



# Eye-BERT 100G Software Programming Guide

## Overview:

The Eye-BERT 100G allows remote control and monitoring via either USB or optional Ethernet connection. Once a connection is made to the driver using one of these interfaces, all command and control is the same regardless of which interface is used.

## USB Interface:

In order for Windows to recognize the Eye-BERT 100G USB port the USB driver must first be installed, after which the Eye-BERT 100G appears as an additional COM port on the computer. Currently Windows XP, Vista, 7, and 8 are supported. Windows 7 requires the extra step listed below; Windows 8 requires additional steps which can be found in the following application note:

<http://www.spectronixinc.com/Downloads/Installing%20Under%20Windows%208.pdf>

1. Copy the file "cdc\_NTXPV764.inf" from the supplied CD to the hard drive.
2. Plug the Eye-BERT 100G into a free USB port. When the hardware installation wizard asks for the driver location, browse to the "cdc\_NTXPVista.inf" file on the hard drive.
3. After the driver has been installed right click "my computer" and select "properties". In the properties window select the "hardware" tab. Click on "device manager" and expand the "Ports (COM & LPT)" item. Locate the "Spectronix, Inc." entry and note the assigned COM number, (ie "COM4"). This is the COM port that the software will use to communicate with the Eye-BERT 100G .

Note, on some operating systems such as Window 7, manual USB driver installation may be necessary. If the hardware installation wizard fails, go to "My Computer" > "Properties" > "Hardware" > "Device Manager", and find the "Spectronix" or "SERIAL DEMO" entry under "Other Devices" and select "Update Driver". At this point you will be able to browse to the location of the driver.

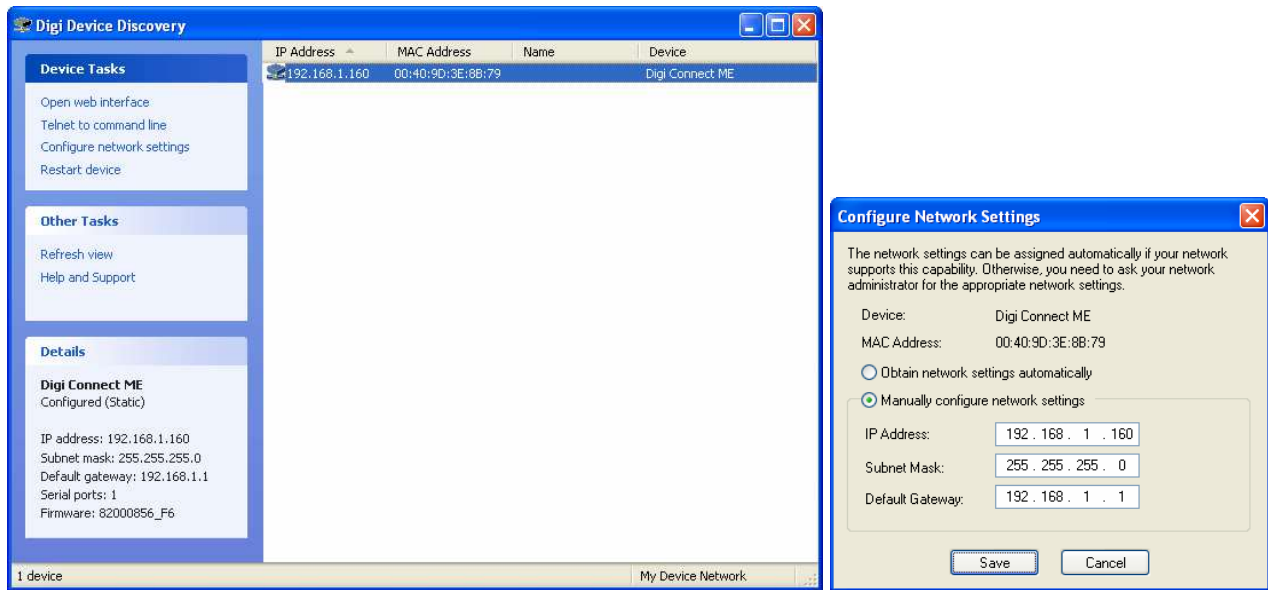
## Optional Ethernet Interface:

The Eye-BERT 100G communicates using TCP/IP on port number 2101 and is shipped with a default IP address of 192.168.1.161.

