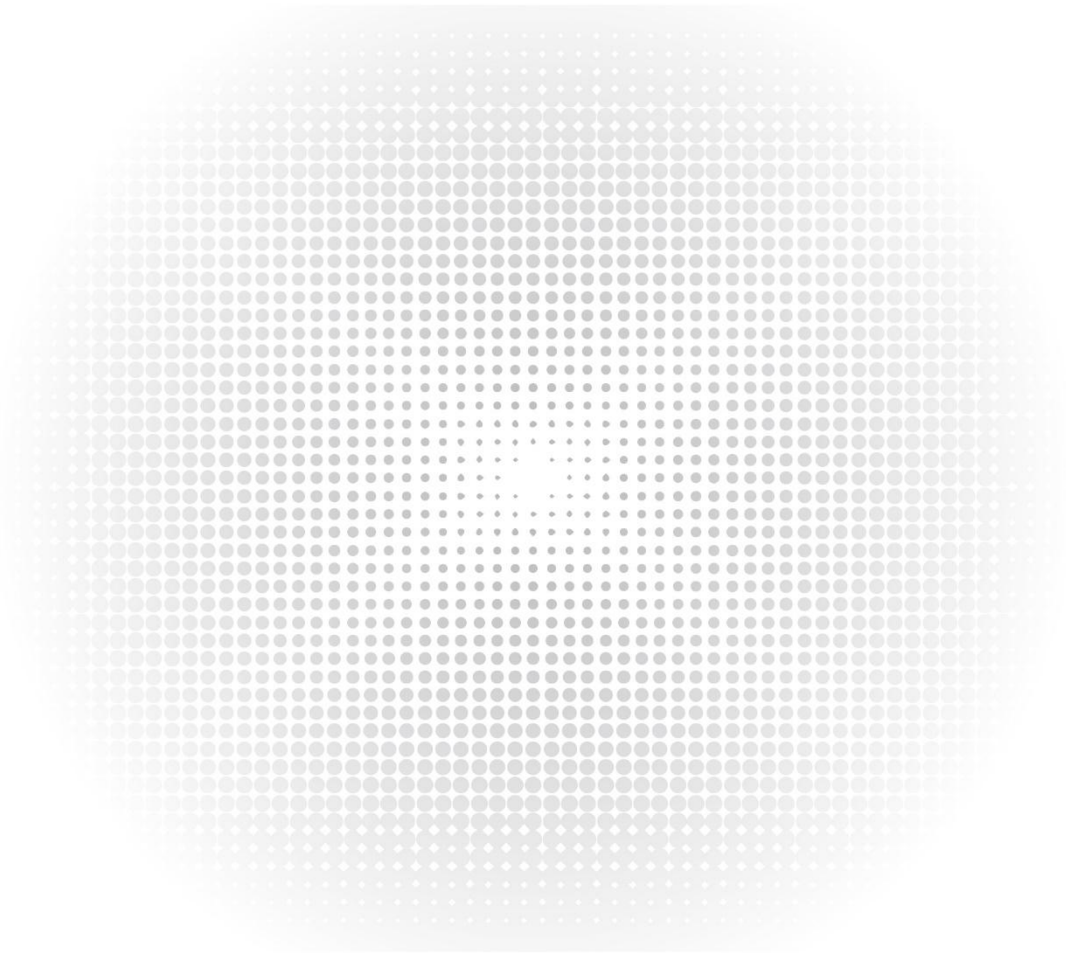


Intel Ethernet Port Configuration

Tool (EPCT)

Models: X710BM2-2SP; XL710BM1-4SP; XXV710AM2-2BP; XL710BM2-2QP; X550AT2-2TP; 82599ES-2SP; E810CAM2-2CP;
E810XXVAM2-2BP



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1. Overview

1.1 Overview of EPCT

The Ethernet Port Configuration Tool (EPCT) is a command line utility that allows users to change the link type of a device. The supported types are defined within the adapter's NVM. This utility displays only the devices that potentially support reconfiguration.et.

NOTE:

A reboot is required to apply configuration changes.

