MICROCHIP

AUTOMOTIVE GRADE LINUX
MEMBER

Seamless Integration of Heterogeneous Automotive Busses into Linux

ALS 2017 - Tokyo

Presented by:
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Product Marketing Manager, AIS

From Steel to Silicon

1908: Ford Model T

1980: ABS

1990: ESP/ESC

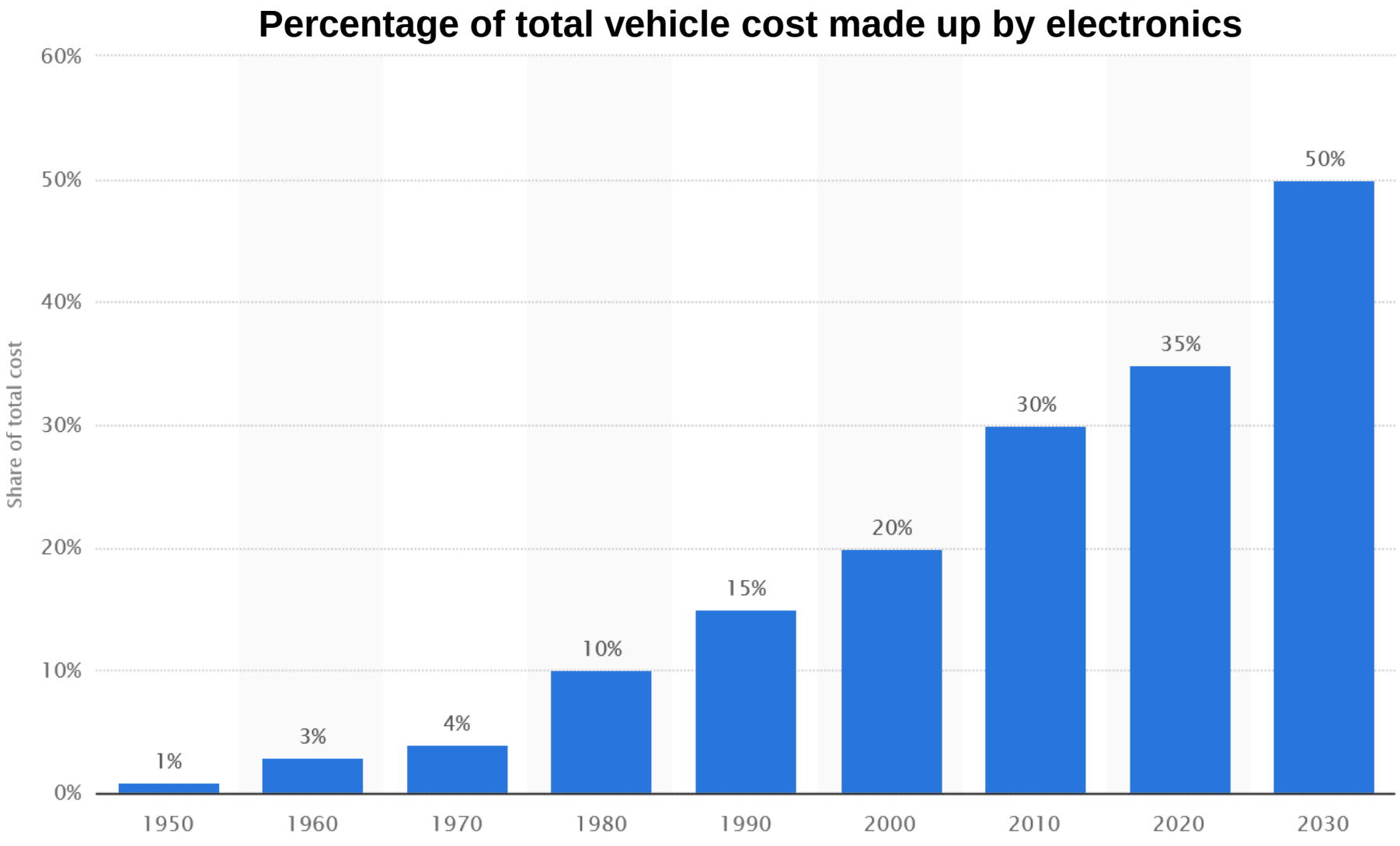
2000: OBD

Autonomous vehicles

ADAS

Electric vehicles

Vehicles Turning into Super-Computers



Source: Statista

Which busses? Which purpose?

