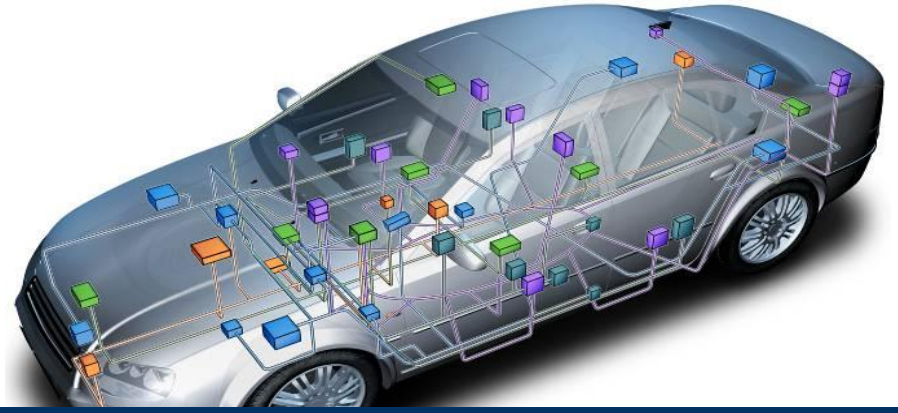


OSI Layers in Automotive Networks

2013-03-20

IEEE 802.1 Plenary Meeting - Orlando

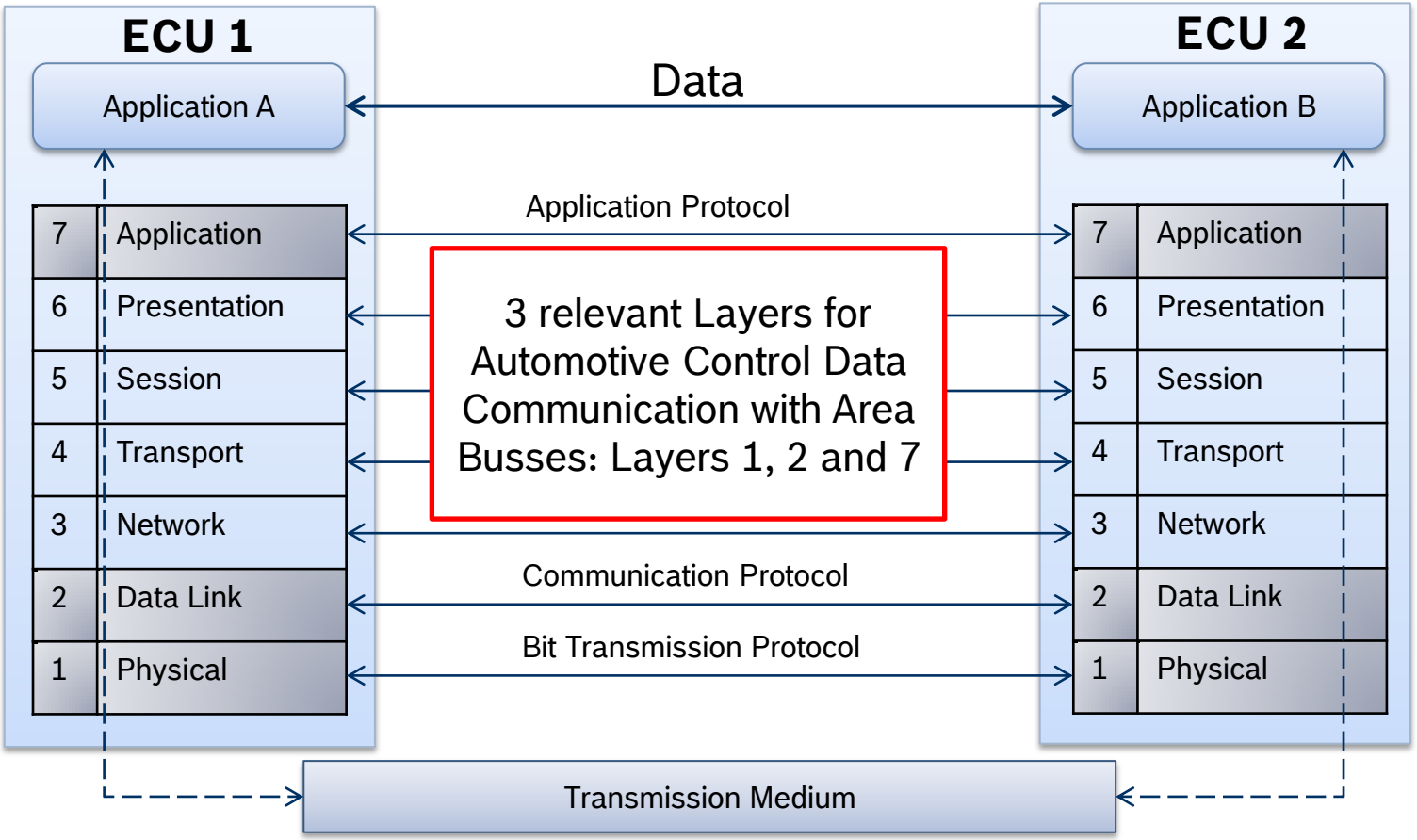
Aboubacar Diarra, Robert Bosch GmbH

BOSCH

Outline

- OSI Reference Model
- Simplified generic Architecture for Automotive Serial Busses
- Basic Automotive E/E Architecture
- Automotive Bus Systems in the OSI Model
- Ethernet Impact on Automotive Bus Layering