### Changing the IP Address

The Digi Device Discovery utility allows the user to retrieve and change Noise Eater IP address. The installation program "40002265\_G.exe" can be found on the Spectronix or Digi web sites.

After installing the utility, disable Windows Firewall and any other virus or firewall programs and start the program. The program will report the IP and MAC addresses of all compatible devices on the network. Right click on the device and select "Configure Network Settings" to change the network settings.



## Updating the Firmware:

It is possible for the user to update the Eye-BERT 100G firmware over the USB or optional Ethernet port using the Spectronix Bootloader application which can be found on the included CD or downloaded from the Spectronix web site. With the unit powered off press and hold the recessed programming button while turning on the main power switch, the LED will turn solid green. Release the button and follow the bootloader user's manual for instructions on loading the firmware.

## Commands:

The Eye-BERT 100G uses ASCII data to communicate with a host computer; the tables below list the individual commands, parameters, and responses from the Noise Eater.

### Notes:

1. All communication is initiated by the host.
2. Commands are not case sensitive.
3. A space or equal sign should be inserted between the command and any parameters.
4. All commands should be terminated with a <CR> <LF>.
5. Responses from the Eye-BERT 100G are initiated with >0x00> and terminated with <CR> <LF> <0xFF>.

Get Unit Information and driver status	
Command:	Example / Parameters:
"?"	(none)
Response:	Example / Parameters:
Start of message	<0x00>
Command echo	?,
Unit name	100416A,

Firmware Rev	000.000,
Termination	CR / LF <0xFF>
Notes:	

Get SPF Information	
Command:	Example / Parameters:
"InfoSFP"	(none)
Response:	Example / Parameters:
Start of message	<0x00>
Command echo	InfoSFP:
SFP Vendor name	(Printable SFP information, PN, vendor, SN, etc)
Termination	CR / LF <0xFF>
Notes:	

Get SPF Information	
Command:	Example / Parameters:
"ReadSFP"	(none)
Response:	Example / Parameters:
Start of message	<0x00>
Command echo	ReadSFP
SFP Vendor name	(Printable SFP register values)
Termination	CR / LF <0xFF>
Notes:	

Get QSPF Information	
Command:	Example / Parameters:
"InfoQSFP"	(none)
Response:	Example / Parameters:
Start of message	<0x00>
Command echo	InfoQSFP:
SFP Vendor name	(Printable QSFP information, PN, vendor, SN, etc)
Termination	CR / LF <0xFF>
Notes:	

Get SPF Information	
Command:	Example / Parameters:
<b>"ReadQSFP"</b>	<b>(none)</b>
Response:	Example / Parameters:
Start of message	<0x00>
Command echo	<b>ReadQSFP</b>
SFP Vendor name	<i>(Printable QSFP register values)</i>
Termination	<i>CR / LF</i> <0xFF>
Notes:	

Read from a QSFP Register	
Command:	Example / Parameters:
<b>"RQSFP"</b>	<b>3 3A</b> <i>[page number] [register in hex]</i>
Response:	Example / Parameters:
Start of message	<0x00>
Command echo	<b>RQSFP</b>
Value	<i>(register value in hex)</i>
Termination	<0xFF>
Notes:	

Write to a QSFP Register	
Command:	Example / Parameters:
<b>"WQSFP"</b>	<b>3 3A F5</b> <i>[page number] [register in hex] [new value in hex]</i>
Response:	Example / Parameters:
Termination	<0xFF>
Notes:	

Get the chassis status and settings	
Command:	Example / Parameters:
<b>"Status"</b>	<b>(none)</b>
Response:	Example / Parameters:
Start of message	<0x00>

