

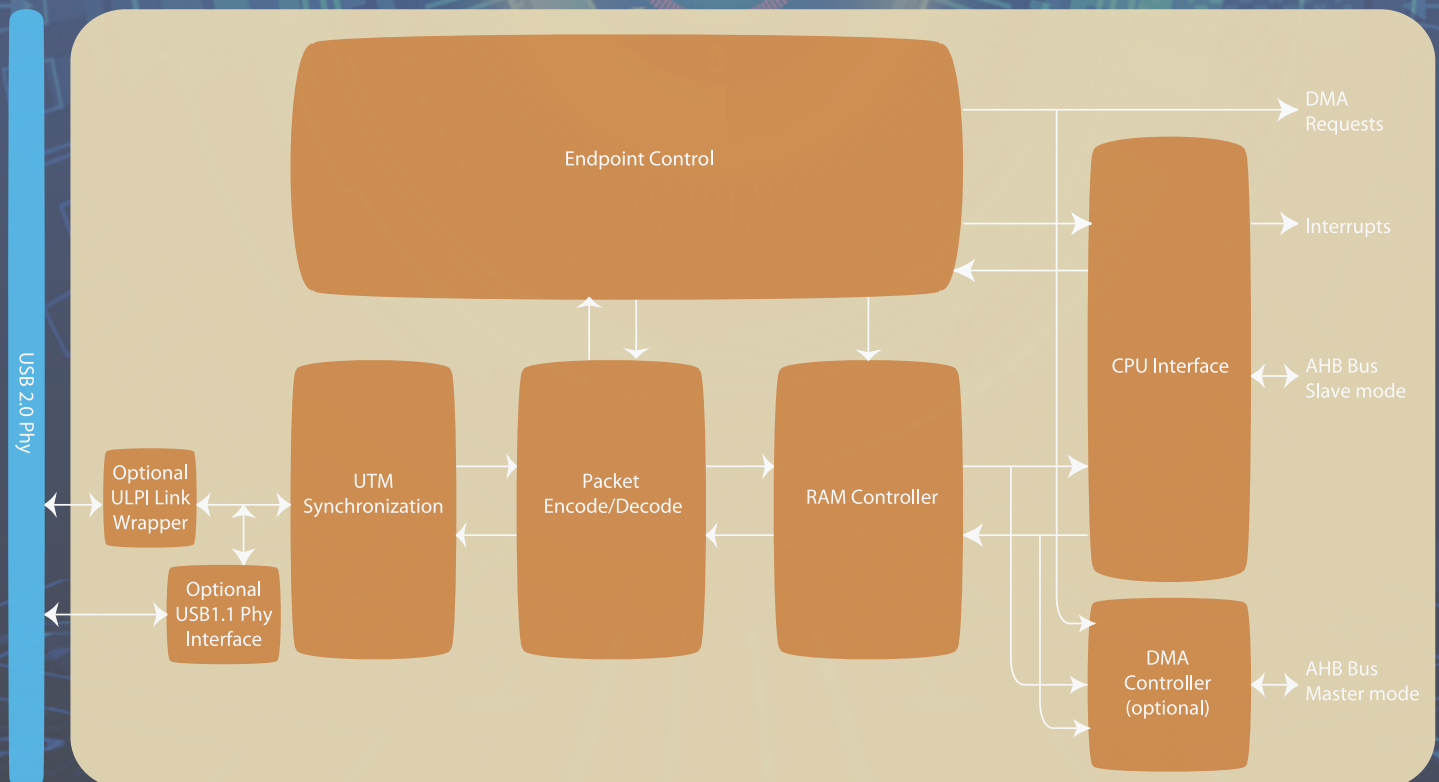
General Description

Innovative Logic's USBMHDRC is a multi-point Hi-Speed dual role USB controller with a complete USB On-The-Go (OTG) capabilities for use in point-to-point communications with other OTG devices and host computers, as well as in multi-point communications with a network of USB 2.0 peripherals and hubs. The controller complies with both the USB standard for Hi-Speed and Full-Speed functions and the OTG supplement to the USB 2.0 specification. The approach used in this controller is to allow the core's endpoints to be allocated to the functions of different target devices. Furthermore, this allocation can be made dynamically. In theory, a full USB tree of 128 devices could be supported in this way, though it is likely to be used with much smaller numbers of devices in practice. An alternative USB 1.1 PHY interface is also provided.