OSI Reference Model



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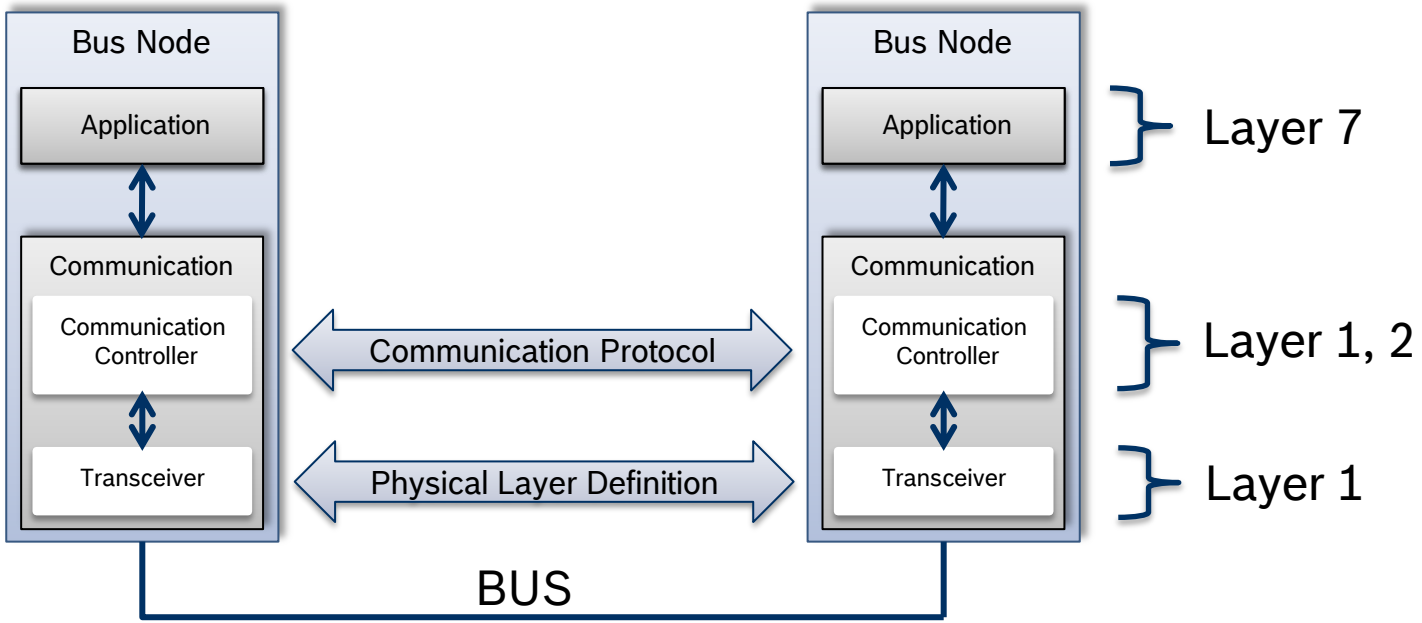
