

ALL PROGRAMMABLE



5G Wireless • SDN/NFV • Video/Vision • ADAS • Industrial IoT • Cloud Computing



Ethernet in Autonomous Cars

Agenda:

➤ ADAS Market Opportunity

➤ Problem Statement

- Cost and Complexity
 - What does wiring inside the car look like?
 - Clusters of bridges to connect multiple sensors with different protocols

➤ Various Competing Technologies

- LVDS, CAN, Ethernet
- Xilinx Supports All Technologies
 - Organization: Open Alliance
 - Ethernet: 1/10/25/40/50/100/400G

➤ Security : Next Frontier in ADAS and AV

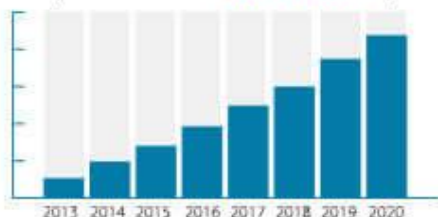
➤ Summary

ADAS Market opportunity:

Global Advanced Driver Assistance Systems (ADAS) Market Segmentation and Forecast, 2013 - 2020

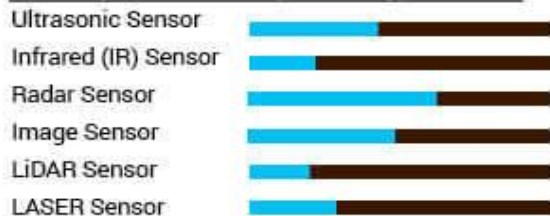
Global Advanced Driver Assistance Systems Market

Global Advanced Driver Assistance Systems Market
is expected to reach **\$60.14 Billion** by 2020



Growing at a CAGR of **22.8%** (2014-2020)

Global Advanced Driver Assistance Systems Market By Sensor Type



■ The comprehensive view on the % share of market by sensor type (2020)

For More Details See Table of Contents

Global Advanced Driver Assistance Systems Market By System Type



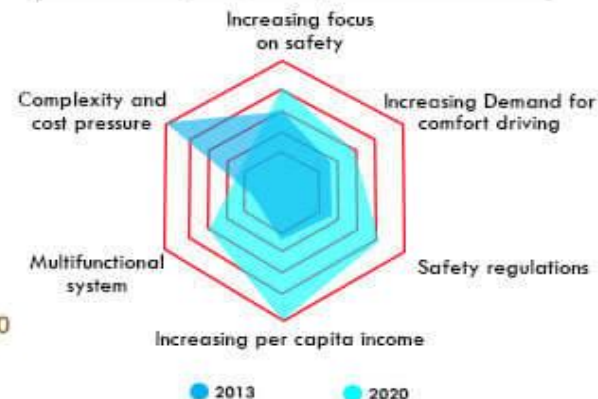
■ The comprehensive view on the % share of system type segment (2020)

