# AUTOMOTIVE ETHERNET TECHNOLOGY TREND

# & NXP SOLUTIONS

DEC 2023

SECURE CONNECTIONS
FOR A SMARTER WORLD

NXP, THE NXP LOGO AND NXP SECURE CONNECTIONS FOR A SMARTER WORLD ARE TRADEMARKS OF NXP B.V.
ALL OTHER PRODUCT OR SERVICE NAMES ARE THE PROPERTY OF THEIR RESPECTIVE OWNERS. © 2023 NXP B.V.

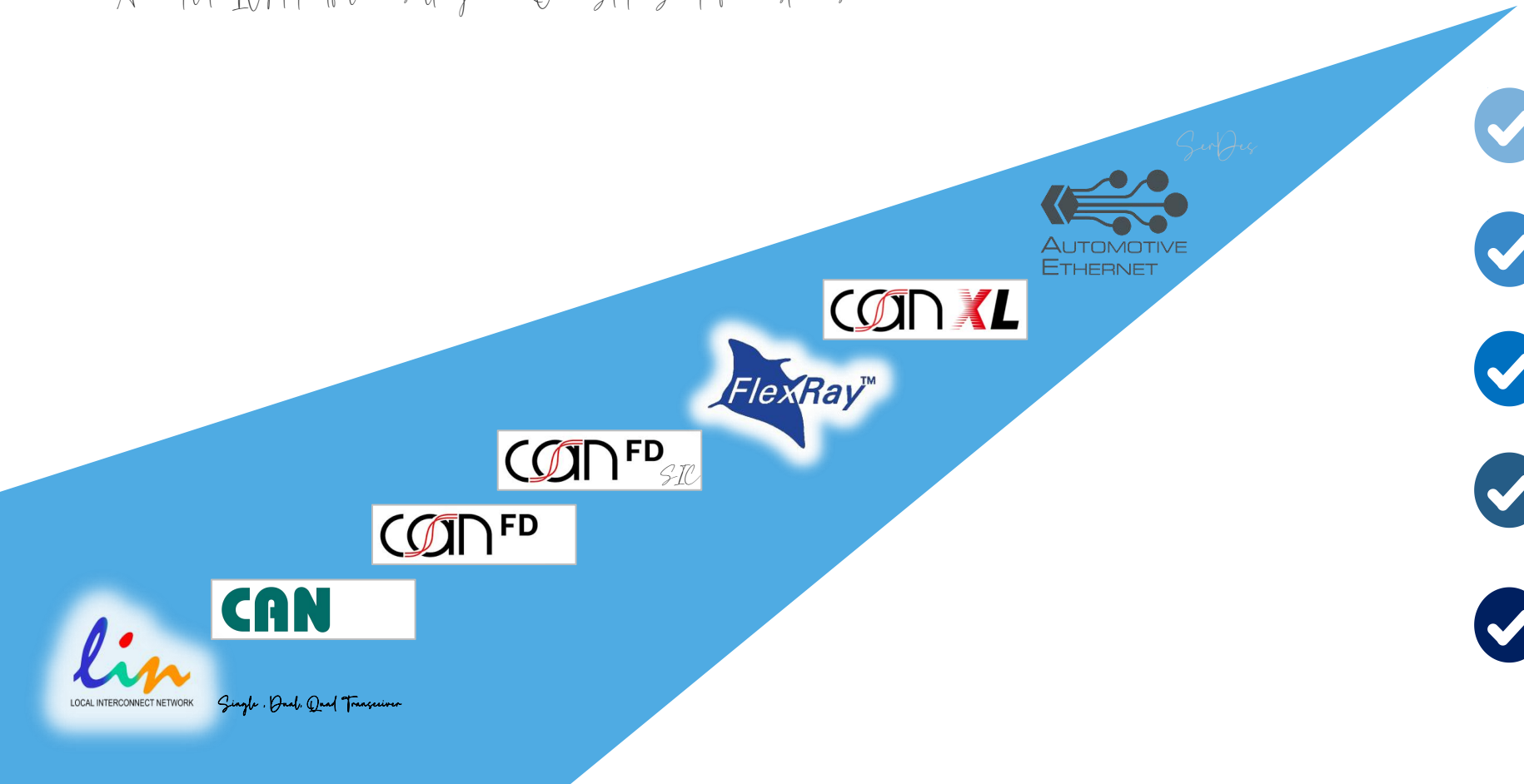
# AGENDA

- NXP Auto networking technology milestone.
- NEW E/E architectures and Networking challenges
- NXP Ethernet and Networking solutions

# NXP AUTO NETWORKING TECHNOLOGY MILESTONE

IVN's Portfolio is continuously updated whilst keeping backward compatibility to previous generations

- Started since 1993 - NXP co-invented the CAN network
- A complete IVN portfolio resulting in a One Stop Shop for customers

