Introduction to the NXP Automated Drive Kit

Bill Harrison

Business Development – ADAS & SAS

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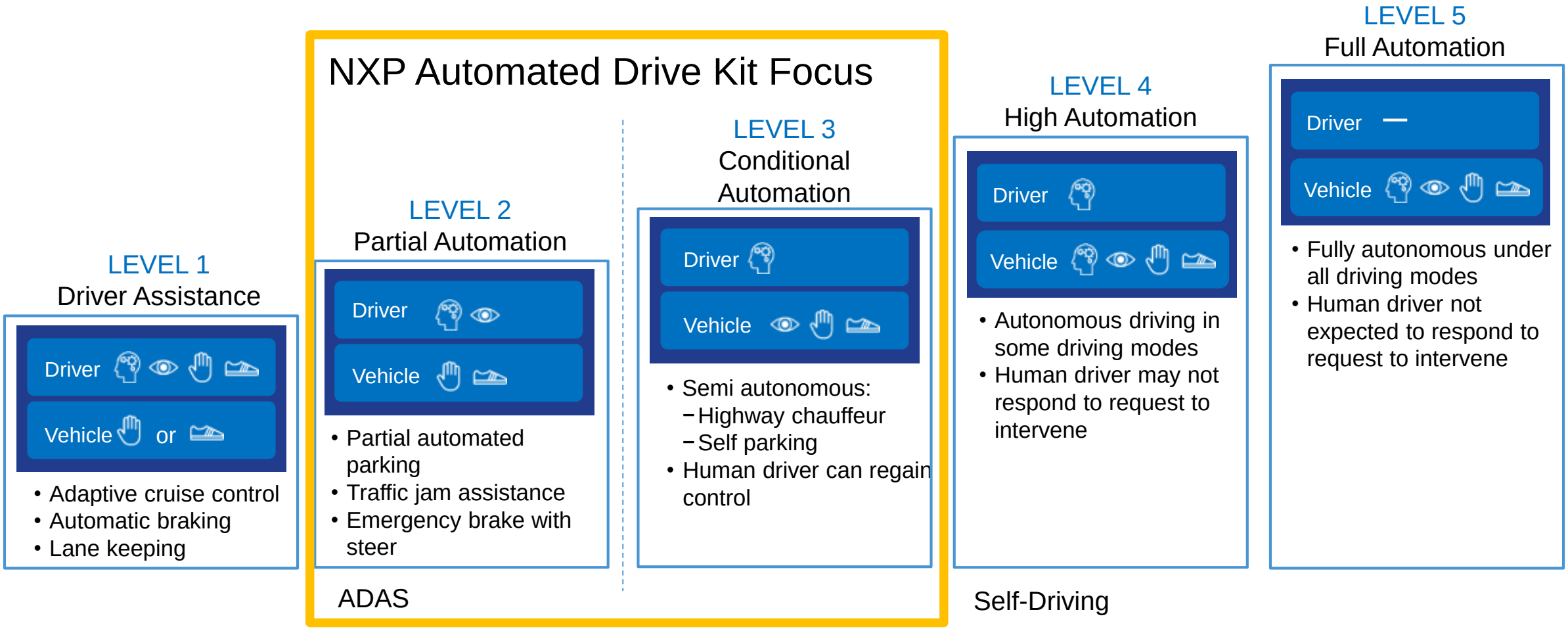
NXP | CONNECTS

