PCI Express - Send an MSI Interrupt using the MSI Interface

Contents

Chapter 1. PCI Express Overview

- Peripheral Component Interconnect (PCI) is a connection interface standard.
- The PCI Express is an upgrade over the previous PCI, where it offers more bandwidth and is compatible with existing operating systems.
- Unlike the PCI's parallel connection, the PCI handles several point-to-point serial connections with a switch (like a network).

Chapter 2. Interrupts Overview

- Interrupts are a method of creating a break in the flow of function.
- The PCI Express feature three main methods of interrupt handling: Legacy Interrupt, Message Signaled Interrupts (MSI), and MSI-X.

Chapter 3. MSI Interface Protocol

The MSI interface protocol is a simple synchronous request/acknowledge handshake. This interface enables the application to request the core to send an MSI interrupt.

Find below the procedure of sending the MSI interrupt using the MSI interface:

1. The MSI interface is only used for upstream ports.
2. ven_msi_req stays asserted until the core asserts ven_msi_grant
3. The MSI is requested by the application logic through the MSI interface.
4. The memory write is then generated by the core.
5. ven_msi_grant is one-cycle pulse acknowledging ven_msi_req
6. ven_msi_req is not required to be de-asserted before reasserting again.
7. When ven_msi_req remains asserted, the core generates another MSI.

Chapter 4. Example of MSI Message Interface Request

The MSI interrupt initiated from the core by the interface.

Figure 1. MSI interface request