

# ACCELERATING THE SECURE INTELLIGENT EDGE

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Chief Technology Officer

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SECURE CONNECTIONS  
FOR A SMARTER WORLD

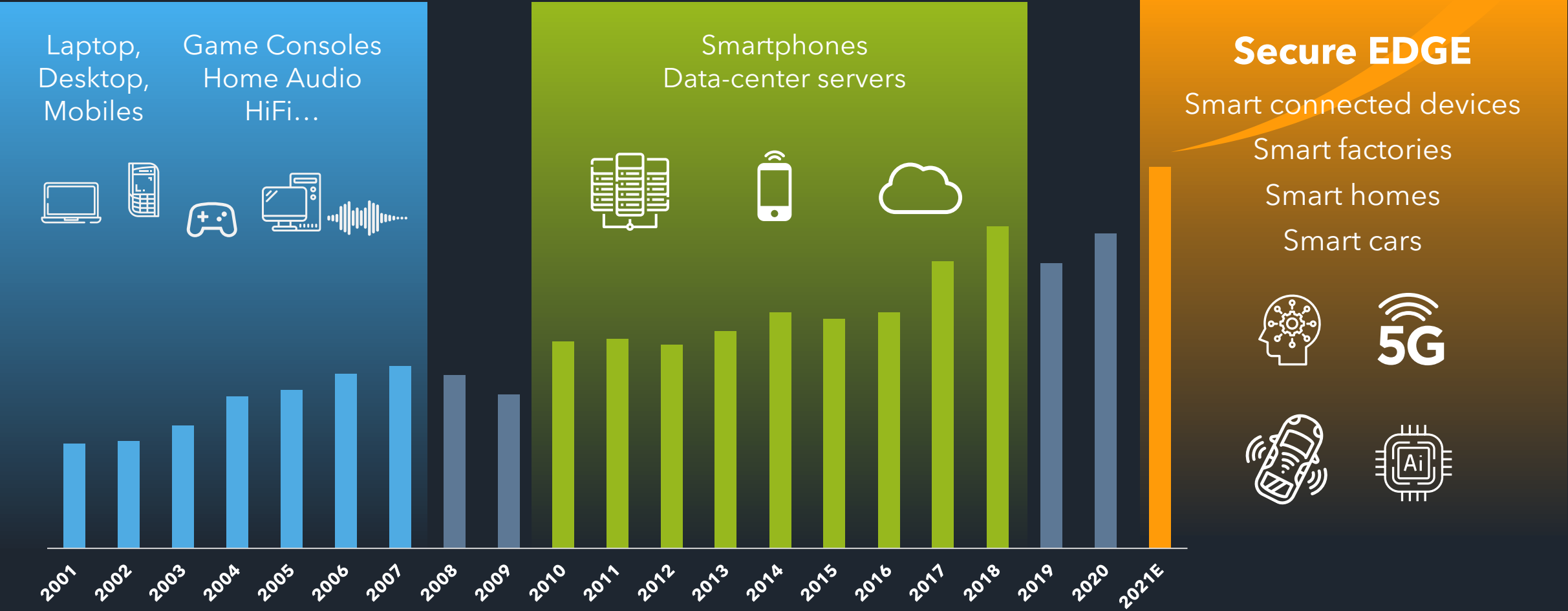
PUBLIC

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# RISE OF THE SECURE EDGE

## MACROTRENDS DRIVING WAVES OF SEMI GROWTH



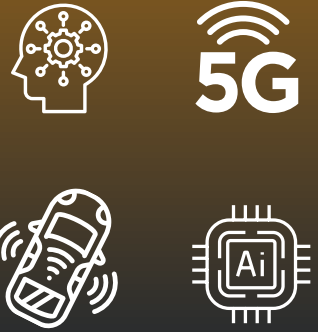
Laptop,  
Desktop,  
Mobiles

Game Consoles  
Home Audio  
HiFi...

