The Need for Multi-Gigabit Speeds for In-Vehicle Connectivity

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Smart Connectivity
Across several markets, with superior physical layer (PHY) technology

Leader
ProAV market, with thousands of HDBaseT-enabled products, millions of chips delivered, YoY growth & highly profitable

Innovator
High-speed in-vehicle connectivity
On the road by 2020 with Daimler
Baseline for MIPI Alliance’s A-PHY standard for video transmission

2006
established

~100
patent portfolio

~330
employees

IL
HQ in Israel

Presence in
8
countries
The Pain Points of Wired Connectivity

**Too many cables**
At our homes, offices, plants & vehicles

**Distance limitations**
Going further without compromising on quality

**Installation Complexity**
Future-proofing for new interfaces & features

**Rough environments**
EMC, EMI, temperature changes, cable aging, cable handling

**High TCO**
Design, development, infrastructure & maintenance costs

**Video Resolution**
Handling high-throughput, time-sensitive content transmission and latency
Automotive: Wire Harness Today Weighs Roughly 60kg

Source: EDAG BFFT Electronics
The Problem Is Real. And Everyone is Talking About It.

Yazaki rethinks wiring for autonomous age
Supplier aims to have vehicles require fewer and lighter harnesses

Musk: Tesla will slash wiring on Model Y

CTO Blog: Architecture overload - there's no more room

Without smart architectures... nothing will happen.
Requirements for Future In-Vehicle Connectivity

- Multi-Gigabit Bandwidth
- Connectivity Convergence
- Low Latency
- Multi-Gigabit Bandwidth
- Cyber Security
- EMC/Robustness
- Diagnostics
Limitations of Existing Connectivity Solutions

- Too slow to support advanced architectures – more bandwidth is needed
- No common solution – different use cases require different connectivity technologies
- No native system convergence – gateways must be used as data bridges
- Use costly wiring harnesses – shielded, expensive wiring is needed to overcome EMC challenges
- Wiring length is limited – imposes constraints on system topologies

A CONNECTIVITY REVOLUTION IS REQUIRED.
Valens Chipset: Smart Connectivity over Simple Wiring Infrastructure

- Audio (I²S, TDM)
- Video (DSI, DP/eDP, oLDI, CSI-2)
- Data (Ethernet, PCIe, USB)
- Control (I²C, UART)
- Power (PoDL)

Physical Layer:
- Multi-Gig link speeds
- Symmetrical/asymmetrical bidirectional link
- EMC robustness
Valens Chipset: Smart Connectivity over Simple Wiring Infrastructure
Unprecedented Bandwidth

Tunneling of multi-Gigabit, bi-directional, simultaneous streams of high-definition video & audio, data, USB, and power over a single wire; scalability over multiple wires
Link Bandwidth Limitations: Communication Channel

> Signal modulation reduces frequency, enabling higher bandwidth

> Adaptive noise cancellation further improves link capacity
EMC Robustness by Design

- Other technologies avoid noise as much as possible
  - Fewer levels of coding
  - Transmitting at a lower data rates
  - Use heavier, expensive shielded wires

- Valens’ technology “welcomes” noise
  - Sampling the noise
  - Learning where it exists
  - Learning how it behaves

The only technology that meets the harsh EMC requirements while transmitting multi-Gigabit data over UTP
Proven EMC Performance

Ongoing testing with leading OEMs and Tier-1s worldwide yielding positive results
Delivering Smart Connectivity

- A single technology solution to address all use cases
  - Asymmetric or symmetric links
  - Various multi-gig link speeds
- Convergence of multiple native data interfaces on one link
- Highly robust EMC performance enables 15m/50ft reach over a single wire (UTP/STP/Coax) with up to 4 inline connectors
- Suitable for point-to-point and networking topologies with near-zero latency
Use Cases
Use Cases

Body/Chassis Connectivity

High-Performance Computing

Infotainment/Telematics

Autonomous
Automotive: Wire Harness Today Weighs Roughly 60kg

Source: EDAG BFFT Electronics
The Industry is Heading to Zonal Architecture

- High-speed data transmission
- Roughly 30% weight reduction
- Massive bandwidth gain
- Reduced wire harness, connectors
- Less complexity, lower BOM
Example: Valens’ Innovative Approach for Zonal Architecture

- High performance with long-range tunneling of PCIe (15m/50ft), and convergence of additional interfaces (such as 2.5GbE)
- Multi-gigabit bidirectional link speeds
- Near-zero latency
- Highly resilient with inherent redundancy capabilities
- Enables virtualization and resource sharing
Example: Optimized Sensor Fusion

- Asymmetric multi-gigabit link speeds
- Baseline technology of MIPI Alliance’s A-PHY standard
- Near-zero latency
- Point-to-point, sensor fusion and network topologies
- Clock synchronization
- Low power consumption
HDBaseT & Automotive Ethernet: No Need to Choose

- Co-existence of numerous technologies to address different applications and technological requirements
  - Symmetric vs. asymmetric
  - PCIe more suitable for direct memory access
- Valens is already an enabler for high-speed Ethernet within vehicles
  - VA6000 with 1Gbps Ethernet in production for smart antenna connectivity in Daimler vehicles
  - 2.5Gbps Ethernet over UTP – a first in the market
  - No need to relax channel requirements
Thank You

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