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The Automotive Ethernet portfolio strengthens our market leading MCU position and increases offering for zonal architectures

Infineon's unique portfolio of MCU and Ethernet

Automotive MCUs
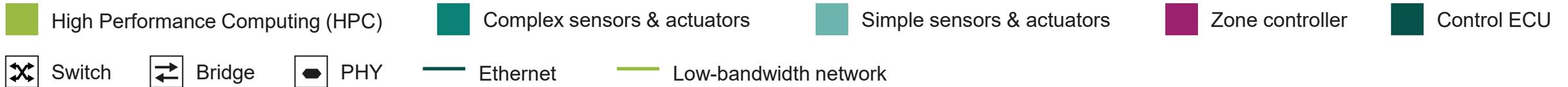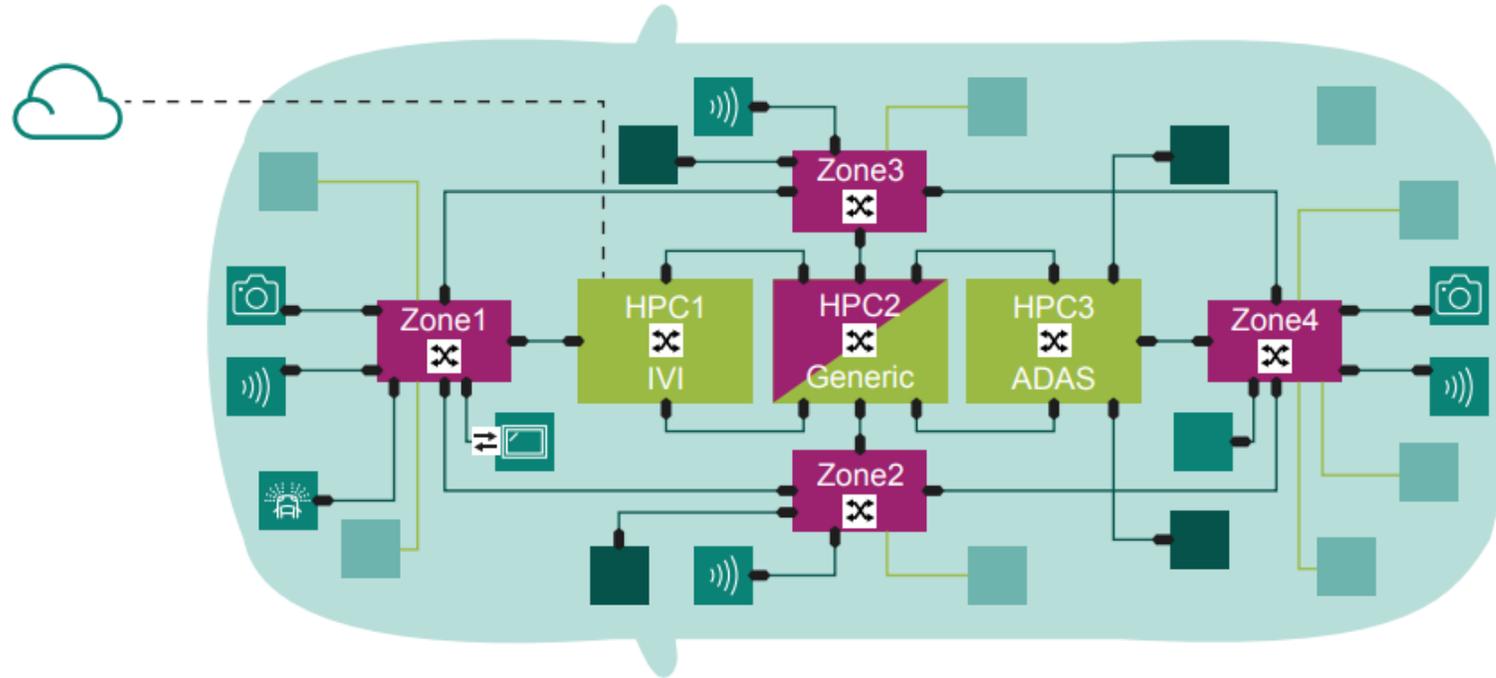

Automotive Ethernet

Synergy between MCU and Ethernet

- Strengthen Infineon's market leading MCU position and increase offerings for zonal architectures in the context of software-defined vehicles

- Expand the scope of Infineon's automotive portfolio with high-performing networking capabilities

- Allow highly integrated chip solutions from one hand, with unique product portfolio of MCU and Ethernet in-house

- Leverage Infineon's customer base for Ethernet solutions

- Current and upcoming automotive Ethernet products are based on Arm® cores. Infineon recognizes the strategic benefits of Arm® technology for Ethernet products.

