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Product Brief

Leading the Multi-Gig Revolution in Automotive

AQcelerate AQV107, AQV108, and AQV109 Automotive Ethernet PHYs

Overview

Marvell® AQcelerate automotive PHYs deliver high-performance, Multi-Gig transfer rates and support 2.5Gbps/5Gbps/10Gbps Ethernet speeds, which are critical for safe, secure ADAS and autonomous vehicle (AV) networks, while providing automotive OEMs with the reliability and cost effectiveness of copper cabling. New automotive applications requiring data rates well beyond gigabit Ethernet can only be enabled by an In-Vehicle Network (IVN) based on Multi-Gig technology.

These applications include higher resolution cameras, improved telematics and rich, in-cabin entertainment experiences. The Marvell AQcelerate automotive PHY family includes the AQV107 (10Gbps), AQV108 (5Gbps), and AQV109 (2.5Gbps).

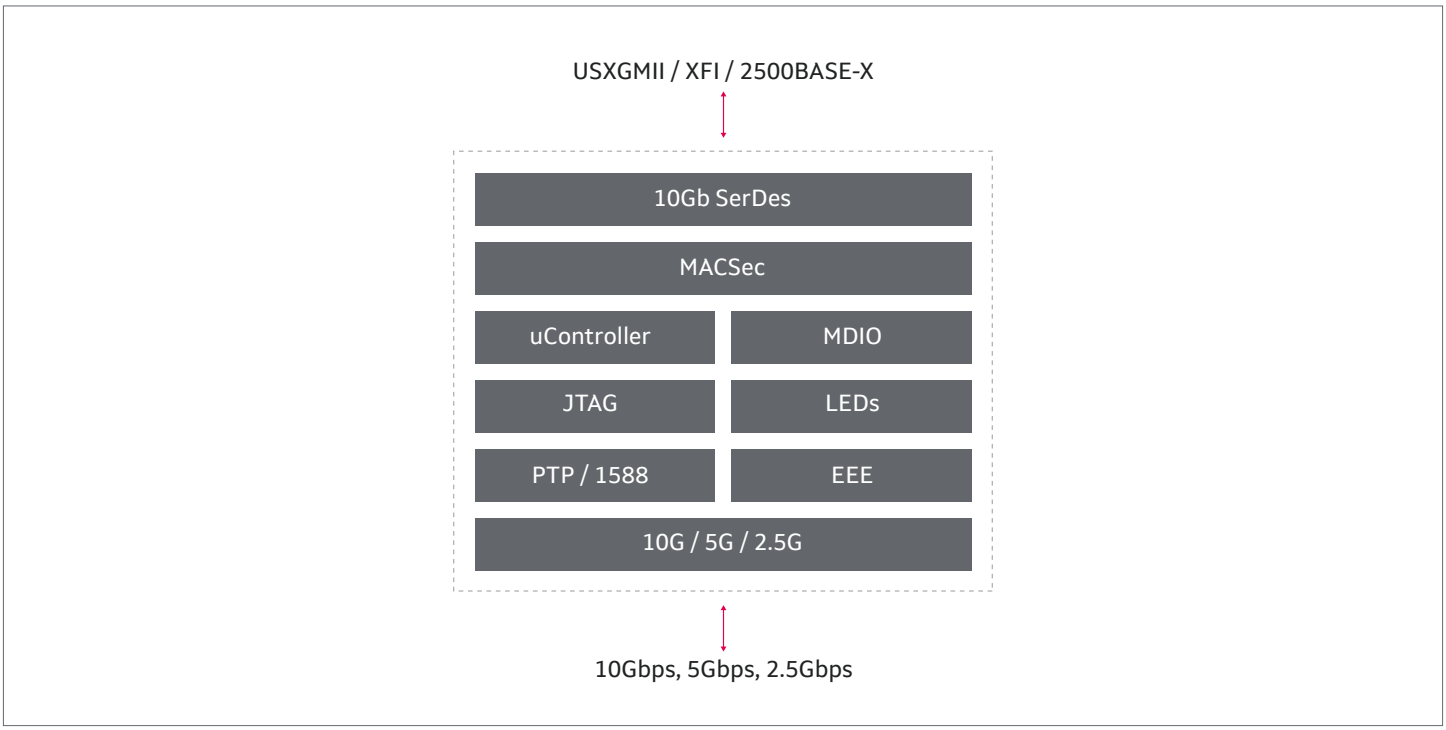
The industry shift towards ADAS and AV driving requires an IVN architecture that can support:

- **Increasing bandwidth** requirements to support the increasing number of sensors and high-resolution cameras.
- **Redundancy** of all the function-critical components and systems to provide the utmost levels of safety.
- **Simplification** – moving from multiple network/interfaces into an industry proven, coherent, secure network that supports all the required features of autonomous driving.

The AQcelerate line is based on Marvell's industry proven AQrate PHY technology which has shipped well over ten million ports into the data center and enterprise infrastructure markets. Just as these markets have benefited from increased throughput, the automotive industry will be able to introduce new classes of applications courtesy of Marvell's Multi-Gig technology.

Marvell Automotive PHYs handle all physical layer functions required for 10/5/2.5Gbps transmission over automotive cables. They also include key features such as IEEE MACsec, Energy Efficient Ethernet (EEE), and IEEE 1588v2 Precision Time Protocol (PTP). Marvell AQcelerate PHYs are automotive qualified based on AEC-Q100 industry standard.

Block Diagram



Key Features

Features	Benefits
Support for the following functions: • 10GBASE-4C/4-channel (AQV107, 10 Gbps only) • 5GBASE-2C/2-channel (AQV108, 5 Gpbs only) • 2.5GBASE-1C/1-channel (AQV109, 2.5 Gbps only) Note: Each supported channel can be one differential pair or one single-ended line	• Meets requirements for delivering 10 Gbps/5 Gbps/2.5 Gbps over 15 meters of automotive-rated cabling with up to four in-line connectors • Meets requirements for both immunity and emissions on automotive- rated cabling
Energy-Efficient Ethernet (EEE)	• EEE lowers overall power consumption
MACsec (IEEE 802.1ae, MAC security standard) • Full support for Advanced Encryption Standard (AES-256) and stand-alone operation	• MACsec provides for secure, encrypted data communications across networks
PTP/1588v2	• PTP/1588v2 provides for timing accuracy across the network
Synchronous Ethernet (Sync-E), ITU-T standard in cooperation with IEEE	• Provides accurate clock recovery for time aware applications
Built-in Thermal Management • On-chip thermal sensor with alarm and warning thresholds	• Enables deployment in thermally constrained environments
Advanced Cable Diagnostics • On-chip high-resolution cable analyzer	• Enables the deployment of meaningful cable analysis tools for debugging installation problems
High-Performance full KR (with autonegotiation)/XFI/ USXGMII/2500BASE-X • Capable of rate adapting all rates into KR/XFI via PAUSE	• Ensures trouble-free operation over a range of interconnect scenarios Comprehensive interface support • Supports legacy and next generation MACs/switches/processors
Advance Loopback and Diagnostic Capability • Flexible on-chip BERT • Full 1-second packet counters and CRC-32 checkers	• Enables extensive system test and debug with remote loopback control

Target Applications

The target applications supported by the AQV107, AQV108, AQV109 include:

- Advanced Driver Assistance System (ADAS)
- Autonomous Vehicle (AV)
- High-resolution front & rear-view cameras
- Surround view & parking assist systems
- Radar, Lidar & Sonar
- Advanced telematics
- Audio video bridging
- Infotainment

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