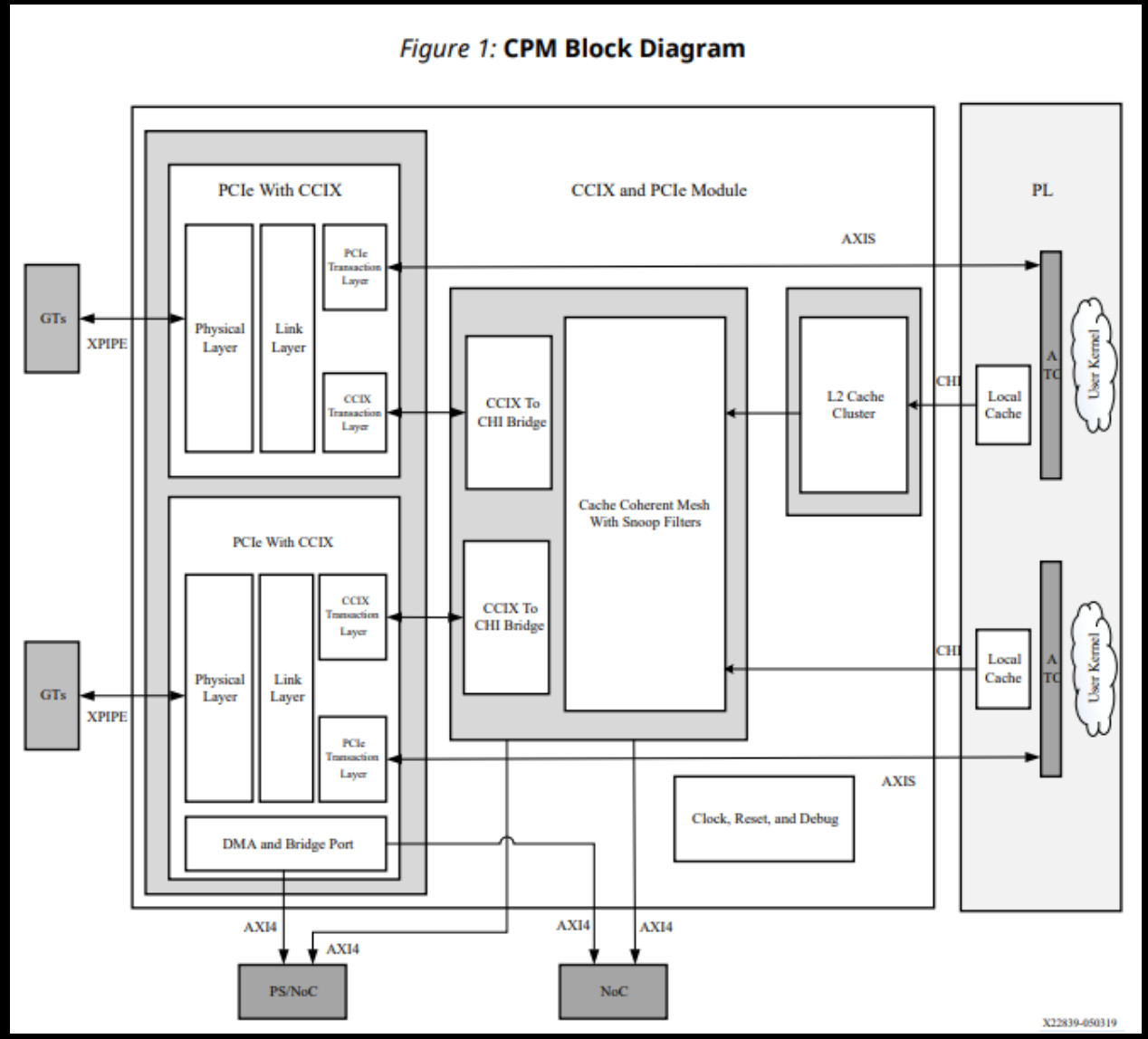
Versal® Architecture and Subsystems for PCIe®