Features

- Point-to-point or multi-point USB OTG
- Compliant with latest USB 2.0 standard
- Supports High-, Full-, or Low-Speed USB devices
- Can be used as either host or peripheral in point-to-point OTG
- Supports SRP and HNP protocols
- Configurable up to 15 additional transmit and receive endpoints
- Configurable FIFOs with option of dynamic FIFO sizing
- Supports 32-bit AMBAAHB interface
- UTMI+ Level 3 transceiver interface with optional ULPI link wrapper
- Optional USB 1.1 PHY interface
- Synchronous RAM interface for FIFOs
- Support for external DMA access to FIFOs
- Support for internal DMA access to FIFOs via built-in DMA controller
- Performs all transaction scheduling in hardware
- UTMI+ PHY vendor register option
- Graphical user interface provided for core configuration

Block Diagram



Block Diagram of USB 2.0 High Speed OTG Controller

Details

The mode initially selected depends on the state of the ID line from the USB mini-A/B connector through which the core is attached to the other device. If sampling the ID line identifies the core as the "A" device, the core will initially go into Host mode. If the core is identified as the "B" device, it will initially select Peripheral mode. The USBMHDRC supports Host Negotiation Protocol (HNP), so where it is connected to another dual-role controller, it can switch roles between host and peripheral. It also supports Session Request Protocol (SRP), whereby the "B" device can request a session by pulsing first the data line and then VBus. Details of both these protocols are given in the USB On-The-Go supplement to the USB 2.0 specification. many registers that may be used for debugging.

Multi-Point Operation

In a multi-point set-up, the USBMHDRC acts as the host to a range of USB peripheral devices connected to the USBMHDRC via one or more USB 2.0 or USB 1.1 hubs.

Target Applications

- Removable hard disks
- Digital camera
- Printer, scanner, etc.
- Multimedia Applications
- Mobile phones and Tablets
- TV, DVD players, Set top Boxes

Deliverables

- Synthesizable RTL developed in Verilog HDL
- Constraints & scripts for synthesis
- Test bench and Test cases developed in SystemVerilog
- Sample Driver code
- User Manual

Hi-, Full-, and Low-Speed transactions are supported through a USB 1.1 hub. The key feature here is the way target device functions can be allocated to the core's individual Rx and Tx endpoints, just by recording the function address and, where necessary, the relevant hub address and port details. Further, this allocation can be made dynamically, allowing the system designer to make full use of the endpoints to service the needs of the different devices that are attached to the core. Once this information has been recorded, transactions can essentially be carried out as if to a single target device, though there are some additional steps to take where the endpoints are allocated dynamically and where control transactions are handled other than through the core's endpoint 0 (EP0). Transaction scheduling is carried out in hardware. The software used just needs to ensure that it does not try to open more pipes than can be supported by the available bandwidth.

Key Benefits

- Optimized designed to achieve lowest power and area for portable electronics
- Extensive debug capabilities
- Configurable options to tune the core as per requirement

Corporate Headquarter and North America Design Center

Innovative Logic Inc.
1731 Technology Dr, Suite. #550 • San Jose, CA 95110
Phone: (408) 824-1313 • Fax: (408) 418-4056
email: sales@inno-logic.com

India Design Center

Innovative Logic Design Services Pvt Ltd.
112/7, Bull Temple Road • Bengaluru – 560019, INDIA
Phone: +91 80 4152 1714