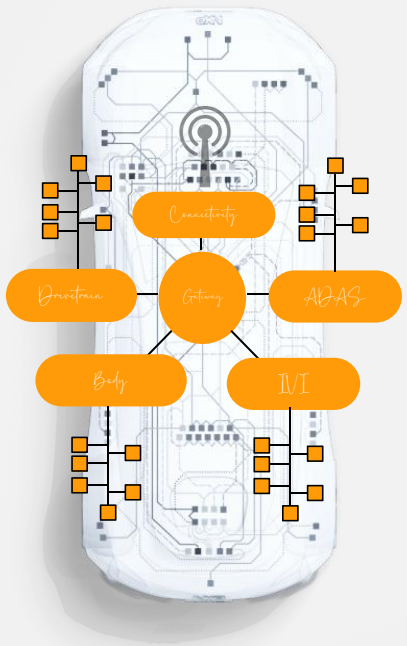
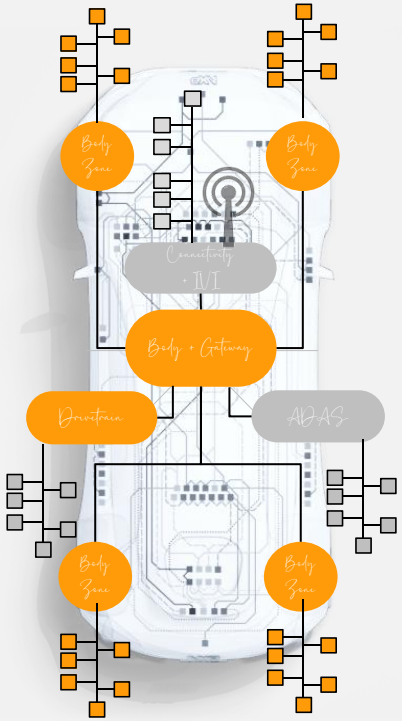
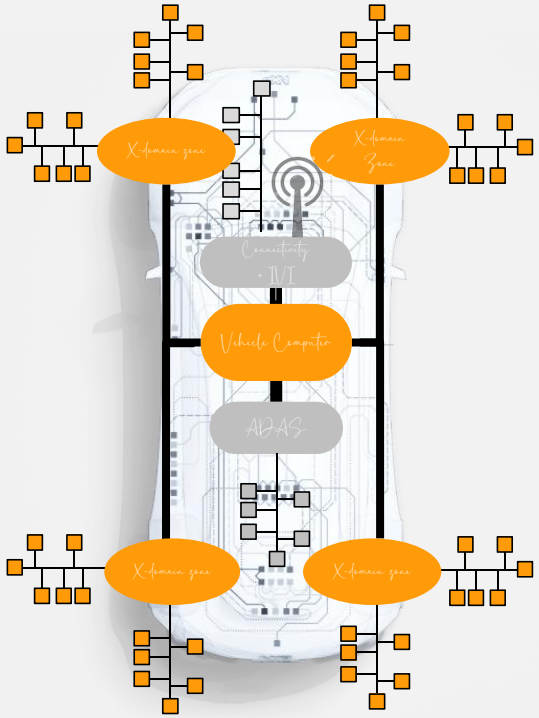
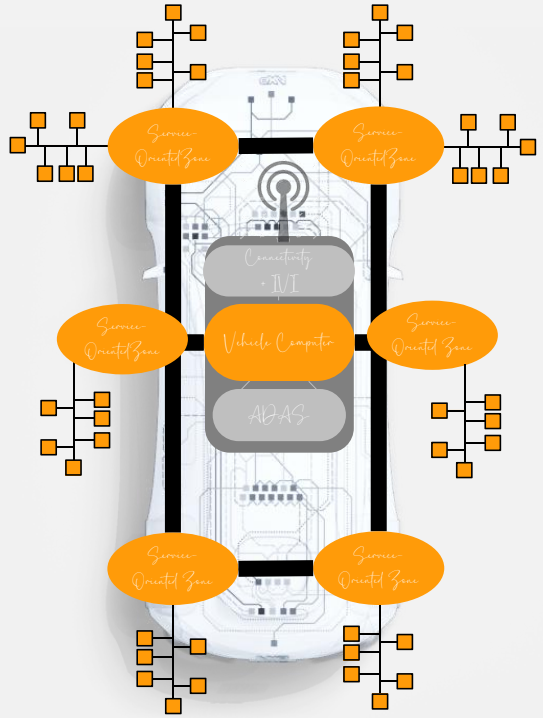



