Multi-Gigabit is the only way: How E/E architectures will benefit

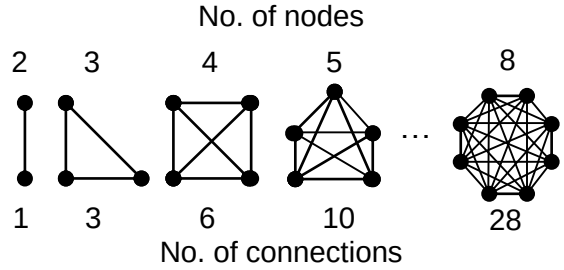
Vector Congress 2018, Stuttgart, November 20/21

Dr.-Ing. Helge Zinner, Continental AG

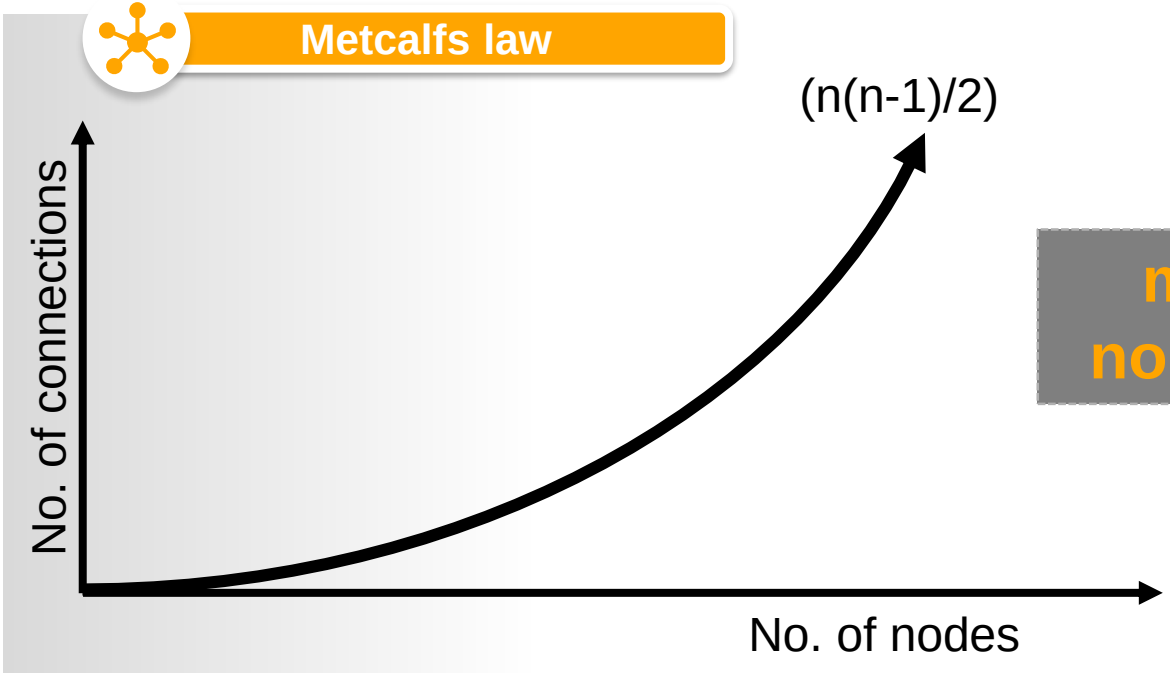
Agenda

- › The value of networking
- › Multi-Gigabit
- › Implications on the E/E architecture
- › Outlook