Agenda

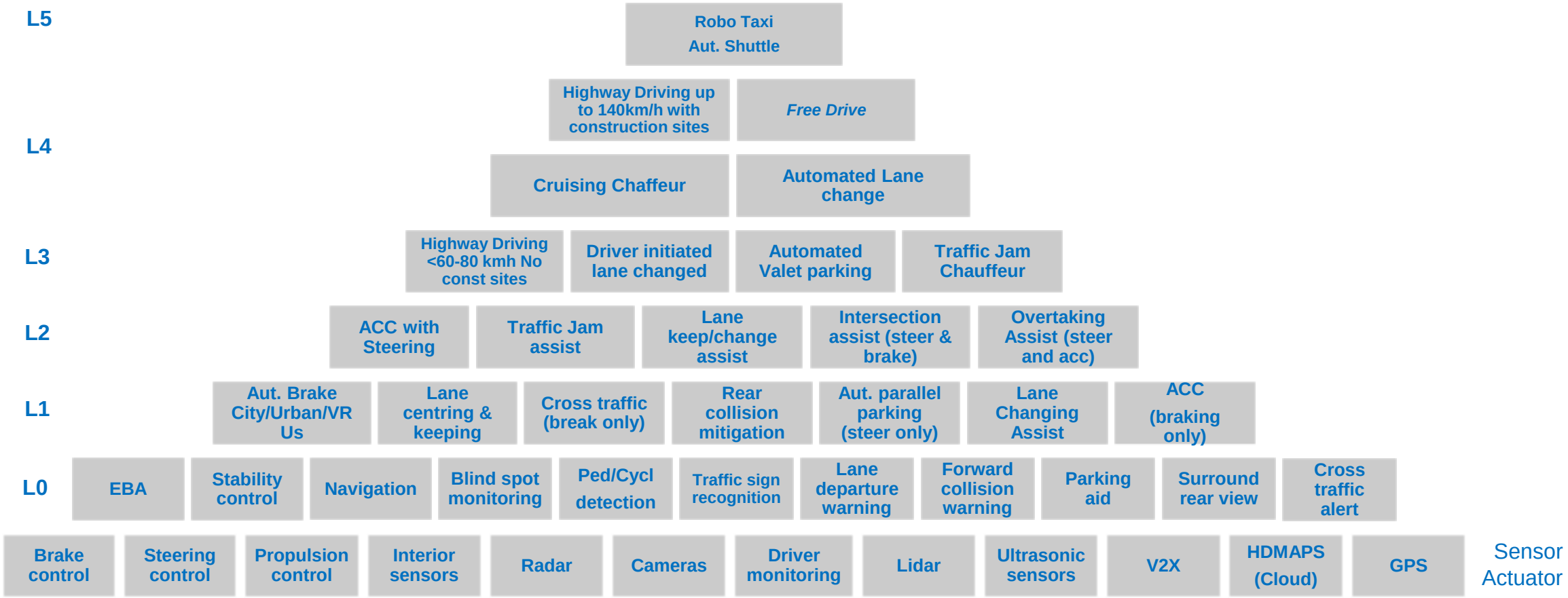
- Level 2/3 Autonomy Market Introduction
- NXP Solution – NXP Automated Drive Kit
- Path to Production Solutions
- FAQ
- Summary

Level 2/3 Autonomy Market Introduction

The Race to Self-Driving as Per the SAE Classification



ADAS and Driving Functions



Driving Functions drives the real Value of Automated Driving

Research Vehicle Platform Example – AutonomouStuff

Customer Development Options for Level 2/3 Autonomy

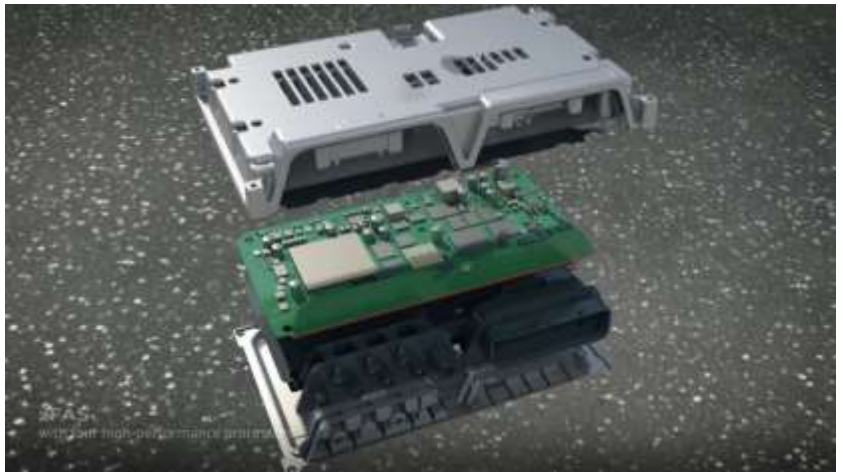
Customer Software Development Strategy

- Use existing computing hardware/software (PC)
  - Readily available with abundant software ecosystem (Ubuntu Linux, ROS, etc)
    - Allows customers to focus resources on value add software like algorithms/applications
  - Many performance points for general computing, GPU
  - Downside is not a platform with pathway to production solution
    - Customer will need a transition to embedded automotive solution