- Leadless options
- Grade 0 options
- VeLIO options
- SIC* options

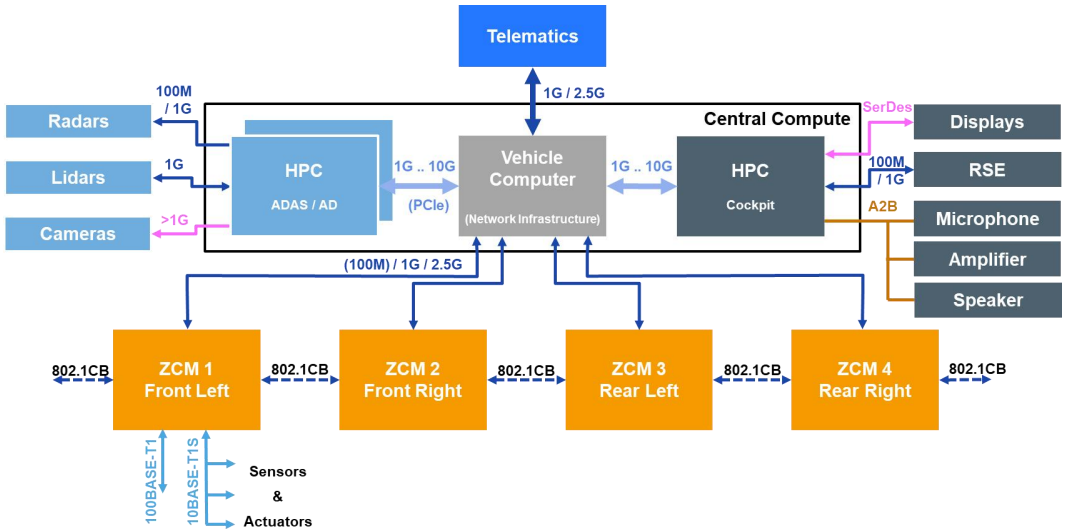
*Signal Improvement Capability

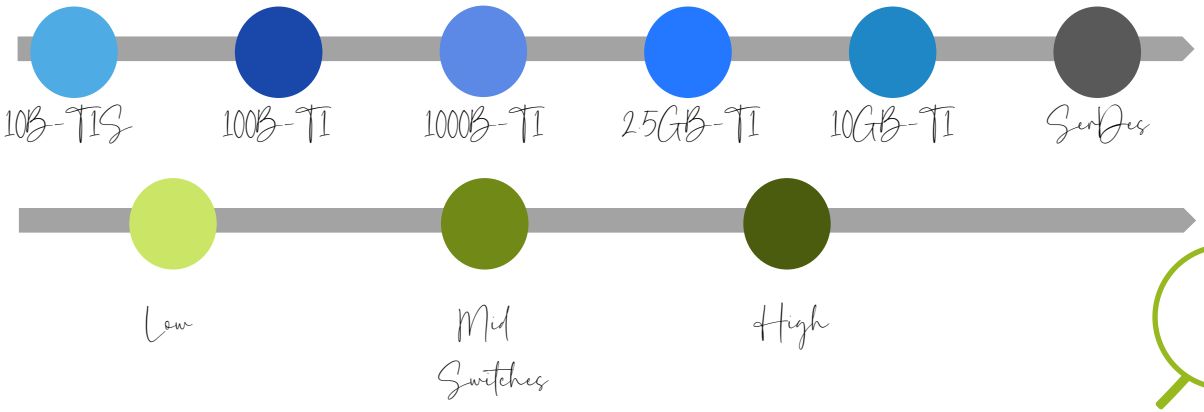
- Secure options

# NEW E/E ARCHITECTURES ARE EMERGING TO MANAGE INCREASING HARDWARE AND SOFTWARE COMPLEXITY

| DOMAIN | BODY-ZONAL | X-DOMAIN ZONAL | CONSOLIDATED COMPUTE |
|---|---|---|---|
|  |  |  |  |
| Creates logical separation to isolate processing of domain functions with static network policies | Creates physical separation for body domain functions enabling smart data and power distribution and reducing wiring/weight/complexity | Creates physical separation for cross-domain functions in zones for further wiring/weight/complexity reduction using distributed compute architecture | Centralized, service-oriented compute architecture with zones supporting SDV SW deployment and further wiring optimization |

# NEW VEHICLE ARCHITECTURES DEFINE NEW REQUIREMENTS FOR THE ETHERNET NETWORK




## Several OEM challenges in the next decade

- Keep networks efficient and affordable
- Install scalable, robust Ethernet networks
  From 10Mb to 10Gb
- Engineer complex, mixed criticality traffic
- Transition video (sensor, display) to Ethernet network
- Enable 10Mb buses, bring IP to the edge
  On-ramp CAN / LIN to Ethernet
- Guarantee safety & security at architecture level