Smartphones  
Data-center servers

**Secure EDGE**

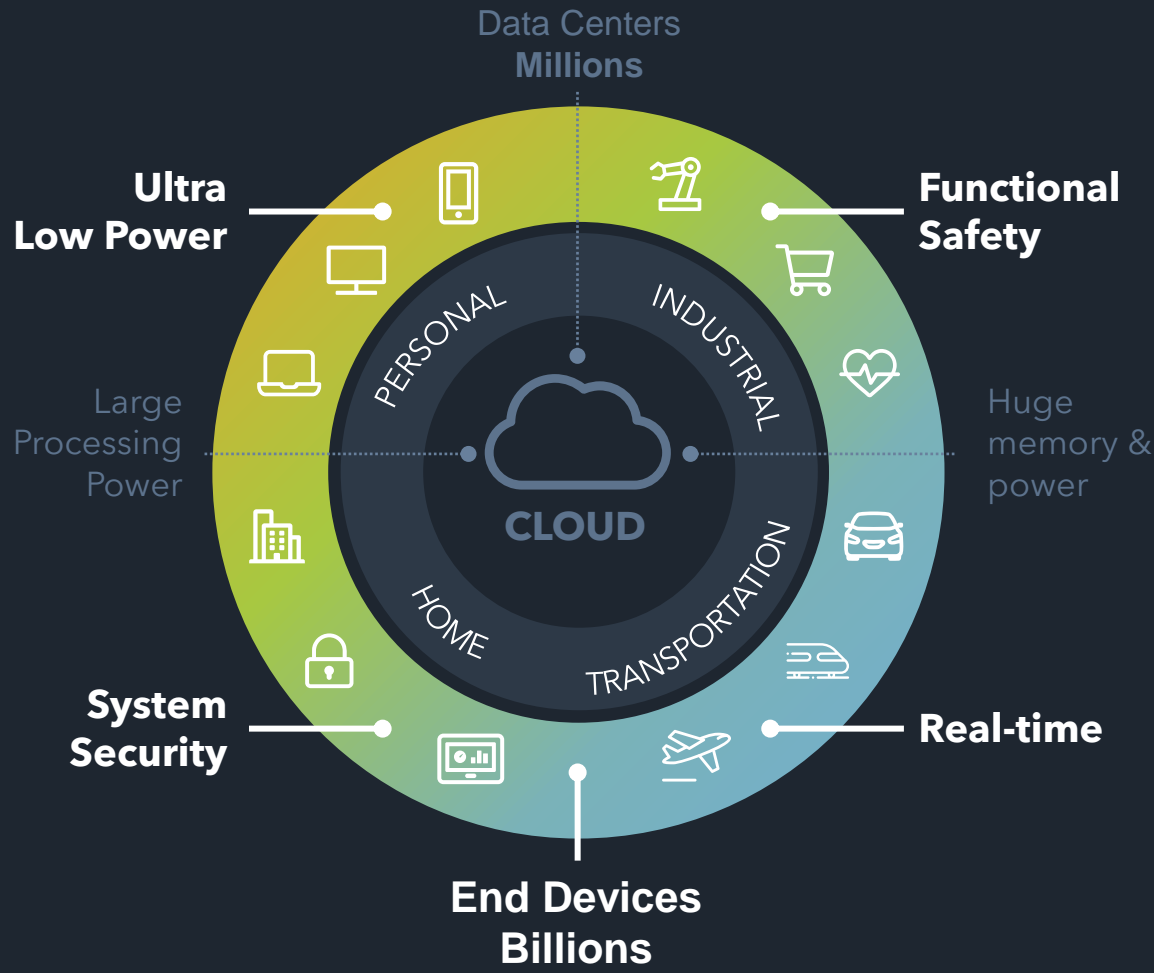
Smart connected devices  
Smart factories  
Smart homes  
Smart cars



Source: IHS, October 2021



# RISE OF SECURE EDGE PROCESSING



Data collection, processing and decisions taken at the Edge, edge devices securely connected to the cloud



**75B+ Connected Devices**  
by 2030



**~50% Electrified Vehicle**  
by 2030



**~50% L2 Assisted Driving Cars**  
by 2030



**5G to cover 60% of the World**  
by 2026



**AI Semi revenue to \$75B**  
by 2025



**20% Smart Home Volume**  
CAGR over '21-'25

# TECHNOLOGY FOUNDATION FOR EDGE DEVICES

SENSE



Everything  
**Aware**

THINK



Everything  
**Smart**

CONNECT



Everything  
**Connected**

ACT



Everything  
**Efficient**



Everything **safe AND secure**



Easy to implement **scalable system solutions**

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# 75+ BILLION DEVICES: WE NEED TO BE RESPONSIBLE