Global Advanced Driver Assistance Systems Market By Geography

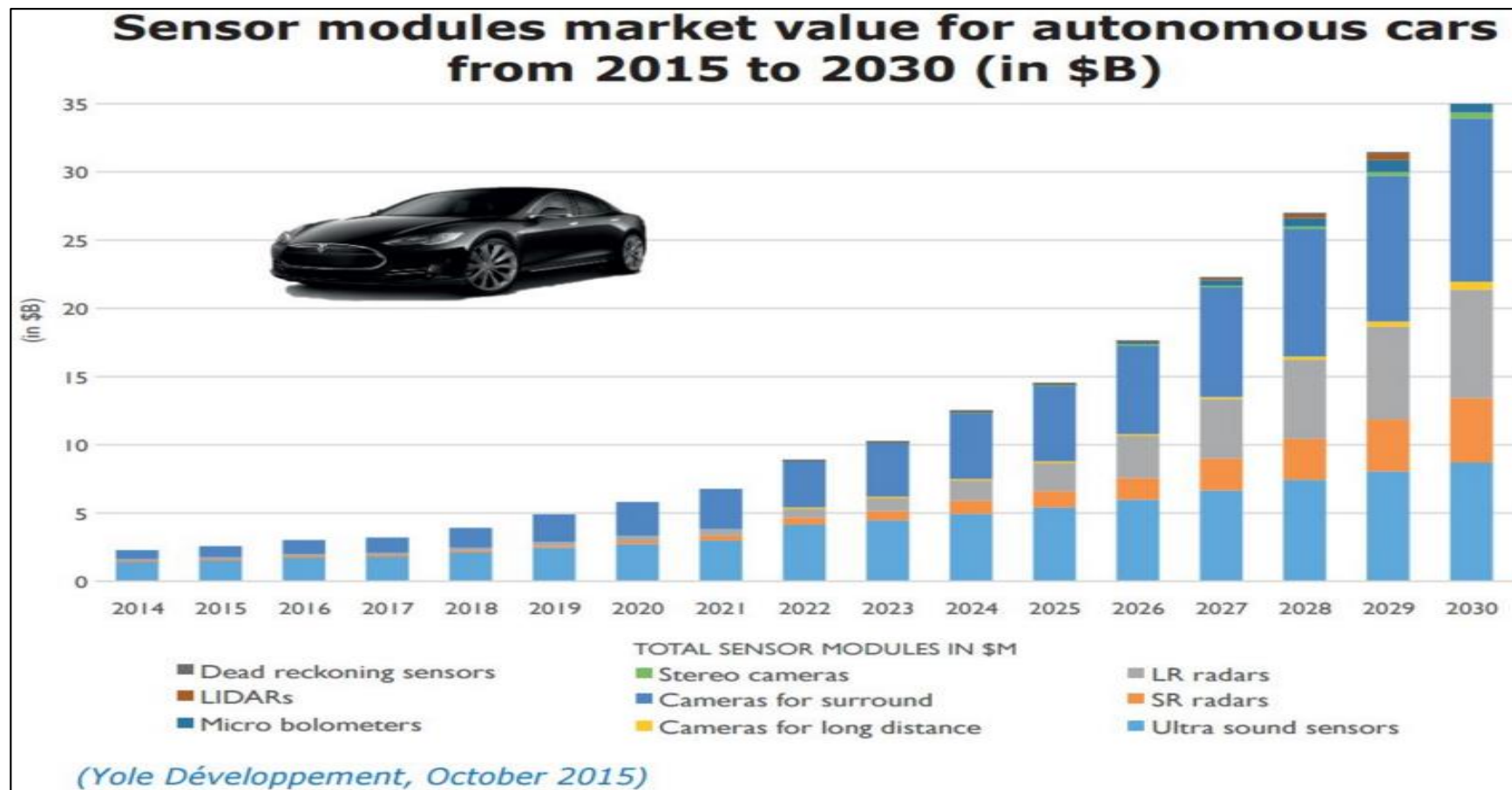


Europe is expected
to be highest revenue
generating region by 2020

Top Impacting Factors



ADAS Sensors' Growth :



>15x (in \$) Growth in Sensors in ADAS market

Problem Statement:



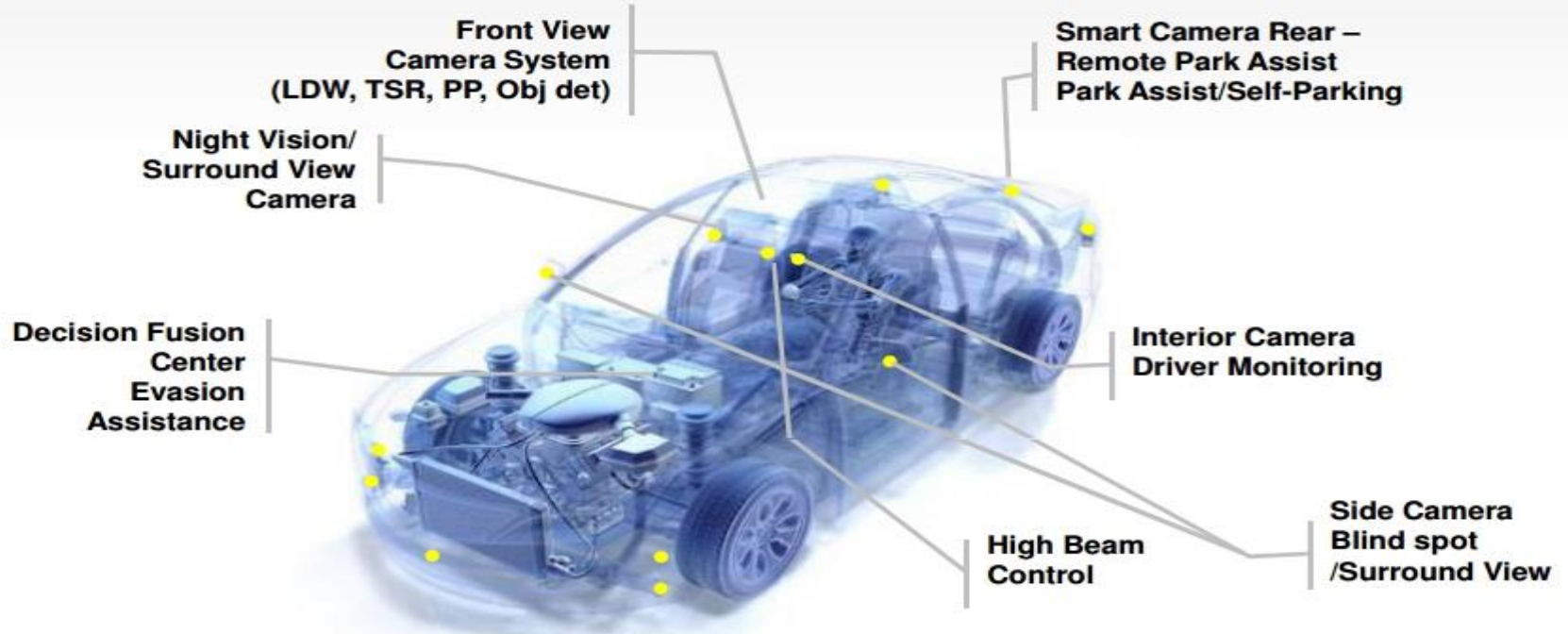
➤ Cost, Complexity, Reliability and Security