# EVOLUTION OF VEHICLE INFRASTRUCTURE PLATFORM

## Central Vehicle Compute Platform

Focused on safe control and driver comfort

Auto quality: Robust, safe, secure and reliable

Foundational across whole range of vehicles

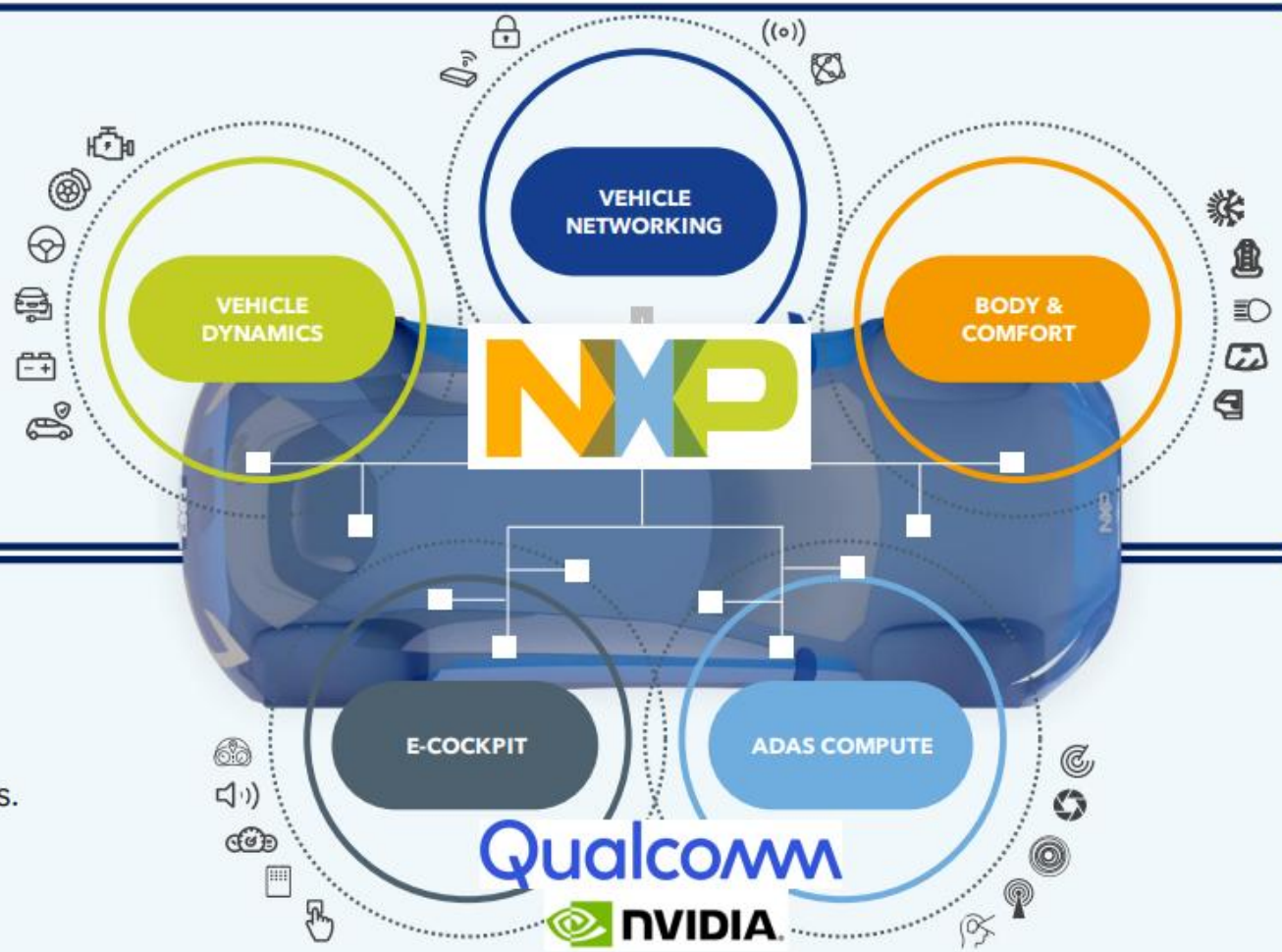
5-7 Years Production Lifetime

## Optional and vehicle dependent

Optional features across a vehicle line

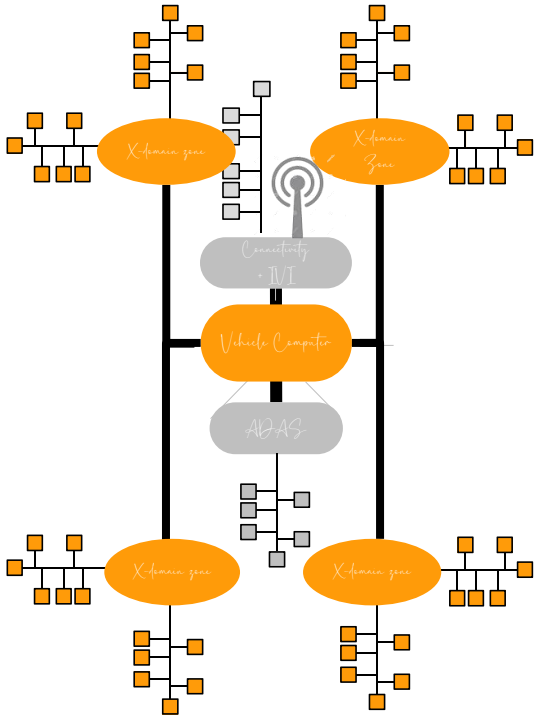
Fashion and time sensitive, replaceable every 2 years.

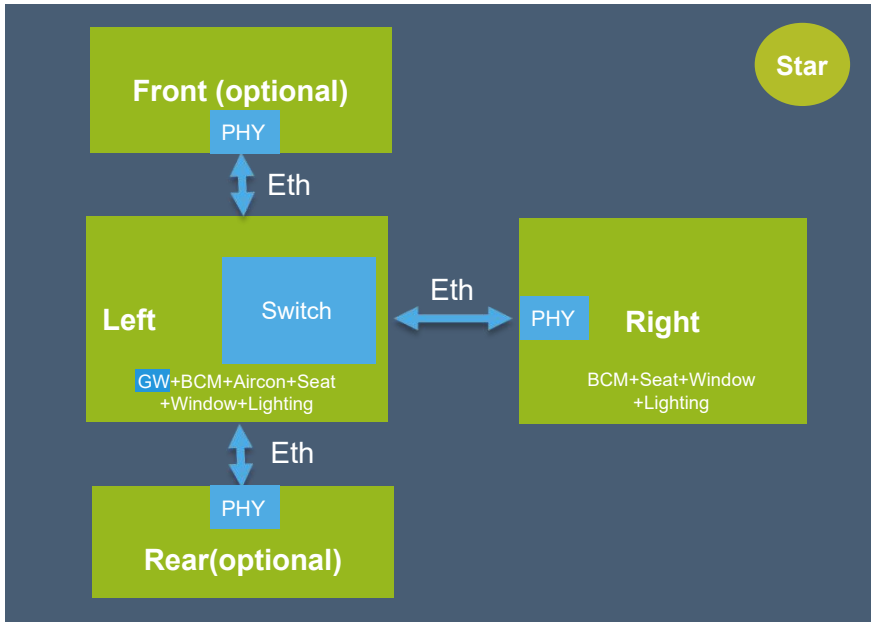
Re-used Mobile Technology.



