Serial Debugging of Blade Host on Dell PowerEdge MX7000 chassis with Microsoft Windows Debugger

Dell EMC Technical White Paper

Revisions

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Introduction:

The Dell PowerEdge MX7000 chassis and blades support Windows debugging on the blade host via the USB serial port on the back of the chassis. This requires several steps to set up the blade, the chassis, and the operating system as follows.

- Setting up the serial connection via Management Module to create a dedicated connection to a specific blade.
- Setting up the blade serial settings in system BIOS.
- Enabling debugging in the operating system.
- Upon completion of debugging, the Management Module GUI can be used to reset the serial connection, so the serial port can be used for other functions.

Hardware required - The MX7000 chassis has a micro-USB port on the back of the Management Module that is used as the serial port. A USB cable with micro-USB on one end and USB on another (Figure 1) is all that's needed.

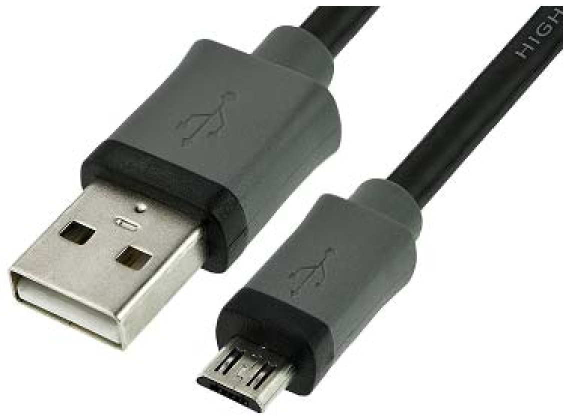


Figure 1 Micro USB to USB cable

Management Module Port located here

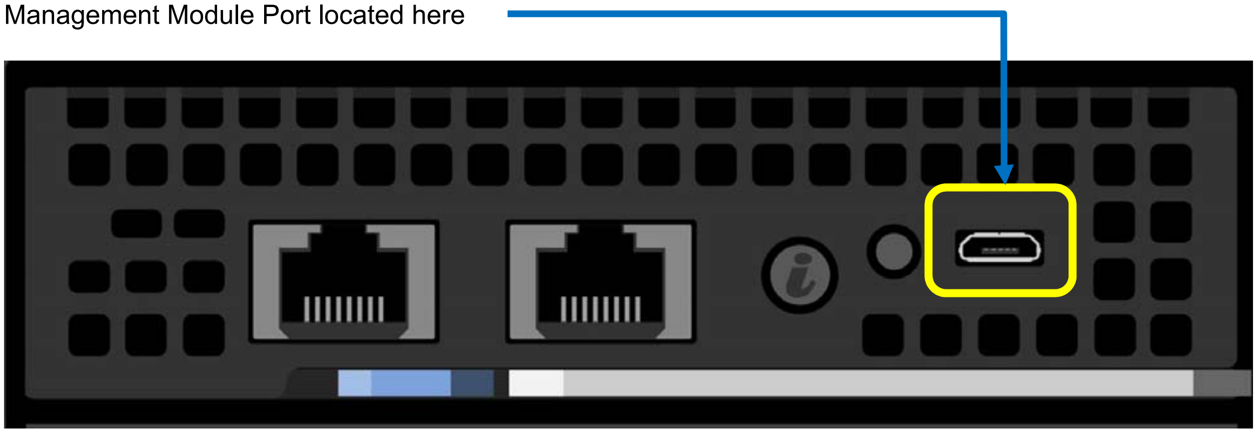


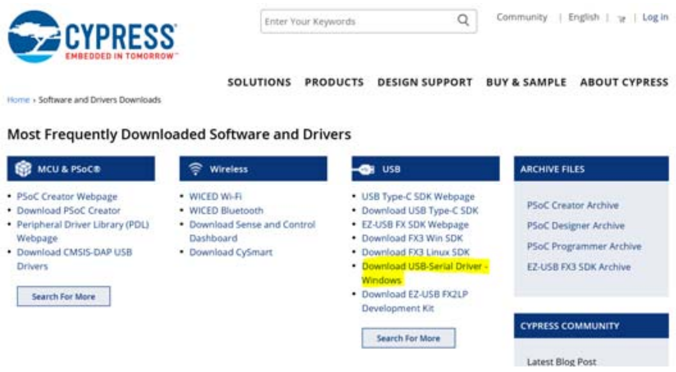
Figure 2 : USB serial port on management module