The value of networking



Metcalfs law



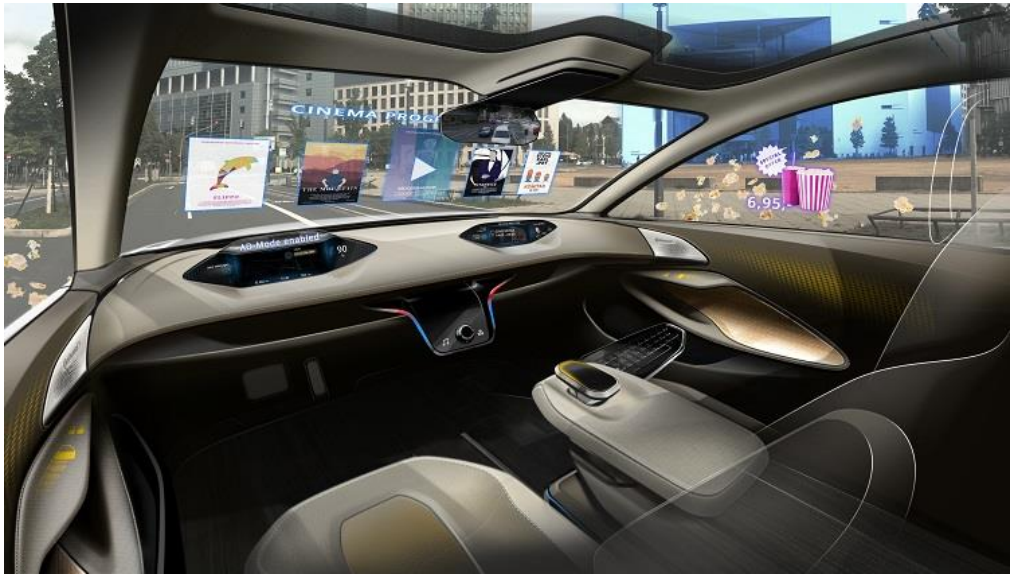
more connected nodes = more value

The value of networking

From physical to virtual connectivity

The value of networking
Implications for Automotive

#1 Networking
#2 Bandwidth

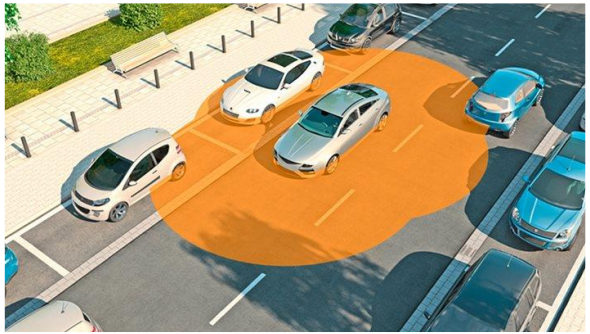


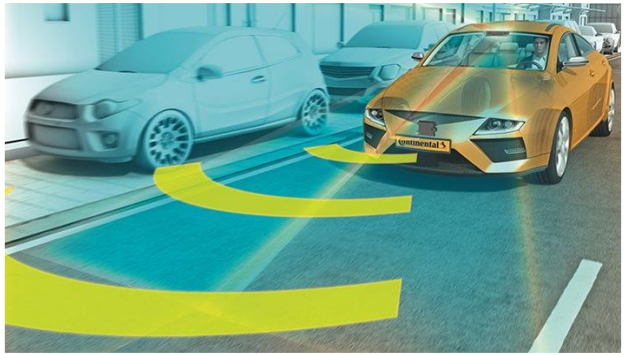
Agenda

- The value of networking
- **Multi-Gigabit**
- Implications on the E/E architecture
- Outlook

Multi-Gigabit Use Cases

25/50 Gbits/s is already visible





Multi-Gigabit Technologies

None of them was developed for/in automotive industry

- up to 12 Gbit/s
- Interfacing via MIPI
- MIPI standardization ongoing

- 1 Gbit/s available
- xMII based interfaces
- 2,5/5/10 Gbit/s standardization ongoing

