



**MICROCHIP**

## **Running the “TCP/IP MDD Demo App” (Beta Release)**

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## Required Hardware

To run this demonstration project, you will require one of the following sets of hardware.

### **Configuration 1: Explorer 16 + ENC28J60 + PIC24FJ256GB110 + USB Thumb Drive**

- Explorer 16 (DM240001)
- USB PICtail™ Plus Daughter Board (AC164131)
- PIC24FJ256GB110 Plug-In-Module (PIM) (MA240014)
- Ethernet PICtail Plus Daughter Board (AC164123)

### **Configuration 2: Explorer 16 + ENC28J60 + PIC24FJ128GA010 + SD Card**

- Explorer 16 (DM240001)
- PICtail Daughter Board for SD and MMC Cards (AC164122)
- PIC24FJ128GA010 Plug-In-Module (PIM) (MA240011)
- Ethernet PICtail Plus Daughter Board (AC164123)
- A second 120-pin female card edge connector (CON0197)

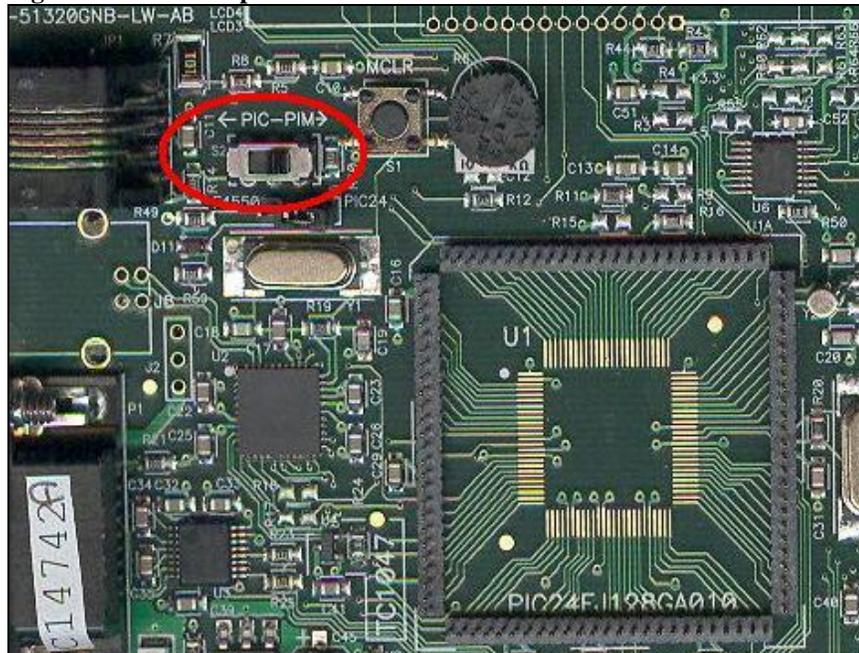
## Configuring the Hardware

This section describes the various hardware configurations set up to run this demo.

### **Configuration 1: Explorer 16 + ENC28J60 + PIC24FJ256GB110 + USB Thumb Drive**

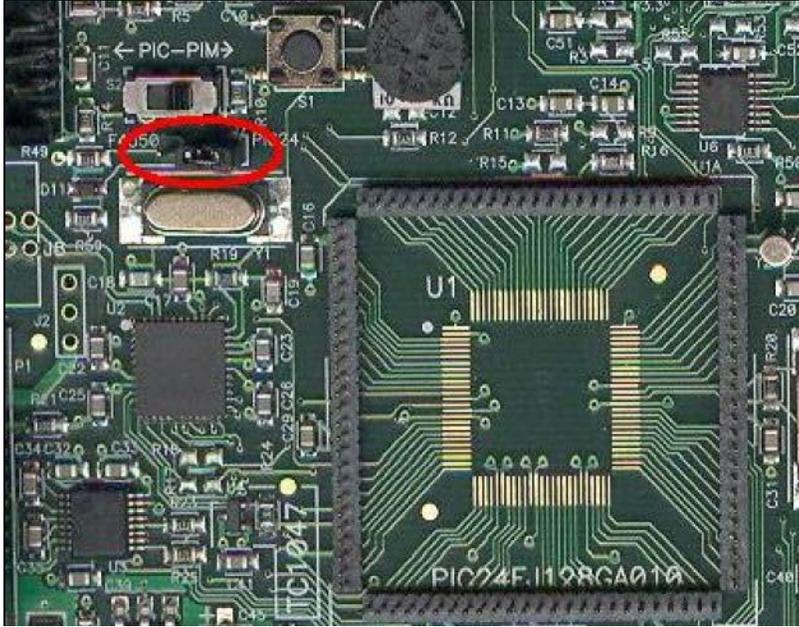
1. Before attaching the PIC24FJ256GB110 PIM to the Explorer 16 board, ensure that the processor selector switch (S2) is in the "PIM" position as shown in [Figure 1](#).