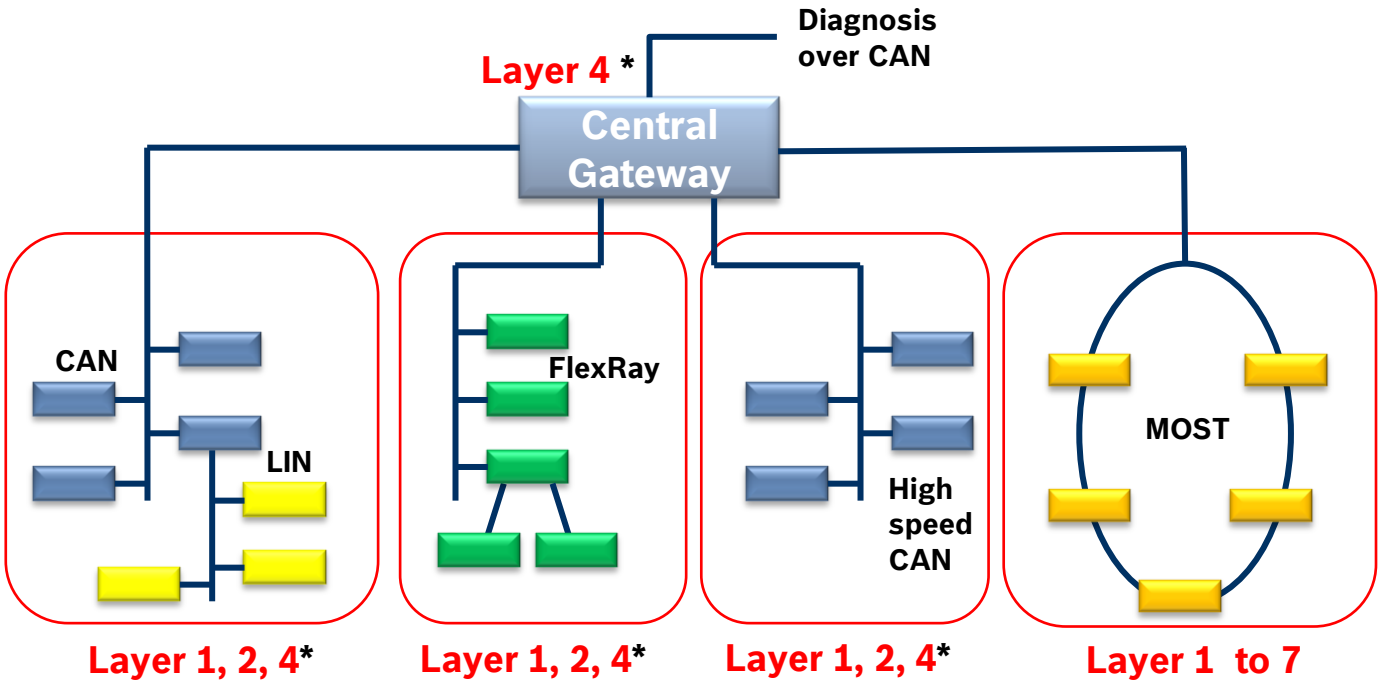
Simplified generic Architecture for Automotive Serial Busses