- In addition to its Ethernet products, Infineon continues to utilize Arm® cores, including the latest M33, in its TRAVEO™, PSOC™ and MOTIX™ product families for the automotive sector.

Ethernet capabilities allow larger scope in SDVs, higher BoM, faster T2M for customers – strongly supporting our P2S play

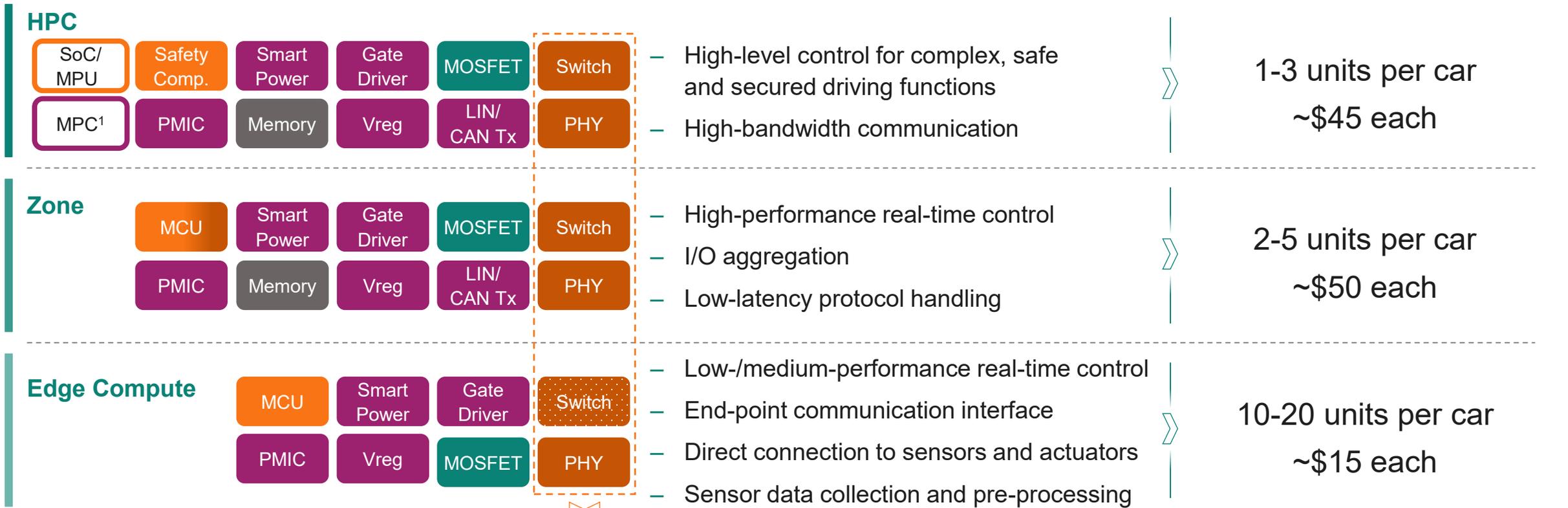**Components of hierarchical E/E architecture**

High Performance Computing (HPC) Complex sensors & actuators Simple sensors & actuators Zone controller Control ECU

Switch Bridge PHY Ethernet Low-bandwidth network

Infineon's extended portfolio contributes essentially to SDV as the second growth pillar alongside e-mobility

## Infineon components for hierarchal computing E/E architecture

Infineon BoM potent.: ~$500

HPC

SoC/MPU	Safety Comp.	Smart Power	Gate Driver	MOSFET	Switch
MPC[1]	PMIC	Memory	Vreg	LIN/CAN Tx	PHY