- 2-8 Gbit/s
- tunneling of various interfaces

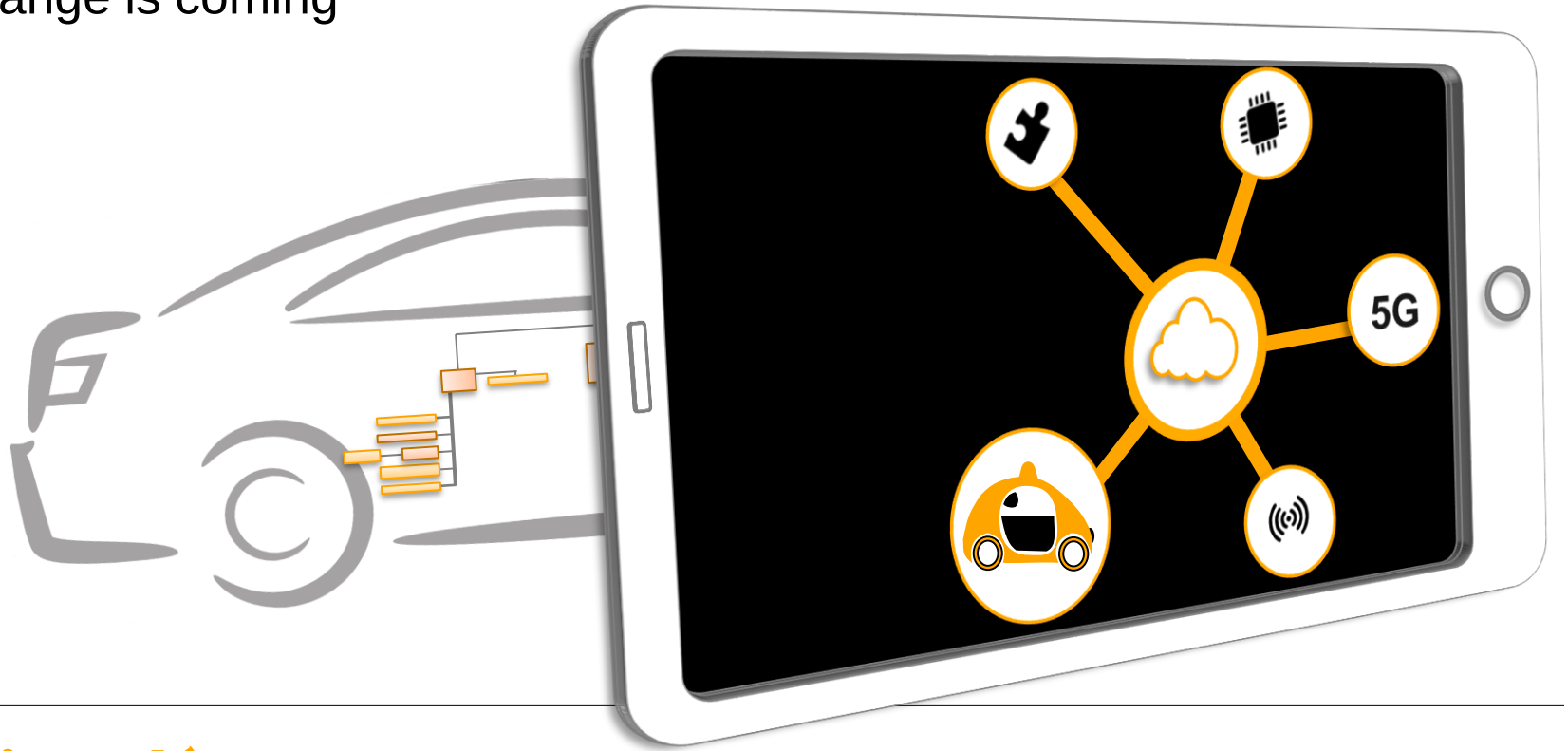
- up to 10 Gbit/s
- Infotainment, connectivity and video