**Figure 1: S2 in PIM position**



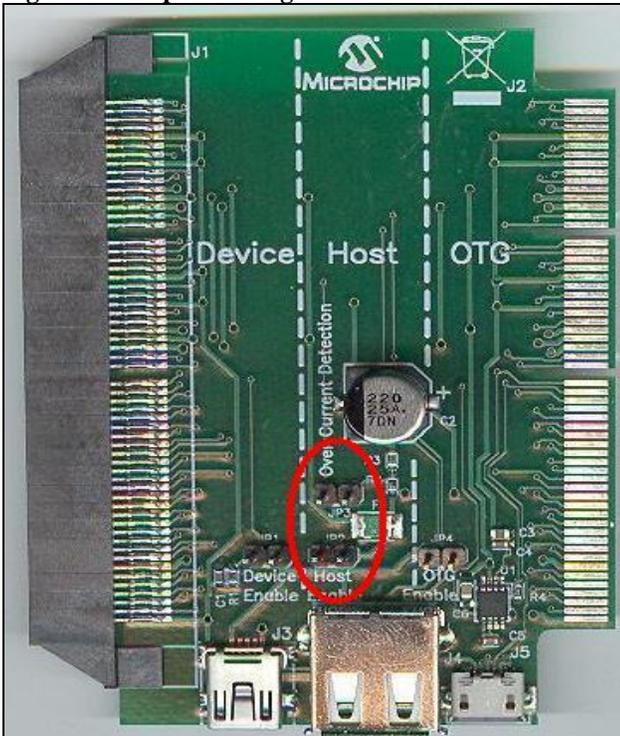
2. Short the J7 jumper to the "PIC24" setting (see [Figure 2](#)).

**Figure 2: J7 Jumper**



3. Before connecting the PIC24FJ256GB110 PIM to the Explorer 16 board, remove all attached cables from both boards. Connect the PIC24FJ256GB110 PIM to the Explorer 16 board. Care must be taken when connecting the boards, to ensure that no pins are bent or damaged during the process. Also, ensure that the PIM is not shifted in any direction and that all of the headers are properly aligned.
4. On the USB PICTail™ Plus board, short jumpers JP2 and JP3. Open all other jumpers on the board (see [Figure 3](#)).

**Figure 3: Jumpers setting on USB PICTail**



5. Connect the USB PICTail Plus board either to the female PICTail Plus connectors or on the card edge connector (J9) at the edge of the Explorer 16 board.
6. Connect the Ethernet PICTail Plus Daughter Board to the female card-edge connector J5 on the Explorer 16 board. The card-edge connector should be inserted in the slot closest to the prototyping area. This will connect the Ethernet PICTail Plus board (see [Figure 4](#)) to SPI1.