- Complex Wiring:
 - Rapid escalation of new Electronic systems straining the limits of existing wiring harness
 - Wiring and bridges to connect to multiple sensors
- Proprietary Protocols
 - Bridges: Protocol conversion
 - Efficiency **loss** due to conversion
- BW and Latency:
 - More Sensors, LIDARs and IP Cameras
 - More compute when added driver's capability
 - Vision, Machine learning
- Security
 - Secure external communication
 - Security inside the car

Standardization will drive further Innovation in ADAS

ADAS Vision:

Automotive ADAS Vision Applications



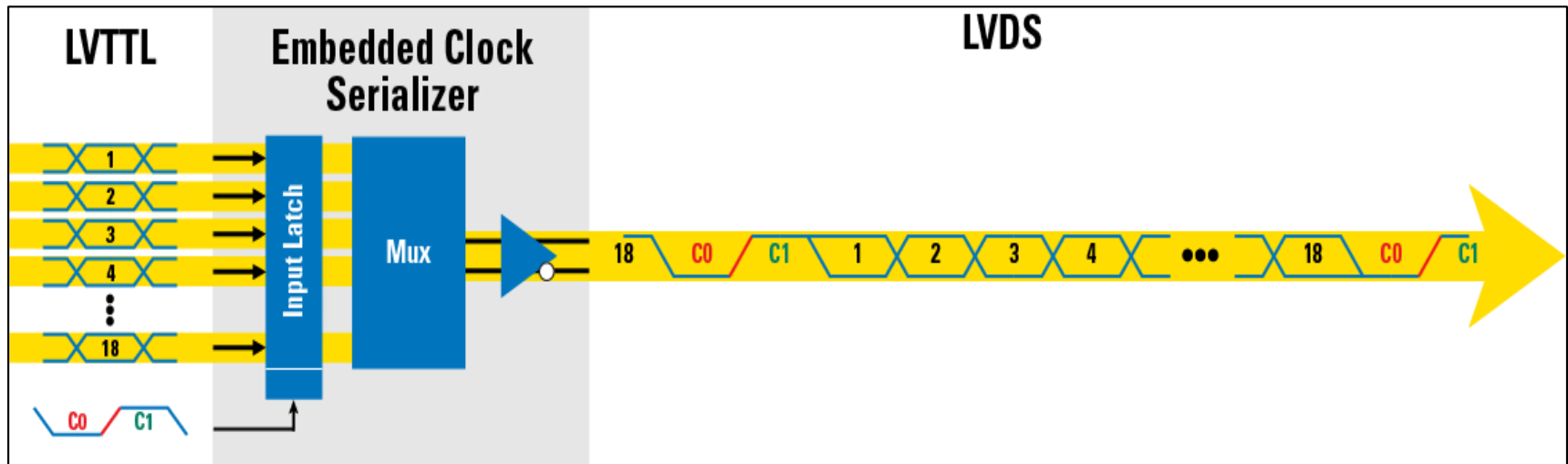
Source: Free scale

Various technologies used in cars today :