- Develop own hardware/software environment (Custom Target)
  - Design and produce unique hardware and software platform that provides a pathway to production
  - Spend resources early on in process developing hardware and software before knowing exact performance requirements
    - Risk in that hardware is not optimized for production
    - If hardware is under specified then final software needs to be limited

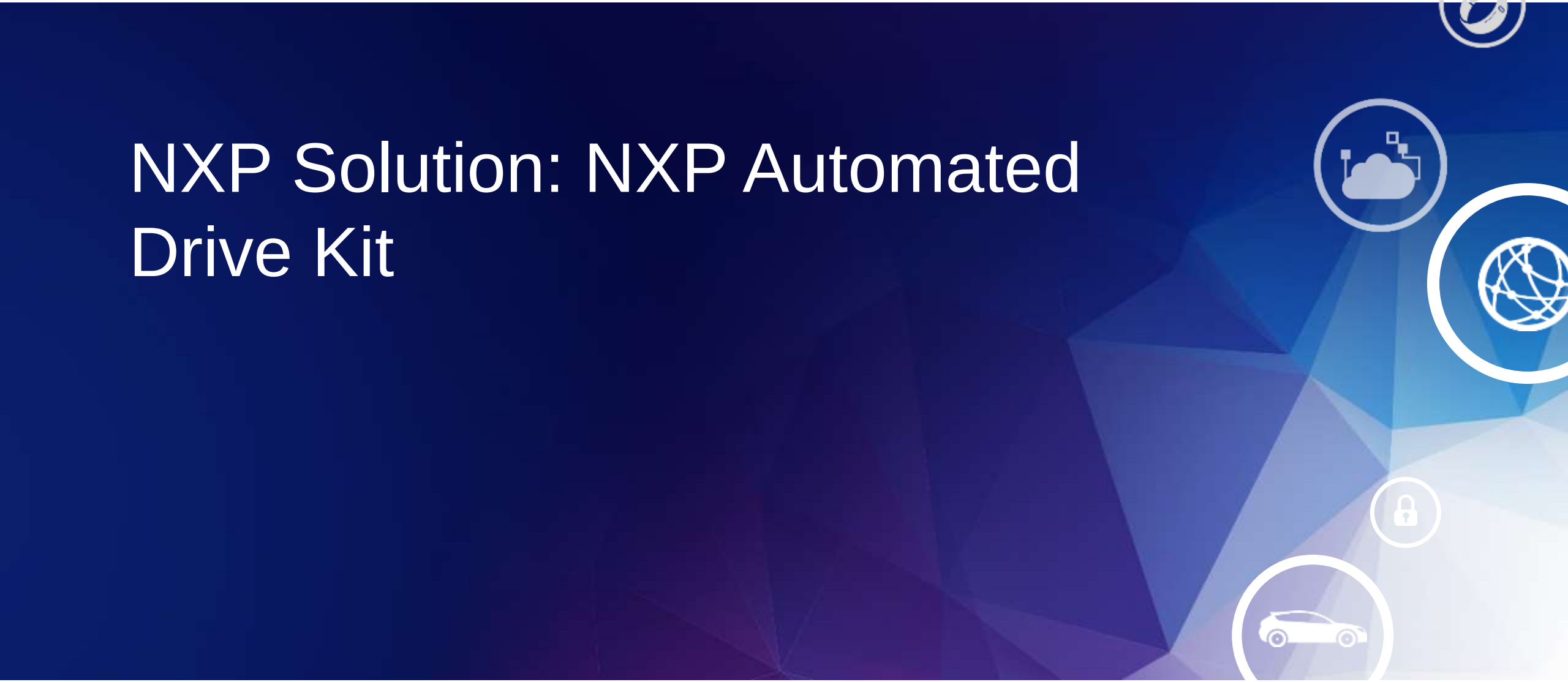
Examples

Rugged PC Platforms
(AutonomouStuff)