LIN

- Body control

CAN / CAN-FD / FlexRay

- Body control applications
- Safety critical functions

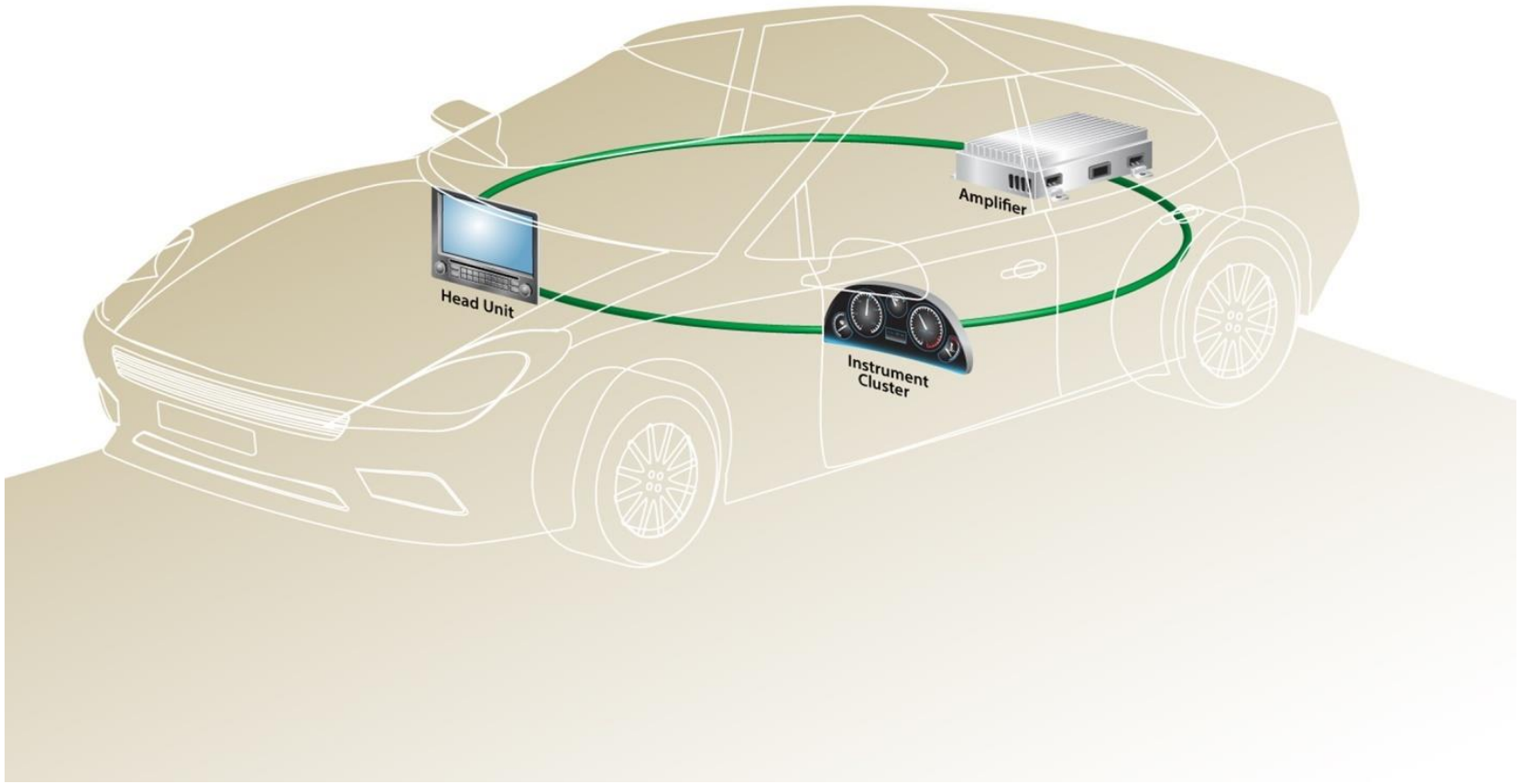
MOST®

- Infotainment
- Control / Audio / Video / IEEE 802.3

