch Hook Control -

n=0 Switch hook relay opens
n=1 Switch hook relay closes

In - Modem Identification

On - On Line

n=0 Return On Line with no retrain*
n=1 Initiate retrain while returning On line.

Qn - Responses

n=0 Send responses *
n=1 No Responses

Sr? - Interrogate Register -

Sr=n - Set Register Value -

Vn - Result Codes -

n=0 Numeric Result Codes
n=1 English Word Result Codes*

Xn - Result Code Set -

n=0 Responses 0-4
n=1 Responses 0-5 & 10
n=2 Responses 0-6 & 10
n=3 Responses 0-5, 7 & 10
n=4 Responses 0-7 & 10*

&F - Reset Factory Defaults

&Gn - Guard Timer -

n=0 None *
n=1 550 Hz Guard Timer
n=2 1800 Hz Guard Timer

%En - Automatic Retrain

n=0 Automatic Retrain Disabled
n=1 Automatically retrain on poor signal quality *

\Nn - Data Buffering

n=0 Data Buffered
n=1 Direct Mode no data buffering *

Embedded Modem Registers

S0 **Answer on nth Ring:** S0 sets the modem to automatically answer on the nth ring. Setting S0 to 0 disables automatic answer.
Range: 0 to 255
Units Rings
Default 0

S1 **Ring Count:** S1 is a read-only register showing the number of rings detected. If a ring is not detected within 8 seconds, S1 is reset to zero.
Range: 0 to 255
Units Rings
Default 0

S2 **Escape Character:** S2 determines the ASCII escape character. Values of 0-127 select valid ASCII escape characters; values from 128 to 255 disable the escape sequence.
Range: 0 to 255
Units ASCII Character
Default 43 (+)

S3 **Line Termination Character:** S3 determines the ASCII character which will terminate commands and modem responses.
Range: 0 to 127
Units ASCII Character
Default 13 (Carriage Return)

S4 **Line Feed Character:** S4 sets the ASCII character to act as a line feed character in modem responses.
Range: 0 to 127
Units ASCII Character
Default 10 (Line Feed)

S5 **Backspace Character:** S5 defines the ASCII character used as a backspace to edit the command line.
Range: 0 to 127
Units ASCII Character
Default 8 (Back Space)

S6 **Dial Tone Wait Time:** S6 determines how long the modem waits for dial tone before dialing begins. The Dial Tone Wait Time cannot be set to less than two seconds.
Range: 2 to 255
Units Seconds
Default 2

S7 **Wait for Carrier after Dialing:** S7 determines how long the modem waits for a valid carrier signal after dialing is completed.
Range: 1 to 255
Units Seconds
Default 30

S8 **Comma Pause Time:** S8 defines the duration of the pause initiated by a comma in the dialing string. The pause is generally used when waiting for a second dial tone.
Range: 1 to 255
Units Seconds
Default 2

S9 **Carrier Detect Response Time:** S9 establishes the length of time the remote modem's carrier must be present to be recognized as valid.
Range: 1 to 255
Units 0.1 Seconds
Default 6

S10 **Carrier Off Disconnect Delay**: S10 selects how long carrier must be lost before the modem disconnects. Note: If S10 is smaller than the value of S9 or S10 is set to 255, the modem will not automatically disconnect on loss of carrier.
Range: 1 to 255
Units 0.1 Seconds
Default 14

S11 **Tone Dialing Speed:** S11 sets the duration and spacing of the dialing tones. S11 does not affect the pulse dialing rate.
Range: 50 to 255
Units 1 Millisecond
Default 95

S12 **Escape Code Guard Timer:** S12 sets the escape sequence guard timer. If characters are received before or after the escape sequence, within the guard timer, the modem aborts the escape attempt and remains in data mode.
Range: 0 to 255
Units 0.02 Seconds
Default 50

Embedded Modem Registers continued

S28 **Inactivity Timer:** S28 determines how long the modem will remain on line with not data flowing. A 0 in this register disables the inactivity time out.

Range: 0-255
Units Minutes
Default 0

S29 **Hook Flash Time**: S29 determines the amount of time the modem will go on-hook when a hook switch flash is called for.