Command echo	<b>Status,</b>
Mode	<b>"MA0B00"</b> (see users manual)
Rate	<b>"10312500"</b> (KHz)
PRBS	<b>"31"</b> (PRBS 7,9,11,15,23,31,58,63)
Clock Divide Ratio	<b>"16"</b> (Divide ratio: 2,4,8,16,32)
FIR tap coefficients	<b>"-02"</b> (Pre cursor) <b>"+20"</b> (Main cursor) <b>"+07"</b> (Post cursor)
SMA outputA state	<b>"0"</b> (State: 0=off, 1=on) <b>"+"</b> (Polarity: +=noninverted, -=inverted)
SMA outputB state	<b>"0"</b> (State: 0=off, 1=on) <b>"-"</b> (Polarity: +=noninverted, -=inverted)
SFP output state	<b>"0"</b> (State: 0=off, 1=on) <b>"+"</b> (Polarity: +=noninverted, -=inverted)
QSFP-1 output state	<b>"0"</b> (State: 0=off, 1=on) <b>"+"</b> (Polarity: +=noninverted, -=inverted)
QSFP-2 output state	<b>"0"</b> (State: 0=off, 1=on) <b>"+"</b> (Polarity: +=noninverted, -=inverted)
QSFP-3 output state	<b>"0"</b> (State: 0=off, 1=on) <b>"+"</b> (Polarity: +=noninverted, -=inverted)
QSFP-4 output state	<b>"0"</b> (State: 0=off, 1=on) <b>"+"</b> (Polarity: +=noninverted, -=inverted)
Termination	<b>CR / LF &lt;0xFF&gt;</b>
Notes:	

Read the current measurements	
Command:	Example / Parameters:
<b>"Meas"</b>	<b>(none)</b>
Response:	Example / Parameters:
Start of message	<b>&lt;0x00&gt;</b>
Command echo	<b>Meas, &lt;CR / LF&gt;</b>
SFP Temp	<b>025,</b> (°C), note, if 126, SFP diagnostics not available
QSFP Temp	<b>027,</b> (°C), note, if 126, QSFP diagnostics not available
SFP wavelength	<b>085000,</b> (nm*100)

QSFP wavelength	<b>155052</b> , (nm*100)
SFP Tx power	<b>+012</b> , (dBm*10)
QSFP CDR Enable (Rev 0.1 and above)	<b>"T-"</b> (Transmit CDR on) <b>"-R"</b> (Receive CDR on) <b>"TR"</b> (Transmit and Receive CDRs on) <b>"--"</b> (all CDRs off)
<i>The following fields are repeated for a total of 6 times (SMA, SFP, QSFP1, QSFP2, QSFP3, QSFP4)</i>	
Rx power	<b>-125</b> , (dBm*10), "0000" for SMA channel)
Signal Detect	<b>1</b> , (0=LOS, 1=signal)
Lock Detect	<b>1</b> , (0=LOL, 1=Lock)
Pattern	<b>123</b> , (Inverted*100 + PRBS length, 0=NA) (ex: inverted PRBS23)
New Errors	<b>1</b> , (0=no new errors, 1=at least one new error)
Errors	<b>2.356E+03</b> , (total bit errors)
Test Time (mS)	<b>0000010000</b> , (test time)
Horz Eye Opening	<b>075</b> , (UI * 100)
Vert Eye Opening	<b>650</b> (mV)
Termination	<b>&lt;0xFF&gt;</b>
Notes:	

Set the Bit Rate	
Command:	Example / Parameters:
<b>"SetRate"</b>	<b>"10312500"</b> (KHz)
Response:	Example / Parameters:
Termination	<b>&lt;0xFF&gt;</b>
Notes:	

Sets clock divider ratio	
Command:	Example / Parameters:
<b>"SetClock"</b>	<b>"16"</b> (2, 4, 8, 16, 32)
Response:	Example / Parameters:
Termination	<b>&lt;0xFF&gt;</b>
Notes:	

Sets 25MHz input reference clock	
Command:	Example / Parameters:
<b>"SetRef"</b>	<b>"I"</b> ( <i>I=internal, E=external</i> )
Response:	Example / Parameters:
Termination	<b>&lt;0xFF&gt;</b>
Notes:	

Sets the generator / detector PRBS pattern	
Command:	Example / Parameters:
<b>"SetPRBS"</b>	<b>"31"</b> ( <i>PRBS 7,9,11,15,23,31,58,63</i> )
Response:	Example / Parameters:
Termination	<b>&lt;0xFF&gt;</b>
Notes:	