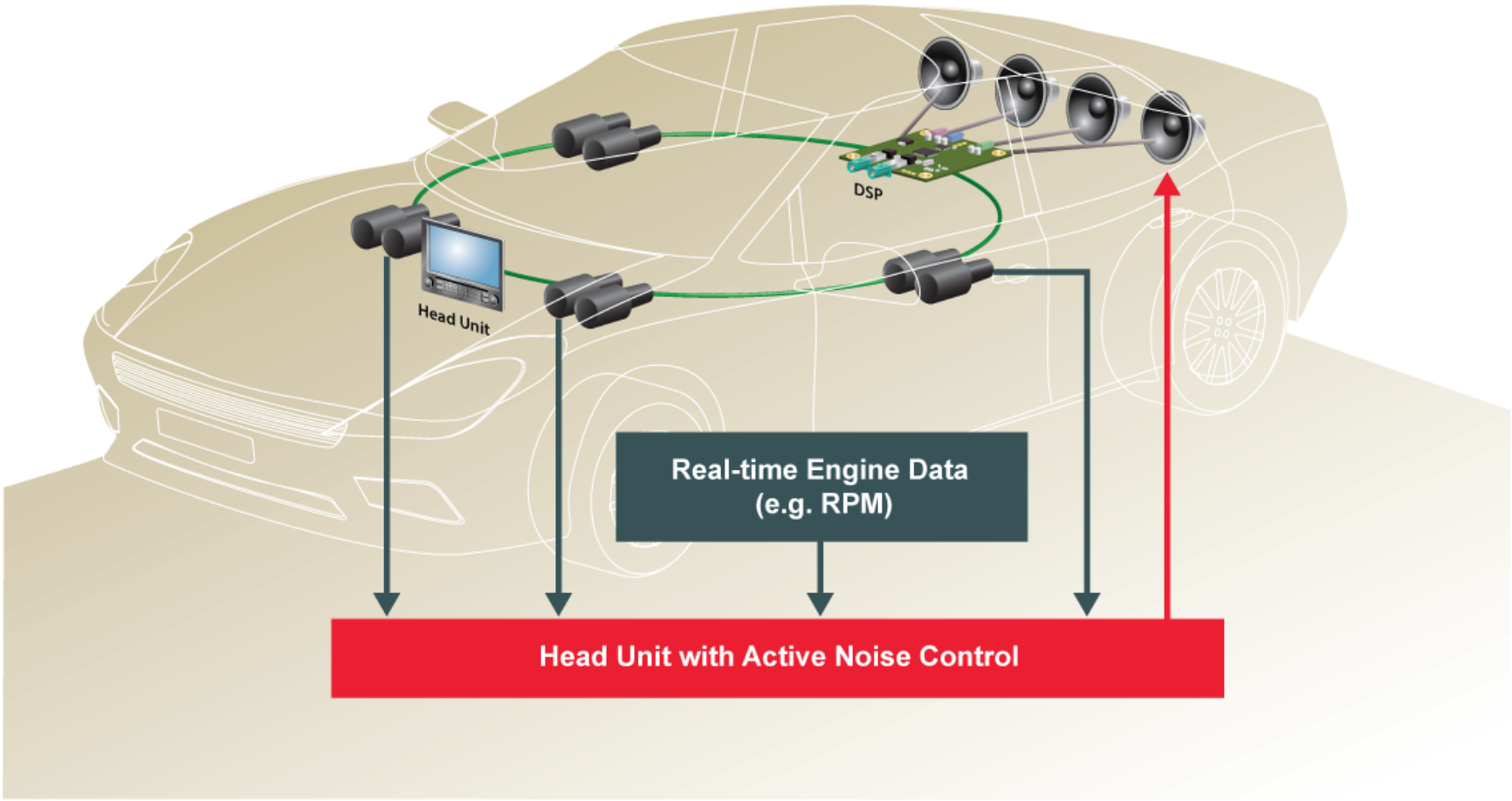
Ethernet

- Information backbone, ADAS, Diagnostic
- TCP/IP, UDP

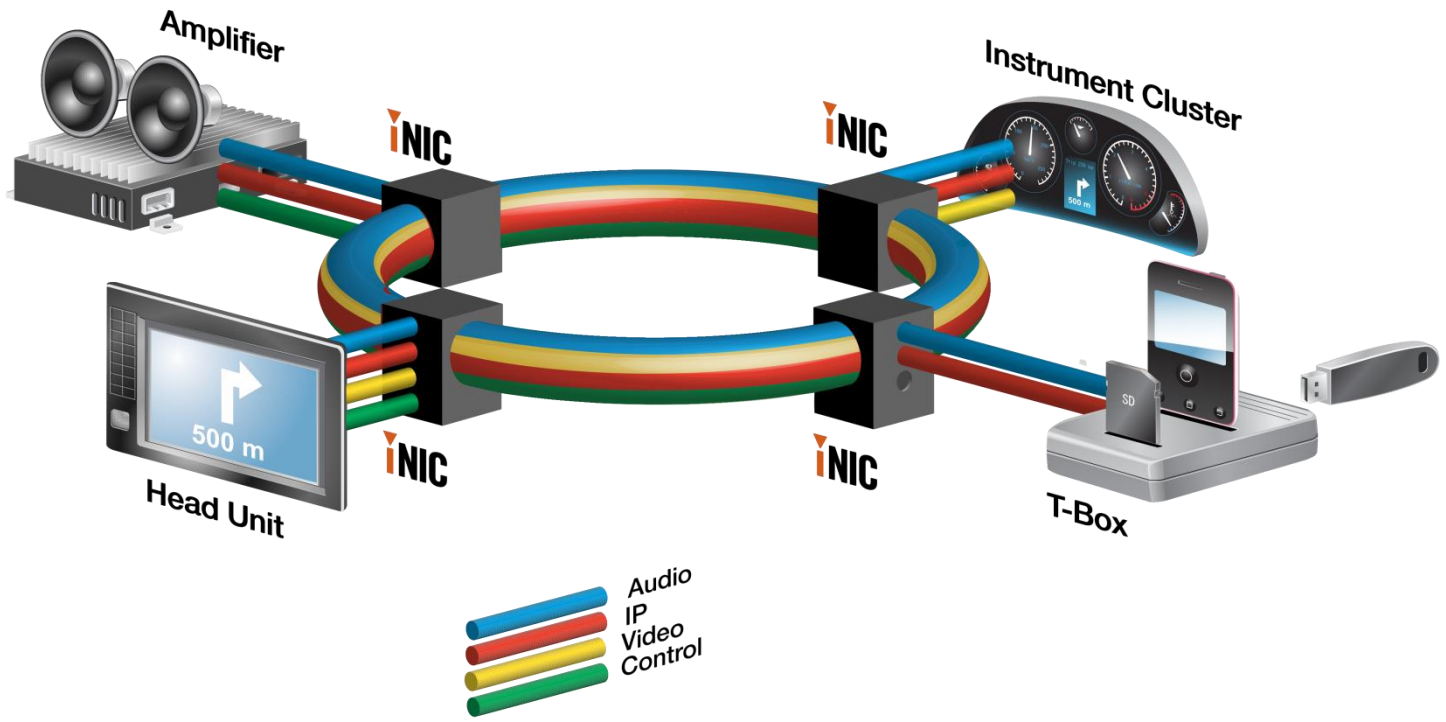
Applications Infotainment A/V



Applications
