Storage on the *Move*
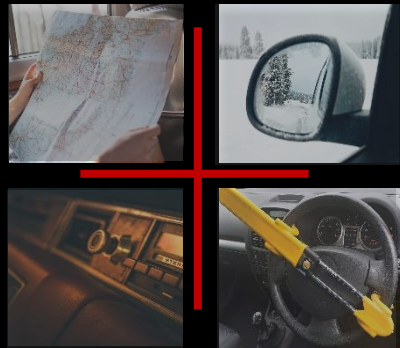
Noam Mizrahi

Fellow
VP Technology and Architecture, Marvell

MARVELL®

4.2 TBs

Per day, will be generated by a self driving car

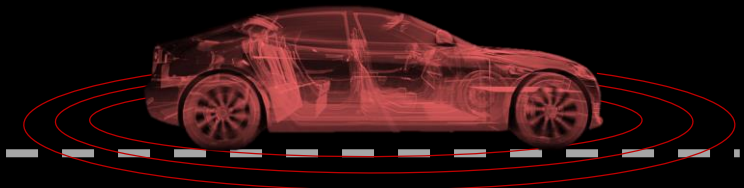**A Level 1 Car**

A Level 2-3 Car

| <1 TFLOPS of Compute | 1-4 Cameras & Sensors |
| 1K Resolution | <1 Gb/s per Stream |

A Level 4-5 Car

| 80 TFLOPS of Compute | 15 Cameras & Sensors |
| 4K Resolution | 8 Gb/s per Stream |

Today

MARVELL ®

Next Generation Cars need a
Zonal Architecture

Legend:
- ● Sensor / Camera / ECU
- ■ Local Ethernet Switch
- ▣ Centralized, high capacity Ethernet Switch
- ■ Centralized Computing
- — Ethernet Interconnect
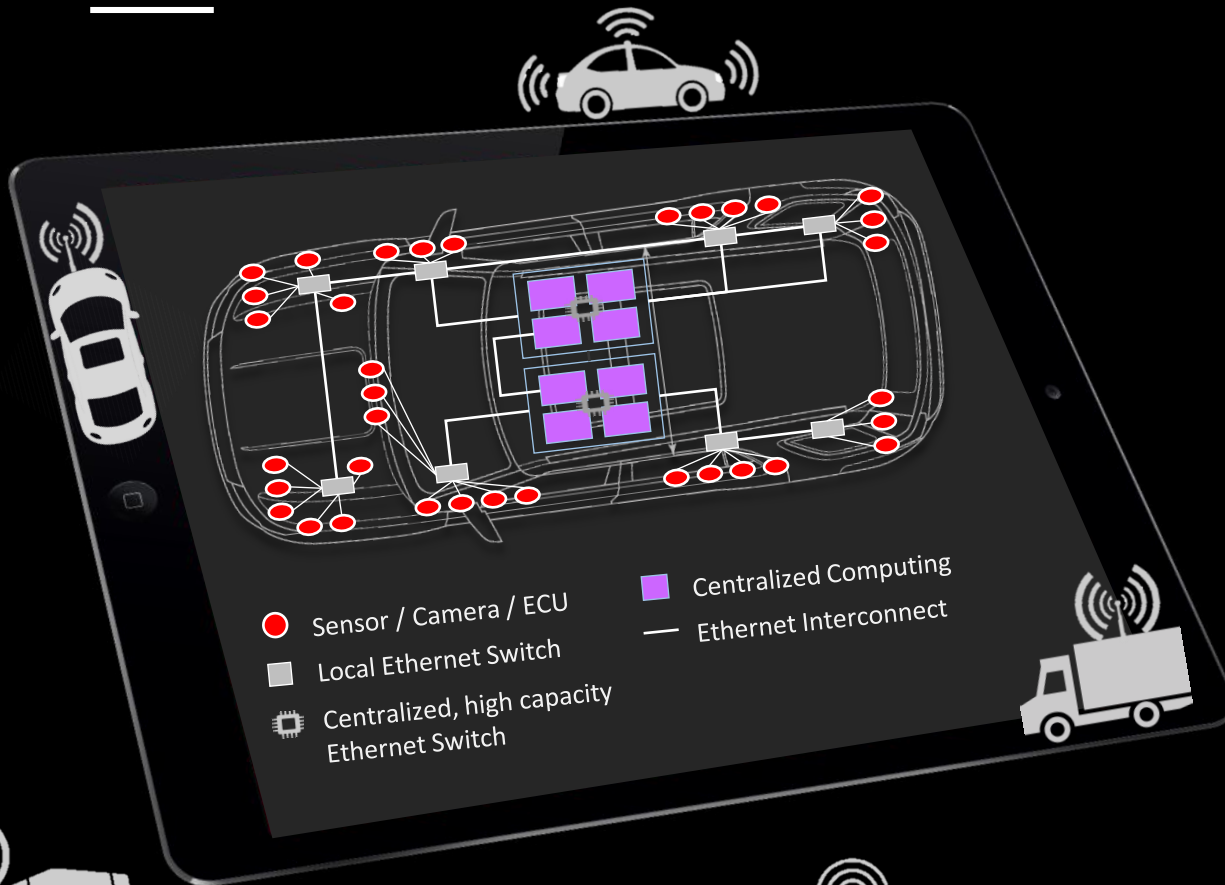
Three Foundations