**Figure 4: Ethernet PICTail Plus board**



7. Complete hardware configuration setup as below.

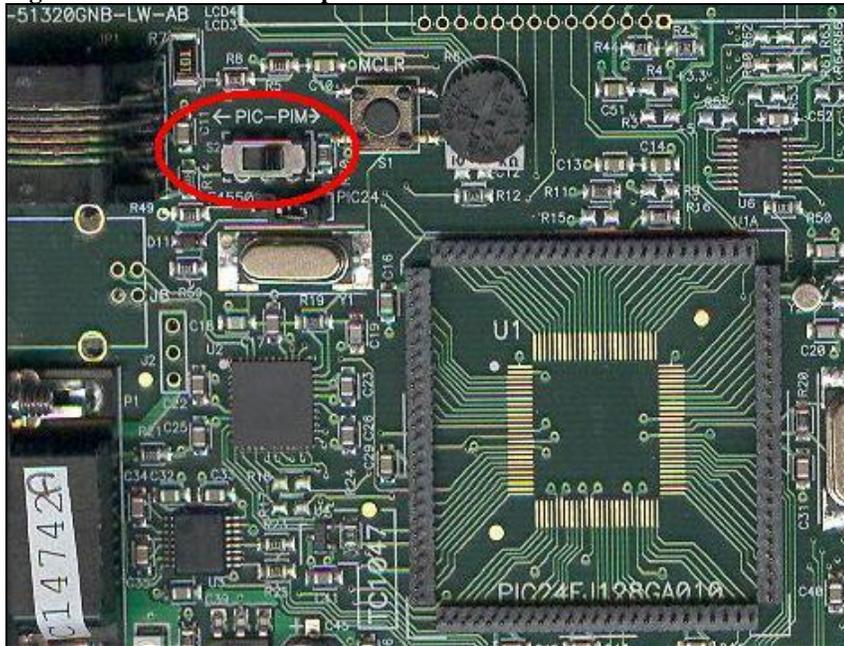
**Figure 5: Hardware Configuration**



## Configuration 2: Explorer 16 + ENC28J60 + PIC24FJ128GA010 + SD Card

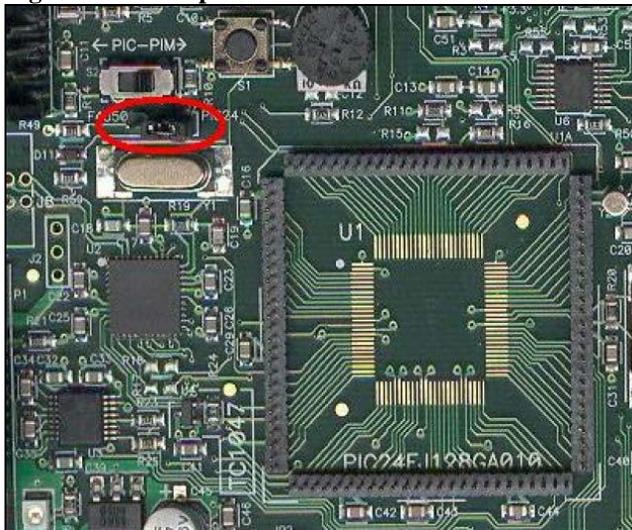
1. Before attaching the PIC24FJ128GA110 PIM to the Explorer 16 board, ensure that the processor selector switch (S2) is in the “PIM” position as shown in [Figure 6](#).