Active Noise Cancelling



Network Capabilities Example with MOST®

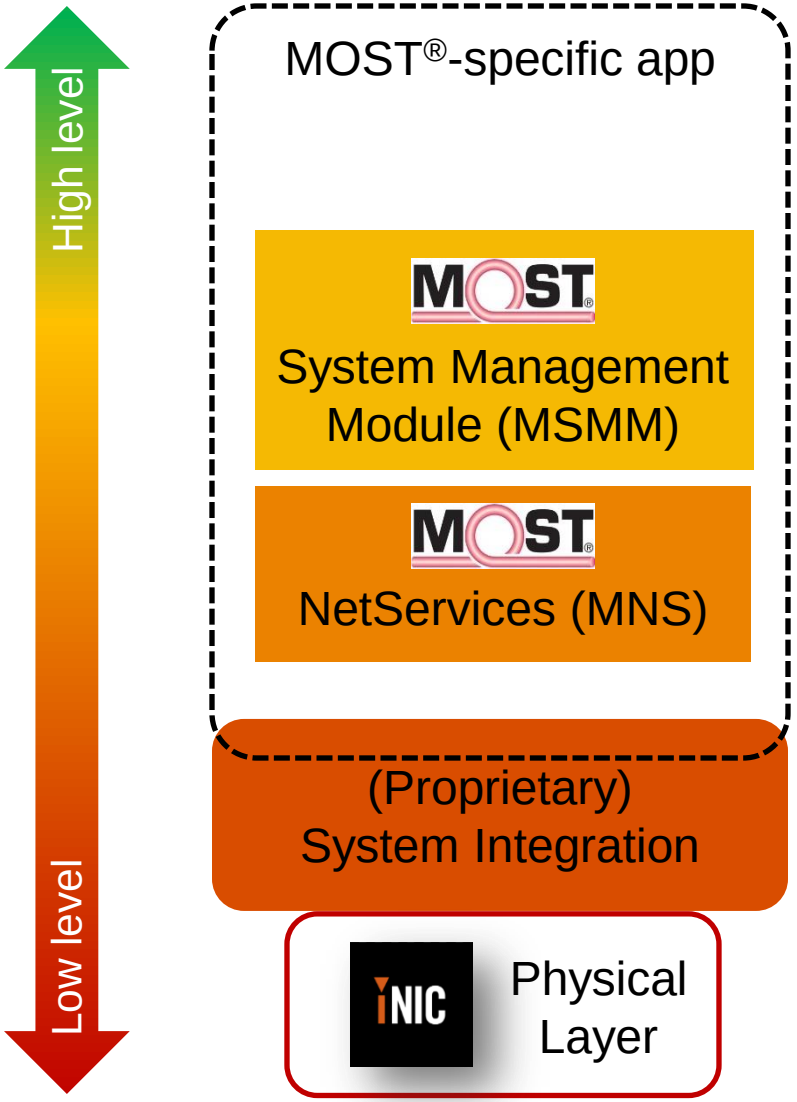


- Many nodes
- Multiple types of data (video, audio, IP, control)
- All data types have their own channels