Custom Hardware/
Software Platform
(Audi)

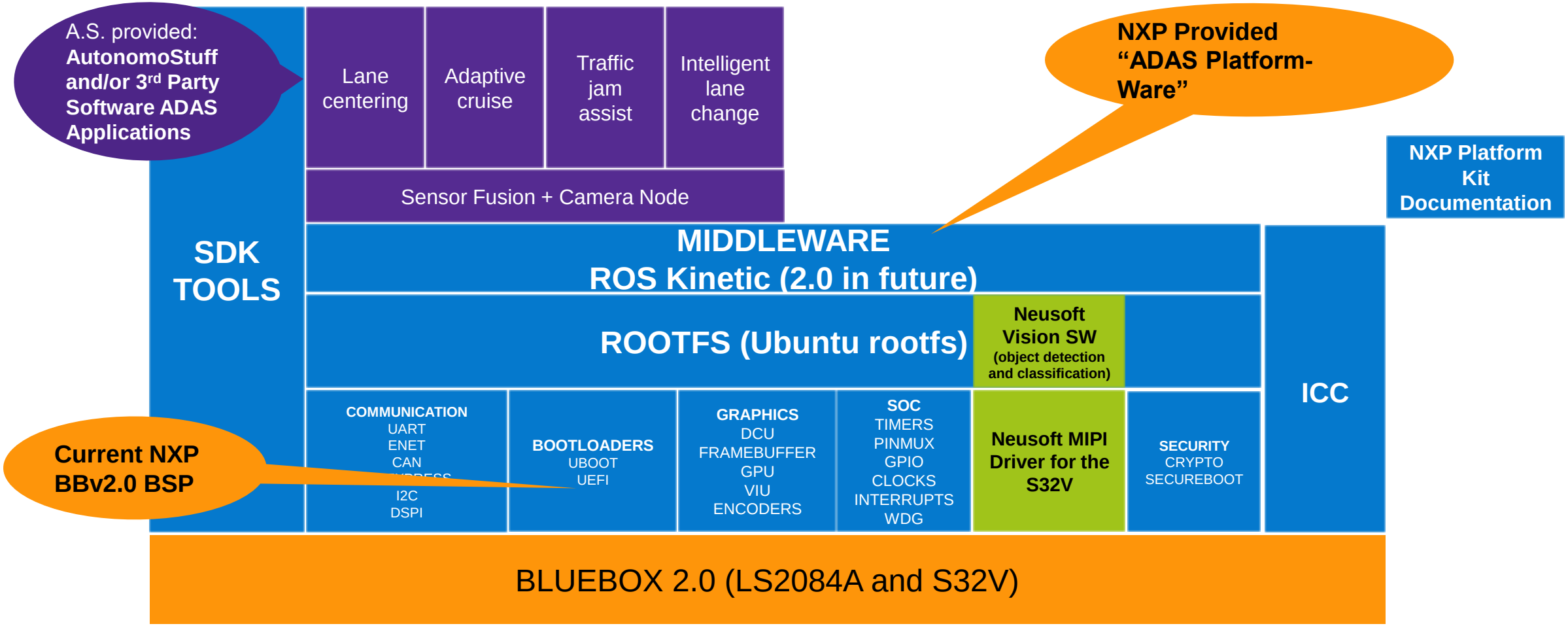
NXP Solution: NXP Automated Drive Kit



Our Solution – NXP Automated Drive Kit

- Open platform for experimentation: flexible development platform that enables user to chose their SW strategy for Level 2/3 autonomy applications with a pathway to production, automotive grade silicon!
  - Customers can deploy their algorithm's of choice for vision, perception, fusion, mission and motion planning. NXP SW partners also provide these algorithms for customers.
- Reconfigure vehicle sensors: emphasis on how many sensors to combine and the type of sensors, to determine data bandwidth and compute needs for various levels of autonomy
  - Baseline kit supports various sensor nodes (front camera, front long-range radar, Lidar, etc.) and is ready to be deployed in test vehicles
- Enable OEM & Tier 1 to focus on their "value add": provide a platform that supports the development environments of choice and enables user to chose their SW strategy
  - ROS (Robot Operating System) workspace provided with the kit, built on Ubuntu Linux File System
- Performance compute needs: from Level 3 and above with compute performance to do their experimentation
  - Baseline performance supports L3 use case with expansion capability for >L3

NXP Autonomous Drive Kit – SW Configuration



What is the NXP Automated Drive Kit (Release 1)?