**COMPUTE ENERGY  
EFFICIENCY**



**INTELLIGENCE  
PRODUCTIVITY**



**DATA SECURITY &  
PRIVACY**

## MOVING FROM CLOUD TO EDGE

### ENABLE REAL-TIME ANALYTICS AND ACTUATION

Not hampered by network latency

### ON-BOARD MACHINE LEARNING

Precise and fast detection, classification, adaptation

### REDUCE DATA CENTER TRAFFIC

Only process and store relevant data

### REDUCE NETWORK COST

Shield cloud from large part of raw data

### SAFEGUARD PRIVACY

Transmit semantic rather than raw data

### INCREASE SECURITY

Resilient to offline conditions



ECONOMICS



ROBUSTNESS  
& SAFETY



DATA PROTECTION





A central blue 3D chip with the letters 'AI' on top, surrounded by white circuit traces on a dark blue background. Several circular icons are scattered around the chip, representing different applications of edge AI.

# INTELLIGENT EDGE

Scalable energy  
efficient computing

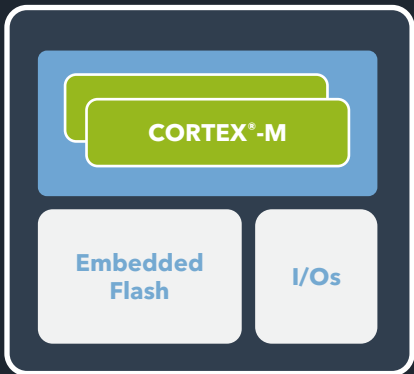
Purposeful connectivity

Easily deployable and  
affordable machine learning

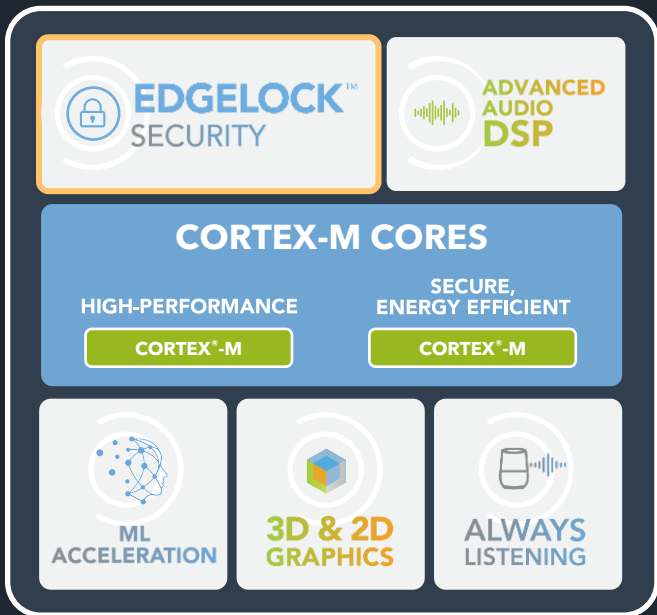
Uncompromised security



