Valens
First in HDBaseT™

Valens Stello
VS3000
Product Brief

Overview

The Valens' VS3000 integrated circuit, the first chipset in the Valens Stello family, leverages the HDBaseT Spec 3.0 standard technology, enabling transmission of **uncompressed** HDMI 2.0 (18Gbps - 4K@60 4:4:4) over a single, standard Catx cable. The VS3000 converges ultra-high-definition video, high-fidelity digital audio interfaces (I^2S-4; S/PDIF), 1000BaseTX Ethernet, control/data formats (I^2C, UART/RS-232, MSIO, CIR), USB 2.0 configurable to Host or Device, and up to 100W of power (Power over HDBaseT – PoH) over a single cable, while supporting point-to-point and networking topologies.

Architecture

The Valens' VS3000 features HDBaseT port duality, as the same chipset can be configured to operate as either a TX (transmitter) device on the video source side, or an RX (receiver) device on the video sink side. The same design of TX and RX devices brings considerable cost savings for manufacturers. The VS3000 HDBaseT port can be configured by either hardware or software, or based on an external trigger.

The Valens VS3000 includes a T-Packet switching core for delivery of multi-streams and sessions, coupled with a DHDI (Dual High-Speed Hardware Interface) for multi-chip interconnection. It supports multiple ProAV architectures, including point-to-point, multi-stream, daisy-chain and ring topologies.

Features

- Convergence of several native interfaces over the same HDBaseT link, including

  - Uncompressed HDMI 2.0 streams using 4K@60 4:4:4, 8-bit resolution over an HDBaseT link, with 16Gbps downstream and 2Gbps upstream

  - Audio I^2S-4 and S/PDIF

  - 1Gbps Ethernet

  - USB 2.0

  - Control & data formats, including integrated I^2C, RS-232 and CIR

  - Power over HDBaseT

- HDBaseT Port Duality, enabling a single hardware design to support both TX and RX (configured through hardware or software)

- Highly integrated chipset

  - Concurrent "HDMI in" and "HDMI out" native interfaces

  - Audio Extract and Insert functionality on "HDMI in" and "HDMI out"

  - Processing of HDCP 1.4, HDCP 2.2 and HDCP2.3

- Full backward compatibility with existing Valens' chipsets (VS1xx and VS2xxx)
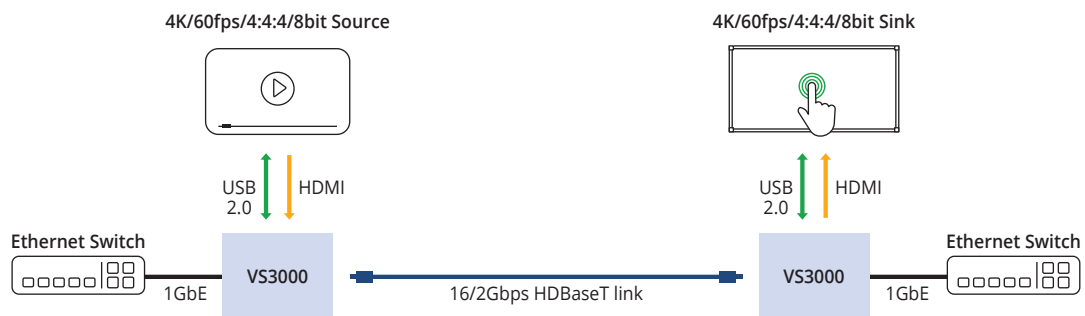
Functional Block Diagram

