Welcome to

DesignCon® 2023

WHERE THE CHIP MEETS THE BOARD

Conference

January 31 – February 2, 2023

Santa Clara Convention Center

Expo

February 1 – 2, 2023

Feasibility of End-to-End Ethernet for Sensor & Display connectivity in automotive applications

Kamal Dalmia, (Aviva Links Inc.)

SPEAKER

Kamal Dalmia

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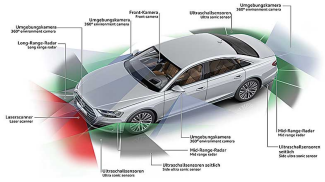
Kamal is a serial entrepreneur with a track record of building businesses from inception. He has pioneered several connectivity technologies that have shaped the industry over two decades. Prior to founding Aviva, Kamal was founder and CEO of Dryv, an automotive company that developed the foundational technology for modern in-vehicle communications and was acquired by Synaptics. Before that, he was Senior Vice President and Section 16 officer at Aquantia, taking the company from a pre-revenue startup to successful IPO.

The Automotive Revolution…

Once-in-a-lifetime transformation of a multi-trillion $ industry is underway



Autonomous Systems
ADAS

Telematics
5G

Infotainment
Smart Cockpit

These trends are often talked out in conjunction with the transition to EVs. However, they are applicable regardless of electric or traditional drive train

Software Defined Vehicles (SDV)

As cars become Software Defined, they need enhanced….

Compute Architecture	**AI**
Sensors	**Cameras, LiDAR, RADARs etc**
Displays	**4K -> 8K -> XR**

And a…

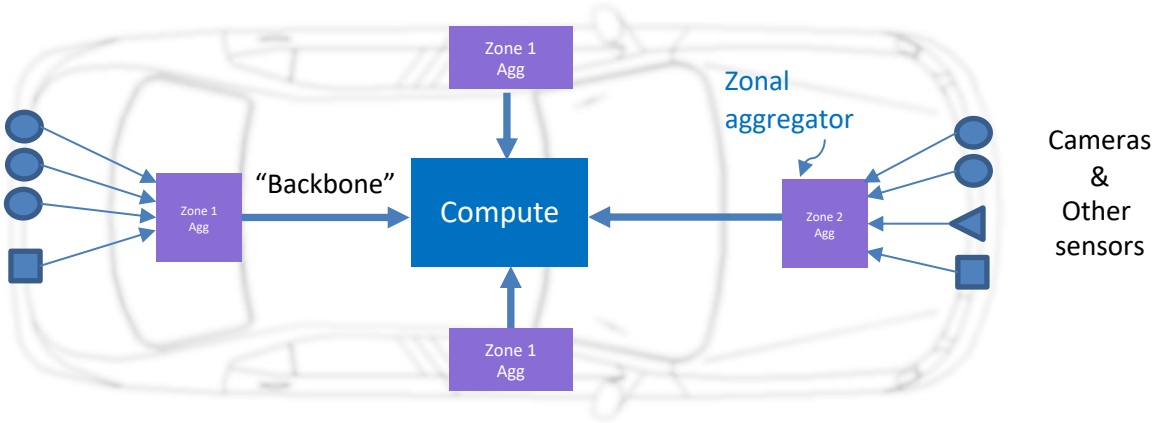
Sophisticated network to connect it all.

SDVs require transition from today's simple point-to-point links to advanced networks.
Higher Bandwidth, low latency, synchronization, redundancy and Security are key requirements.