### TRADITIONAL MCUS



### CROSSOVER MCUS



### APPLICATIONS PROCESSORS



EDGEVerse

SCALABLE COMPUTE PLATFORM

# ENERGY ZAPPERS

ONE YEAR OF VAMPIRE  
POWER ACROSS THE US



POWERS NYC FOR

# 3 YEARS

## ENERGY FLEX ARCHITECTURE

CAN ELIMINATE

### >90% OF ENERGY WASTE





UWB



DSRC



MIFARE



MiGLO



N



RAIN  
RFID



sigfox



THREAD



ZigBee



Bluetooth™



WiFi™



V2X

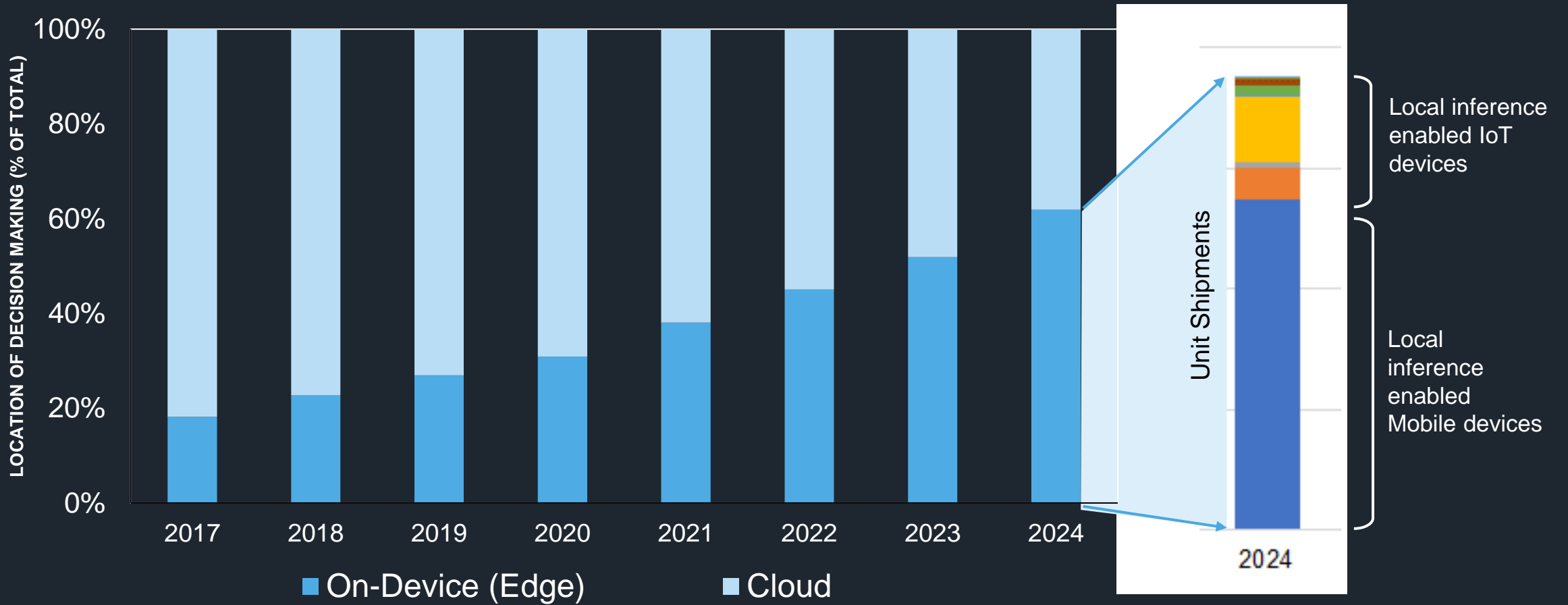


5G

# EASY-TO-DEPLOY MACHINE LEARNING



# INCREASING SHIFT OF INTELLIGENCE FROM CLOUD TO EDGE



Source: ABI

# MACHINE LEARNING AT THE EDGE ENCOMPASSES MANY DOMAINS



## VISION

ADAS (Lane Keep, Lane Change Assist, Emergency Brake Assist, Blind Spot Warning, Traffic Jam Assist, ...)  
Driver, Occupancy and In-Cabin monitoring  
Surveillance systems for security or factory monitoring  
Package detection  
Appliance access and smart doorbell



## VOICE/SOUND

Voice-based personal assistant (speech to text, natural language processing/understanding, keyword detection)  
Audio alarm analytics (breaking glass/baby crying)