The Phase 1 kit will contain the following:

- Computing: NXP BlueBox 2.0, BLBX2-DB
- Vision: Neusoft Front Camera SW running on S32V234 (inside BLBX2-DB) with Truly MIPI CSI2 Camera
- LiDAR: Selection of Lidars supported
- Long Range Front Facing RADAR
- IMU & Integrated GPS
- O/S: Auto SDK Linux + Ubuntu RFS + Veth SW
- Middleware: ROS (Robot Operating System)

NXP Automated Drive Kit Introduction – CES2018

NXP Automated Drive Kit – AutonomouStuff

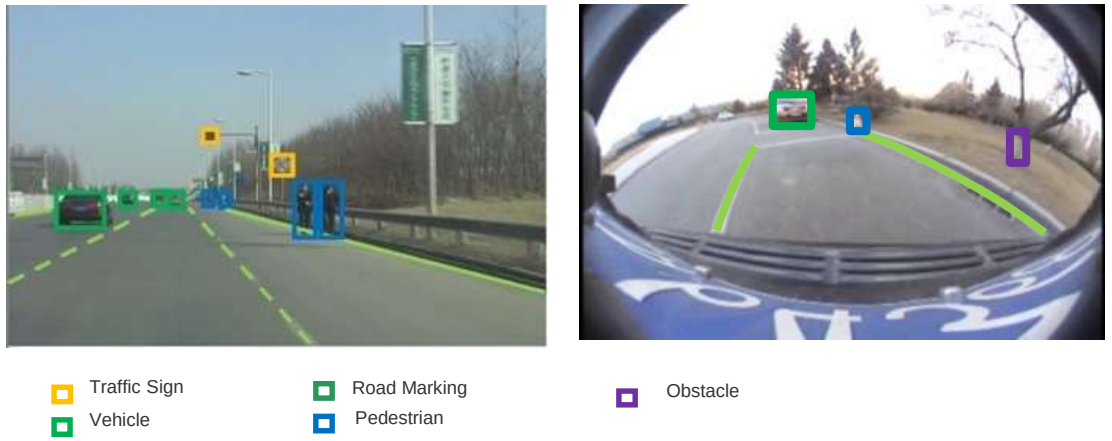
AutonomouStuff

- Value added reseller
- Accelerates development by building automated research platforms
- Prepares, maintains, supports and re-sells the NXP Automated Drive Kit
- Offers perception positioning software based on NXP Automated Drive Kit
- System integration and ROS enablement for sensors and other hardware plus reference applications
- First line system support