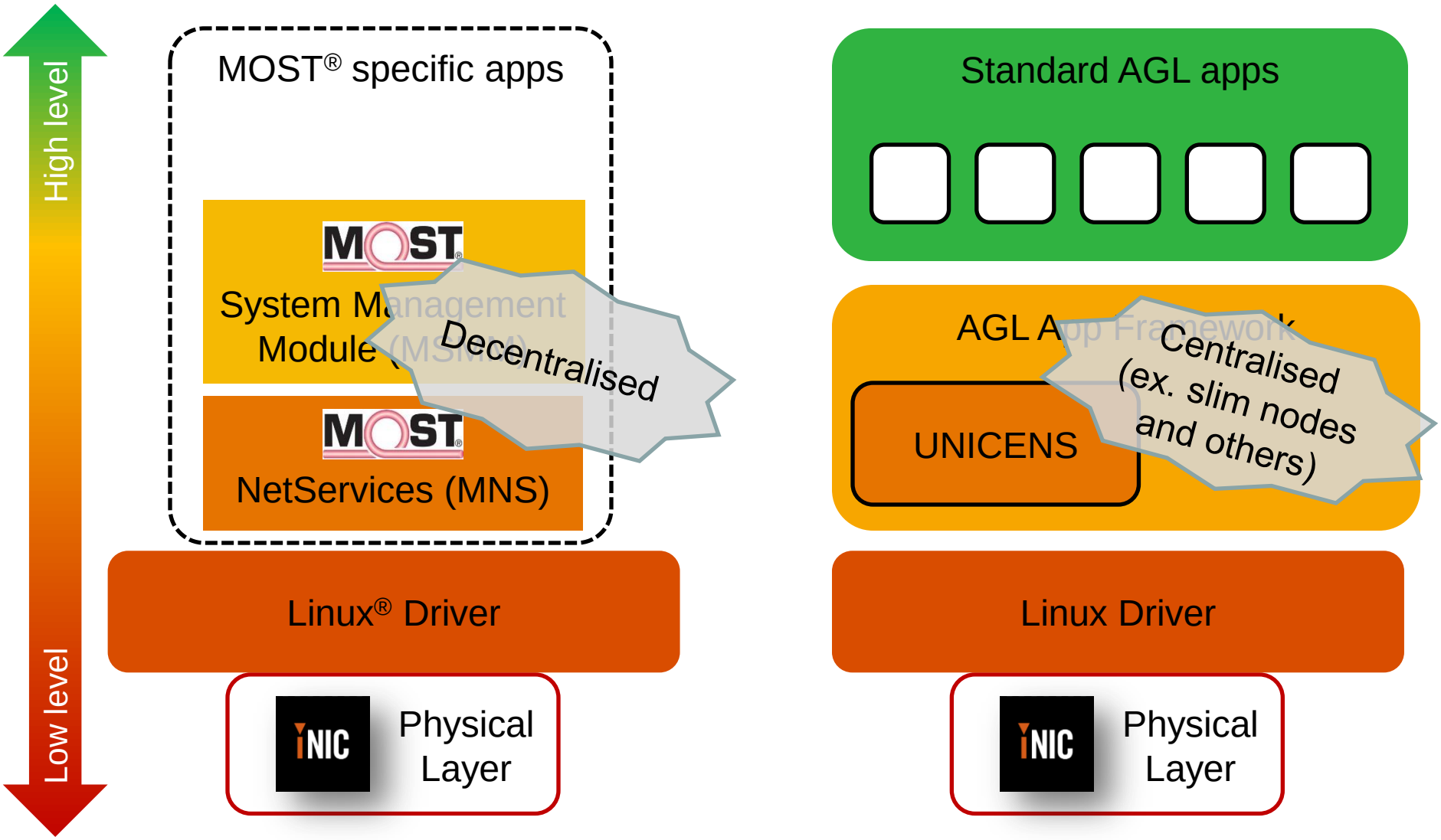
Requirements for a Seamless Integration

- Providing support for the bus
  - Low-level driver for networking IC
- Enabling easy handling of the network
  - Network & connections management software
- Enabling standard and secure applications
  - OS integration providing standard interfaces
  - Integration into an application framework