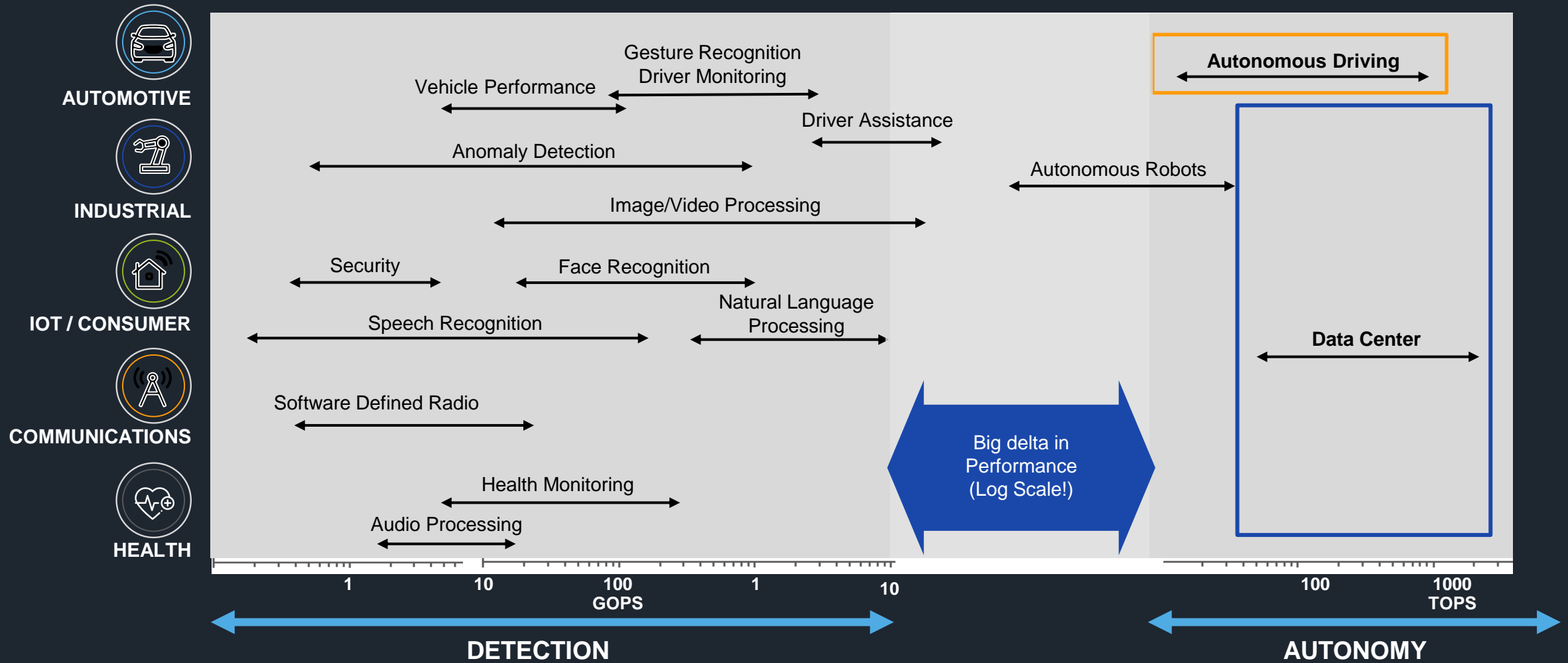


## ANOMALY DETECTION

Network security anomalies  
Motor analysis  
Agriculture and industry quality control/analytics  
Health monitoring