Connectivity is trending to zonal architecture

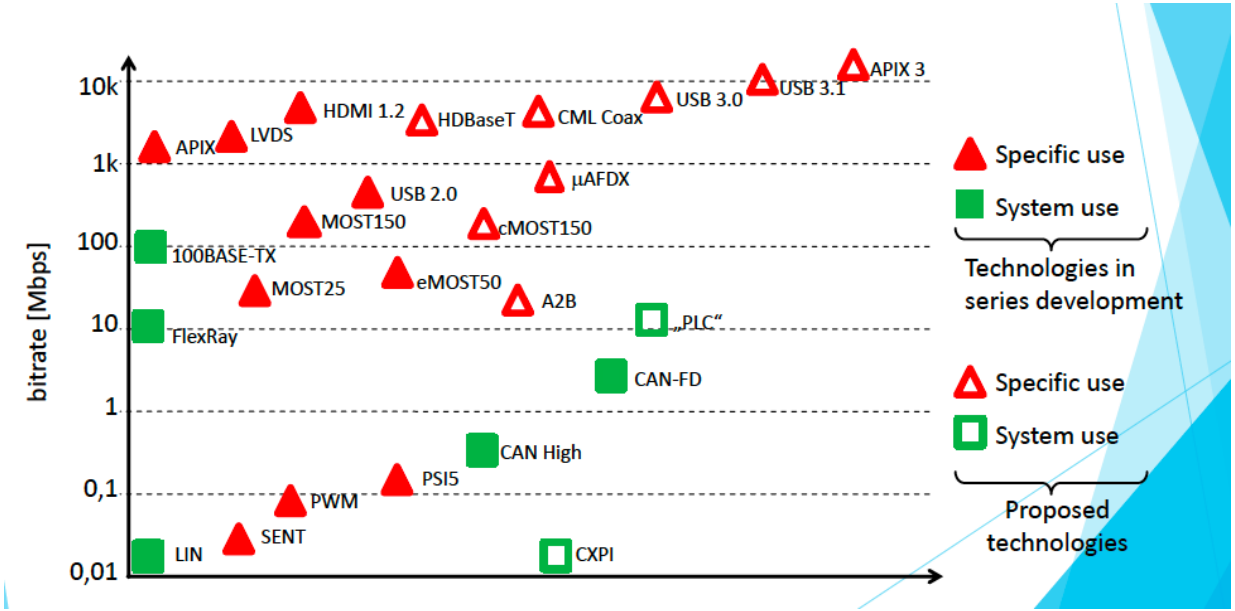
Today's cars are primarily based on "Domain Architecture"

Moving towards "Zonal Architecture" while facilitating software driven features



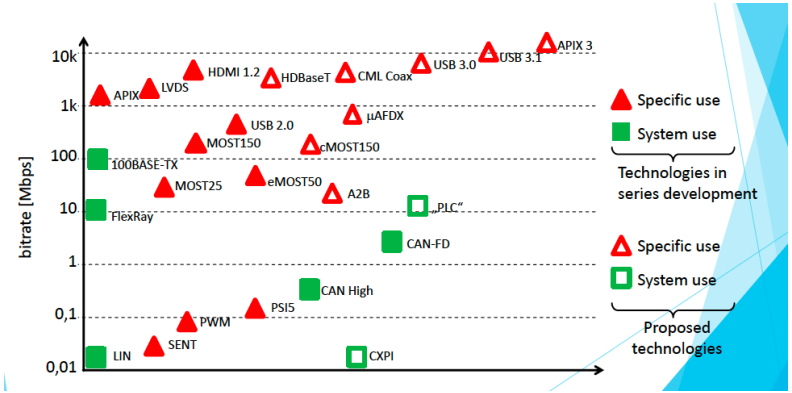
Simple illustration of Zonal Architecture

Too many connectivity technologies…



Source: https://www.ieee802.org/3/cfi/1116_1/CFI_01_1116.pdf

Ethernet is the natural choice for unification



Ethernet?

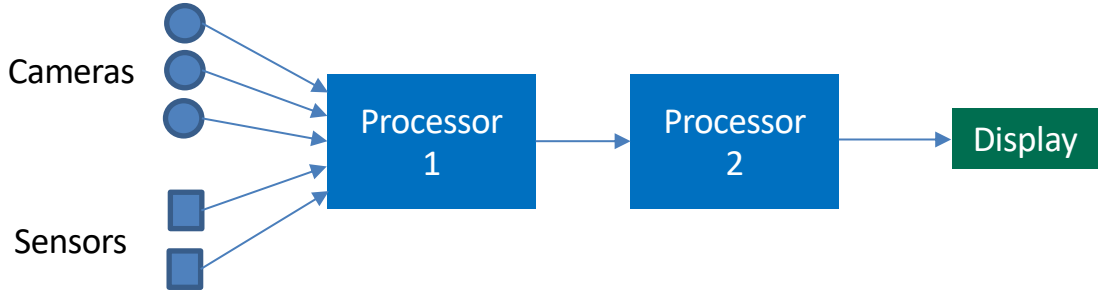
Various speeds for differing use cases
10Mbps to 10Gbps+

Ethernet standards provide a great toolbox with lots of flexibility.