**Figure 6: Switch S2 in PIM position**



2. Short the J7 jumper to the “PIC24” setting (see [Figure 7](#)).

**Figure 7: J7 Jumper**



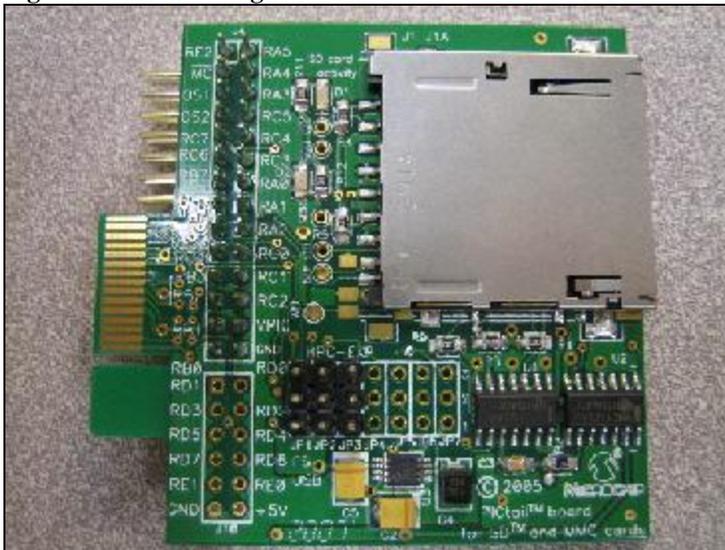
3. Before connecting the PIC24FJ128GA010 PIM to the Explorer 16 board, remove all attached cables from both boards. Connect the PIC24FJ128GA010 PIM to the Explorer 16 board. Care must be taken when connecting the boards, to ensure that no pins are bent or damaged during the process. Also, ensure that the PIM is not shifted in any direction and that all of the headers are properly aligned.
4. Connect the Ethernet PICtail Plus Daughter Board to the female card-edge connector J6 on the Explorer 16 board. The card-edge connector should be inserted in the slot closest to the prototyping area. This will connect the Ethernet PICtail Plus board (see [Figure 8](#)) to SPI1. If J6 is not populated with a female PICtail Plus connector, you must solder one to the board.

**Figure 8: Ethernet PICtail Plus board**



5. Connect the PICtail Daughter Board for SD and MMC Cards to the female card-edge connector J5 on the Explorer 16 board. The card-edge connector should be inserted in the center slot, with the card socket facing the microcontroller. This will connect the PICtail Plus board to SPI2.

**Figure 9: PICtail Daughter Board for SD and MMC Cards**



6. Complete hardware configuration setup as below.

**Figure 10: Hardware Configuration Setup**



## Firmware

To run this project, load the corresponding firmware into the devices. There are two methods available for loading the demos:

- Precompiled Demos and
- Source Code Projects

Precompiled demos are available in the “<Install path>\TCPIP\Demo App MDD\Precompiled Hex” directory. The hex files for each demo contain descriptions of the hardware platform that the demo was built for. Select the hex file that matches the hardware configuration and the demo to run, import it into MPLAB, and program it to the target processor.

The source code for this demo is available in the “<Install Path>\TCPIP\Demo App MDD” directory. This directory contains all of the user level source and header files as well as project and workspace files for each of the hardware platforms. Find the project (\*.mcp) or workspace (\*.mcw) file that corresponds to the hardware platform. Compile the code and program the output to the hardware platform. For more information on how to compile and program projects, refer to the MPLAB<sup>®</sup> help available through the help menu of MPLAB (Help->Topics...->MPLAB IDE).

## Running the Demo

For this demo, you must copy all the demo web pages, files and subfolders from the directory “<Install Path>\TCPIP\Demo App MDD\WebPages2” to a target directory “WWW” at the root path of the SD card or USB thumb drive. You must also copy `DynRcrd.bin` and `FileRcrd.bin` files from “<Install Path>\TCPIP\Demo App MDD” to the same “WWW” directory.

The precompiled hex files use the “[\WWW](#)” (\root\www\) directory of the SD Card or USB thumb drive as target path for web pages storage.

Connect a CAT-5 Ethernet cable to the ENC28J60 stand-alone Ethernet PICtail plus connector on the demo board.

The LCD screen should display the revision number of the MCHP TCP/IP Stack and the IP address assigned to the board.

Open HTTP client browser like Microsoft Internet Explorer (IE), Mozilla Firefox, or Google Chrome at a workstation in the same LAN. Enter the IP address displayed in the LCD of the board to access the web pages stored in the SD card or the USB thumb drive. The HTTP client browser should be served with the Microchip TCP/IP Stack HTTP2 Server demo web page. Set the different LEDs on board to ON/OFF. Change the Potentiometer on the Explorer 16 board and check the corresponding reading in the web page. Use the SMTP client feature to send email about the board status from the "Send E-mail" link in the navigation frame. You can also explore the dynamic DNS feature by opening the "Dynamic DNS" page.

If web pages in the existing demo needs to be modified, refer to the section "Modifying the Demo".