➤ LVDS

– LVDS

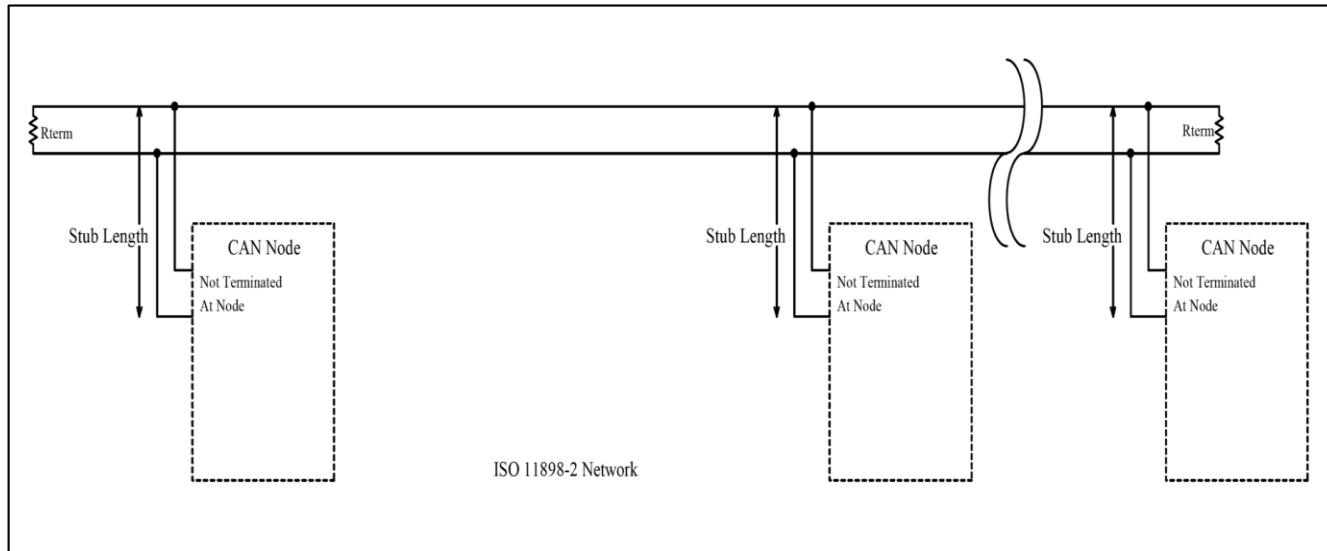
- Low voltage differential signaling
- Rates up to 622 Mbps/copper pair : Point to Point
 - Available up to 3.125 Gbps/copper pair on very high quality transmission lines



Various technologies used in cars today :

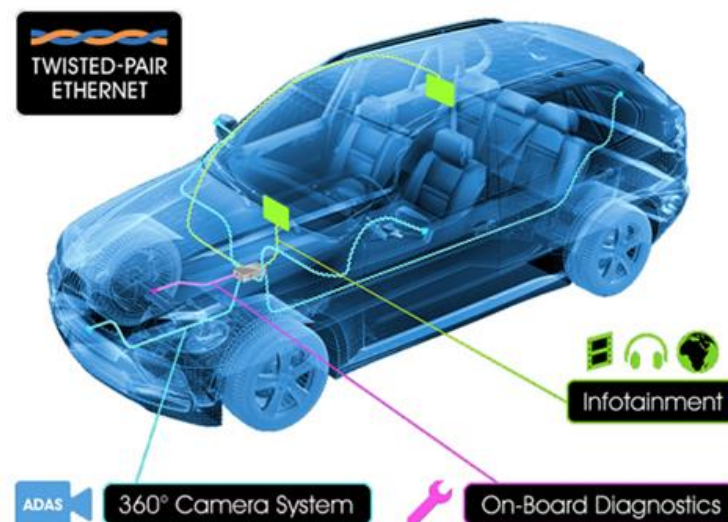
➤ CAN bus

- CAN : Controller Area Network
 - Typically 1 Mbps
- Improved CAN FD
 - Can achieve up to 10 Mbps