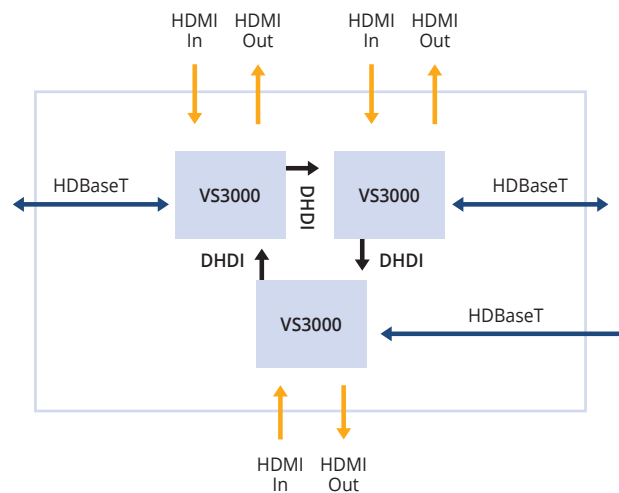The figure below depicts the main functional blocks of the Valens VS3000 IC:
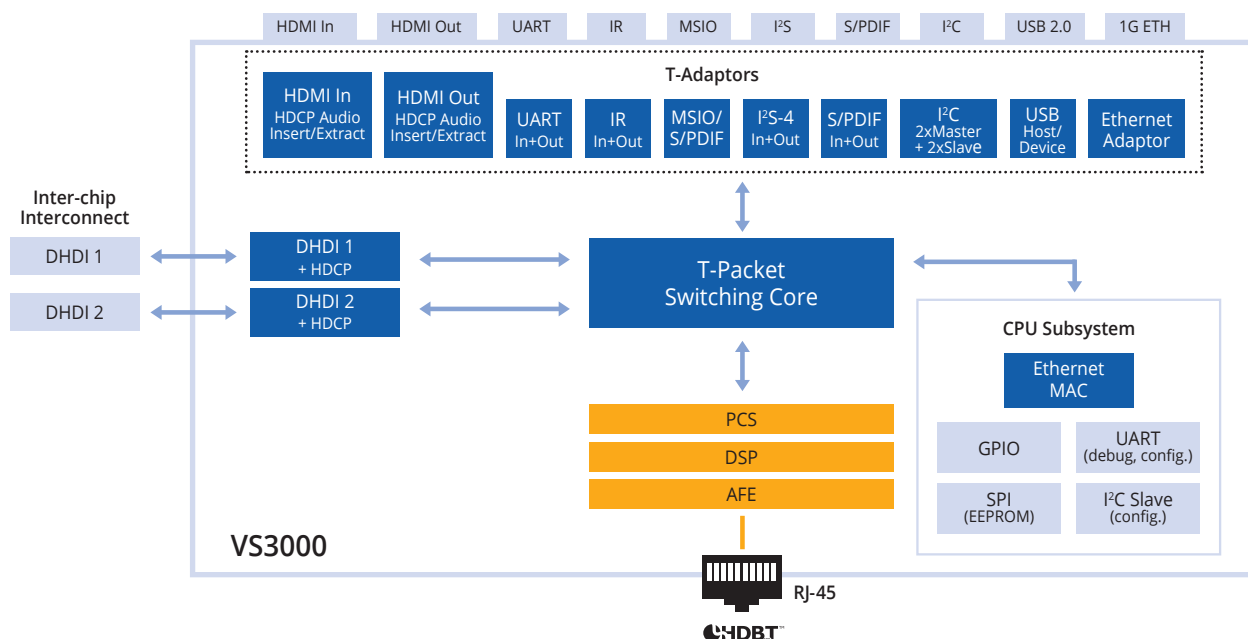
Applications

The VS3000 is optimized for several sectors, particularly those in need of high-performance, uncompressed video. Suitable applications include HDMI 2.0 extension, NxK AV matrixes, AV receivers, Ultra-HD interactive projectors, industrial PCs, single-wire TVs, KVM (keyboard-video-mouse) extension, digital signage displays, conference rooms/teleconferencing, collaborative classroom, medical imaging, multi-stream video switching/distribution/aggregation and daisy-chaining.