## Modifying the Demo

### Storing web pages to a non-root target directory on your flash device

Copy the demo web pages and the binary files `DynRcrd.bin` and `FileRcrd.bin` to the desired target path and directory on the SD card or on the USB thumb drive. Change the following macro in "`<Install path>\TCPIP\Demo App MDD\TCPIPConfig.h`" file to the new path:

```
#define MDD_ROOT_DIR_PATH "\\WWW\\"
```

Note that the backslash character begins an escape sequence in C; therefore the user has to include two backslashes in the path to separate directory names.

Select the MPLAB workspace that corresponds to your hardware setup, compile the code using the modified copy of `TCPIPConfig.h`, and program the result to your board.

The LCD screen should display the revision number of the MCHP TCP/IP Stack and the IP address assigned to the board. All the demos described in the previous section should work as specified.

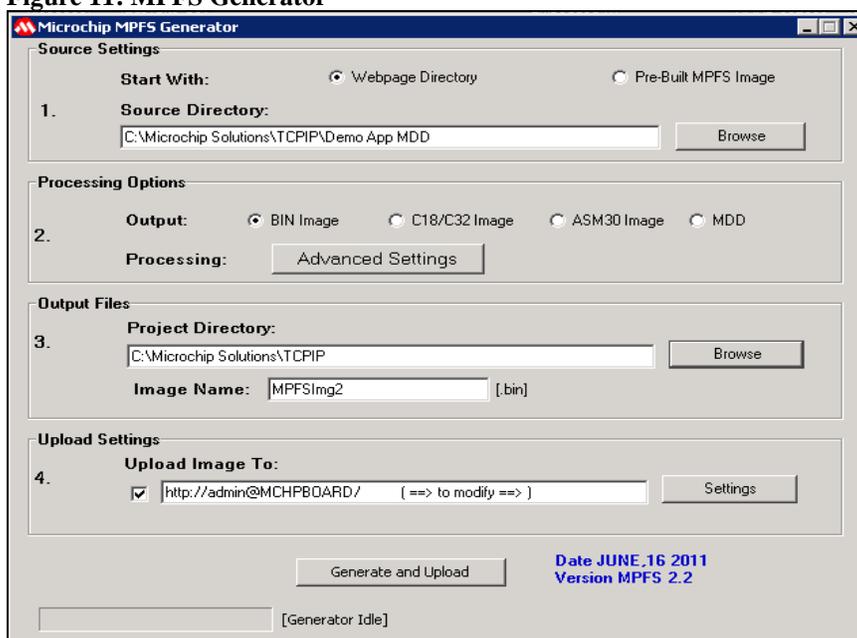
### Adding a new web page or changing an existing web page

Whenever the content of a web page changes (text changes, adding/removing dynamic variables, etc) the two binary files included in the web page installation (`DynRcrd.bin` and `FileRcrd.bin`) must be regenerated.

`FileRcrd.bin` contains information about web pages with dynamic variables. `DynRcrd.bin` provides the information about the dynamic variables in each of the web pages and their offsets in the respective web page. These two files are used by the HTTP2 server to process dynamic variables. Hence, any change in the web pages or addition of new web pages calls for regeneration of these two files. These files are generated using the MPFS2 utility.