Range: 0-255
Units 0.02 Seconds
Default 25

S37 **Maximum Line Data Rate:** S37 sets the maximum line data rate or modulation technique that the modem will support for any connection.

Register Value	Communications Supported
0	Maximum Data Rate determined by the autobaud function of the AT Command
1	Connect using V.23, asymmetrical modem modulation, 1200/75 BPS
2	Connect using Bell 202, asymmetrical modulation, 1200/150 BPS
3	V.21, Bel 103, 300 BPS
4	Reserved
5	V.22, Bell 212A 1200 BPS
6	V.22bis 2400 BPS

Embedded Modem Responses

Numeric	Full Word	Description
0	OK	Successfully executed command line
1	CONNECT	300 bps connection
2	RING	Ring signal detected
3	NO CARRIER	Carrier not detected/lost
4	ERROR	Error in command line
5	CONNECT 1200	1200 bps connection
6	NO DIAL TONE	No dial tone detected
7	BUSY	Busy signal detected
8	NO ANSWER	5 second silence not detected
10	CONNECT 2400	2400 bps Connection
16	CONNECT 1200TX/75RX	V.23 Connection transmitting at 1200 BPS
17	CONNECT 75TX/1200RX	V.23 Connection transmitting at 75 BPS
18	CONNECT 1200TX/150RX	Bell 202 Connection transmitting at 1200 BPS
19	CONNECT 150TX/1200RX	Bell 202 Connection transmitting at 150 BPS

AT COMMANDS FOR 900 MHZ TRANSCEIVER

Interface

When a communications are initiated from the remote modem, the XE924M switches to its wireless AT commands after the modem connection is established. These AT commands control the configuration of the wireless link.

Command Line Format

Wireless Command lines issued to the XE924M follow the same format as those of the modem AT commands Each command begins with the prefix AT and ends with a carriage return. All AT commands are issued to the communications controller at the modem data rate; there is no autobaud function. The modem uses the AT command prefix to automatically determine the parity of the incoming characters.

Command Prefix - Each command, except the A/ command, begins with the AT prefix. The "A" and "T" may be either both upper case or both lower case but cannot be of different cases. The prefix identifies parity of the commands by comparing the parity bits of the "A" and the "T" characters.

Command Line - Commands may be strung together in a single command line of up to 36 characters. Commands in the command string are executed in the sequence they appear.

Omitted Parameters - Most commands include a parameter which determines the function setting. When the command parameter is omitted from the command string, it is assumed to be a 0.

Result Codes - The modem normally issues a result code after each action. Result codes may be provided as full words, one or two digit numeric codes, or may be disabled all together. Each result code ends with a carriage return when numeric result codes are chosen. When full word result codes are chosen, a Line Feed and Carriage Return precede and follow each result code.

Disconnect Sequence - A three character sequence initiates a disconnect of the wireless link. The sequence "~~~" is assigned to disconnect the link.

Embedded Wireless AT Commands

An asterisk indicates the factory default

A **Answer Command** - forces the smart transceiver respond to a summons from another wireless device.

Dn **Initiate a Wireless Link** - attempts to establish a connection with the transceiver at address n.

In **Identification** - displays product identification code.

n=0 Display Product Code

n=1 Display Product Name

n=2 Display Model Number

n=3 Display Copyright

n=4 Display Firmware Revision

Qn **Result Code Display** - determines if results codes will be displayed.

n=0 Display Result Codes *

n=1 Do not Display Result Codes

Sn= **Set Value of Register Sn**

Sn=? **Read Value of Register Sn**

Vn **Response Type** - selects Full Word or Numeric responses

n=0 Numeric Responses

n=1 Full Word Responses *

Zn **Reset** - executes a soft Reset

n=0 Reset to Values Stored in User Profile 0 *.

n=1 Reset to Values Stored in User Profile 1

&F **Restore Factory Settings** - returns all configuration commands and registers to their factory default values.

&V **View Active Configuration** - sends the active configuration data to the system host.