Former situation with Classical MOST®

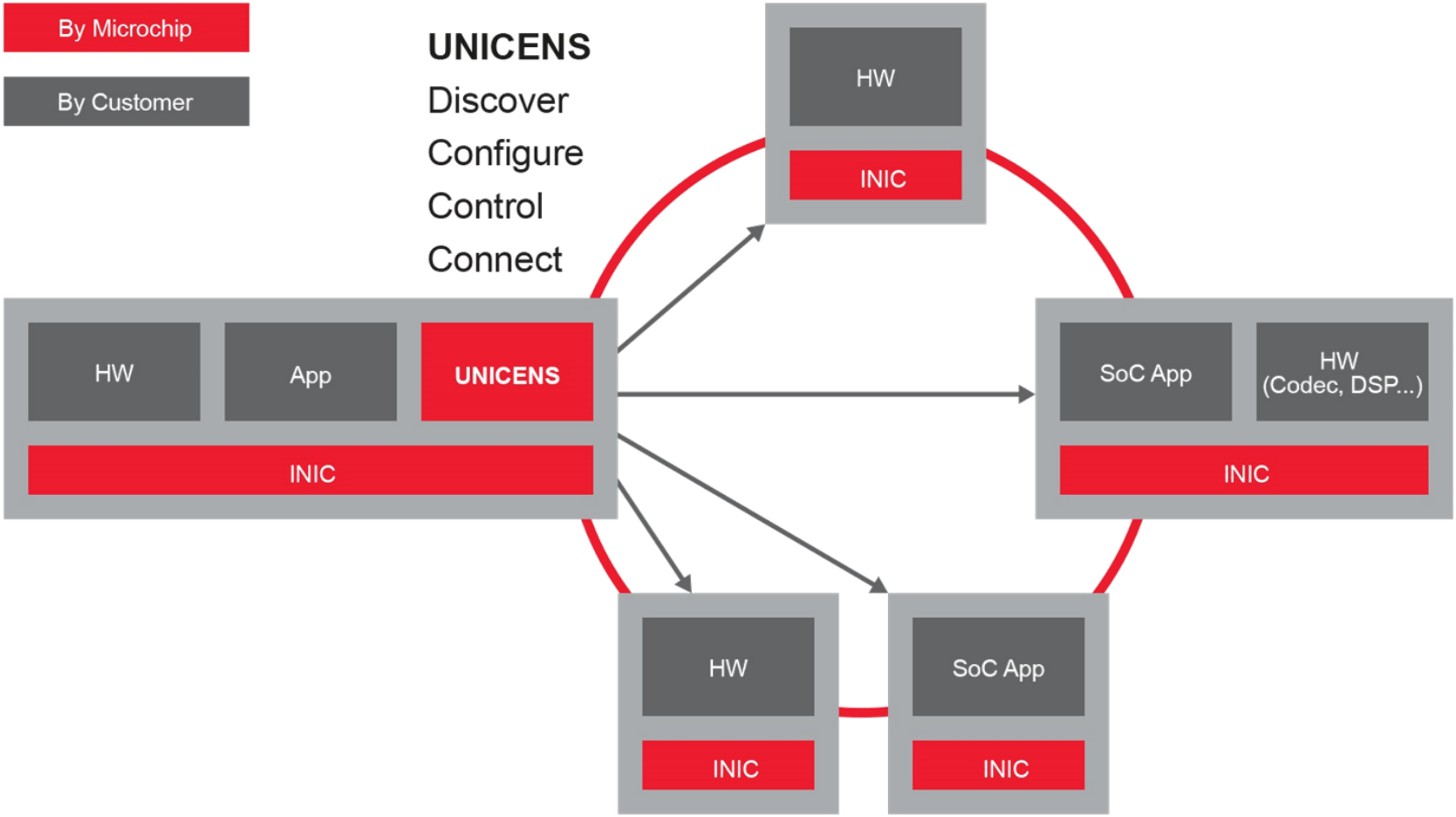


Linux® & AGL Integration with UNICENS



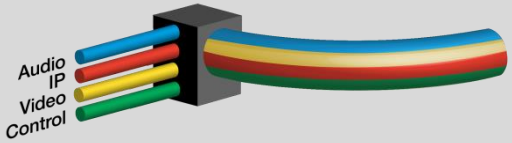
Unified Centralized Network Stack (UNICENS)

- Centralized intelligence in root node ⇨ Easy maintenance
- From design stage to running in “a day” ⇨ Shorten development cycle

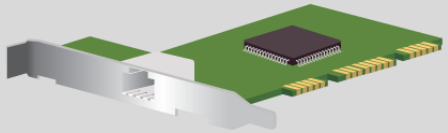


Specific Technology Standard OS Interfaces

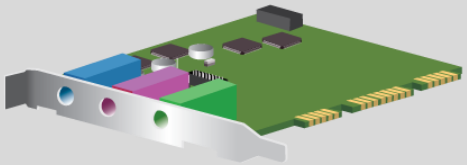
Character device (cdev)



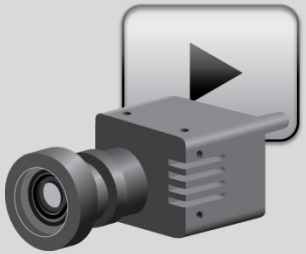
Ethernet card



ALSA device



V4L2 device



Technology-Independent Applications

Non MOST® specific applications / standard programs and libs

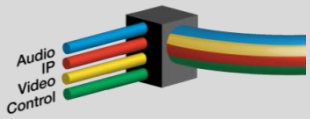
open
read
write
close

TCP/IP
UDP
SOME/IP
etc.

ALSA mixer
std libs &
programs

ffmpeg
gstreamer
etc.

cdev



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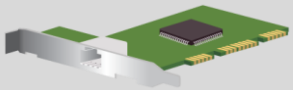
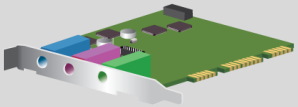


ALSA



V4L2

MOST specific domain abstracted by Linux Driver

control
channel

Ethernet
packet channel

synchronous
channel

isochronous
channel

iNIC

Physical
Layer

Seamless Integration Achievement with MOST®

- **Providing support for the bus**
  - **Low-level driver for networking IC**

✓ Linux® driver

- **Enabling easy handling of the network**
  - **Network & connections management software**

✓ UNICENS

- **Enabling standard and secure applications**
  - **OS integration providing standard interfaces**