Connecting to the chassis, and setting up the serial connection between the blade and the debugger –

Introduction:

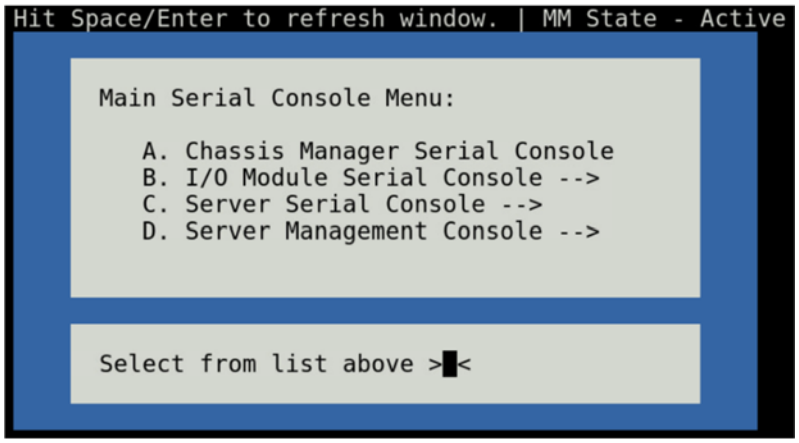
- Attach one end of USB cable (Figure 1) to the management module's USB port (Figure 2). Attach the other end to the system you will use as the debugger, typically a laptop running Windows.
- On the debugger, the USB device will be enumerated in the Device Manager as Cypress USB-to-serial device.   The driver is native to Windows 10/Windows Server 2016. If the USB device is discovered, proceed to step 4, otherwise proceed to step 3.
- 3Windows 8.1/Windows Server 2012R2 debugging system will require the driver to be manually downloaded and installed. The driver package can be found in:

i. http://www.cypress.com/sdc



- Run a terminal emulator program like TeraTerm or Putty and open the COM port with 115200 baud, 8 bits, no parity settings. Once the connection is established, you should see the serial console menu as shown in Figure 3.

Note: If you have 8.1/Windows Server 2012R2 had followed step 3 to install the driver manually, the menu may not appear automatically. If it does not, try cycling the serial port connection's baud rate. First set it to 9600 and then back to 115200. This is a known erratum with no current fix, but the workaround (cycle baud rate) is relatively easy to do. This issue has not been seen with Windows 10/Server 2016, only on older Windows OS, such as Windows 8/8.1.



```
Hit Space/Enter to refresh window. | MM State - Active

    Main Serial Console Menu:

        A. Chassis Manager Serial Console
        B. I/O Module Serial Console -->
        C. Server Serial Console -->
        D. Server Management Console -->

    Select from list above >█<
```