&Wn **Store Current Configuration** - loads the current XE900M configuration into either User Profile 0 or User Profile 1.

n=0 load configuration into User Profile 0

n=1 load configuration into User Profile 1

#B **Wireless Broadcast Mode** - initiates wireless broadcast mode for diagnostic purposes.

#C: **Count-Off Request (ASCII)** - Initiates a “count-off” sequence in the network with node status to be reported in ASCII format.

#C= **Count-Off Request (Hex)** - Initiates a “count-off” sequence in the network with node status to be reported in hexadecimal format.

#Ln **Check RSSI Level** - Displays current Wireless received signal levels

n=0 Display a single value *

n=1 Display 4 Values

n=2 Display continuous values

Wireless Configuration Registers

S0 **Answer Wireless Link Request:** S0 determines if the XE900M will automatically respond to a wireless link request.

S0=0 No Automatic response to link requests

S0=1 Automatically respond to link requests

S2 Wireless Disconnect Character - S2 sets the ASCII character to be used in the link disconnect sequence. The default character is the tilde "~".

Range: 0-255

Default: 126

S12 Disconnect Guard Timer - S12 sets the value of the guard timer in milliseconds before and after the disconnect sequence. If any characters other than the disconnect sequence are received within the window defined by S12 the link will not be disconnected.

Range: 0-255

Default: 40

Units: Milliseconds

S14 Bit-mapped Register - S14 stores the values of the ATQ and ATV commands.

S105 XE900M ID Number - S105 sets the ID number for the XE900M. Each unit on the Base Access Network is required to have a unique ID number. The ID number of the Base Access Point is always 1.

Range: 2-254

S106 Set Noise Threshold - S106

S108 Transmit Level Control - S108 sets the transmit level for the XE900M.

Range: 0-63

Default: 4

Units:

S110 Set Frequency Channel - S110 selects the frequency channel for wireless communications. 126 channels are spaced at 200KHz intervals from 902.5 to 927.5 Mhz

Range: 1-126

Default: 71 (916.5 MHz)

Wireless Responses

Numeric	Full Word	Description
0	OK	Successfully executed command line
1	CONNECT RF	Wireless Connection Established
2	RING	Wireless Link Request Detected
3	DISCONNECT	Failed to Establish or Lost Wireless Link
4	ERROR	Error in command line
7	BUSY	Link Request Time Out has occurred
9	WAIT	Wireless Link is not available

XE924M COMMUNICATIONS FREQUENCIES

The XE924M utilizes 126, 200 KHz channels for data transfer. The communications channel is selected by Register S110. The address for the communications channels are shown below.

Channel Address	Frequency (MHz)	Channel Address	Frequency (MHz)	Channel Address	Frequency (MHz)	Channel Address	Frequency (MHz)
1	902.5	33	908.9	65	915.3	97	921.7
2	902.7	34	909.1	66	915.5	98	921.9
3	902.9	35	909.3	67	915.7	99	922.1
4	903.1	36	909.5	68	915.9	100	922.3
5	903.3	37	909.7	69	916.1	101	922.5
6	903.5	38	909.9	70	916.3	102	922.7
7	903.7	39	910.1	71	916.5	103	922.9
8	903.9	40	910.3	72	916.7	104	923.1
9	904.1	41	910.5	73	916.9	105	923.3
10	904.3	42	910.7	74	917.1	106	923.5
11	904.5	43	910.9	75	917.3	107	923.7
12	904.7	44	911.1	76	917.5	108	923.9
13	904.9	45	911.3	77	917.7	109	924.1
14	905.1	46	911.5	78	917.9	110	924.3
15	905.3	47	911.7	79	918.1	111	924.5
16	905.5	48	911.9	80	918.3	112	924.7
17	905.7	49	912.1	81	918.5	113	924.9
18	905.9	50	912.3	82	918.7	114	925.1
19	906.1	51	912.5	83	918.9	115	925.3
20	906.3	52	912.7	84	919.1	116	925.5
21	906.5	53	912.9	85	919.3	117	925.7
22	906.7	54	913.1	86	919.5	118	925.9
23	906.9	55	913.3	87	919.7	119	926.1
24	907.1	56	913.5	88	919.9	120	926.3
25	907.3	57	913.7	89	920.1	121	926.5
26	907.5	58	913.9	90	920.3	122	926.7
27	907.7	59	914.1	91	920.5	123	926.9
28	907.9	60	914.3	92	920.7	124	927.1
29	908.1	61	914.5	93	920.9	125	927.3
30	908.3	62	914.7	94	921.1	126	927.5
31	908.5	63	914.9	95	921.3		
32	908.7	64	915.1	96	921.5		

FCC Part 68 Instructions

The information shown below must appear in the users manual for the system in which the XE924M is used.

