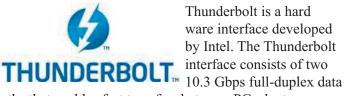# NXP Interface Technology:
Meeting the Needs of High Speed Computing

Consumers' growing demand for high definition video, multimedia and fast data transfers with global access is driving the evolution in computing and communciations technology . As video and data transfer protocols continue to advance to meet this demand, interface technology must support higher speeds, deliver excellent signal integrity and provide a bridge to legacy standards. NXP Semiconductors addresses these challenges with the fastest multiplexer/demultiplexer switches including mux switches supporting Thunderbolt™ I/O technology, level shifters and a broad selection of I2C peripherals and bus enablers.

Thunderbolt is a hard ware interface developed by Intel. The Thunderbolt interface consists of two 10.3 Gbps full-duplex data paths that enables fast transfers between PCs, laptops or tablets and peripheral and display devices. Thunderbolt multiplexes data (PCI Express®) and video (DisplayPort) onto one cable. Hot-plugging and unplugging of cables is supported by the protocol. The two lanes can be running completely independent at different data rates in a Thunderbolt cable. Users can also add peripheral devices via simple daisy chaining; up to six different Thunderbolt peripherals can be connected on a daisy chain. Devices on this chain also can be bus-powered. The Thunderbolt cable can provide up to ten watts of power.

This kind of architecture leads to a design that needs some sort of muxing or splitting to enable both DisplayPort and PCIe® information to go through the same connector. NXP offers two high-speed solutions that enable the necessary switching: CBTL05023 and CBTL05024.

The CBTL05023 is a multiplexer/demultiplexer switch device for DisplayPort v1.2 signals and the control signals of a 10 Gbit/s channel. The 10 Gbit/s channel does not pass through this switch. This device also provides a BIASOUT output control signal and DC-biasing pull-down resistors to facilitate the external 10 Gbit/s channel.

Featuring an integrated 10Gb/s Thunderbolt signal with no external PIN diodes, NXP's next generation switch CBTL05024 integrates two different muxes inside.

One is a three-to-one mux and the other is a two-to-one mux. The Thunderbolt MUX is a three-to-one switch that selects between Thunderbolt data path and DisplayPort v1.2 control signals — either DDC or AUX. The port is backwards compatible and the DisplayPort data can be sent out when DisplayPort is connected or Thunderbolt data sent out when Thunderbolt signals or peripherals are connected.

CBTL05024 also delivers advanced characteristics that enhance signal integrity and power efficiency. It is powered by a 3.3 V supply and available in a small 3×3 mm HVQFN24 package with 0.4 mm pitch.

The Thunderbolt controller acts as a junction in the daisy chain of Thunderbolt products. Current Intel "Ivy Bridge" platforms use "Cactus Ridge" Thunderbolt controllers, while newly launched "Haswell" platforms use "Redwood Ridge" Thunderbolt controllers. Both devices, CBTL05023 and CBTL05024, can be used on Cactus Ridge and Redwood Ridge platforms. For higher integration and a more simplified solution, the CBTL05024 is the better solution as it features integrated pull-up/pull-down resistors and a LSRX (control signal for Thunderbolt channel) buffer to optimize the BOM and improve signal integrity.

At Computex 2013 in Taipei, Intel officially branded its next-generation Thunderbolt as Thunderbolt 2, which will run at 20 Gbps and support 4K video (Ultra HD). The initial production is expected before the end of 2013 with ramp up in 2014. As we've seen, NXP has a sharp focus on this market, offering high-speed switches that meet all Thunderbolt requirements, so without jumping the gun on future announcements it is safe to say that designers would do well to look to NXP for their high-speed interface computing needs both today and going forward. NXP has a sharp focus on this market offering high speed switch solutions that meet all Thunderbolt system requirements and will continue to offer high-speed interface computing solutions going forward.

For more information on Thunderbolt, visit:
http://www.nxp.com/campaigns/high-speed-computing/