Sets the wavelength of the SFP	
Command:	Example / Parameters:
<b>"SetSFPWL"</b>	<b>"####.##"</b> ( <i>Wavelength in nm</i> )
Response:	Example / Parameters:
Termination	<b>&lt;0xFF&gt;</b>
Notes:	<i>Example: "setwl=1550.12"</i>

Sets the wavelength of the QSFP	
Command:	Example / Parameters:
<b>"SetQSFPWL"</b>	<b>"####.##"</b> ( <i>Wavelength in nm</i> )
Response:	Example / Parameters:
Termination	<b>&lt;0xFF&gt;</b>
Notes:	<i>Example: "setwl=1550.12"</i>

Change the mode	
Command:	Example / Parameters:
<b>"SetMode"</b>	<b>"MA0B00"</b> ( <i>each place represent a function and each character represents a port, see below</i> )
Response:	Example / Parameters:
Termination	<b>&lt;0xFF&gt;</b>
Notes:	Function: {input} {PRBS out} {TxClock} {RxClock} {SMA Rx}

	{SFP Rx} Port: (0=off, A=OutA, B=OutB, M=SMA, F=SFP, Q=QSFP) "MA0B00": In=SMA, PRBS=OutA, TxClock=OutB.
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Turns the pattern generator output on/off	
Command:	Example / Parameters:
"SetOutput"	<b>[channel] [state]</b> (channel: A=SMAa, B=SMAb, F=SFP, 1:4= QSFP 1:4) (state: '0'=off, '1'=on) <b>"A 1"</b> (turns SMAa on)
Response:	Example / Parameters:
Termination	<0xFF>
Notes:	

Change the polarity of the pattern generator output	
Command:	Example / Parameters:
"SetPol"	<b>[channel] [polarity]</b> (channel: A=SMAa, B=SMAb, F=SFP, 1:4= QSFP 1:4) (polarity: '+' / '-') <b>"F +"</b> (sets SFP output positive)
Response:	Example / Parameters:
Termination	<0xFF>
Notes:	Note, the pattern generator normally outputs an inverted PRBS pattern so inverting the output will effectively make the output non-inverted.

Turns on/off the internal QSFP Tx and Rx CDR (Rev 0.1 and above)	
Command:	Example / Parameters:
"SetQCDR"	<b>[function] [state]</b> (function: T=transmit, R=receive) (state: 0=off, 1=on)
Response:	Example / Parameters:
Termination	<0xFF>
Notes:	



Change the FIR filter tap coefficients or the generator output	
Command:	Example / Parameters:
"SetFIR"	<p><b>[cursor] [value]</b></p> <p>Cursor: 0= pre, 1= main, 2= post, t= auto mode: optimize transmitter, r=auto mode: optimize receiver, m=manual mode</p> <p>Value: pre: +/-15, main: 0:31, post: +/-15</p> <p><b>"1 13"</b> (sets the main cursor to 13)</p> <p><b>"t"</b> (puts the FIR filter in auto mode to optimize the eye at the transmitter output)</p> <p><b>"r"</b> (puts the FIR filter in auto mode to optimize the eye after the receiver equalizer)</p> <p><b>"m"</b> (puts the FIR filter in manual mode)</p>
Response:	Example / Parameters:
Termination	<0xFF>
Notes:	

Re-optimizes the input equalizer	
Command:	Example / Parameters:
"OptEq"	
Response:	Example / Parameters:
Termination	<0xFF>
Notes:	Resets the counters for all BERTs

Reset the BER counters	
Command:	Example / Parameters:
"Reset"	
Response:	Example / Parameters:
Termination	<0xFF>
Notes:	Resets the counters for all BERTs

Scan an eye diagram	
Command:	Example / Parameters:
"Scan"	<p><b>[channel] [scale]</b></p> <p>(channel: 0:15, scale: 1=100, 2=200, 3=300, 4=400mVpp)</p> <p><b>"7 4"</b> (scan CH6, 400mVpp)</p>
Response:	Example / Parameters:

Termination	<b>&lt;0xFF&gt;</b>
Notes:	Channels: M= SMA input, F= SFP input, 1= QSFP1, 2= QSFP2, 3= QSFP3, 4= QSFP4. All other channels are internal.