Versal CPM Architecture

CPM

- 將GT,NOC,DDR,PS,PL之間專門硬核化
- 另外多整合了兩個PCIE Controller

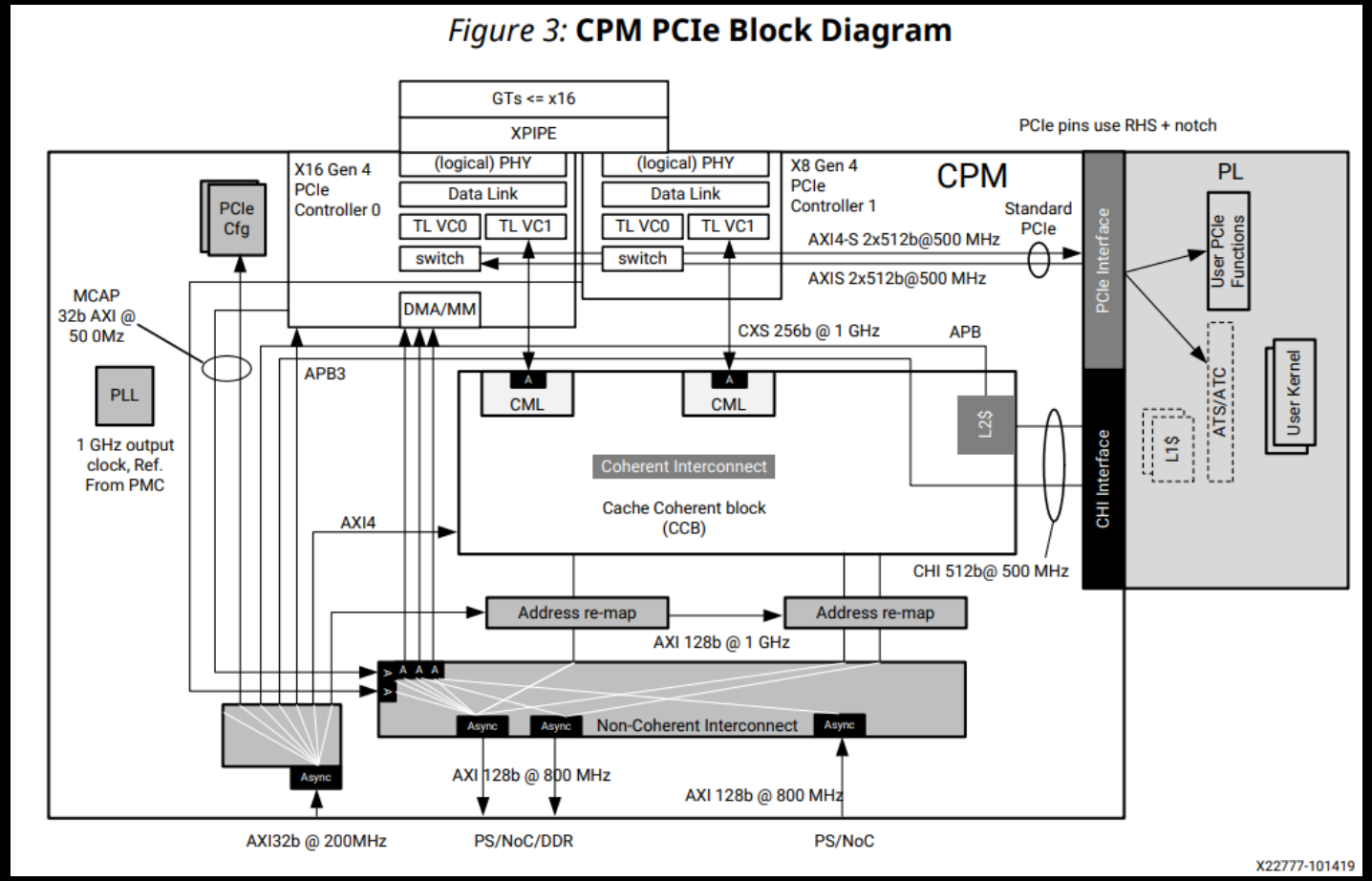


AMD

Versal CPM Architecture

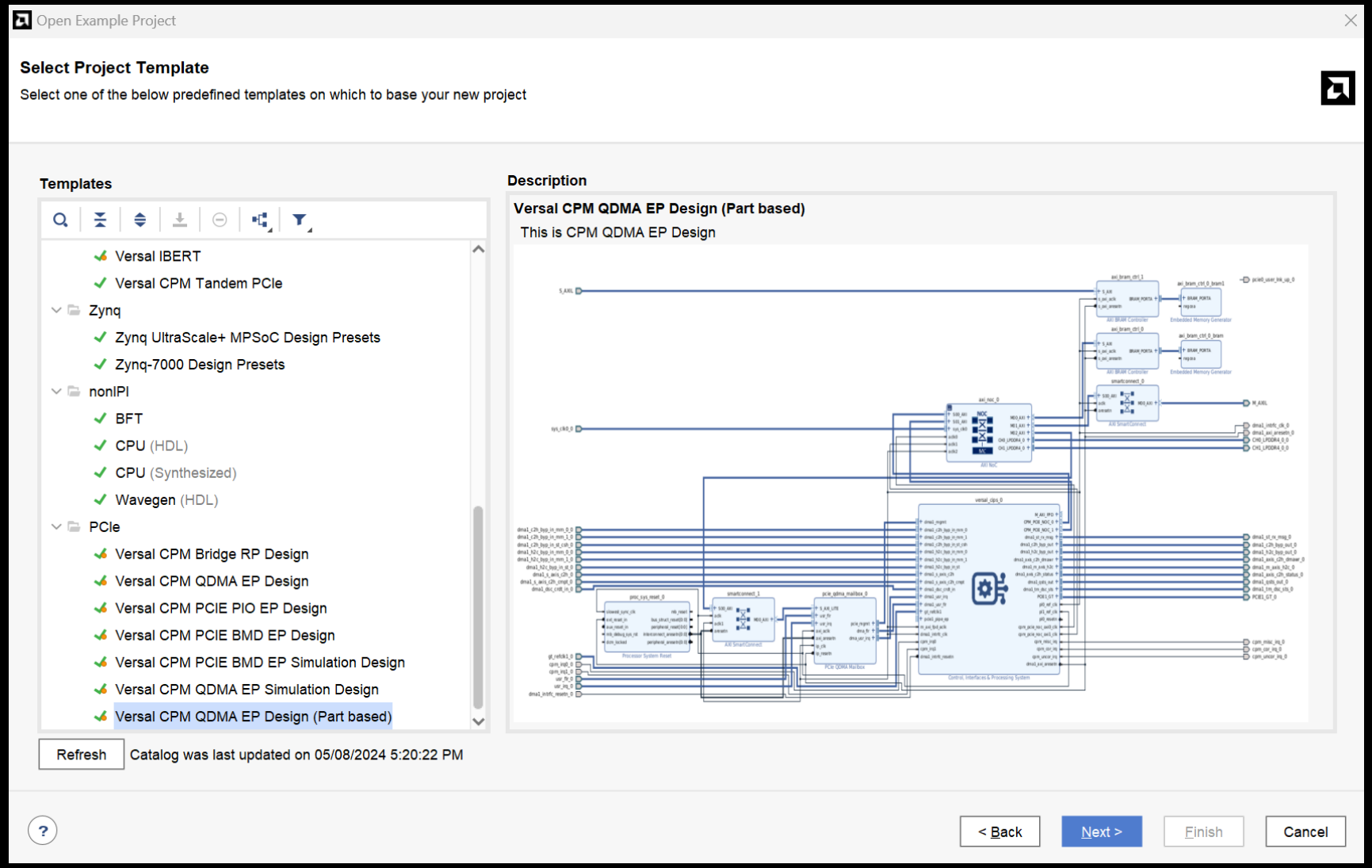
CPM PCIe

- 具有較高的頻寬且整合了DMA
- 開機啟動速度比PL端的Pcie更快且 Address可以自動配置



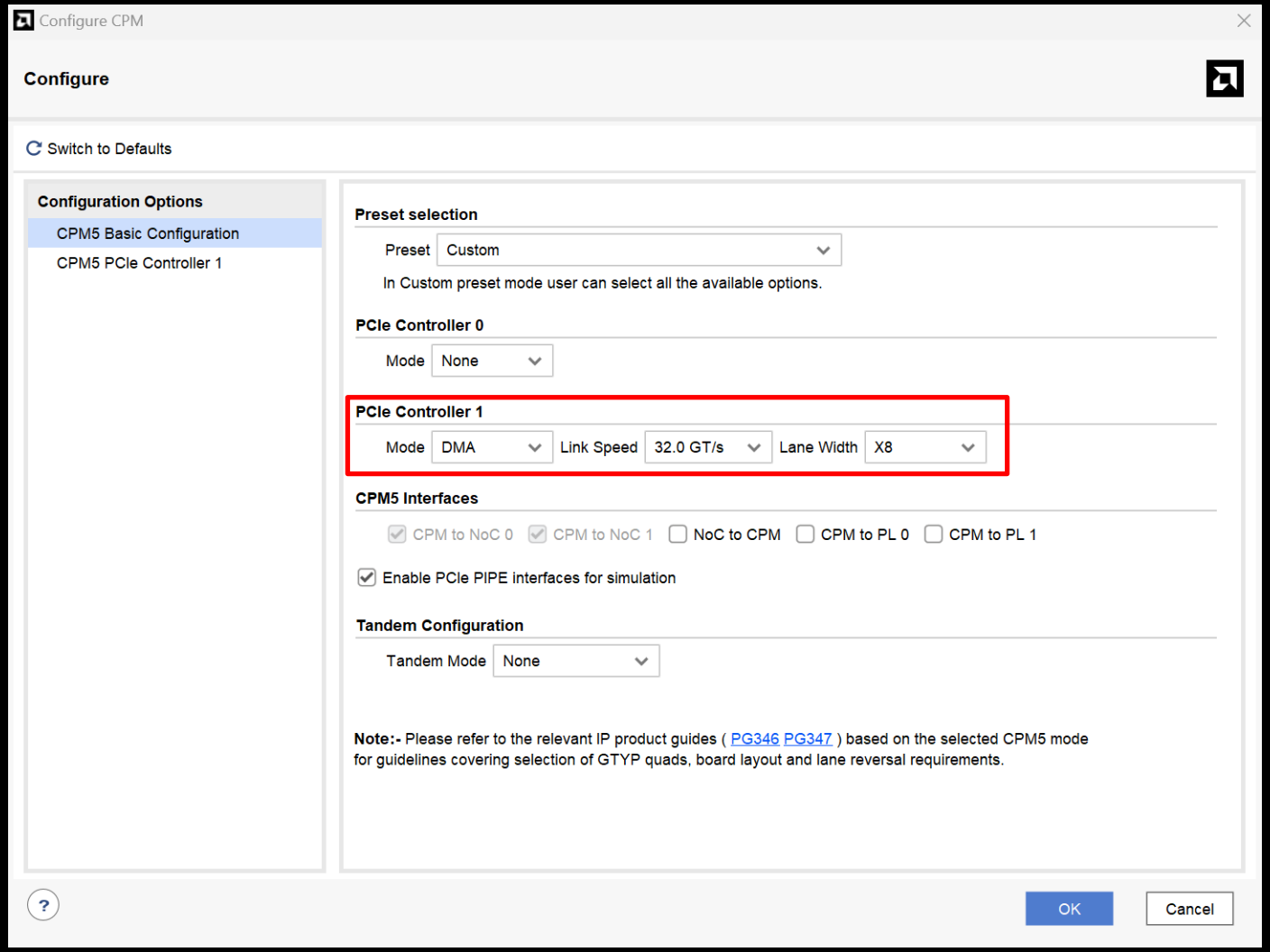
Example Design

Vivado Example Design



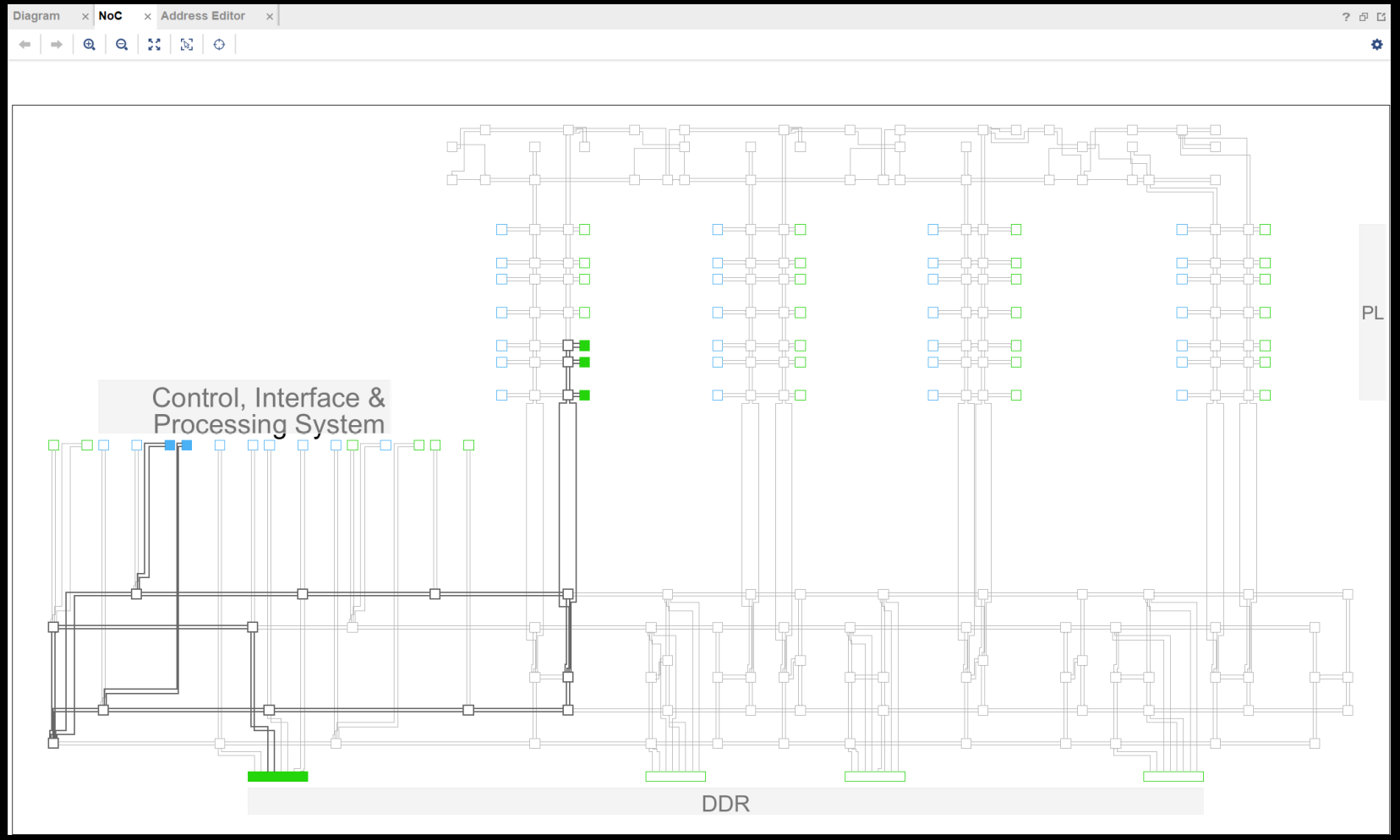
Example Design

CPM IP Setting

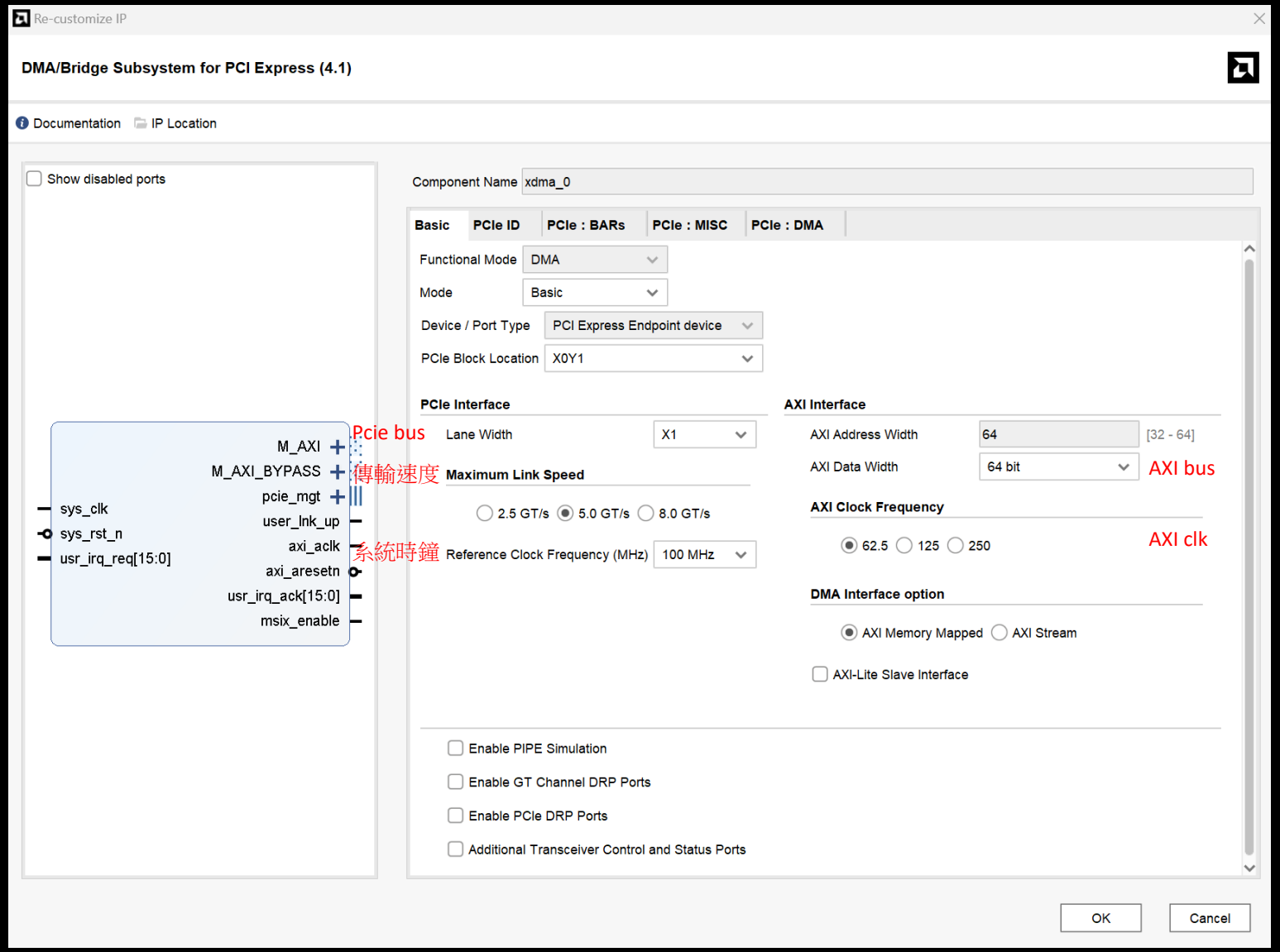