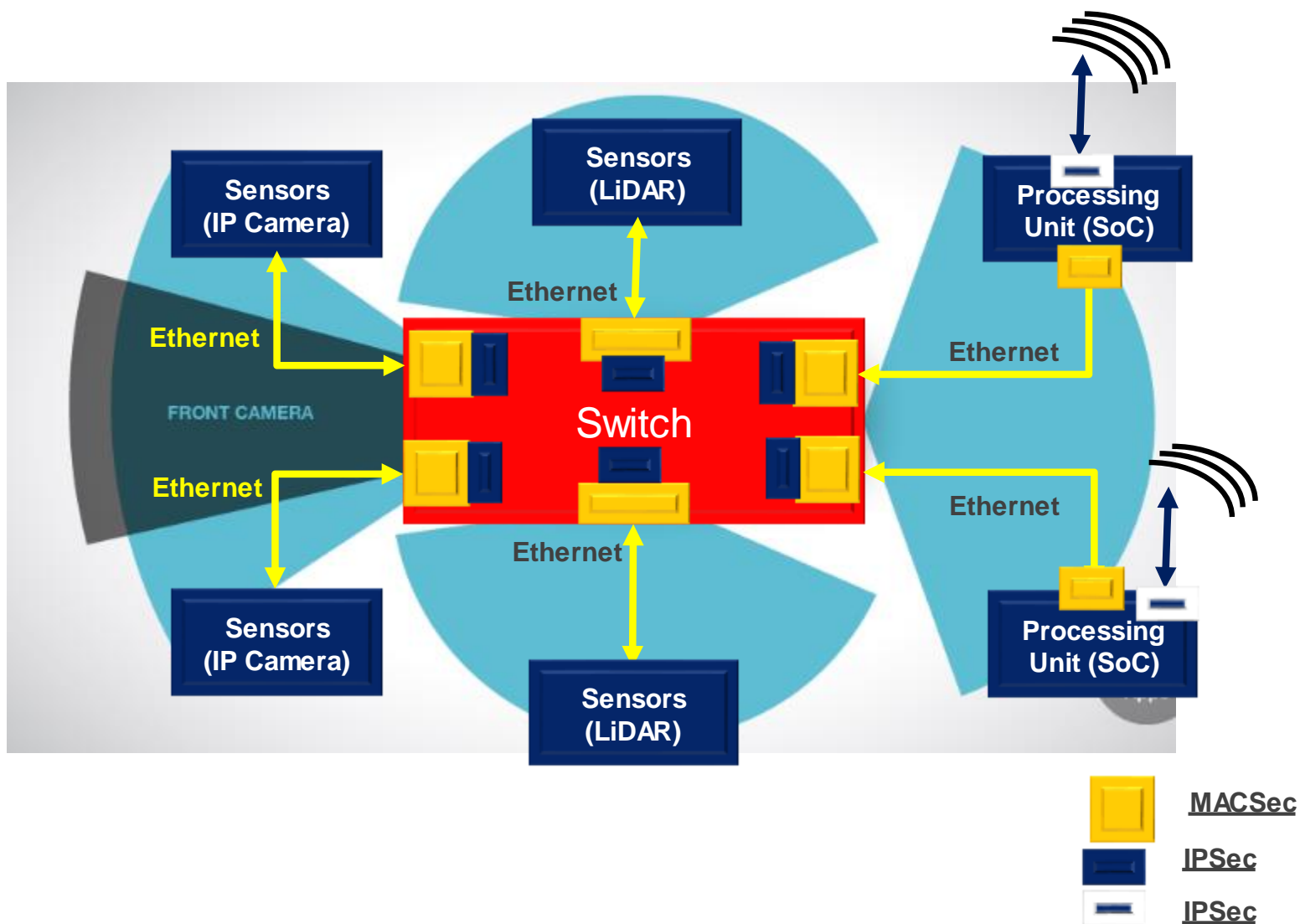
Ethernet: opensig.org

- More Versatile and Available in Variety of Use Cases
- Typically Ethernet Adapts to other Use Cases
 - Wired/Wireless Communication
 - Homes
 - AVB
 - IOT and IIOT devices
 - Factory Floors
- Ethernet in More Use Cases
 - ADAS and AV



Ethernet: Cyber Security is Challenged

Security in ADAS w Ethernet Network:



Summary

- All Programmable FPGA - Protocol Agnostic
 - Programmable IOs
 - IOs Supports
 - CAN, LVDS and various speeds of Ethernet (10Mbps to 400GE)
 - Programmable Logic with Programmable interconnect
 - Any type of digital logic can be implemented inside Xilinx FPGA
 - Ethernet still has challenges in terms of security in Auto market
 - Needs to be addressed as the technology is adopted
 - Use of MACSec, IPSec and SSL/TLS in Xilinx FPGAs
 - To alleviate security concerns

Backup