NXP Automated Drive Kit – Neusoft

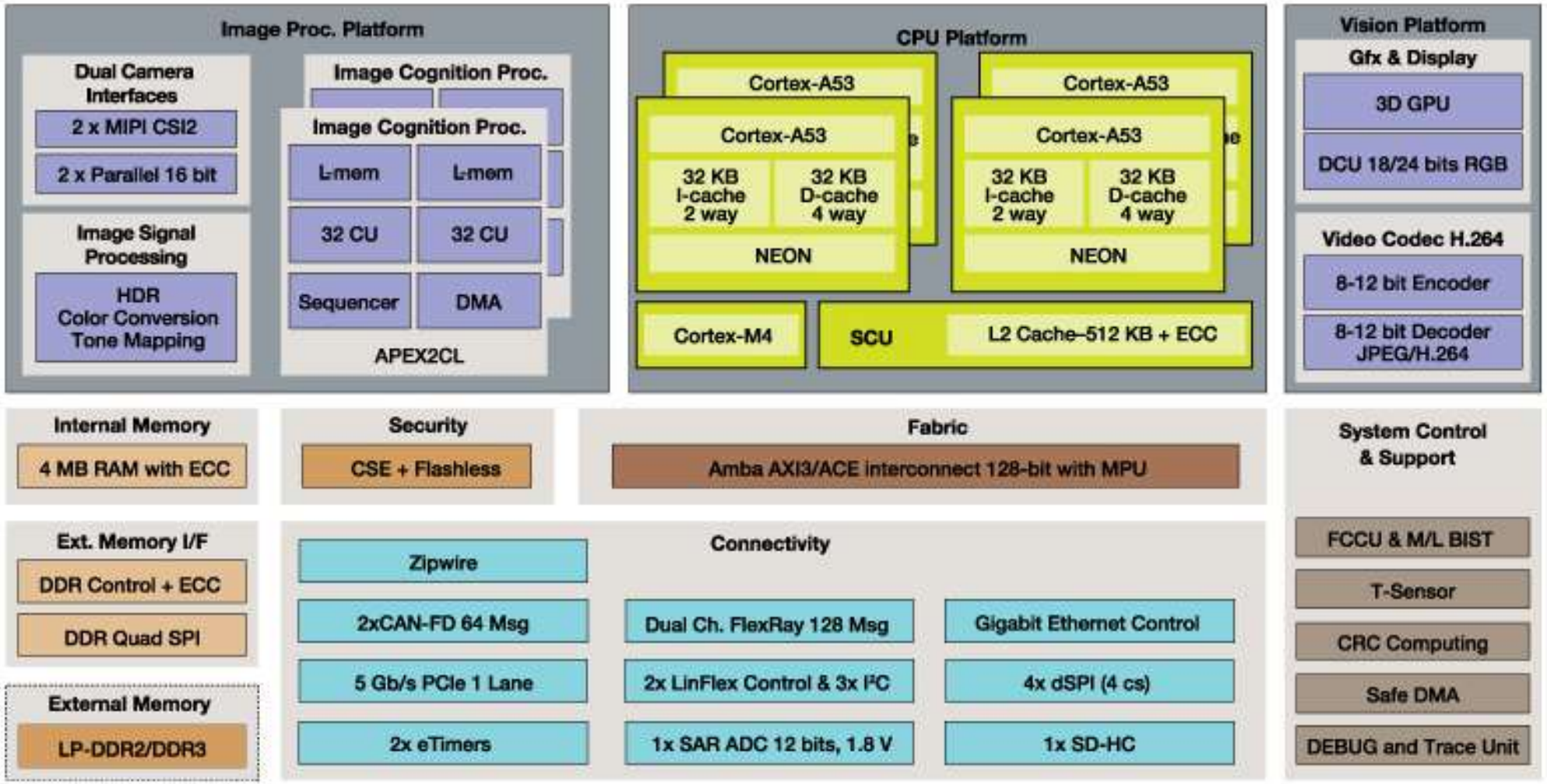
Neusoft

- A Global Automotive Software and Solutions provider
- 20+ years experience of object detection and image processing technologies
- SW utilizing Multi-core High Performance computing
- Features included in kit:
  - Lane detection
  - Vehicle detection
  - Pedestrian, Motorcycle, Bicycle detection
- Optional features:
  - Cross Traffic detection
  - Traffic Sign, Traffic Light detection
  - Blind Spot detection
- Supports Truly 1.3MP forward facing MIPI camera module and 52 degree lens
  - Object detection range 100+ Meters
  - Support for other camera modules