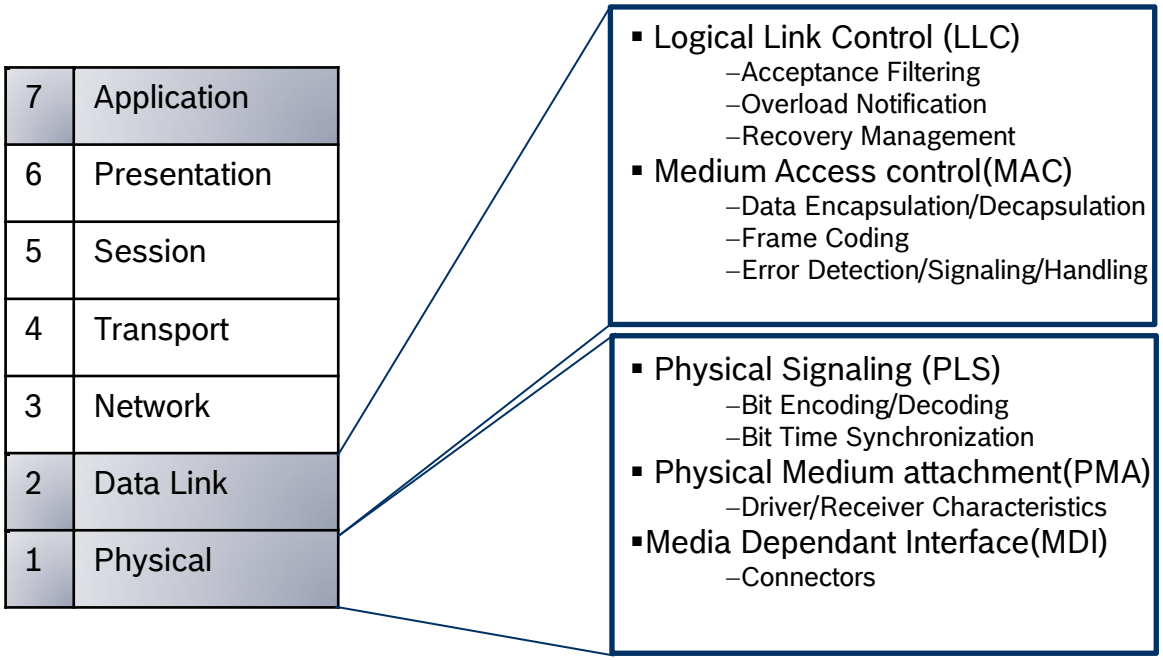


Basic Automotive E/E Architecture

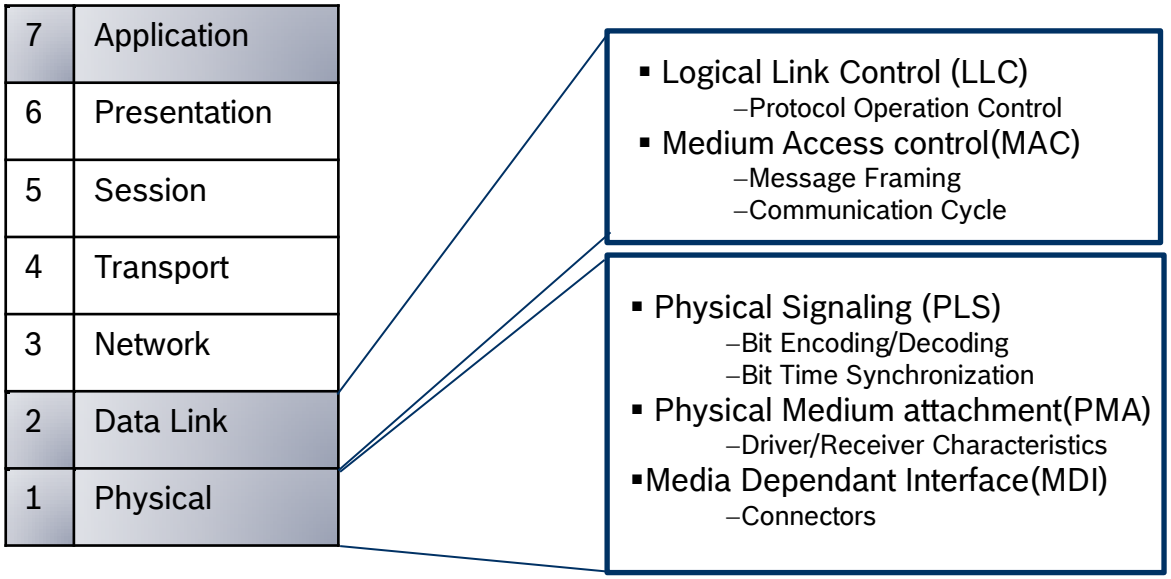


* Layer 4 is used in this case for Diagnosis Services

Automotive Bus Systems in the OSI Model: Example of the CAN Bus

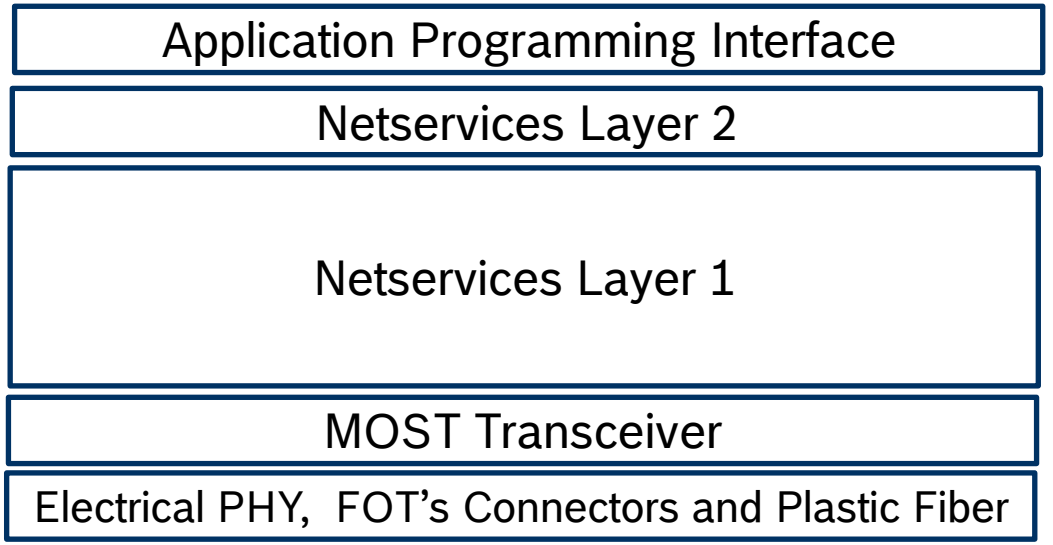


Automotive Bus Systems in the OSI Model: Example of the FlexRay Bus

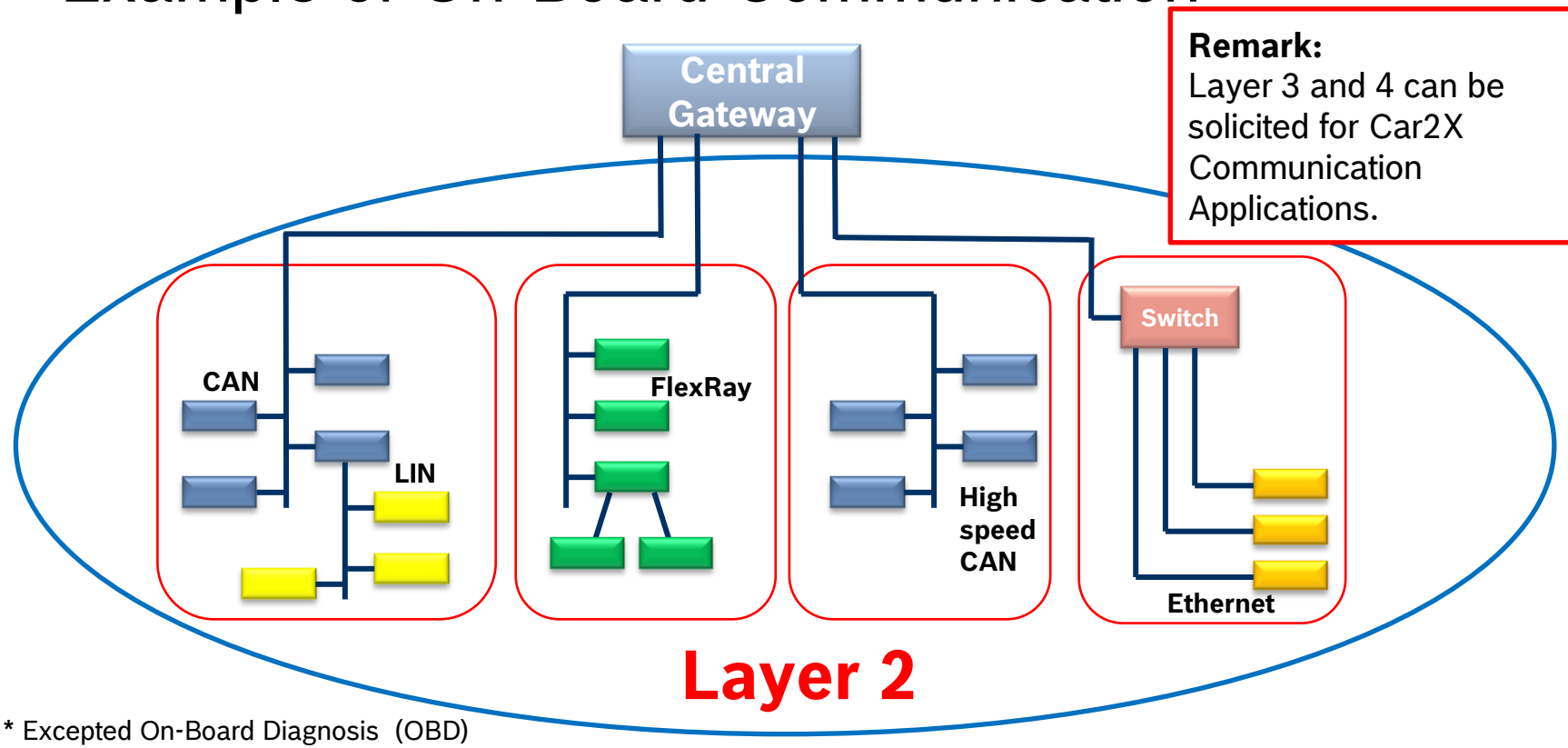


Automotive Bus Systems in the OSI Model: Example of the MOST Bus

7	Application
6	Presentation
5	Session
4	Transport
3	Network
2	Data Link
1	Physical



