



Explore Scientific PMC-Eight® Application Note PMC8-AN003: Switching Between the WiFi Interface and the Serial Interface on the iEXOS 100™ Mount Controller



The Explore Scientific PMC-Eight® iEXOS 100™ Mount Control System (Model 1A) uses the Espressif ESP-WROOM-02 WiFi module for wireless access. The ESP-WROOM-02 module can be configured to connect to the ExploreStars™ application (Explore Scientific default) via the UDP/IP protocol OR to the PMC-Eight® ASCOM Driver via the TCP/IP protocol.

Unlike the WiFi module used in the PMC-Eight® Model 2A (Microchip RN-131) the Espressif ESP-WROOM-02 module cannot run both the UDP/IP and TCP/IP protocols at the same time. During the boot process the PMC-Eight® firmware configures the WiFi module based on the selected, stored protocol selection. The firmware command “ESY!” is used to toggle the protocol to either UDP/IP or TCP/IP. The program **Packet Sender** can be used to send the “ESY!” command to specifically switch the WiFi protocol from UDP/IP to TCP/IP. The terminal program **Putty** can then be used to specifically switch the WiFi protocol back from TCP/IP to UDP/IP by sending the “ESY!” command again.

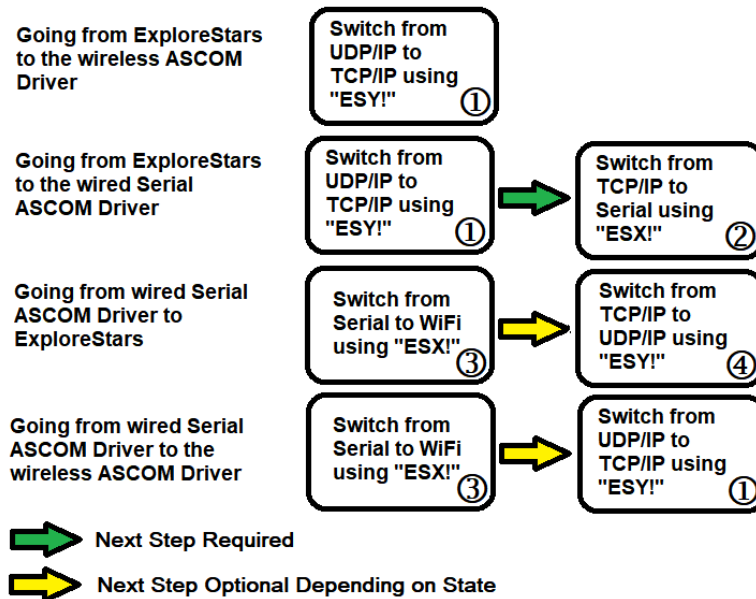
Once you have issued the “ESY!” command and switched to the TCP/IP protocol from the UDP/IP protocol, the terminal program **Putty** can be used to switch the default interface from the WiFi Interface (interface 1) to the PGMR/SERIAL port (interface 0) by sending the “ESX!” command. The PGMR/SERIAL port uses a mini-USB Type B (female) style connector for Data Communications Equipment (DCE). A USB type A (male) to mini-USB Type B (male) cable is required to communicate with the iEXOS 100™ PMC-Eight® when selected to the SERIAL interface (interface 0). These cables can be purchased online or at your local computer electronics supply store.

Once you are connected to the PMC-Eight via the mini-USB Type B (female) PGMR/SERIAL port (interface 0) you can use the program **Parallax Serial Terminal** to enter diagnostic mode to perform other functions or connect the PMC-Eight ASCOM Driver using the serial port connection. You can again switch the default interface back to the WiFi Interface (interface 1) by issuing the “ESX!” command over the PGMR/SERIAL port (interface 0). The **Parallax Serial Terminal** program is used to perform this switch back to the WiFi Interface (interface 1). The WiFi protocol will be either TCP/IP or UDP/IP depending on where you left it last when issuing the “ESY!” command.

WORKFLOW DIAGRAM

Use the Workflow Diagram to identify the procedures to perform for each specific switching configuration you require. The procedure numbers (circle number) are indicated in each box below.

Switching PMC-Eight Communications Interface



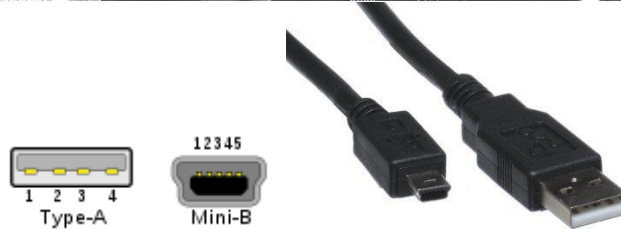
REQUIRED ITEMS

NOTE: The software items listed below are FREE and can be downloaded from the links shown below.