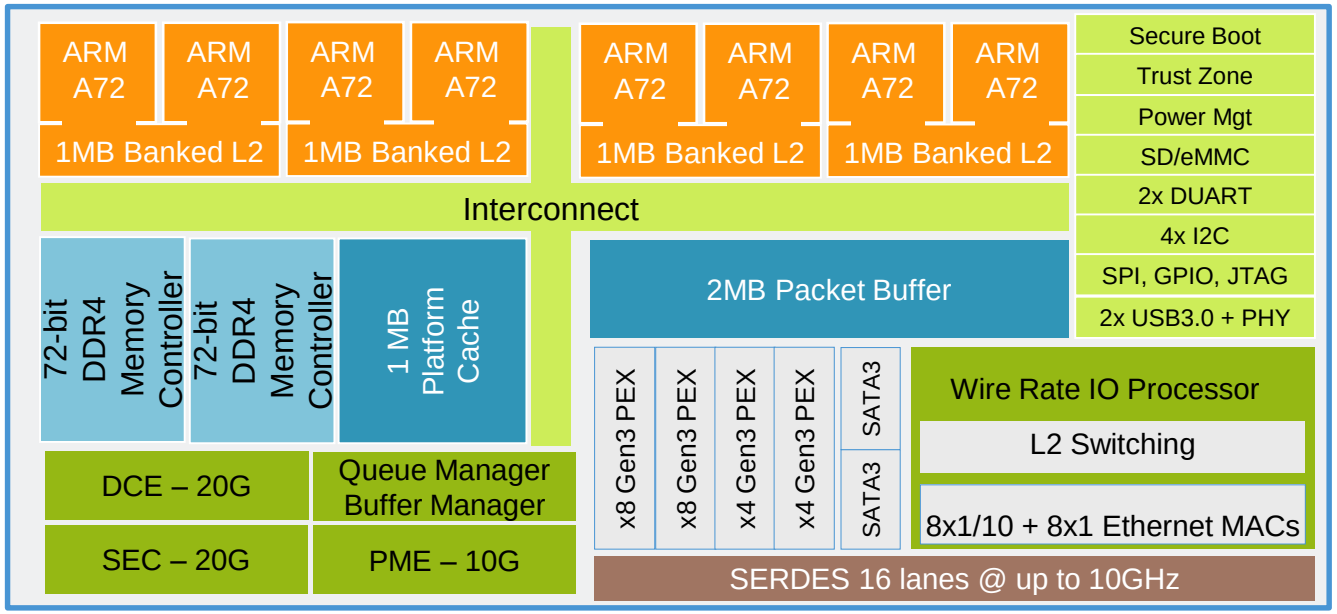


Path to Production Solutions

S32V234: Block Diagram



QorIQ Layerscape LS2084A



Auto quality

- AEC Q100 Grade 3 (105C Tj)
- 15 years product longevity
- ZD-like approach to reduce risk of DPPM or Life failures
- Expected Operating Life fail rate <10 FIT
- Mission Profile: 10 years, 90C Tj-effective

Process & Package

- 28HPM, ~40W Thermal Max @ 105C
- 37.5 x 37.5 mm, lidded FCBGA, 1mm pitch, 1292 pins

Performance

- ARM A72 x 8 @ 2.0 GHz
  - 95.3K DMIPS
  - SpecInt2k6 – 14.5, Rate -83.4
  - Neon SIMD in all CPUs
- 2x72b (including ECC) DDR4 up to 2.1GT/s
  - 33.6GB/s memory BW
- High Speed IO
- Multiple PCIe Gen3 controllers
- Multiple Ethernet MACs (up to 10G)

Functional Safety

- Target ASIL-B*
- ECC protected memories
- Fault localization, containment and recovery
- Soft lockstep with determinism
- Excellent support for virtualization, containerization

Security

- 20Gbps Crypto Acceleration
- MACSEC, IPsec, SSL
- Trust Architecture
  - Secure Boot
  - Secure Debug
  - Secure Storage
  - Tamper Detection
  - HW Enforced Partitioning
  - ARM Trust Zone