Example Design

NOC



XDMA IP Setting



Install Host PC Driver

上電燒錄後，須確保FPGA不斷電的情況下重啟Ubuntu主機

重啟後先安裝必須的依賴庫及套件

```
$ sudo -s
$ apt-get update
$ apt-get install build-essential
$ apt-get install libaio-dev
```

下載Xilinx提供的dma driver

https://github.com/Xilinx/dma_ip_drivers

cd至以下目錄中，並編譯xdma driver

```
$ unzip dma_ip_drivers-master.zip                          # 解壓縮driver包
$ cd dma_ip_drivers-master/QDMA/linux-kernel               # cd進目錄中
$ make clean
$ make                                                     # build driver
$ make install                                             # install xdma driver
$ sudo reboot
```

Load Driver

Ubuntu重開後確認是否有成功辨識到Pcie Device

```
$ sudo –s                                                    # need to be root
$ lspci –vvd:b03f                                            # note BDF e.g. “86:00.0” on 1st line
```

利用script生成對應的設定檔

```
$ dma_ip_drivers-master/QDMA/linux-kernel
$ cd scripts ; chmod 0755 *.sh
$ ./qdma_generate_conf_file.sh 0x86 1 1 0                    # 利用Xilinx提供的script生成裝置的設定檔
$ cd ..
```

加載驅動

```
$ modprobe qdma-pf                                           # 加載驅動
$ lspci –vvd:b03f                                            # 再搜尋一次確認是否有成功加載
```

Load Driver

使用官網提供的測試檔案

```
$ echo 8 > /sys/bus/pci/devices/0000\:86\:00.0/qdma/qmax          # 使用之前生成的設定檔
```

添加序列

```
$ dma-ctl qdma86000 q add idx 0 dir bi                            # adds
$ dma-ctl qdma86000 q start idx 0 dir bi                          # starts
```

讀寫測試序列

```
$ dma-to-device –d /dev/qdma86000-MM-0 –s 32                      # PC寫入DMA
$ dma-from-device –d /dev/qdma86000-MM-0 –s 32                    # PC讀取DMA
```

停止序列

```
$ dma-ctl qdma86000 q stop idx 0 dir bi                           # stop
$ dma-ctl qdma86000 q del idx 0 dir bi                            # deletes
```


AMD