Currently, asymmetrical operation is possible by applying EEE to symmetrical PHYs.

But there is a need for more optimized automotive Ethernet solution supporting asymmetric data rates at PHY level.

Why do we need Asymmetrical Ethernet?



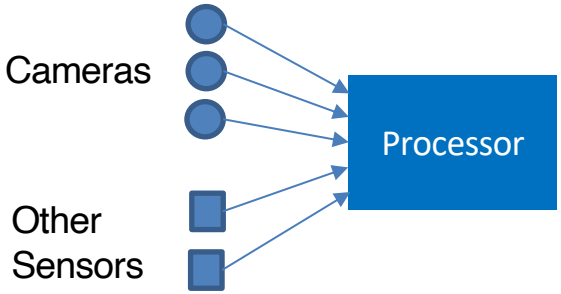
Traditional Ethernet came from office and home networking roots. It is symmetrical in nature.

High bandwidth data movement in vehicles is dominated by video applications (cameras, displays..) These applications requires transmission of multi-gigabit data in the "forward direction".

Relatively small amount of data in the "reverse direction" for control purposes.

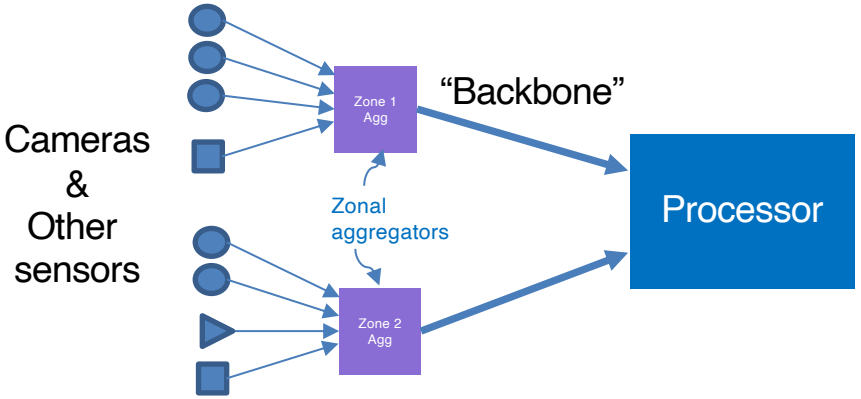
Therefore, the application is "asymmetrical" in nature.

Asymmetrical Ethernet in Zonal Architecture



Near term

- Sensor connections are point to point
- Accomplished using proprietary SerDes
- Moving to standards based SerDes



Longer term

- Zonal architecture changes certain things…
- But, in most cases, data flow would still be **asymmetrical**

ASA – New Standard for In-vehicle Connectivity

Automotive SerDes Alliance

- Founded in May 2019
- Optimized for in-vehicle connectivity
- Rev 1.01 spec released in Dec 2020
- Rev 1.1 is being completed (adds DP & Link agg.)
- Rev 2.0 – Ethernet capability!

100+ members

Strong momentum! Members include…

- ✓ OEMs
- ✓ Tier 1s
- ✓ Semiconductor vendors
- ✓ Cable, connector & test vendors

https://auto-serdes.org/

Why ASA 2.0?

ASA 1.x addressed the need for standardization of SERDES

Standardization of SerDes is a great step forward, but provides limited networking capabilities

ASA 2.0 will allow seamless integration into an Ethernet network with a truly asymmetric PHY

It will provide the system level benefits of ETHERNET while providing the cost, power & latency benefits of SERDES