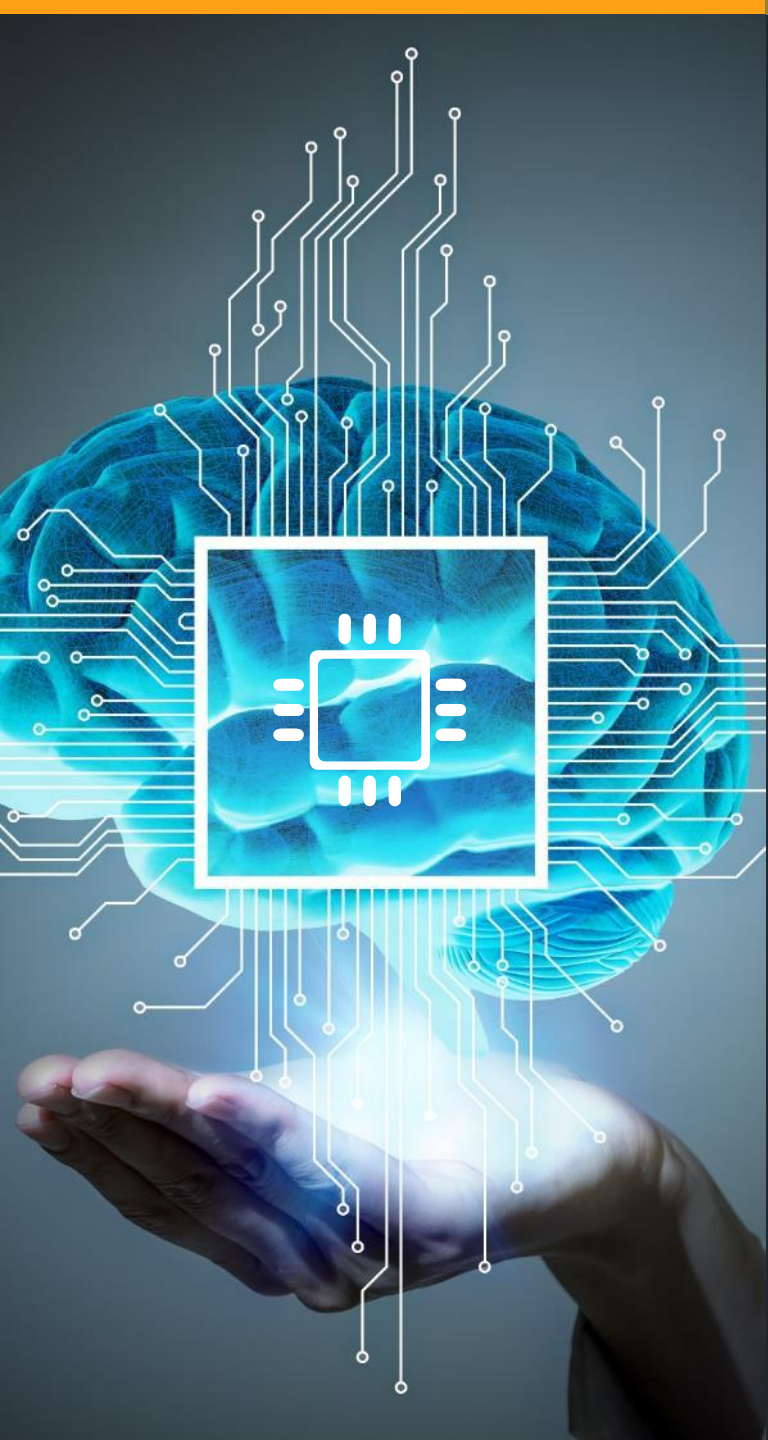


# AI/ML COMPUTE WORKLOADS (INFERENCE\*)



\* Compute and memory requirements for training are typically 100 – 1000x higher





# WHERE MACHINE LEARNING AND SECURITY + PRIVACY INTERSECT

Improve safety and security of ML Systems

Security of ML

Confidentiality

Adversarial Attacks

Integrity & Authenticity

Privacy

Security & ML

Apply ML in products to help defeat security attacks

ML for Security

For Defense

Intrusion Detection

Fraud Detection

Control Flow Protection

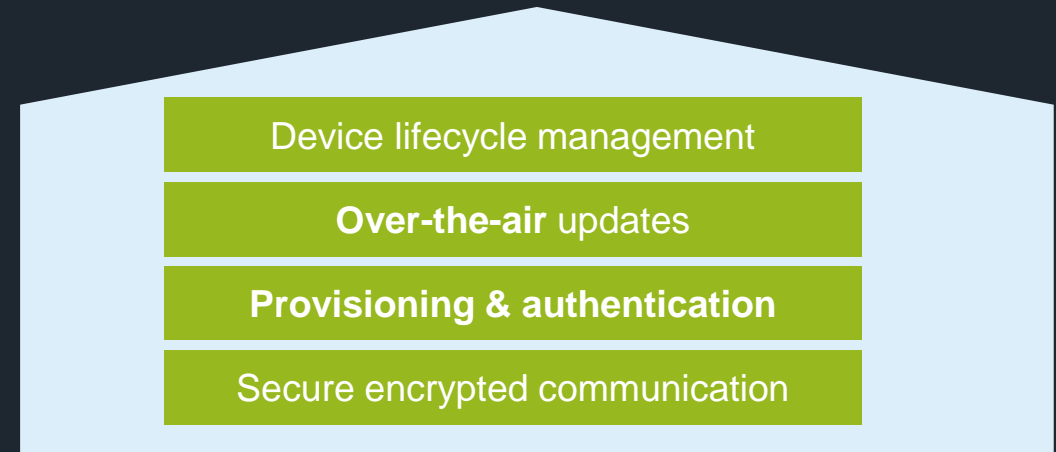
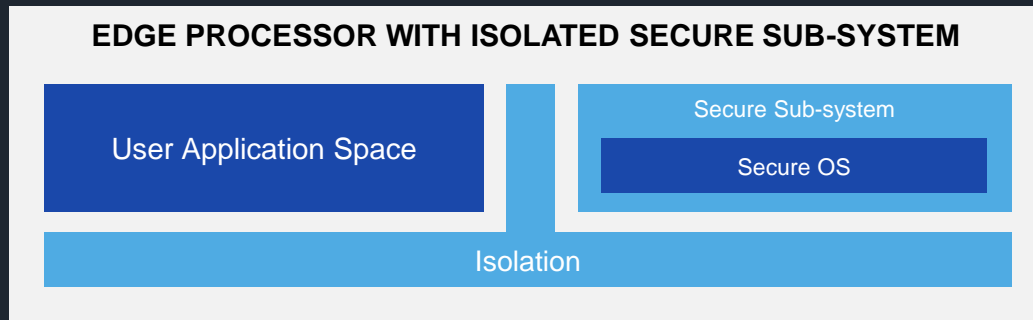