– High-level control for complex, safe and secured driving functions

– High-bandwidth communication

1-3 units per car
~$45 each

Zone

MCU	Smart Power	Gate Driver	MOSFET	Switch
PMIC	Memory	Vreg	LIN/CAN Tx	PHY

– High-performance real-time control

– I/O aggregation

– Low-latency protocol handling

2-5 units per car
~$50 each

Edge Compute

MCU	Smart Power	Gate Driver	Switch
PMIC	Vreg	MOSFET	PHY

– Low-/medium-performance real-time control

– End-point communication interface

– Direct connection to sensors and actuators

– Sensor data collection and pre-processing

10-20 units per car
~$15 each

Total BoM for Infineon increases by almost $100 due to Ethernet

[1] Digital multi-phase controller for SoC/MPU

■ Control ■ Analog ■ Memory ■ Power ■ Ethernet ▨ Component if needed ▢ Not part of Infineon portfolio

The MCU market will continue to grow – four big myths explained
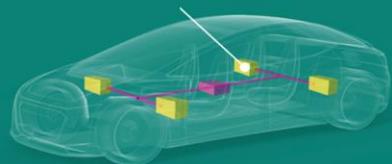
Myth #1

**"MCUs will be eaten up by MPUs as the zonal processors"**

- Zone is a geographical term and does not indicate computing performance
- MCUs perform real-time data processing to decrease in-vehicle data traffic
- Some ECUs are relabeled as smart sensors and smart actuators

Myth #2

"Infineon's AURIX™ family cannot compete with MPUs in terms of performance"

- The AURIX™ family (with built-in PPU) offers real-time data processing & Edge AI capabilities being superior to MPUs
- The AURIX™ family is the right fit for zones and supports real-time OS, e.g. AUTOSAR, FreeRTOS, Zephyr
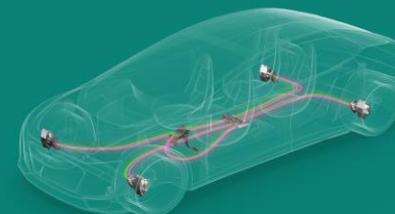
Myth #3

"MCUs in real-time applications will be absorbed by the zonal MPU"

- Many applications, e.g. steering, braking, x-by-wire, and motor & engine management require real-time decentralized control algorithms closely to physical actuators, e.g. motors
- Low latencies and dependable reaction times offered by MCUs matter
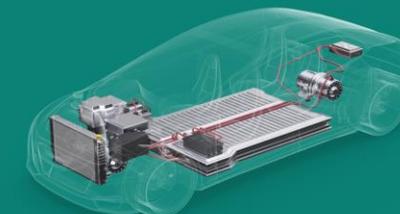
Myth #4