1. Centralized Compute

2. Centralized Storage

3. Ethernet Interconnect

Ethernet *Connects* it all

- Scalable

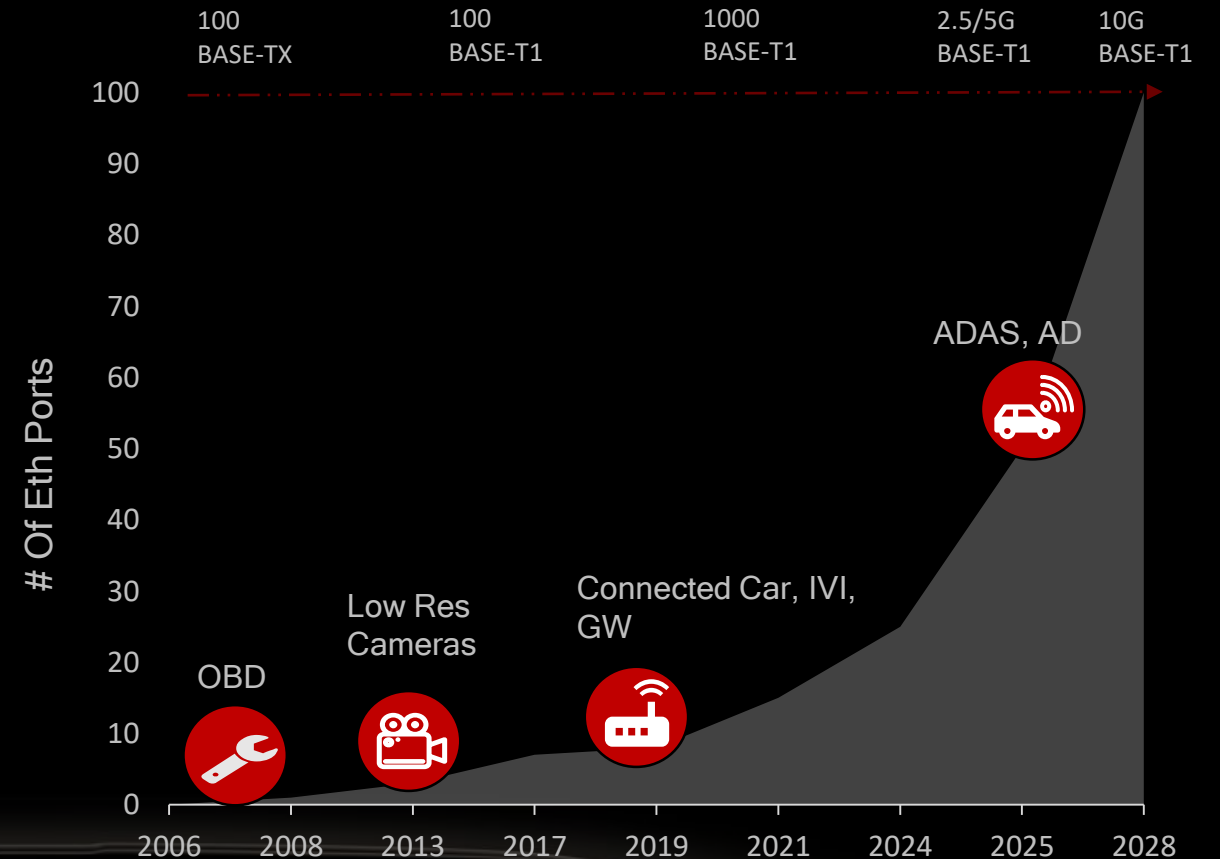- Designed for large number of connections

- Real Time (TSN) and Best Effort models

- Built in Security

- Native Virtualization, Mng, QoS support

- Single standard – any to any connection

100 BASE-TX	100 BASE-T1	1000 BASE-T1	2.5/5G BASE-T1	10G BASE-T1

 # Of Eth Ports (axis: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100)

ADAS, AD

Connected Car, IVI, GW

Low Res Cameras

OBD

Years: 2006, 2008, 2013, 2017, 2019, 2021, 2024, 2025, 2028

MARVELL ®

Centralized Storage?