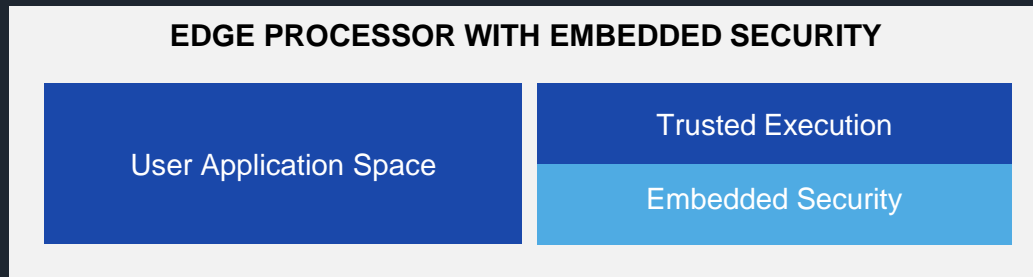
For Attack

Secure Access

API/protocol

Defend against attacks enabled by ML

# DATA SECURITY & PRIVACY



# THE MOST COMPLEX EDGE DEVICE ON THE PLANET



SECURITY  
COMPLEXITY



SOFTWARE  
COMPLEXITY



PRECISION  
SENSING



NETWORKING  
CHALLENGES



COMPUTING



STRINGENT  
SAFETY  
REQUIREMENTS





# THE CAR RUNS ON CODE

**150 MILLION LINES TODAY**

Increasing in complexity as higher levels of safety and security are required

## **SHIFT TO AUTOMATED DRIVING**

Understands, predicts environment  
Mix of AI and deterministic computing  
Very low latency  
Safety-first, always reliable