The XE2420 used in the XE924M complies with part 68 of the FCC Rules and Regulations. With each device shipped, there is a label which contains, among other information, the FCC Registration Number and Ringer Equivalence Number (REN) for this product. You must, upon request, provide this information to your telephone company.

The mounting of this device in the final assembly must be made in such a manner as to preserve the high voltage protection between the TIP/RING Connection and the rest of the system. Typically, this may be accomplished by maintaining a minimum spacing 100 mils between the TIP/RING Traces to the RJ-11C Jack and low voltage portion of the system. No additional circuitry may be attached between TIP/RING and the telephone line connection, unless specifically allowed in the rules.

The REN is useful to determine the quantity of devices you may connect to a telephone line and still have all of these devices ring when the number is called. In most, but not all areas, the sum of the RENs of all devices connected to one line should not exceed five (5.0). To be certain of the number of devices you may connect to the line, as determined by the REN, you should contact the local telephone company to determine the maximum REN for you calling area.

If your system causes harm to the telephone network, the telephone company may discontinue service temporarily. If possible, they will notify you in advance. If advance notification is not practical, you will be notified as soon as possible.

Your telephone company may make changes in its facilities, equipment, operations or procedures that could affect proper functioning of your equipment. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.

If you experience trouble with this device, please contact XECOM at (408) 945-6640 for information on obtaining service or repairs. The telephone company may ask you to disconnect this device from the network until the problem has been corrected or until you are sure that the device is not malfunctioning.

The device may not be used on coin service lines provided by the telephone company (this does not apply to private coin telephone applications which use standard telephone lines). Connection to party lines is subject to state tariffs.

FCC Part 15 Compliance

The XE924M is designed to comply with FCC Part 15 rules, however, it is not FCC approved. The XE924M is not eligible for FCC approval because it is a component which requires the addition of other components to function. These other components include the power supply, antenna, and printed circuit board. Any of these other components could affect FCC Part 15 compliance if not properly designed.

Approvals may be required of your system before it can be sold in the united States or other countries. The XE924M is subject to rules governing both intended and unintended radiation. The 900 MHz transceiver must transmit its signal in compliance with FCC Part 15 rules governing intended radiation. Part 15 rules also govern unintended radiation sources such as the Telephone line cable connected to the XE924M. Your system will have to be approved before it can be sold; however, because the XE924M utilizes the 900 MHz ISM band, your customers will not require an FCC license.

Terms of Sale

Devices sold by XECOM are covered by the warranty provisions appearing in its Terms of Sale only. XECOM makes no warranty, express, statutory, implied, or by description regarding the information set forth herein, or regarding the freedom of the described devices from patent infringement. XECOM makes no warranty of merchantability or fitness for any purposes. XECOM reserves the right to discontinue production and change specifications and prices at any time and without notice. This product is intended for use in normal commercial applications. Applications requiring extended temperature range, unusual environmental requirements, or high reliability applications, such as military, medical life-support or life-sustaining equipment, are specifically not recommended without additional processing and authorization by XECOM for such application.

Xecom assumes no responsibility for the use of any circuitry other than circuitry embodied in a Xecom product. No other circuits, patents, or licenses are implied.

Life Support Policy

Xecom's products are not authorized for use as Critical Components in Life Support Devices or Systems.

Life Support Devices or Systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions provided in the labeling, can be reasonably expected to result in significant injury to the user.

A Critical Component is any component of a life support device or system whose failure to perform can be reasonably expected to cause failure of the life support device or system, or to affect its safety or effectiveness.

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