BEST of BOTH Worlds: ETHERNET + SERDES

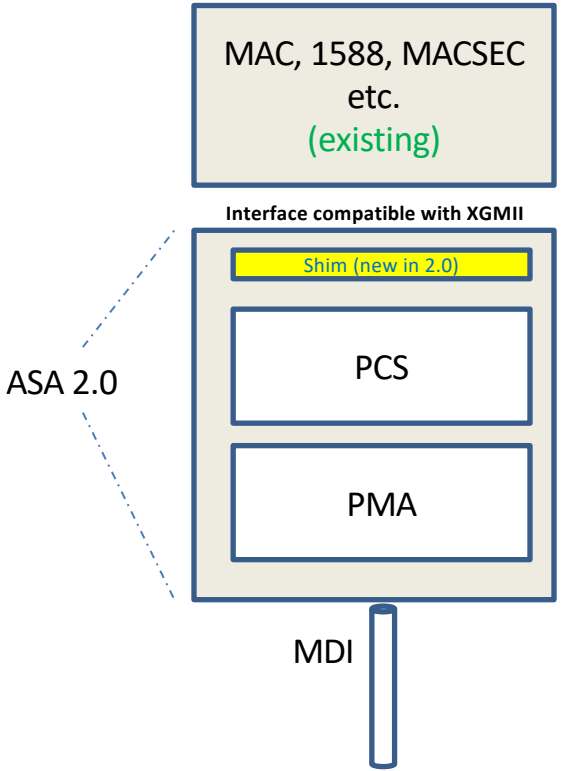
ASA 2.0 Ethernet capable PHY

Builds on top of current ASA 1.x PHY

2.0 specific modifications make the new PHY compatible with existing system level Ethernet interface

Designed to work seamlessly with existing Ethernet elements such as a MAC

Baseline adopted by ASA committee in Nov 2022



ASA 2.0: PHY Speeds

	Downstream	Upstream
ASYM	10G	1G
	10G	100M
	5G	100M
	2.5G	100M
SYM	5G	5G
	2.5G	2.5G
	1G	1G

ASA 2.0 is focused on asymmetrical rates,

But also support symmetrical rates!

Data rates to support existing MACs

ASA 2.0: TDD based architecture for flexible rates

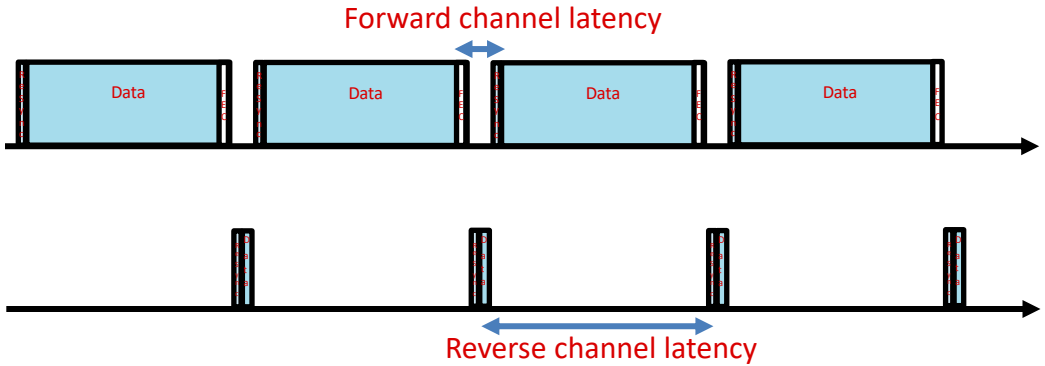
ASA Motion Link specs defines automotive SerDes that is based on TDD

TDD stands for Time Domain Duplexing

It is a technique to send data in "both directions" i.e. duplex but on a TDM basis

Inherently asymmetrical in nature & now capable of carrying Ethernet traffic

TDD Based PHY



Benefits of ASA

Link Speeds

ASA 1.0 2G to 16G line rates
ASA 1.1 Link Agg up to 64G
ASA 2.0 1G to 10G line rates

PHY Latency

Low PHY latency for both upstream and downstream directions

Power Consumption

Lower power consumption due to TDD PHY architecture

Solution Size

Small overall footprint due to smaller PoC inductors

Security

Complete security solution including encryption and key management

Performance

Highest SNR and link quality due to non-overlap of Signals, along with FEC

Summary

- Automotive market is going through once in a lifetime transition
- Software Defined Vehicles with advanced electronics are happening
- Market desires End-to-End Ethernet for SDVs
- Asymmetrical Ethernet is a key requirement to make this happen
- ASA 2.0 is in the process of specifying TDD based Ethernet-capable PHY
- Once available, this will pave the way for a unified & scalable architecture

Thank you for attending !

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QUESTIONS?

Thank you for attending this webinar!

Join us again for Advanced Manufacturing Minneapolis

October 10-11, 2023