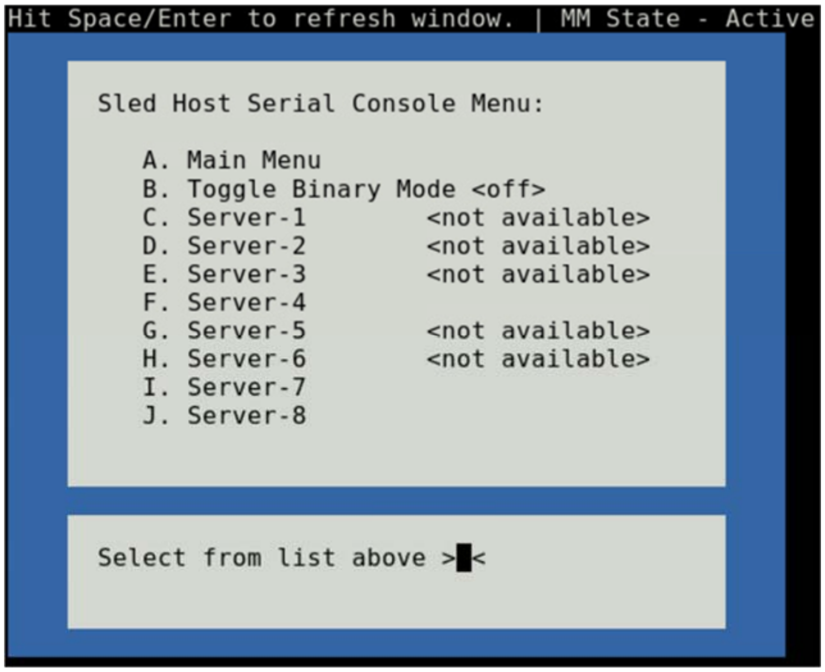
Figure 3	: Serial console main menu

- Select C (Server Serial Console) to get to the blade host menu (Figure 4). TWO selections must be made on this menu:
  - Option “B” to toggle Binary Mode to ON. It ensures the serial connection from chassis to blade is PERSISTENT (the connection will not be dropped on a reboot), and it establishes a direct binary serial connection to the blade selected.

Note: Once the serial connection from the chassis to the blade is configured, the connection is permanent. To use the serial connection for other purposes, use the Management Module GUI as described below to reset the connection:

> Navigate to the Chassis Manager GUI’s home page and select “Troubleshoot” -> “Terminate Serial Connection” to return to the Serial Console main menu.

  - Next, select the specific server you wish to establish a serial connection to.



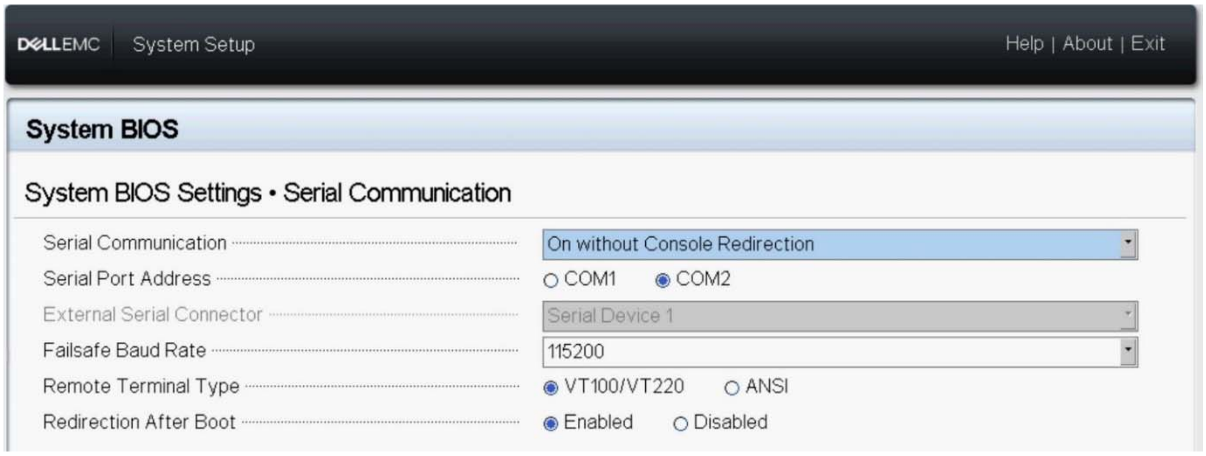
```
Hit Space/Enter to refresh window. | MM State - Active

Sled Host Serial Console Menu:

   A. Main Menu
   B. Toggle Binary Mode <off>
   C. Server-1        <not available>
   D. Server-2        <not available>
   E. Server-3        <not available>
   F. Server-4
   G. Server-5        <not available>
   H. Server-6        <not available>
   I. Server-7
   J. Server-8

Select from list above ><
```

Figure 4 : Blade host menu

Finally, once you have made the selection in the menus above, be sure to CLOSE your terminal emulation program. Only one program at a time can access the serial connection, so you cannot have both the terminal emulator and Windows debugger active at the same time.