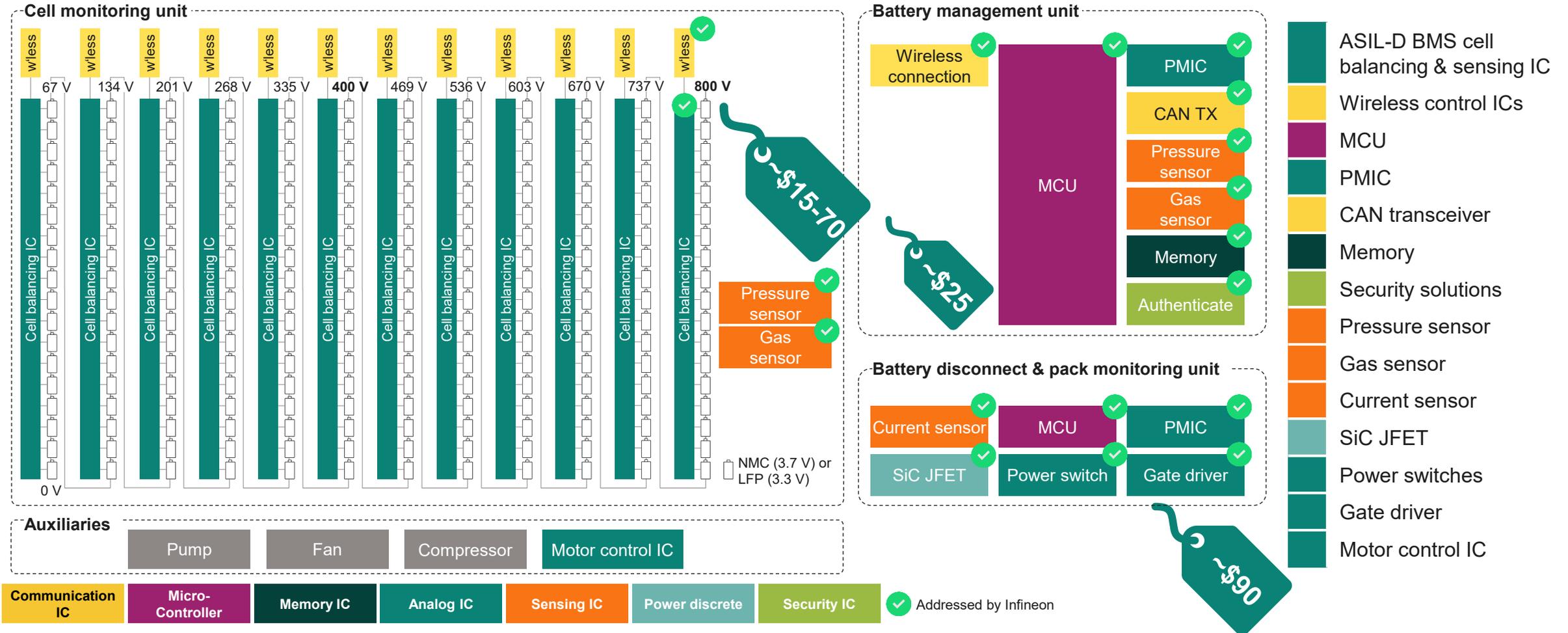**"MCU demand is drivetrain agnostic"**

- An ICE drivetrain requires 2 MCUs (engine management, transmission)
- Hybrid & BEV drivetrains require up to 6 MCUs (incl. motor management, OBC, DC-DC converter, BMS, thermal management)

We expect the automotive MCU market continue to grow into next decade

Infineon offers a full portfolio for BMS – from cell and pack monitoring ICs to power discrete and processors

Infineon portfolio for battery management system (BMS)

Cell monitoring unit

w'less 67 V, 134 V, 201 V, 268 V, 335 V, **400 V**, 469 V, 536 V, 603 V, 670 V, 737 V, **800 V**

Cell balancing IC

0 V

~$15-70

Pressure sensor / Gas sensor

NMC (3.7 V) or LFP (3.3 V)

Auxiliaries

Pump | Fan | Compressor | Motor control IC

Battery management unit

Wireless connection | MCU | PMIC | CAN TX | Pressure sensor | Gas sensor | Memory | Authenticate

~$25

Battery disconnect & pack monitoring unit

Current sensor | MCU | PMIC | SiC JFET | Power switch | Gate driver

~$90

Legend
- ASIL-D BMS cell balancing & sensing IC
- Wireless control ICs
- MCU
- PMIC
- CAN transceiver
- Memory
- Security solutions
- Pressure sensor
- Gas sensor
- Current sensor
- SiC JFET
- Power switches
- Gate driver
- Motor control IC

Communication IC | Micro-Controller | Memory IC | Analog IC | Sensing IC | Power discrete | Security IC | ✓ Addressed by Infineon

The transition to the wireless 800 V LPF-based BMS will lead to a ~2.5x increase in BoM in cell monitoring unit for Infineon

Estimated BoM[1] could more than double depending on configuration

	NMC				LPF			
	400 V		800 V		400 V		800 V	
	Wired	Wireless	Wired	Wireless	Wired	Wireless	Wired	Wireless
TLE9012	✅	✅	✅	✅	✅	✅	✅	✅
TLE9018	✅ ~$40	✅	✅	✅	✅	✅	✅	✅ ~$95

1 BoM does not include battery disconnect & pack monitoring unit

✅ Addressed by Infineon

BMS trends

– Trend #1: from 400 V to 800 V

– Trend #2: from NMC to LPF

– Trend #3: from wired to wireless

– LPF requires a more precise voltage sensitivity due to the more flattish charging characteristic