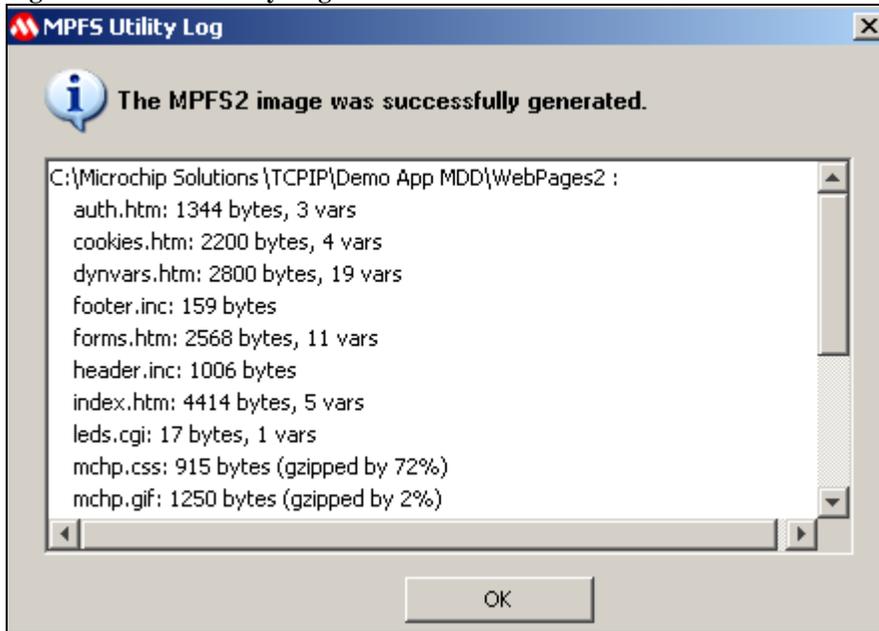
Run "`<Install path>\Microchip\TCPIP Stack\Utilities\MPFS2.jar`". Select the "MDD" option in the Processing Options. Also, select Source and Project directories in the respective settings.

Figure 11: MPFS Generator



After processing all the files in the source directory and generating the two binary files the following window appears (see [Figure 12](#)).

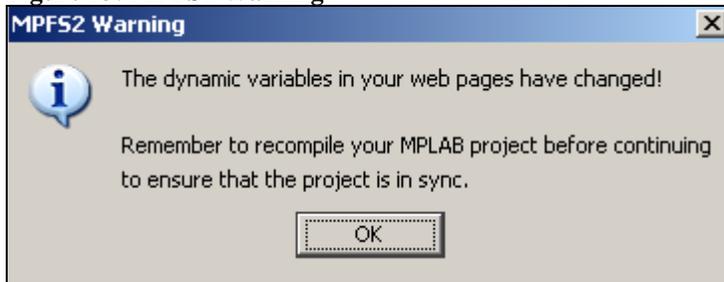
**Figure 12: MPFS Utility Log**



If the dynamic variables in the HTML pages are changed, the utility pops up the warning message as shown in [Figure 13](#). The utility generates new *HTTPPrint.h* file at "*<Install Path>\TCPIP\Demo App MDD*" directory.

If the warning appears, user should recompile MPLAB project before continuing, to ensure that the project is in sync.

**Figure 13: MPFS2 Warning**



Copy the updated web pages and the regenerated binary files to the path defined by "MDD\_ROOT\_DIR\_PATH" in *TCPIPConfig.h*. Insert the SD Card or USB thumb drive into the respective PICtail board (connected to the Explorer 16).

Select the MPLAB workspace/project that corresponds to your hardware profile and compile. Program the new hex image to the target processor.

The LCD screen should show the revision number of the MCHP TCP/IP Stack and the IP address assigned to the board. All the demos explained in the previous section should work as specified.

**Note:** The “Demo App MDD” directory has HTTP2 Server with MDD support. This directory is added to the “<Install path>\TCPIP\”. This demo enables the PIC and HTTP2 server users to store the web pages on an external memory. Hot pluggable memory interface such as SD card or USB thumb drive with MDD support could be used. This feature eliminates the need to use an EEPROM, external SPI Flash or Internal Program memory to store web pages. This is the beta release of this project.

## **Limitations**

1. This demo is currently supported only with two hardware configurations specified in this document.
2. Only the HTTP2 server is integrated with MDD file system. SNMPv2c agent does not work in this demo.
3. The TCPIPConfig.exe tool available in the “<Install path>Microchip\TCPIP Stack\Utilities” directory should not be used to configure the stack for this demo.
4. If the Explorer 16 development board is to be used with MPFS classic or MPFS2, make sure that SD card PICtail or USB PICtail Plus board is not connected.
5. This demo works only with dynamic FSFILE object allocation options enabled in FSconfig.h file. This file can be found in “<Install Path>\TCPIP\Demo App MDD”.
6. In this Beta Release, only one TCP Socket initialization is supported. The HTTP2 server will still cater to multiple http client connections.

## **Trademarks**

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