Blade Setup –

- Go into BIOS serial settings (press F2 during POST (Power-On Self-Test), and set the BIOS serial settings as shown in Figure 5:
-



System BIOS Settings • Serial Communication

Serial Communication	On without Console Redirection
Serial Port Address	COM1 [✓ COM2]
External Serial Connector	Serial Device 1
Failsafe Baud Rate	115200
Remote Terminal Type	[✓ VT100/VT220] ANSI
Redirection After Boot	[✓ Enabled] Disabled

Figure 5 : Blade BIOS setting

- Exit BIOS and reboot

Target Windows setup –

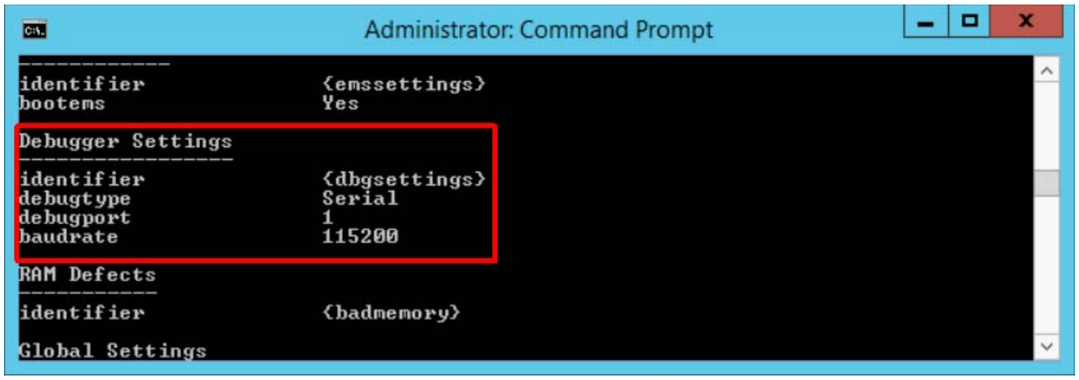
- Enable debugging, and set transport to serial, com port 1, 115200 using bcdedit commands (commands noted below). See -- https://docs.microsoft.com/en-us/windows-hardware/drivers/debugger/setting-up-a-null-modem-cable-connection for further information.

On the target computer, open a Command Prompt window as Administrator, and enter the following commands

- bcdedit /debug on
- bcdedit /dbgsettings serial debugport:1 baudrate:115200

Reboot the target computer.

- Type the following command in Windows command prompt – "bcdedit /enum all". There will be a lot of information, but scroll down to find the "Debugger Settings" section. If everything is correct the settings should look like in Figure 6:



```
-------------
identifier              {emssettings}
bootems                 Yes

Debugger Settings
-----------------
identifier              {dbgsettings}
debugtype               Serial
debugport               1
baudrate                115200

RAM Defects
-----------
identifier              {badmemory}

Global Settings
```

Figure 6 : Verification of debug settings

Debugger setup–

- Attach debugger to the MM serial port via usb cable
- Download Windbg (https://developer.microsoft.com/en-us/windows/hardware/download-windbg)
- On the debugger, open WinDbg.

  - On the File menu, choose Kernel Debug.
  - In the Kernel Debugging dialog box, open the COM tab.
  - In the Baud rate box, enter the rate you have chosen for debugging.
  - In the Port box, enter COMn where n is the COM port number you have chosen for debugging on the host computer.

i. NOTE: you will have to go to Windows Device Manager and find the specific COM port that is assigned, since this is a USB/serial connection and the serial port is dynamically assigned.

  - • Click OK.

- On the debugger, you will now see "waiting for connection…"
- Reboot the target system.
- The debugger will register the connection when the OS begins coming up.

Conclusion

The serial port on the MX7000 chassis provides the capability to perform Windows debugging on a blade in the MX7000 chassis. This capability can be considered as a debugging method if the other methods to debug, such as USB, or network are not functional or available.