# ZONAL ARCHITECTURE OF TODAY IN CHINA MARKET

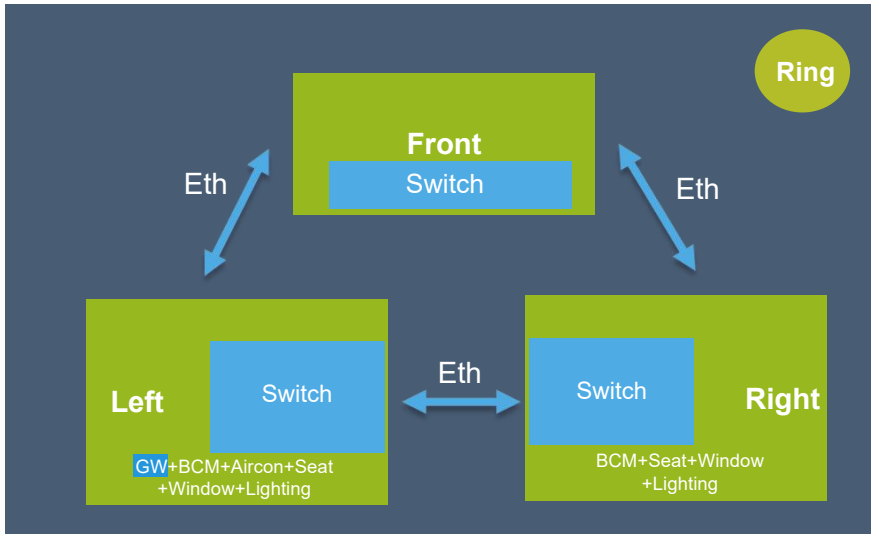
2024+
X-DOMAIN ZONAL




Star

- 80% vehicle
- Backbone: 100 Eth




Ring

- 20% vehicle
- Backbone: 100/1000 Eth + TSN

# SJA1110 SAFE AND SECURE AUTOMOTIVE ETHERNET SWITCH FOR TIME SENSITIVE NETWORKING (TSN)

## Data and Connectivity

- 8 Gbps non-blocking switch core
- Scalable (xMII, up to 2.5 Gbps SGMII, 100BASE-T1 and 100BASE-TX)
- AVB and TSN support
- Fully open embedded Arm® Cortex® M7

## Safety

- ASIL B Safety rating
- Dedicated safety features for increased service availability

## Security

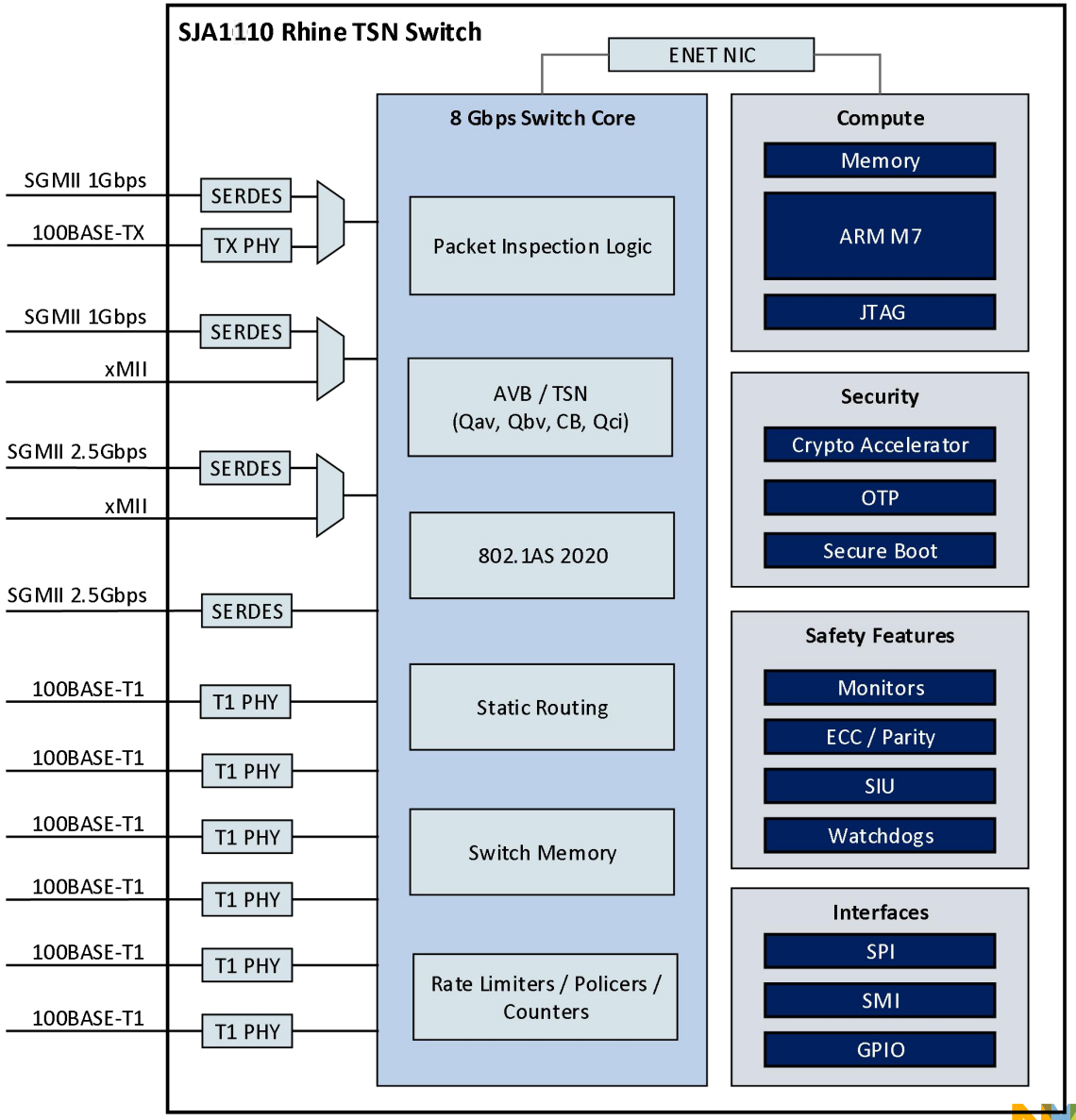
- Deep-Packet Inspection Engine
- HW-assisted secure boot (ECDSA & RSA supported)
- Feature rich traffic filtering/monitoring capability