You may lose link if you change the link type of your device from any port option that contains three to seven ports to a port option that enables multi-lane interfaces, such as 2x100Gbps, 2x50Gbps, or 1x100Gbps. One of the following methods may resolve the issue:

1.Use the utility to change the port option to 8x10Gbps; reboot your system; change to your originally desired configuration.

2.Completely power cycle your system.

If the tool displays an error such as "Access error" or "Cannot initialize port," you may be using an outdated driver. Please download the latest driver from <https://support.intel.com> and try again.

1.2 Supported Operating Systems

- Microsoft Windows Server*
- Linux* Kernel
- Red Hat* Enterprise Linux*
- SUSE* Linux Enterprise Server
- openEuler* for AArch64 (only on Intel® Ethernet E810 Series)
- VMware* ESXi*
- FreeBSD*

NOTE:

On systems running Linux, FreeBSD, or ESXi, the base driver must be present for EPCT to function correctly.

2. Installation

2.1 Installing the Tool on Microsoft* Windows*

To install the tools' drivers on Windows, run install.bat from the appropriate directory of the install package.

Although the tools are not installed with install.bat, the driver that the tool requires is copied into the local machine Windows driver directory. To run the tool, launch a Command Prompt window from the Windows Start Menu. Go to the media and directory where the tool is located and run the utility. The readme files for each tool are found in the same directory as the tool. These tools can be manually installed on the local hard drive in any directory.

The tool uses its own driver file (not the same as the system network driver). If the driver sys file already exists in the drivers directory, install.bat may fail to copy. Using the /y switch with install.bat will override and copy the driver file regardless. However, this can be dangerous if an older version of the driver is being used by another application such as Intel® PROSet. If a driver is already present in the drivers directory, try running the tool from the command prompt. If it runs, then the driver is fine. The tool will not run if the driver version present does not match the driver version expected.

Note that you must have access to the %systemroot%\system32\drivers directory. Only the administrator account has these privileges. You must be logged in as administrator or the tools must be run as administrator.

Note that on Windows, any device that is disabled in Device Manager will not be accessible by tools due to no memory resources. You would get an error code 0xC86A800E. To solve this problem, you can do one of the following:

Re-enable the device in Device Manager. Never disable this device when using tools.

Install an NDIS device driver for the device and make sure that it does not have a yellow or red bang by it in Device Manager.

Delete the device from Device Manager and restart the system. The install new hardware wizard should appear on next reboot. Do not cancel this. Just move the window aside and run the tool(s). Generally, you can click Cancel on the wizard but there are some cases where Windows will disable the memory resources, causing you to get back into the same state.

2.2 Installing the Tool on EFI

The EFI 1.x tools are not supported.

There is no installation required for EFI tools. The tools can simply be copied from the appropriate directory to the drive that they will run from. The EFI2 binaries are for use with the UEFI Shell 2.X with the UEFI 2.3 HII protocol. EFI2 tools will not run on the EFI Shell 1.X or if the UEFI 2.3 HII protocol is not present.

Note that while EFI supports USB drives, there may be issues running tools from the USB drive. Whether or not there are issues are BIOS specific. If you experience issues, run the tool from hard disk instead.

2.3 Installing the Tool on Linux*

In order to run tools on Linux*, a driver stub must be built and installed on the system. This driver is not related to the

network device driver that is used to run the network during live traffic. It is a separate driver used explicitly for tools. Due to the nature of Linux with the number of kernels that can exist, we provide source for the driver module and an install script to build/install it.

The tools support Linux distributions based on kernels 2.6.x. Validation is done randomly on popular distributions such as Red Hat* or Suse*. Configured kernel source that matches the currently installed kernel is required. A working GCC is also required. There are some versions of GCC that had a bug which did not support unnamed structures. These versions of GCC are not supported. If you have compilation errors, try updating your version of GCC. If you have linker errors when installing the driver, you should update your kernel; download the latest stable off www.kernel.org and build/install it.

Note that some distributions such as recent Fedora core versions do not ship with Kernel source. You must download, install, and configure the source in order to get the tools' driver built on this OS. Installing the kernel source RPM does not solve the problem.