State regulations require recording at least the last 30 seconds from all the vehicle functions (and a few seconds after)

Reduce weight and packaging

Minimize duplications

Simplify the edges

Easier to secure, protect and manage

Not everything is latency sensitive (but some is…)

01. Capacity

02. Shared

06. Scalable

03. Parallelism

Latency **05.**

RAS **04.**

Storage Requirements

01 **TBs** of capacity

02 **Virtualized and Shared** by 100's

03 **Dozens** simultaneous accesses

04 **Available and Reliable** Storage

05 **µs' s** low latency

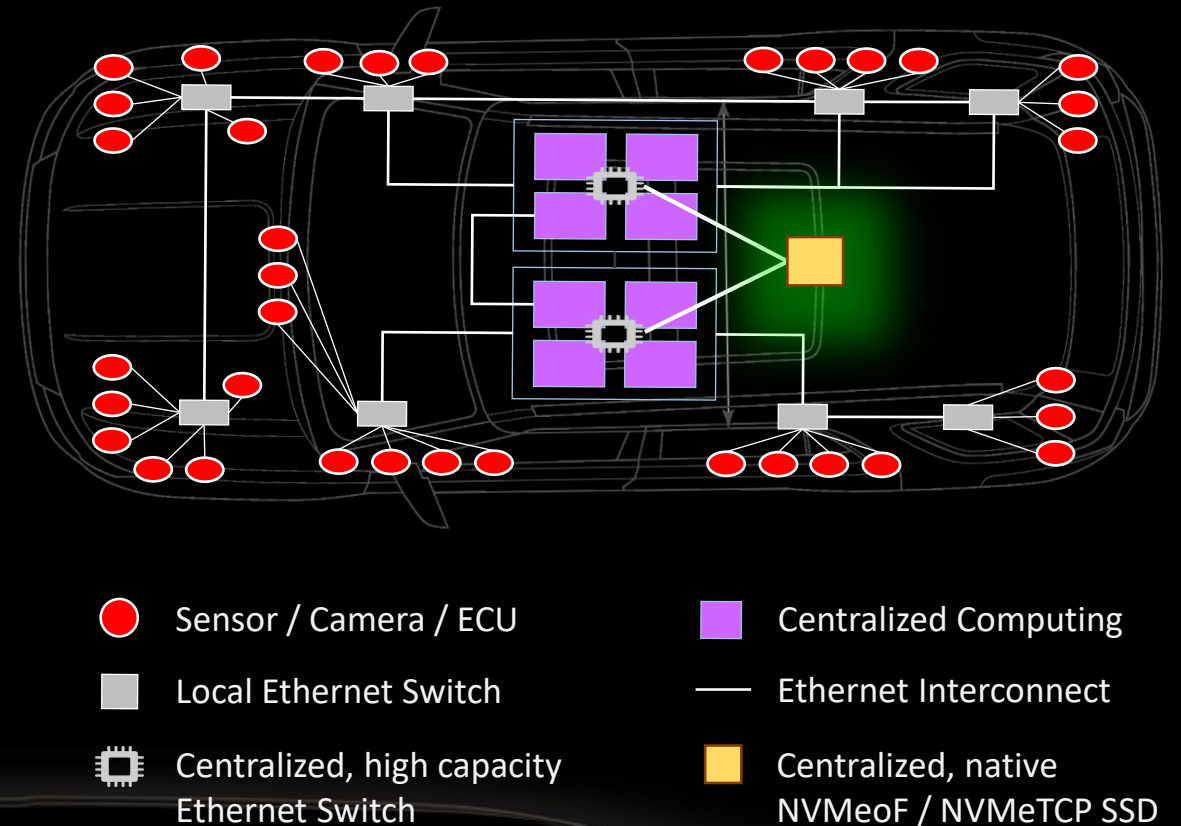**06** **Scalable** grow upon need over time

Introducing the concept of

AUTOMOTIVE STORAGE OVER FABRICS

Centralized, seamless NVMeoF / NVMeTCP
connectivity for in car storage communication
over Ethernet backbone

Centralized Automotive Storage over Fabrics

- Native NVMeoF / NVMeTCP connectivity
- Direct access to all (simultaneously)
  - No single point of failure
  - Complete virtualization of storage
- Reliable connection:
  - Built in redundancy ports
  - RDMA, TCP
- Scalable architecture
  - Add more storage capacity when needed behind the Ethernet switch
  - Native service protocols
- Low latency access time

🔴 Sensor / Camera / ECU   🟪 Centralized Computing

⬜ Local Ethernet Switch   — Ethernet Interconnect

▣ Centralized, high capacity Ethernet Switch   🟧 Centralized, native NVMeoF / NVMeTCP SSD

AUTOMOTIVE NATIVE NVMeoF/TCP SSD

Present any NVMe SSD as native NVMeoF / NVMeTCP

Standalone device or integrated into the SSD

Most Efficient

750 KIOPS / 25Gbps Eth

Low Latency <1us TAT

Shared and Accessible

100's of parallel service queues (QPs) to support 100's of VMs

SSDs & Queues

Management

Configuration

Diagnostics

Reliability

Built in dual ports for redundancy

MARVELL®

Come and discuss more about *Automotive Storage Over Fabrics* at the Marvell booth

Requirements	Automotive Storage Over Fabrics
Capacity	✔
Simultaneous Access by dozens of VMs	✔
Low Latency	✔
Availability and Reliability	✔
Virtualized	✔
Scalable	✔

MARVELL ®