- up to 16 Gbit/s with PCIe Gen4
- Inter-Processor communication

CE industry has a considerable impact on Automotive

Consumer industry is driving the interfaces

A change is coming

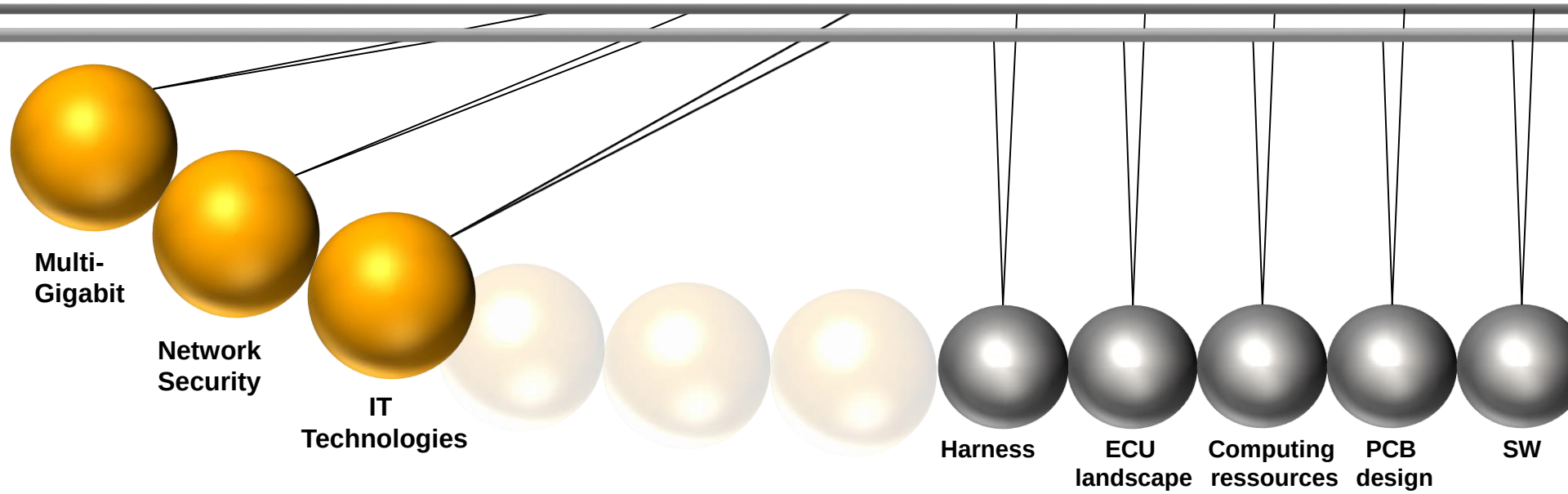


Agenda

- The value of networking
- Multi-Gigabit
- **Implications on the E/E architecture**
- Outlook

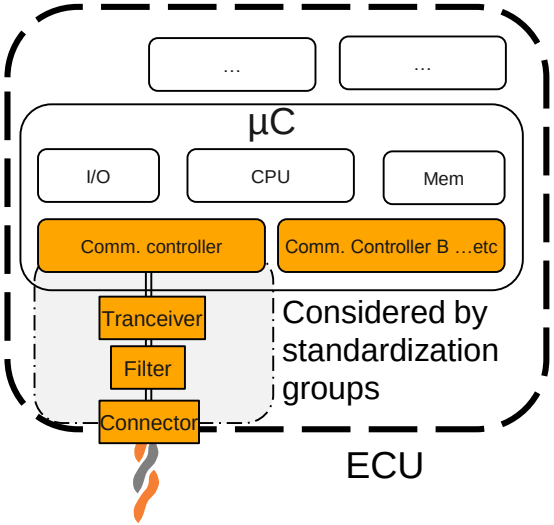
E/E architecture transformation

Multi-Gigabit affects the overall automotive system



E/E architecture transformation

Past: Common automotive networks defined only the lower layer system



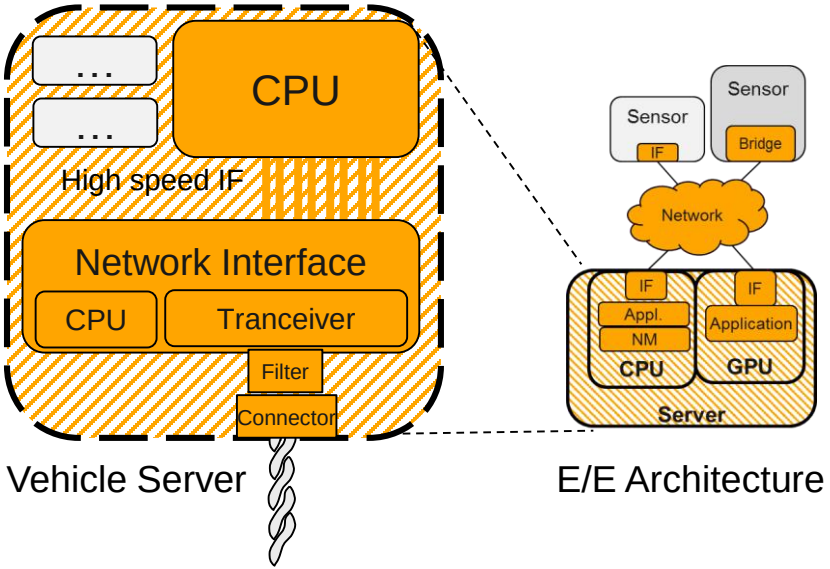
Impact

- common automotive bus systems have less impact on the system design of the ECU
- physical layer component definition only
- overall system approach is not considered so far
- packetizing & processing can be handled with/in the CPU