## Software

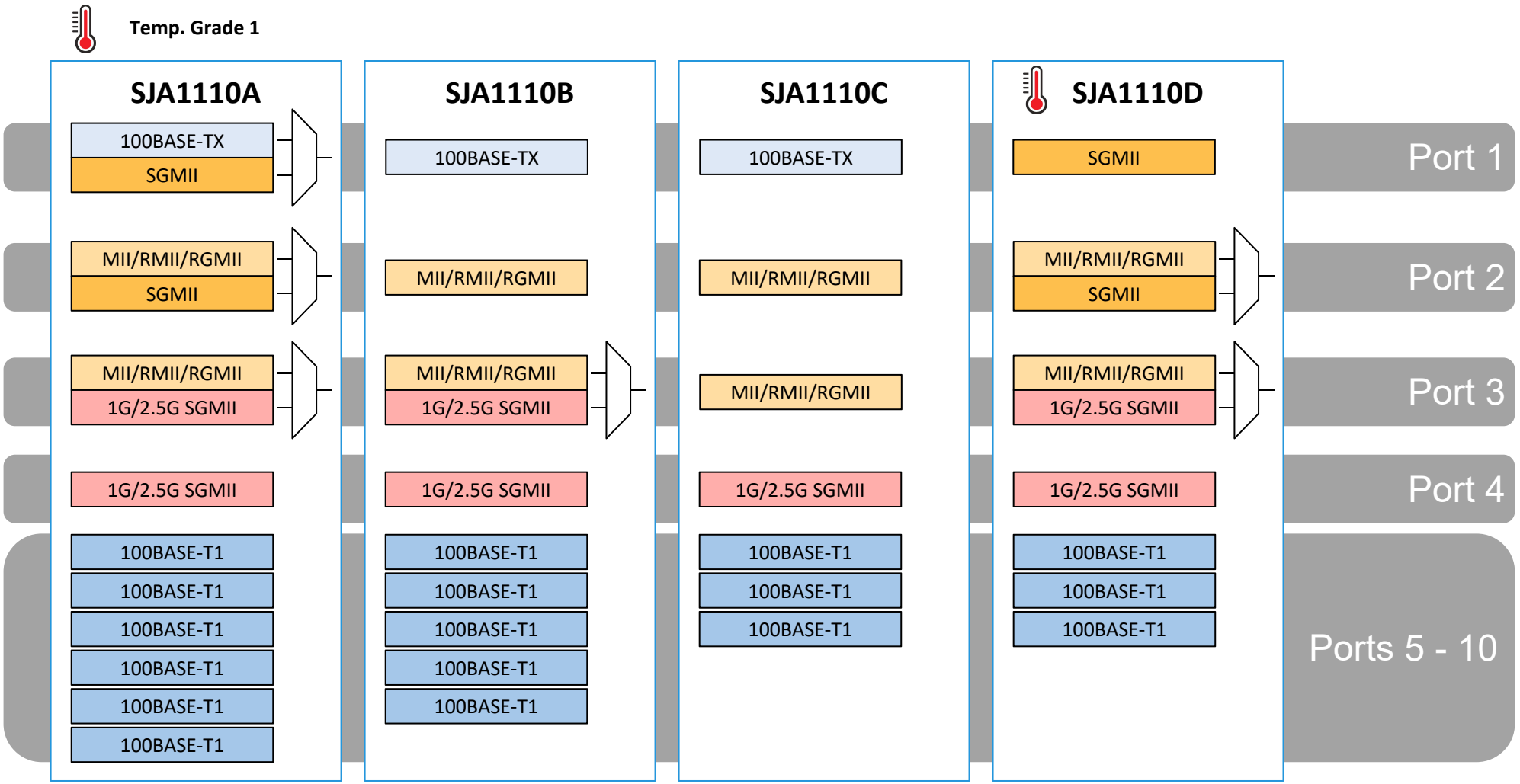
- Production intent SDK
- AUTOSAR Driver and MCAL
- Automotive AVB stack

## True Automotive

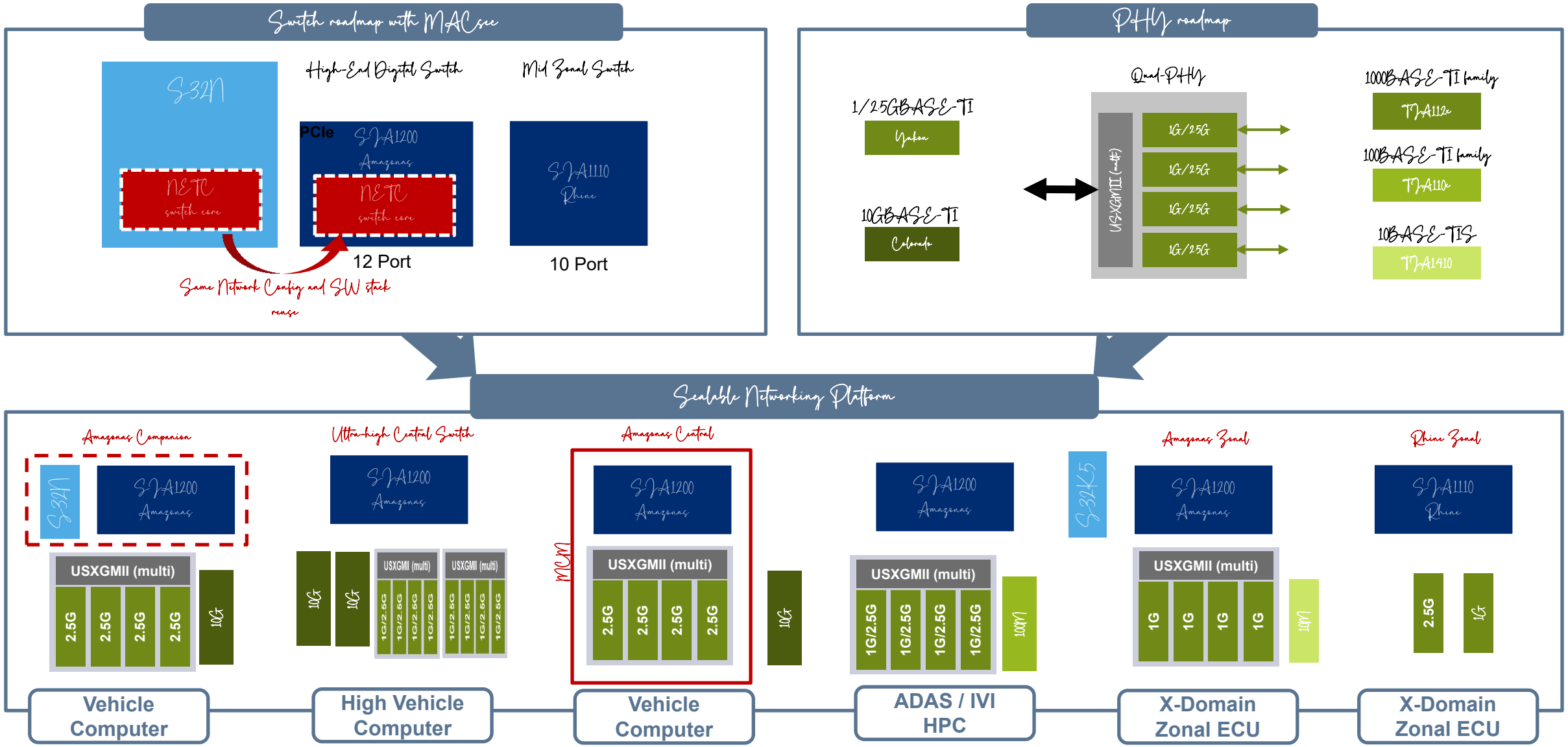
- High Quality, target 0.3 DPPM
- Temp. Range Ta = -40ºC to +105ºC / -40ºC to +125ºC
- Support for TC10 Wake-Up forwarding mechanism