1. PMC-Eight® Control System Box and Power Supply.
2. Microsoft Windows® PC System with Internet Access.
3. USB type A to mini-USB type B cable.
4. Packet Sender program <https://packetsender.com/>
5. Putty terminal program <https://www.chiark.greenend.org.uk/~sgtatham/putty/>
6. Parallax Serial Terminal <https://www.parallax.com/downloads/parallax-serial-terminal>

APPLICABLE PMC-Eight Hardware/Firmware Versions

1. PMC-Eight® System Controller version 1A-01C or later. (Only used in the iEXOS 100).
2. PMC-Eight® System Controller Firmware version 10B01 or later.



SERIAL communications port mini-USB Type B and USB type A connectors and cable.

SETUP PROCEDURE

First, install both programs by following the installation instructions included in the installation. The TELNET parameters to connect to the PMC-Eight® for **Putty** are:

IP ADDRESS: 192.168.47.1
PORT: 54372

The serial port parameters to connect to the PMC-Eight® for **Putty** and the **Parallax Serial Terminal** are:

BAUD Rate: 115200
Data Bits: 8
Stop Bits: 1
Parity: NONE
Flow Control: NONE

Procedure ①

Switch from UDP/IP to TCP/IP using the “ESY!” command

NOTE: This procedure assumes that you start with the delivered configuration of the PMC-Eight® with the WiFi interface enabled.

1. Launch the program **Packet Sender**
2. Power up your iEXOS 100™ mount
3. Switch your computer over to the PMC-Eight-xxxx SSID specific to your controller.

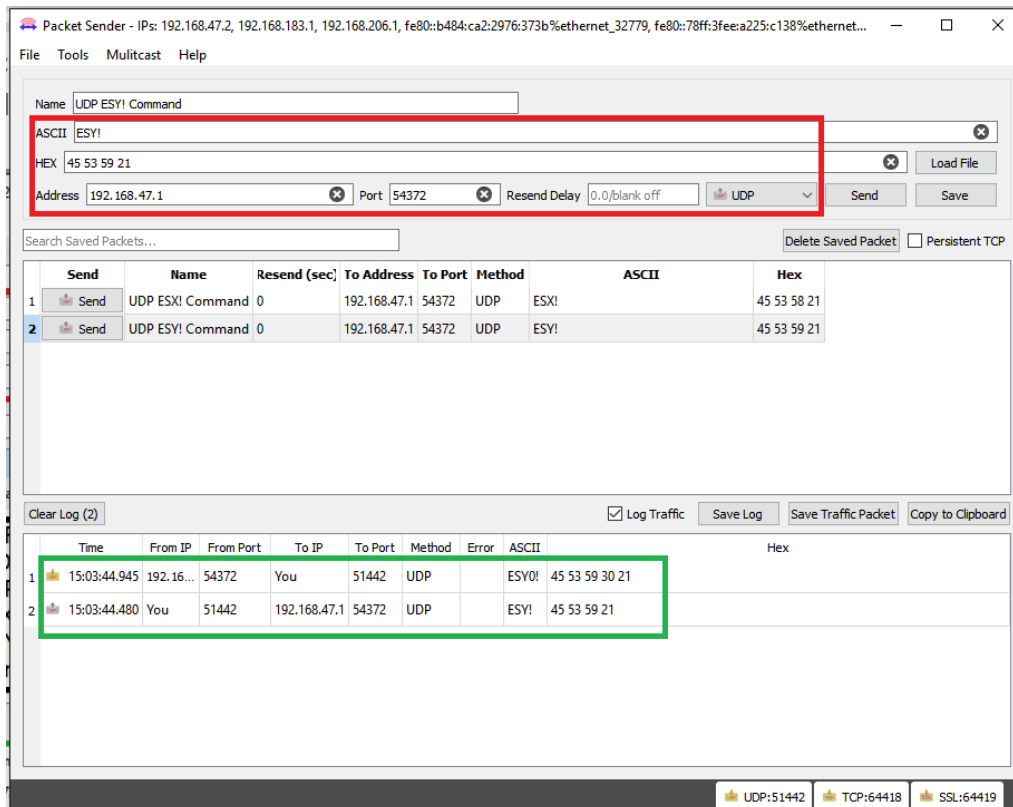
4. Using **Packet Sender**, configure the following fields as shown in the figure below in the **RED** box:

ASCII: ESY!
Address: 192.168.47.1
Port: 54372
Protocol: UDP (pull-down)

5. While watching the RED and GREEN LEDs on the iEXOS 100 mount, Press the SEND button to transmit the “ESY!” command. You should see the GREEN LED flash on.