This is the installation procedure:

1. Log in as root and create a temporary directory to build the Intel® Network Connection Tools driver.
2. Copy install and iqvlunix.tar.gz to the temporary directory. There are 2 versions of Linux supported: Linux32 (x86) and Linux_ x64 (x64). Copies of the above files exist in the appropriate directory for your platform.
3. CD to the temporary directory and run ./install. The driver has been installed now, so the files in the temporary directory can be removed.
4. Copy the tools that you want to use from the appropriate directory of the CD.

Kernel 4.16 or Higher

On Linux kernel 4.16 and higher, the iomem parameter is set to "strict" by default, which may prevent the tool from accessing the MMIO of the device. Trying to update a device when "strict" is set causes the device to lose link during the update process.

If you wish to update a device without losing link, you can either:

1. Install Linux base drivers (igb or ixgbe) from Release 24.1, or newer.
2. Set the iomem kernel parameter to relaxed (i.e., iomem=relaxed) and reboot the system before running the update utility.

2.4 Installing the Tool on FreeBSD*

In order to run tools on FreeBSD*, a driver stub must be built and installed on the system. This driver is not related to the network device driver that is used to run the network during live traffic. It is a separate driver used explicitly for tools. Due to the nature of FreeBSD with the number of kernels that can exist, we provide source for the driver module and an install script to build/install it.

The tools support FreeBSD distributions version 10.1 and later.

This is the installation procedure:

1. Log in as root and create a temporary directory to build the Intel® Network Connection Tools driver.
2. Copy install and iqvfreebsd.tar to the temporary directory. There are two versions of FreeBSD supported: FreeBSD32 (x86) and FreeBSD64e (x64). Copies of the above files exist in the appropriate directory for your platform.
3. CD to the temporary directory and run ./install. The driver has been installed now, so the files in the temporary directory can be removed.
4. Copy the tools that you want to use from the appropriate directory of the CD.

2.5 Installing the Tool on VMware* ESXi*

In order to run tools on VMWare* ESXi*, the base driver must be installed on the system.

VMWare ESXi 8.0 and Later

This release includes a signed package version of tools. For security purposes, VMWare ESXi 8.0 (and later) prevents you from running binaries that were not installed from a signed vSphere* Installation Bundle (VIB) file.

To install the signed package, do the following:

1. Extract the zip file or tarball for the tool. For example:

```
tar -xvf <tool file>.tar.gz  
unzip <tool file>.zip
```

2. Install the VIB file using the esxcli command:

```
esxcli software vib install -v <path/package_file>.vib
```

3. Reboot the system to ensure that any changes made by the VIB installation take effect.
4. Change directory to the folder where the NVM images are present. For example

```
cd E810/ESXi_x64
```

NOTE:

This example is specific to an Intel® Ethernet E810 Series adapter, but the actual directory may vary depending on the tool, version, and device family.

5. Run the tool using one of the provided commands. The correct command depends on where the tool's binary is installed. See the tool's readme for details how to use the tool.

```
/opt/<tool name>/bin/<tool binary>
```

Or

```
/opt/intel/bin/<tool binary>
```

For example:

```
/opt/nvmupdaten64e/bin/nvmupdaten64e  
/opt/intel/bin/nvmupdaten64e  
  
/opt/epctn64e/bin/epctn64e  
/opt/intel/bin/epctn64e
```

2.6 Uninstalling Intel Network Connection Tools

Run the uninstall.bat batch file if you need to manually remove the old version (iqvw<architecture>.sys) of the Intel Network Connection Tools driver.

On Windows, you also need to manually remove the iqvsw64e.sys driver. Running the Utility

3. Running the Utility

Use the following syntax to run EPCT:

```
epct [options]
```

Using the `/?` option will display a list of supported command line options.

See Options below for this tool's supported parameters.

NOTE:

If the tool displays the error: "Unable to load the driver. Please close all other applications and try again", you have a mix of old and new versions of the utility tool on your system. Quit all open applications and retry your operation. If the issue persists:

1. Download the latest version of the utility tools.
2. Run the uninstall script to remove the old version of the tool driver.

3. Run the install script from the downloaded tools package.
4. Retry your operation.

You may also need to download and install the latest Intel Ethernet driver or Intel® PROSet package for your device.