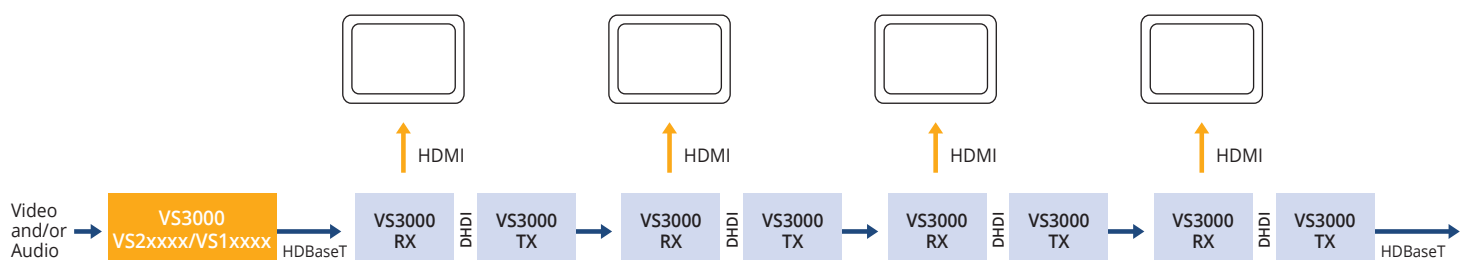## HDMI 2.0 Extension with USB and Ethernet support over CATx Cables

4K/60fps/4:4:4/8bit Source

4K/60fps/4:4:4/8bit Sink

USB 2.0 | HDMI

USB 2.0 | HDMI

Ethernet Switch

Ethernet Switch

1GbE | VS3000 | 16/2Gbps HDBaseT link | VS3000 | 1GbE

AV Switch Application – On-chip Multiple Streams

HDMI In | HDMI Out | HDMI In | HDMI Out

HDBaseT | VS3000 | DHDI | VS3000 | HDBaseT

DHDI | DHDI

VS3000 | HDBaseT

HDMI In | HDMI Out

- Utilizing 2 DHDI interconnection per chip
- 3 HDMI INs, 3 HDMI OUTs, 3 HDBaseT ports (configurable as either Tx or RX)

Daisy-Chain Signage Application

HDMI | HDMI | HDMI | HDMI

Video and/or Audio → VS3000 VS2xxxx/VS1xxxx | HDBaseT → VS3000 RX | DHDI | VS3000 TX → VS3000 RX | DHDI | VS3000 TX → VS3000 RX | DHDI | VS3000 TX → VS3000 RX | DHDI | VS3000 TX → HDBaseT

Technical Highlights

Parameter	Value
HDMI Interfaces	• Fully compliant with HDMI 2.0 and HDMI 1.4 • EDID adjustment mechanism for HDMI 2.0 at pixel clock higher than 594 MHz • Glueless interface to TMDS, DDC, CEC, and HPD HDMI signals
HDCP	Support for HDCP 1.4, HDCP 2.2 and HDCP2.3: • Termination/conversion mode – negotiation is performed "per segment". The VS3000 acts as an HDCP repeater. Conversion between HDCP 2.2 (source/device) to HDCP 1.4 (sink device) is supported as defined in the HDCP standard
Audio Insert/ Extract	• Audio Extract and Insert on HDMI In, HDMI Out and HDBaseT
Audio Interfaces	• Standard S/PDIF, I²S-4 • All audio formats supported by HDMI 1.4 and HDMI 2.0 • All major digital audio formats, including: Dolby Digital, DTS, Dolby TrueHD • DTS HD-Master Audio, Dolby Pro Logic 7.1 & 9.1, and more
USB	• USB 2.0 standard compliant. USB port is configurable as host or device port
Ethernet Interfaces	• SGMII (1000BaseT or 100BaseT) • RMII (10/100BaseT)
Control Interfaces	• UART, IR, I²C (slave/master), MSIO-6 General Purpose fast serial channels
DHDI Interfaces	• 2 x DHDI digital interfaces for on-board inter-chip connectivity and applications, support for 16 Gbps inter-device on-board connectivity
System Interfaces	• 100Mbps Ethernet MAC, RS232, I²C slave, SPI boot EEPROM
Power	• PoE (802.3af), PoE+ (802.3at), PoH
Maximum Data Rate	• Main channel – downstream data rate: 16 Gbps • Auxiliary return channel – upstream data rate: 2 Gbps Full Duplex
Networking	• Supports multiple ProAV topologies – point-to-point, daisy-chain and redundant HDBaseT ring
Junction Temp.	• 0°C to +125°C
Dimensions	• HSBGA: 21 mm x 21 mm • Ball pitch: 1.0 mm • Pin count: 400 (20 x 20)

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