# SJA1110 | ALL VARIANTS

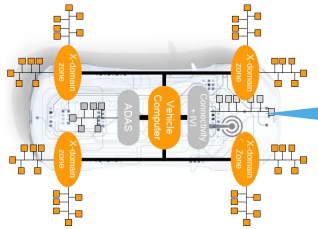


# ETHERNET SOLUTIONS: FULL NETWORKING PLATFORM



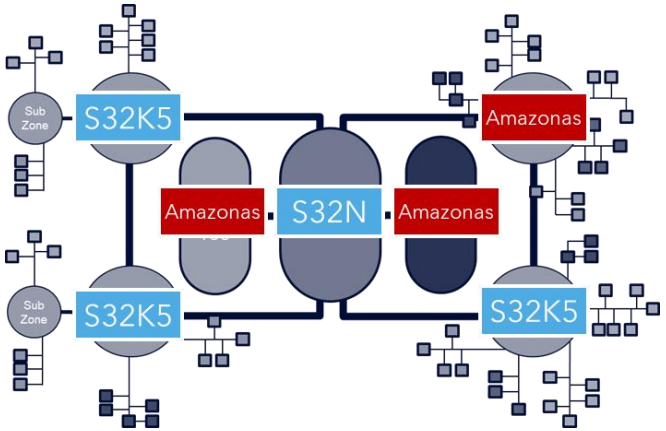
# NXP NETWORKING SOLUTION | VALUE PROPOSITION

## One Stop VEA Solution

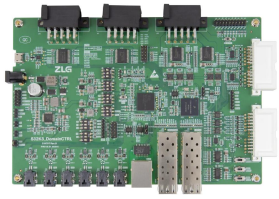



### Vehicle level

- Easy configuration of a multi-switch network
- Scalable from high end to low end architectures

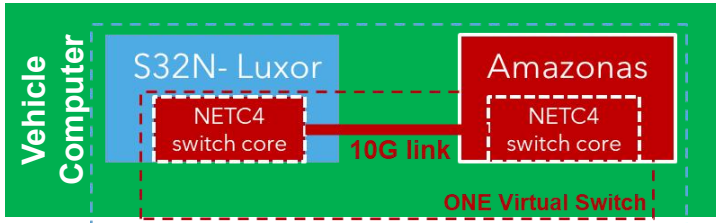


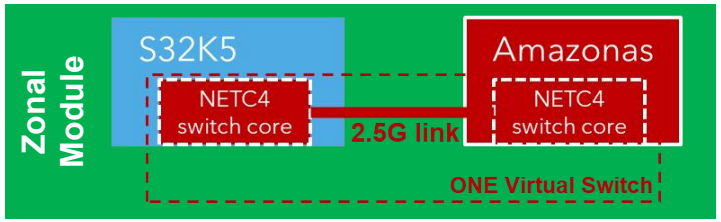

## Software Simplification



### Board level

- Expanding SoC/MCU networking sub system
- Same SW running on SoC/MCU and Switch




