SAGE INSTRUMENTS, 240 AIRPORT BLVD., FREEDOM, CA 95019-2614 Ph (831) 761-1000 Fax (831) 761-2452 www.sageinst.com



APPLICATION NOTE

V.22bis Modem Emulator Test Function for Sage 960B

This document briefly describes the new V.22bis Modem Emulator test function for the Sage Model 960B IP Telephony Set, and how to run it. The Modem Emulator function supports test access at metallic analog and PCM interfaces. For simplicity, the example setup assumes both ends of the circuit are metallic analog 2-wire.

Background

A V.22bis modem is commonly used by point-of-sale terminals such as credit card readers. In these applications, the terminal dials a central server and exchanges data.

As voice gateways are replacing legacy circuit-switches, such terminals frequently encounter mysterious problems and stop working. The goal of this test is to emulate such modem calls and find problems.

A V.22bis modem is a full duplex modem, operating at either 2400 or 1200 bps. As noted above, the calling side is the sales *terminal*, and the answering side is the *server*. So, in our test, there is a V.22bis *terminal* emulator and a V.22bis *server* emulator. The "terminal" side must be the call originator (Director), and the "server" side must be the answering side (Responder).

Note that you can't use just a single "Term" or "Server" function in conducting tests. This is because 960B "Term" and "Server" test functions each transmit a known "BER" (bit-error rate) test pattern after passing the initial handshaking. The receiver at each end synchronizes to the pattern and detects all errored bits.

The test provides the following data:

- 1. A real-time text status display showing the progression through the stages of the call
- 2. Total received number of bits
- 3. Number of bit-errors
- 4. EVM (error-vector-magnitude) EVM is a parameter that characterizes how good or bad the modulation quality is.
- A graphical "constellation" display — If the received signal is good (meaning the communication channel under test did not add much noise or other impairments), the received signals will converge to the constellation points.

- DUCK FIDILE	Save Cancel	Dial Digits	Turn Audio Off	Enable Log	Save PCM
Interface: Pots1		•	Run	Diagn Ida	On Off
IF Status: No E	rrors	Manual	Stop	I Nebi Pio	ok(IX) C
Test Type: V22b	is Term	- Configure	Test Statu	s: Stopped()	
Call Setup: Dial !	5551212	Configure	Pass / Fail	ss / Fail Monit	or Enabled
Load Type: Fixed	d Delay	• Configure	Attempted	Calls: 1	of: 1
Log To: C:\Pr	ogram Files\Sage Inst	tru Configure	Failed	Calls: 0	
Stats VF Test	•]				
Started Unscrambled b Sending S1 seq Send scramble Send scramble	pinary detected juence d binary: 1200bps d binary: 2400bps	Bit Errors: Total Bits: EVM (%):	0 71656 0.9	4 3 2 1 0 -1	
Send scramble Test completed	d binary: selected b d successfully	Pause		-2 -3	

Figure 1 — V.22bis Term Test Results

Procedure

Configure the Terminal (Director) Side

- 1. Configure the 960B analog port for 2-Wire 600 ohms
 - a. Click the "Home" button located at the top of the Sage 96x Windows GUI (graphical user interface) screen
 - b. Double-click on the desired test access interface, then click on the "Configure" button located at the left of the display.
 - c. In the resulting display, locate the "Mode:" window, then click on the corresponding drop down arrow, and select "2-Wire 600 Ohm" as illustrated in *Figure 2*, at right.



Figure 2 – Select 2-Wire 600 ohm

- 2. Click the "Back" button located at the upper left of the display.
- 3. In the resulting "Span View" window, double-click on the channel 1 line.
- 4. In the resulting screen, locate the "Test Type" window. Click on its associated drop-down arrow and select "V22bis Term, as shown in *Figure 3*, at right.
- 5. Click the Save button at the upper left of the screen.



Figure 3 — Select V22bis Term

- 6. Locate the Configure button associated with the "Test Type" window and click it.
- You will now see a "Configure V22bis Emulator" dialog box, as shown in *Figure 4*, at right. Here, you can change the
 Transmit signal level
 - a. Transmit signal level
 - b. Test signal duration
 - c. Bit rate to 1200 or 2400 bits-per-second *Note:* Insure that your bit rate setting for the Term and Server ends match (i.e. either 1200 or 2400)
- 8. Once you have made any desired changes, click the OK button to accept them.