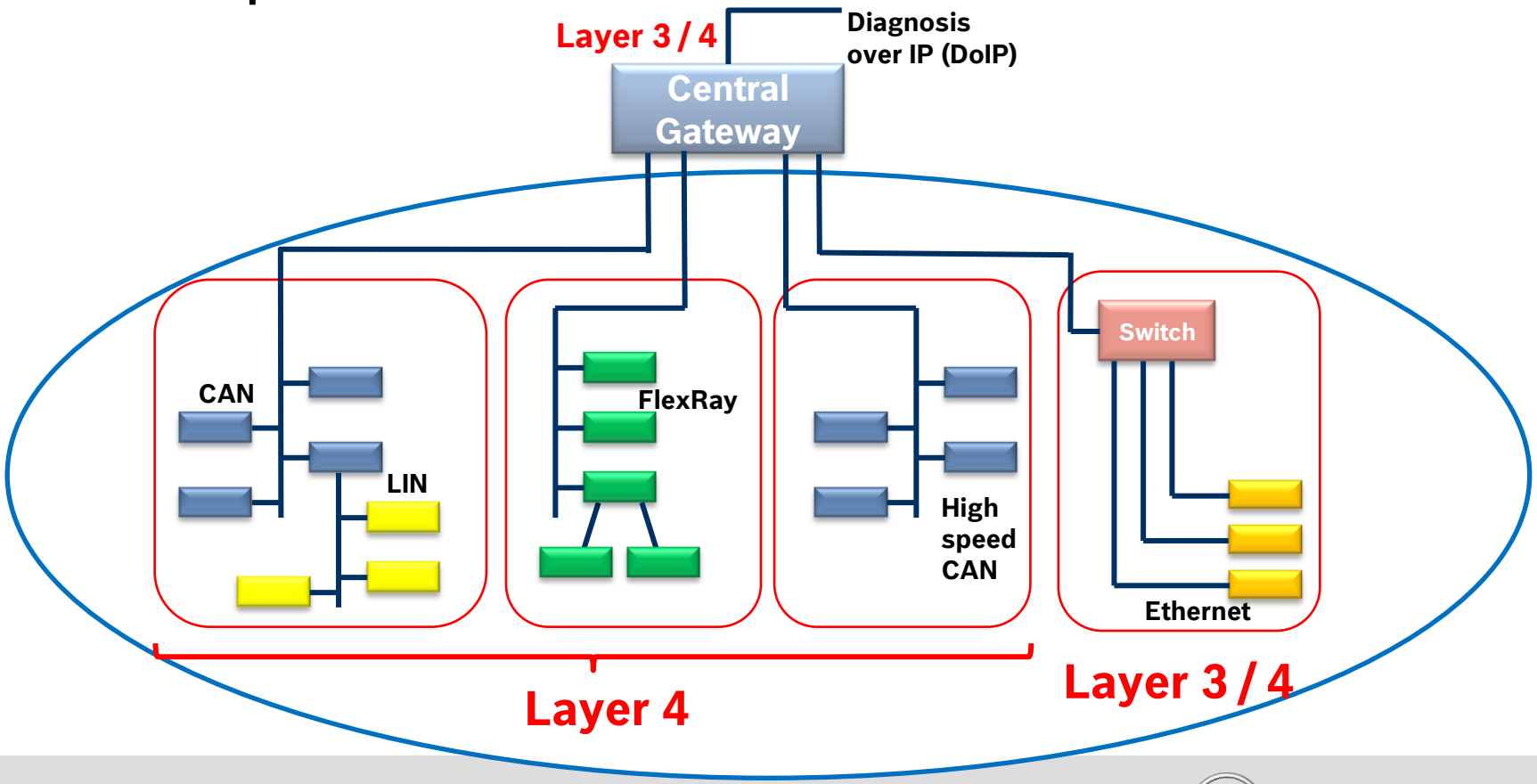
Ethernet Impact on Automotive Bus Layering: Example of On-Board Communication *



Remark:
Layer 3 and 4 can be solicited for Car2X Communication Applications.

* Excepted On-Board Diagnosis (OBD) which needs a Layer 4 support

Ethernet Impact on Automotive Bus Layering: Example of Off-Board Communication



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Conclusion(1)

- In reference to the OSI Data Communication Model, the Serial Interface of CAN, FlexRay and LIN Busses typically needs 3 OSI Layers for On-Board Communication excepted OBD: the **Physical Layer**, the **Data Link Layer** and the **Application Layer**
- The MOST Bus covers all the 7 OSI Layers for On-Board Communication
- The **Transport Layer** is used for Off-Board Communication like Diagnosis and also for OBD on these typical Automotive Area Networks.
- The Layers 3 and 4 can be used for Vehicle On-Board Communication in Car2X Communication Applications

Conclusion(2)

- Therefore, for a Control Data Communication that occurs in an In-vehicle closed Network, the need of the Layer 2 is justified.

- On top of that, Layer 3 Routing Processes require more infrastructure (eg. IP stack implementation, software implementation, memory need . . .) and costs investments than Layer 2 solutions from an Automotive Perspective

- For In-vehicle Control Applications which require a very low Latency, a Layer 2 solution is more pragmatic than a Layer 3 solution

- However, Diagnosis over IP, Car2X and In-Car Wireless Communication Applications need Layer 3 Routing Support

Thank You for your Attention

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