✓ Linux driver
UNICENS

AUTOMOTIVE GRADE LINUX

  - **Integration into an application framework**

✓ AGL
App Framework

„Free like Freedom“

- **Linux® Driver**
  - Released under GPL v2
  - Source code published on GitHub
    - https://github.com/microchip-ais/linux/tree/mld-1.5.0/mld
  - Mainline since kernel 4.3

- **UNICENS**
  - Released under BSD-3
  - Source code published on GitHub
    - UNICENS: https://github.com/MicrochipTech/unicens
  - Working with AGL app framework
    - UNICENS AGL Binder: https://github.com/iotbzh/unicens2-binding

Corporate Overview

- **Leading semiconductor provider:**
  - High-performance **microcontrollers**, digital signal controllers and microprocessors
  - Mixed-signal, analog, **interface and security** solutions
  - Clock and timing solutions
  - Flash IP solutions
  - Non-volatile EEPROM and Flash memory solutions
  - Wireless and wired **connectivity** solutions
  - #8 in WW automotive supplier ranking
- **~ $3.5 billion revenue run rate**
- **~13,000 employees**
- **Headquartered near Phoenix in Chandler, AZ**

In-Vehicle Networking Leadership

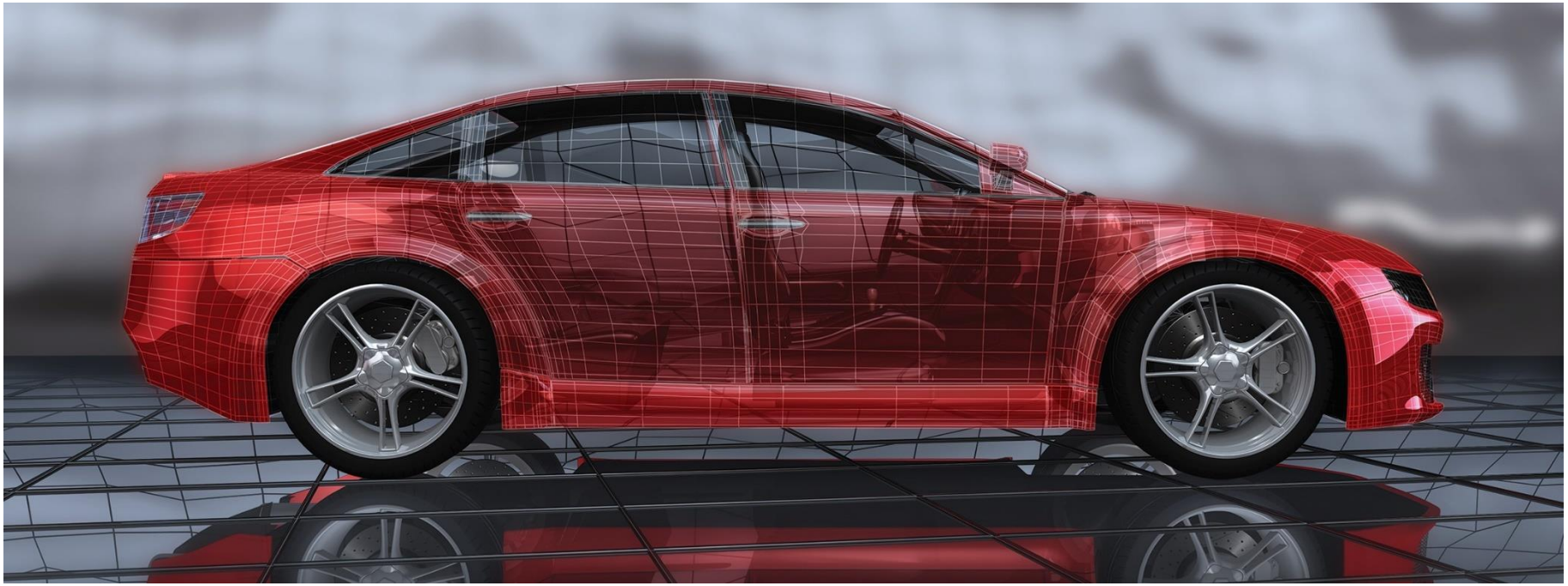
Infotainment Network MOST®

IEEE 802.3 Ethernet

SUPERSPEED CERTIFIED USB

CAN FD

lin



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