		_		
Tx Level(dBm):	-12		ОК	
Duration(sec):	30	_	Cancel	
Bit Rate:	2400	·		
EC Disable Tone				
Freq (Hz): 2100 Level (dBm): -12 Phase Jump				
Ph Jump(Deg):	180	# Cycle	s: 3	
Ph Dur(ms):	450	-		
Modulation				
		Mod Toda	× 02	

Figure 4 — *Terminal* Emulator Config

- 9. To save a log of the test results as seen by the *Terminal* (Director) end, locate the "Log To" window and click on its associated "Configure" button.
- 10. In the resulting Log Configuration dialog box (See *Figure 5* below), you can:
 - a. Select whether to have the program log the test configuration data
 - b. Change the default log file and path name, as desired.
 - c. When you are done, click the OK button to accept the changes

C Log Failure/Error				
 Log Fallure/Error Log Every 1 	(1~1000) Results			
C Log Every 3	(3~1000) Second	ls		
C Log Final Result				
Print Configuratio	n Data (will print everyt	ime test starts ru	nning)	
o File: C:\Program	Files\Sage Instruments\!	960\results\Testl	Log.csv	Browse

Figure 5 — Log Configuration Dialog Box

Configure the Server (Responder) Side

- 1. Configure the 960B analog port for 2-Wire 600 ohms
 - a. Click the "Home" button located at the top of the Sage 96x Windows GUI (graphical user interface) screen
 - b. Double-click on the desired test access interface, then click on the "Configure" button located at the left of the display.
 - c. In the resulting display, locate the "Mode:" window, then click on the corresponding drop down arrow, and select "2-Wire 600 Ohm" as illustrated in *Figure 6*, at right.



Figure 6 – Select 2-Wire 600 ohm

- 2. Click the "Back" button located at the upper left of the display.
- 3. In the resulting "Span View" window, double-click on the channel 1 line.
- 4. In the resulting screen, locate the "Test Type" window. Click on its associated drop-down arrow and select "V22bis Server, as shown in *Figure 7*, at right.

- 5. Locate the Configure button associated with the "Test Type" window and click it.
- 6. You will now see a "Configure V22bis Emulator" dialog box, as shown in *Figure 8*, at right. Here, you can change the
 - a. Transmit signal level
 - b. Test signal duration
 - c. Bit rate to 1200 or 2400 bits-per-second *Note:* Insure that your bit rate setting for the Term and Server ends match (i.e. either 1200 or 2400)
 - d. Parameters of the echo canceller disabler signal
- 7. Once you have made any desired changes, click the OK button to accept them.

Figure 7 — Select V22bis Server

V22bis Server

Digit Analyzer

MOS Transmit

MOS Receive

PESQ Transmit PESQ Receive Remote Audio 105 Director 10x Responder Fax Monitor 23-Tone Test V22bis Term V22bis Server PESQ File Dir PESQ File Resp V90 Modem Monito

Digit Sender One-Way Delay TX One-Way Delay RX ٠

Configure V22his Emulator	IX
	<u></u>
Tx Level(dBm): -12	ОК
Duration(sec): 30	Cancel
Bit Rate: 2400	•
EC Disable Tone	
Freq (Hz): 2100 Phase Jump Ph Jump(Deg): 180 Ph Dur(ms): 450	Level (dBm): -12 # Cycles: 3
Modulation Freq: 15	Mod Index: 0.2

Figure 8 — Server Emulator Config

- 8. To save a log of the test results as seen by the *Server* (Responder) end, locate the "Log To" window and click on its associated "Configure" button.
- 9. In the resulting Log Configuration dialog box (See *Figure 9* below), you can:
 - a. Select whether to have the program log the test configuration data
 - b. Change the default log file and path name, as desired.
 - c. When you are done, click the OK button to accept the changes

Configuration				
V22bis Server				
C Log Failure/	Error			
C Log Every	1 (1~1000) Results			
C Log Every	3 (3~1000) Second	is		
C Log Final R	esult			
Print Config	aration Data (will print every	ime test starts running))	
to File: C:\Pro	gram Files\Sage Instruments\	960\results\TestLog.cs	sv	Browse
			OK	Cancel

Figure 9 — Log Configuration Dialog Box

Start the Test

- 1. If you are not already at the *Server* (Responder) test screen navigate to it, then click the "Run" button located near the upper right of the screen.
- 2. Now, navigate to the *Term* (Director) test screen, then click the "Run" button located near the upper right of the screen.
- 3. As the call progresses, the "VF Test" tab of each end will display the following:
 - a. Major steps of the test
 - b. Number of bit errors detected
 - c. Total number of bits transmitted
 - d. %EVM (error-vector-magnitude)
 - e. A graphical "constellation" display of the received signal

This concludes the description of the V.22bis Modem Emulator test function, and an example setup procedure.

This Application Note is made available as a courtesy to our customers, in the hope it will be helpful. However, it is provided "as is" without warranty of any kind, either express or implied.

If you have any questions or comments, please contact Sage Technical Support by e-mail at <technicalsupport@sageinst.com,> or by phone at (831) 761-1000 Option 4.