## Scalability, Automotive DNA

### Product level

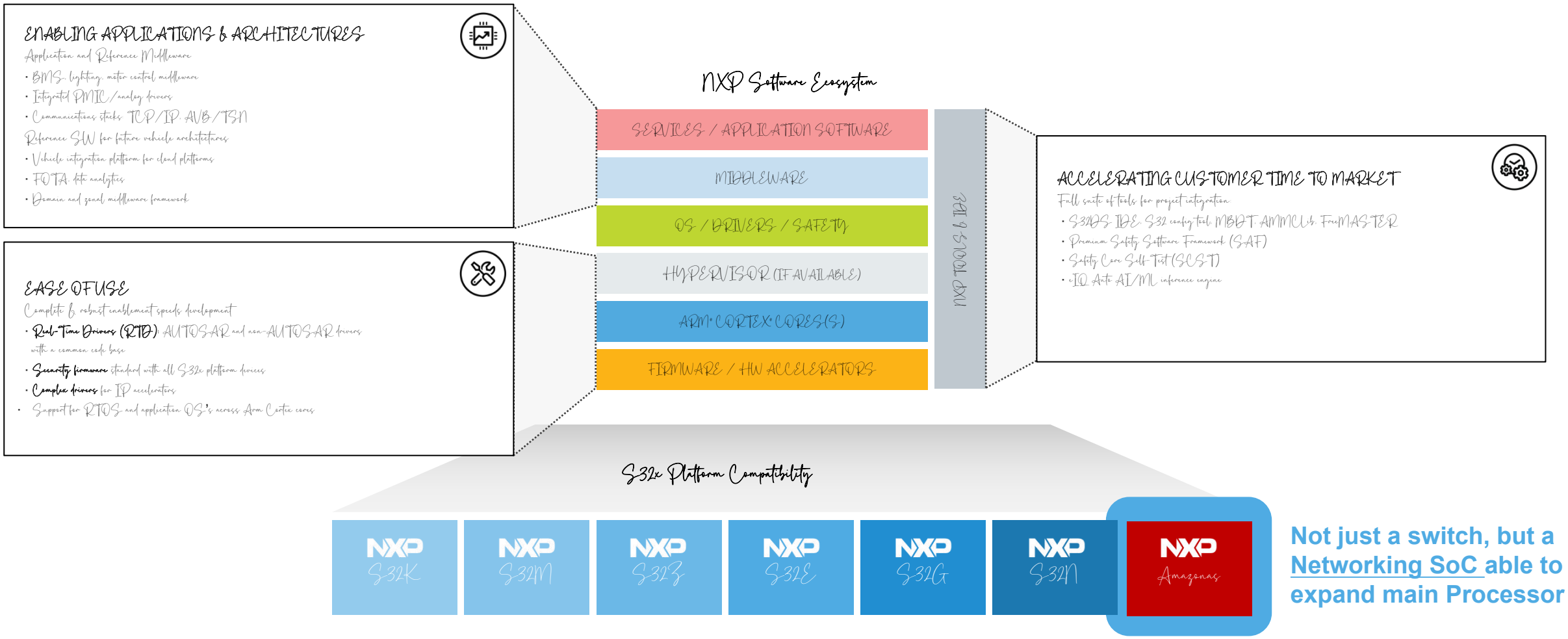
- High scalability & port configurability 10Mb→10Gb
- True Automotive Quality
- Supply assurance, safety & security

High End HPC | Mid-End VC | Zonal Module

CONCEPT: Subject to change

# ADOPTING THE COMMON S32X SOFTWARE PLATFORM

NXP provides leading class software tools, integrated frameworks and a broad ecosystem of solutions within a common software architecture platform. Platform compatibility across all S32x SoCs accelerates adoption of transformational automotive architectures.




**Not just a switch, but a Networking SoC able to expand main Processor**

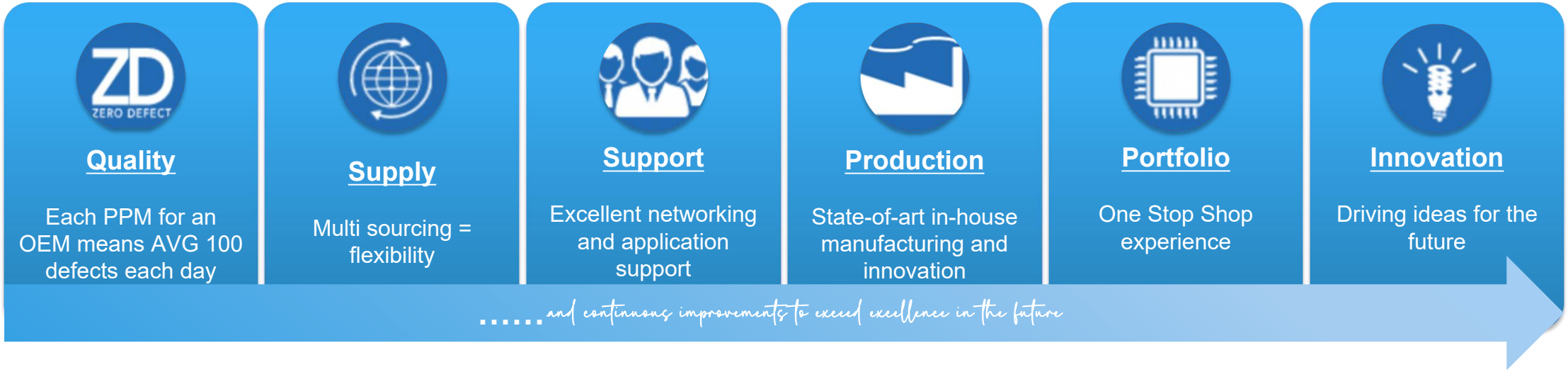
# NXP SOLUTION ADDITIONAL ADVANTAGES – IVN SIX PILLARS OF EXCELLENCE

Offering a broad IVN portfolio and driving innovation with strong key differentiators

The product we sell is more than a device!

Our total value proposition is based on our outstanding performance in six different dimensions

Six Pillars of Excellence




Is targeting 1PPB in 2030 !

SECURE CONNECTIONS
FOR A SMARTER WORLD

NXP, THE NXP LOGO AND NXP SECURE CONNECTIONS FOR A SMARTER WORLD ARE TRADEMARKS OF NXP B.V. ALL OTHER PRODUCT OR SERVICE NAMES ARE THE PROPERTY OF THEIR RESPECTIVE OWNERS. © 2023 NXP B.V.