3.1 Basic Usage Examples

The following show some basic usage examples for EPCT:

See Detailed Usage Examples below for additional examples.

```
epct -devices  
  
epct -devices branding  
  
epct -nic=1 -get  
  
epct -nic=1 -set 2x1x50  
  
epct -help
```

3.2 Options

The Ethernet Port Configuration Tool can be run with any of the following command line options.

NOTE:

- You can use the slash / character in place of the dash - character.
- All options are case-sensitive.

-h, -help, -?

Displays help for the command or the parameter.

You can also use the following to display help for the specified parameter:

```
-h <parameter name>  
-help <parameter name>  
-? <parameter name>
```

-devices [branding] <option>

Displays supported devices present in the system. If branding is specified, then the branding view is displayed. If an option is specified, the value for that setting is also displayed.

Possible values for <option> are:

tx_balancing: Displays the device's transmit balancing setting.

-get <option>

Displays the configuration for the specified option on the device specified by -nic.

If an option is not specified, -get displays the port configuration for the specified device.

● Active indicates the currently used configuration.

● Pending indicates the configuration the device will use after the system reboots.

Possible values for <option> are:

tx_balancing:

Displays the device's transmit balancing setting.

max_pwr:

Displays the maximum power options of the QSFP/SFP cages.

See -get Examples below for example usage of this option.

-location <SS:BBB>

Specify a device for this instance of the tool to update, where <SS:BB> means:

SS:

The PCI segment of the desired device.

BBB:

The PCI bus of the desired device.

Do not specify -nic in the same command as -location.

-nic=<device_ index>

Selects the device at the specified index. Do not specify -location in the same command as -nic.

-set <option>

Configures the selected device with the specified option. Valid values for <option> are:

tx_balancing enable|disable:

Enables or disables the transmit balancing feature, to improve transmit performance.

max_pwr X:

Sets the maximum allowed power to X for the QSFP/SFP cage.

<port configuration string>:

Specifies the configuration to set for the desired quad, port, or speed.

A port configuration string is defined as:

- QxPxS - if all port speeds are the same across both quads and all lines, or
- P1xS1-P2xS2 - if each quad has a specific speed, or
- P11xS11+<...>+P1nxS1n-P21xS21+<...>+P2mxS2m

Where:

- Q:** The desired quad number.
- P:** The desired port number.
- S:** The desired port speed.
- n:** The desired port/speed combination for quad 0.
- m:** The desired port/speed combination for quad 1.

For example:

```
epct -nic=1 -set 2x25+2x10-2x10
```

See -set Examples below for example usage of these options.

NOTE: A reboot is required after changing the port settings.

3.3 Detailed Usage Examples

Note: Some configurations shown in the examples below may not apply to all adapters.

The following examples show the tool's -devices option, the -get option, and the -set option.

-devices Examples

Typing the following at the prompt:

```
epct -devices
```

Will display:

NIC	Seg:Bus:Fun	Ven-Dev	Connector	Ports	Speed	Quads	Lanes per PF
1)	000:012	8086-1583	QSFP	2	50 Gbps	Single	1
2)	000:015	8086-1584	QSFP	4	25 Gbps	Single	1
3)	000:017	8086-1589	SFP	4	25 Gbps	Single	1
4)	000:030:00-01	8086-1588	QSFP	2	25 Gbps	Single	1
	000:030:02-05	8086-1587	QSFP	4	10 Gbps	Single	1

The following shows how to use the branding option:

```
epct -devices branding
```

NIC	Seg:Bus	Ven-Dev	Mode	Adapter Name
1)	000:012	8086-1583	N/A	Intel(R) Ethernet Converged Network Adapter XL710
2)	000:029	8086-1583	4x10	Intel(R) Ethernet Converged Network Adapter XL710
3)	000:129	8086-1599	2x25, 2x10-2x10	Intel(R) Ethernet Controller E810-XXV for backplane
4)	000:132	8086-159A	2x50	Intel(R) Ethernet Controller E810-XXV for QSFP

-Get Examples

Typing the following at the prompt:

```
epct -nic=1 -get
```

Will display:

Available Port Options:

Option	Port Option (Gbps)	Quad 0				Quad 1			
		L0	L1	L2	L3	L4	L5	L6	L7
Active	4x25	-> 25	25	25	25	-	-	-	-
	2x1x100	-> 100	-	-	-	100	-	-	-
	2x2x25	-> 25	25	-	-	25	25	-	-
	2x50	-> 50	-	50	-	-	-	-	-
Pending	2x1x50	-> 50	-	-	-	50	-	-	-
	2x4x10	-> 10	10	10	10	10	10	10	10
	2x25+2x10-2x10	-> 25	25	10	10	10	10	-	-
	1x10+1x25+1x10+1x25-2x10	-> 10	25	10	25	10	10	-	-

To display the current setting for the transmit balancing feature on a specific device:

```
epct -nic=1 -get tx_balancing
```

To display the minimum and maximum power allowed for the QSFP/SFP cage on a specific device:

```
epct -nic=1 -get max_pwr
```

For example, the above will display:

Seg:Bus:Fun	Ven-Dev	MIN PWR ALLOWED	MAX PWR ALLOWED	MAX PWR SET
=====	=====	=====	=====	=====
000:012	8086-1583	1	5.5	3.5

-Set Examples

To set two ports to 50Gbps (first port starts with lane L0 in quad 0 and second with lane L4 in quad 1):

```
epct -nic=1 -set 2x1x50
```

To set the first and second ports to 25Gbps (respectively lanes L0 and L1 in quad 0), the third and fourth port to 10Gbps (respectively lanes L2 and L3 in quad 0), and the fifth and sixth port to 10Gbps (respectively lanes L4 and L5 in quad 1):

```
epct -nic=1 -set 2x25+2x10-2x10
```

To enable the transmit balancing feature on a specific device:

```
epct -nic=1 -set 'tx_balancing enable'
```

To set the maximum allowed power for a QSFP cage:

```
epct -nic=1 -cage=2 -set 'max_pwr 2.5'
```

NOTE:

- A reboot is required after changing the port settings. In Windows, you must use double quotation marks instead of single quotation marks.

- For example:

```
epct -nic=1 -set "tx_balancing enable"
epct -nic=1 -cage=2 -set "max_pwr 2.5"
```

4. Exit Codes

Upon exit, when possible, the EPCT reports an overall status code to indicate the results of the operation. In general, a non-zero return code indicates an error occurred during processing.

Value	Description
0	Success
1	No supported adapter found
2	Insufficient privileges to run the tool
3	No driver available
4	Unsupported base driver version
5	Bad command line parameter
6	Invalid adapter selected
7	Unsupported ports configuration selected
8	Adapter does not support ports configuratio
9	Memory allocation error
10	Adapter access error
13	Cannot set new port option. Pending reboot detected
14	The device is in recovery mode
15	The requested feature is not supported on this device. You may get this error if your system/device/operating system combination does not support the option you tried to set.
25	Setting value is out of range

NOTE:

EFI versions of this tool may report an incorrect error code when no adapter is installed. This is due to a known limitation in the UDK2015 UEFI Development Kit (UDK) build environment.

5. Troubleshooting

5.1 Issues with breakout cables

Use of the 4x25 quad breakout or 1x100 port option will only work on Port 2 of Intel® Ethernet Network Adapter E810-C-Q2 products.

5.2 Unexpected PF mapping

Physical Function (PF) to physical lane mapping is dependent upon the hardware and may change across different MAC port options. This may be most noticeable when using a breakout cable, in which case the labeling on the cable may not align with the device port assignment.

For example, inserting a 4-port breakout cable into either QSFP cage and configuring the device in 2x2x25 mode may result in the two active PFs being assigned to the third and fourth cables of the breakout connector.

5.3 Possible misconfiguration of the Ethernet port

You may see an informational message stating that a potential misconfiguration of the Ethernet port was detected. This is to alert you that your device is being underutilized. If this was intentional, you may ignore this message. For example, setting your Intel® Ethernet Network Adapter E810-C-Q2 to 2x2x25 is valid, but it does not use the full capabilities of the device. If you see this message, and the configuration was not intentional, you may use EPCT to correct the configuration.