6. Verify that the request and response is shown in **Packet Sender** as shown in the figure below in the **GREEN** box. You should see an “ESY0!” response.

7. You should now be able to connect via TELNET using **PUTTY**.



Procedure ②

Switch from TCP/IP to SERIAL using the “ESX!” command

1. Switch your computer over to the PMC-Eight-xxxx SSID specific to your controller.
2. Using **Putty**, TELNET into address 192.168.47.1 port 54372.

NOTE: You will not see any prompt on the terminal screen.

3. Enter "ESX!" on the terminal window and you should see an "ESX0!" response which indicates that the communications interface was switched to the serial port (interface 0).
4. You should now be able to use the SERIAL mini-USB Type B (female) connection with your mini-USB Type B (male) to USB Type A (male) cable to communicate with the iEXOS 100.

Procedure ③

Switch from SERIAL to WiFi using the "ESX!" command

NOTE: You can determine the assigned com port number in the following step by using the windows settings program *Device Manager*.

1. Using the *Parallax Serial Terminal*, connect to the assigned com port number with connection parameters: 115200, N, 8, 1.
2. Once connected, you should see the firmware startup splash screen information scroll on the screen. (See firmware startup splash screen example at the end of this document)
3. At the top line, enter "###" you should see "Diagnostic Mode Disabled#"
4. Enter "ESX!" and you should see "ESX1!" which says that the interface was switched to the WiFi port (interface 1)

Procedure ④

Switch from TCP/IP to UDP/IP using the "ESY!" command

1. Switch your computer over to the PMC-Eight-xxxx SSID specific to your controller.
2. Using *Putty*, TELNET into address 192.168.47.1 port 54372.

NOTE: You will not see any prompt on the terminal screen.

3. Enter "ESY!" and you should see "ESY1!" which says that the interface was switched to UDP/IP from TCP/IP on WiFi (interface 1).
4. You should now be able to wirelessly use the ExploreStars™ Application with the iEXOS 100™.

PMC-Eight Firmware Startup Splash Screen

This is the startup splash screen that you will see when booting up the system while connected over the SERIAL port with the Parallax Serial Terminal.

```
-----  
-----  
      PPPPPP   MM       MM   CCCCCCCC      888888  
      PP  PP   MMM      MMM   CC          88  88  
      PPPPPP   MM M      M MM   CC          XXXXX  888  
      PP       MM  M  M  MM   CC          88  88  
      PP       MM   MM   MM   CCCCCCCC      888888  
-----  
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PMC-Eight Support 1-866-252-3811  
http://www.explorescientificusa.com  
-----  
Portions of FIRMWARE covered by MIT LICENSE terms  
-----  
Explore Scientific PMC-Eight Controller - Startup  
Initializing PMC-Eight Model 1A-01C-FW10B1a 10 AUGUST 2018...  
CONFORM TEST VERSION - COMMUNICATIONS TIMEOUT DISABLED  
-----  
EEPROM Memory Test - Basic  
MEM_TEST1:F0F0F0F0  
MEM_TEST2:0F0F0F0F  
MEM_TEST3:F0F0F0F0  
MEM_TEST4:0F0F0F0F  
MEM_TEST5:F0F0F0F0  
-----  
Command Processor Started  
JOC Controller Command Set:      Enabled  
PMC-Eight Diagnostic Command Set: Enabled  
PMC-Eight ES Command Set:       Enabled  
System Initialized!  
-----  
BAUD Rate Value: P0 115200  
Assigned SSID: PMC-Eight-280D  
Communications Channel - Enabled: P1 Serial  
WiFi Protocol - Disabled: P2 UDP/IP  
Assigned WiFi Channel Number: 7  
ST4 port Sidereal Rate Fraction: P3 40  
Unused Value: P4 0  
Unused Value: P5 0  
Unused Value: P6 0  
Unused Value: P7 0  
Unused Value: P8 0  
Unused Value: P9 0  
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```

If you have any issues performing these procedures, or if you have any suggestions, comments or questions, please contact support@explorescientific.com or call our customer support number (866)252-3811.