FAQ

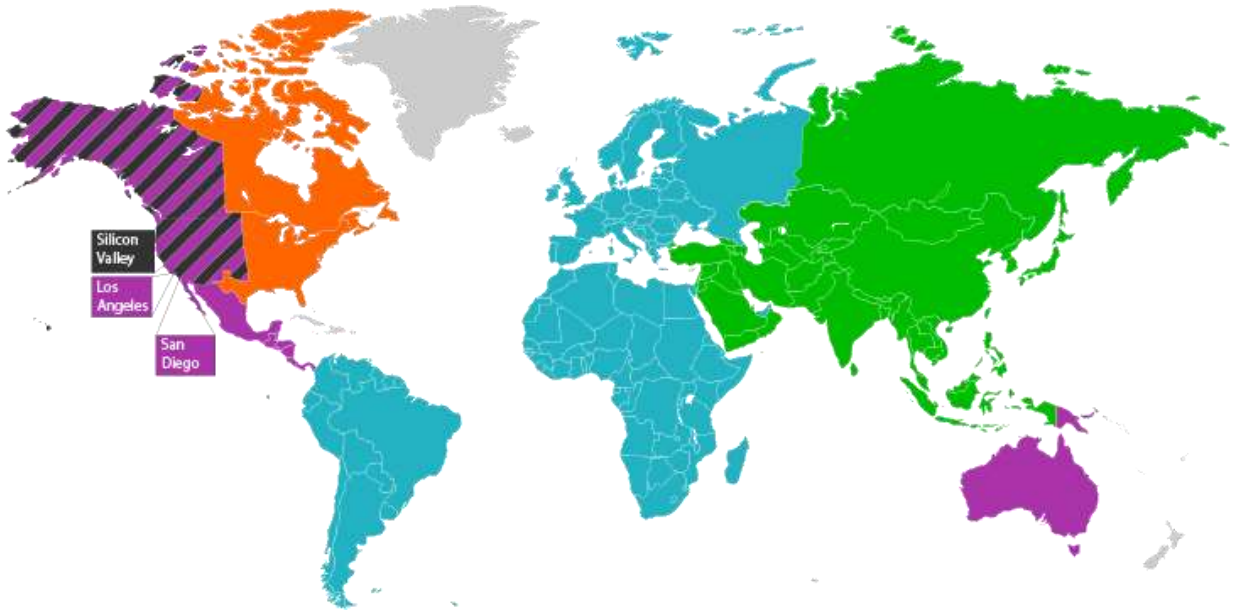
Frequently Asked Questions (FAQ)

- Q: How does a customer purchase the NXP Automated Drive Kit?
  - A: The NXP Automated Drive Kit can be purchased through our partner, AutonomouStuff. AutonomouStuff will package the NXP Bluebox 2.0 with ADAS Sensors and software to create a value added solution. The kit can be purchased as stand-alone or can be packaged inside a vehicle with drive-by-wire solution to access steering, braking, shifting, and torque systems.

- Q: Does AutonomouStuff have support globally?
  - A: Yes. AutonomouStuff has support in North America centered in Detroit and Silicon Valley. They also have support and partnerships established in China and Europe.

- Q: Does the NXP Automated Drive Kit support Neural Network processing?
  - A: The current NXP Bluebox 2.0 is focused on traditional machine vision algorithms for front camera solutions. Artificial Intelligence capability will be coming in future versions of the NXP Bluebox to will focus on multiple camera inputs and neural network acceleration for object detection and classification.

AStuff Sales Regions



Wolfgang Juchmann | Worldwide support
VP of WW Sales & Business Development
wjuchmann@AutonomouStuff.com

Nicole Waier | Eastern US
Director of Sales
nwaier@AutonomouStuff.com

Cameron Gieda | Western US, Silicon Valley
Regional Sales Manager
cgieda@AutonomouStuff.com

Kendra Gallup | Western US, LA/San Diego, Aust/NZ
Sales & Business Development Manager
kgallup@AutonomouStuff.com

Marco Reiling | Europe, UAE, South America
Senior Business Development Manager
mreiling@AutonomouStuff.com

Teng Hoong Swee | Asia Pacific
Director of Sales & BD
tswee@AutonomouStuff.com

Summary

Summary – NXP Automated Drive Kit

- Full System [HW + SW] Development Platform with pathway to production silicon solutions!
  - Easily move from PC environment to NXP Automated Drive Kit to test vehicle with minimal effort
  - Allows customer resources to focus on value added software
- Address levels of autonomy up to Level 3
  - Flexible set of ADAS sensors to fit customer requirements
- NXP Automated Drive Kit purchased through AutonomouStuff
  - https://autonomoustuff.com/product/nxp-automated-drive-kit/

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