Legend: Affected by bus system

E/E architecture transformation

Future: Multi-Gigabit requires a comprehensive system integration approach



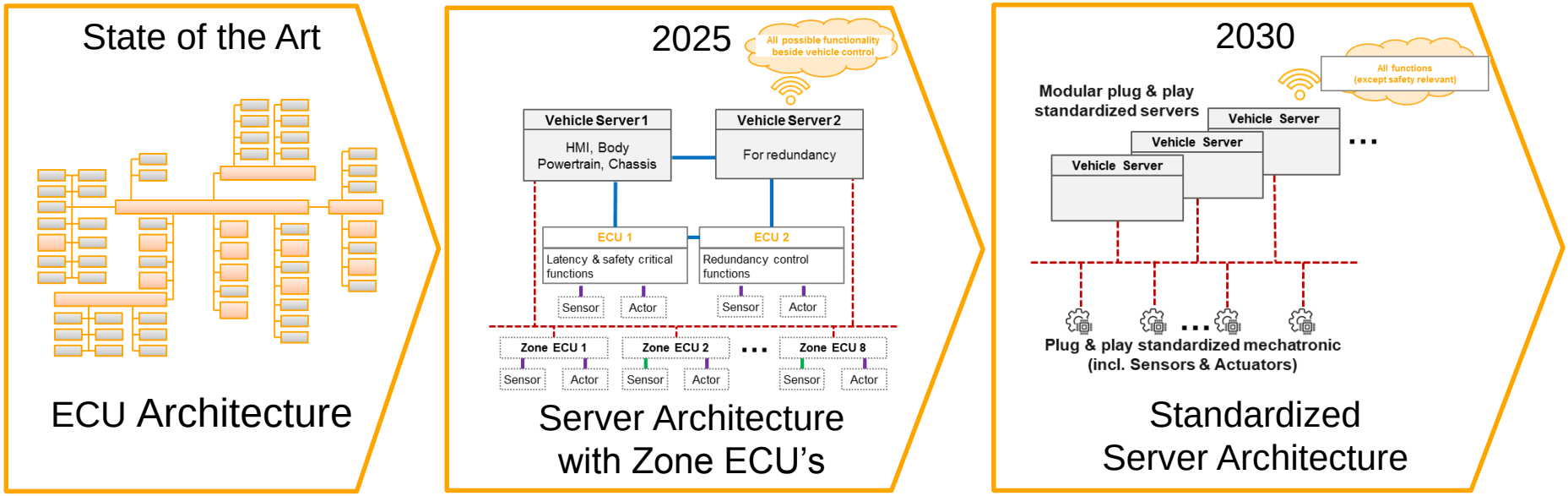
Impact

- HW embedded functions to frequently access frame metadata
  - filtering, policing, encryption
- Offloading of high frame rate network traffic handling
- ECU design for high frequencies
- System approach necessary
- High-speed interface to the CPU

Legend: Affected by MultiGig

New vehicle EE architecture

From specific ECU architecture to high performance computing



Agenda

- The value of networking
- Multi-Gigabit
- Implications on the E/E architecture
- **Outlook**

Moving forward with Multi-Gigabit Ethernet

Multi-Gigabit isn’t address on a system level

- **IEEE 802.3**
  - defines „only“ the physical layer, hasn‘t started with 25/50 Gigabit/s
  - no µC-interfaces, cables, connectors
- **OPEN Alliance SIG**
  - defines missing support functions for the physical layer
  - focus isn’t on the system level

The NAV alliance

Platform for the autonomous driving network infrastructure

Founded by

Leading car manufacturers, system and component suppliers in the automotive market

Purpose

To provide a platform for the automotive industry to develop the next generation of in-vehicle network infrastructure for autonomous vehicles and facilitate wide deployment of networking technologies and products, with a focus on interoperability, security and reliability of the network.

The NAV alliance
System level approach

- TWG1 – 25G and 50G Automotive Ethernet PHY Specifications
- TWG2 – EMC Requirements and Limits
- TWG3 – Physical Layer System and Component Integration
- TWG4 – Protocol Encapsulation for Ethernet
- TWG5 – System Controls and Management

Summary

Multi-Gigabit Ethernet becomes real for Automotive

- Multi-Gigabit Ethernet to address the requirements for the next car generation
- 25/50 Gigabit/s is on the way to becoming the future high speed backbone
- Comprehensive approach is necessary to enable Multi-Gigabit Ethernet

Let’s join forces and develop the Multi-Gig concept


Continental