## **LEVELS OF ELECTRIFICATION**

Energy reductions  
Route planning  
Mechanical replacement

## **THE CONNECTED, UPGRADEABLE CAR**

Over-the-air upgrades  
New cloud services  
Feature enhancements

## **IMMERSIVE EXPERIENCES**

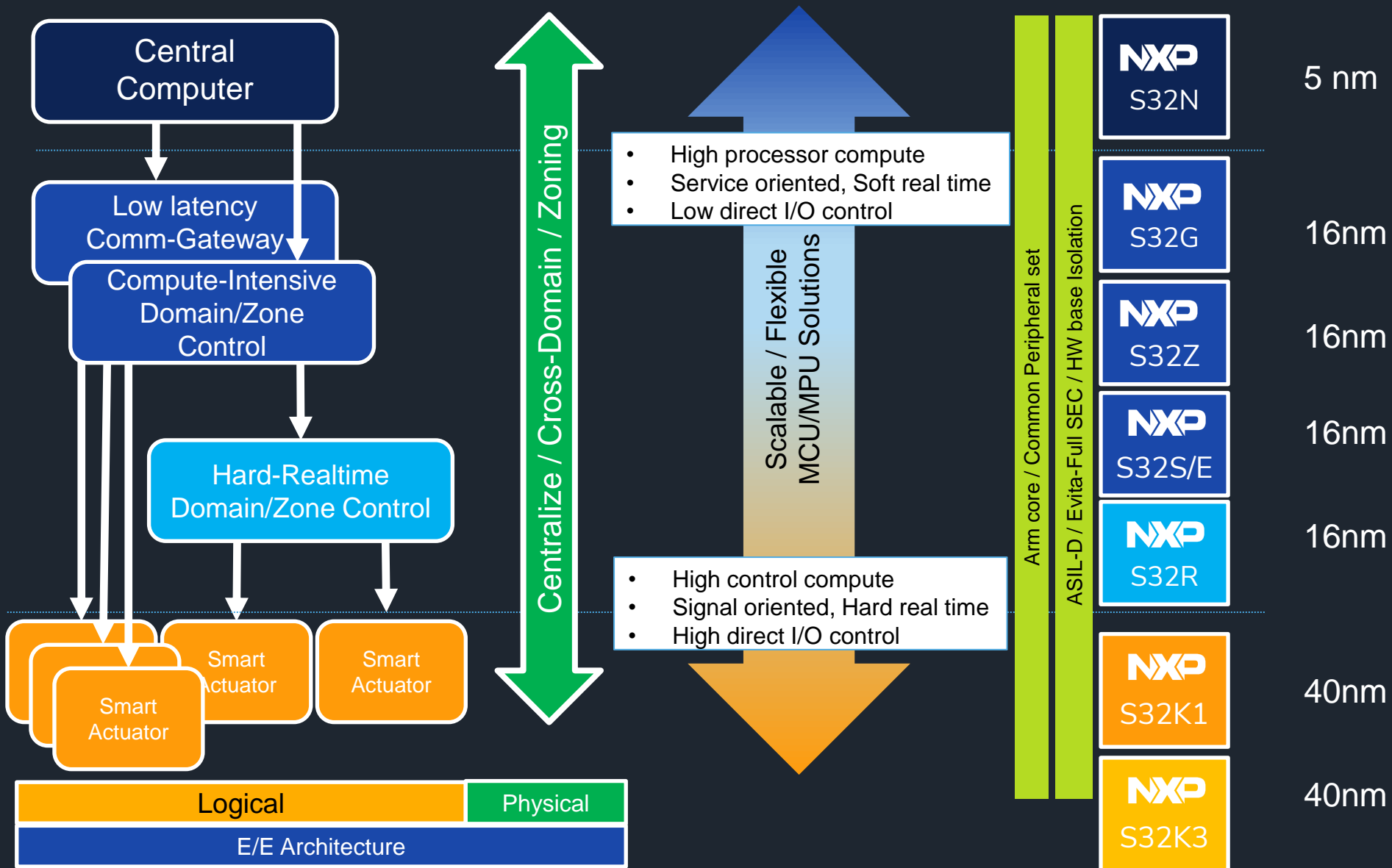
Interactive, graphically rich  
Voice and gesture control  
Customizable and oriented to personal preferences

# VALUE SHIFT FROM COPPER TO MORE SAFE AND SECURE MPUS & MCUS



	YEAR 2000	YEAR 2010	YEAR 2020	YEAR 2030
TOTAL PROCESSORS PER CAR	~10	~30	~45	~60
DOMAIN/ZONAL CONTROLLERS			EMERGING	~4
LINES OF CODE	4K	10M	100 - 200M	500 - 1,000M
COPPER WIRING	20m	0.5Km	1.2Km	COPPER WIRING REDUCED ~50%
WEIGHT OF WIRING HARNESS	~10Kg	~30Kg	50-75Kg	WEIGHT REDUCED ~50%
DATA GENERATED PER DAY	MB's	2-3GB	50GB	10-12TB
DATA TRANSFER PER DAY	MINIMAL	50 MB	1-2GB	40-50GB

# S32 PORTFOLIO UNIQUELY POSITIONED TO SERVE DOMAIN, ZONAL, END NODES



# S32G

16nm FINFET gateway & networking processor



Body & Comfort



Radar



Networking & Connectivity



xEV / EV

**NXP**

S32K

**NXP**

S32R

**NXP**

S32G

**NXP**

S32Z/S/E

**NXP**

Next Gen  
5mm



S32G flagship

## High level Safety & Security

ASIL D functional safety support

Advanced hardware security engine

## Networking acceleration

20 x CAN/CAN FD interfaces

LIN and FlexRay™ interfaces

4 x gigabit ethernet interfaces

PCI Express Gen 3 interfaces

## High-performance compute

10x higher performance\*

Lockstep Arm® Cortex®-M7 MCUs

Cluster lockstep Cortex-A53 MPUs

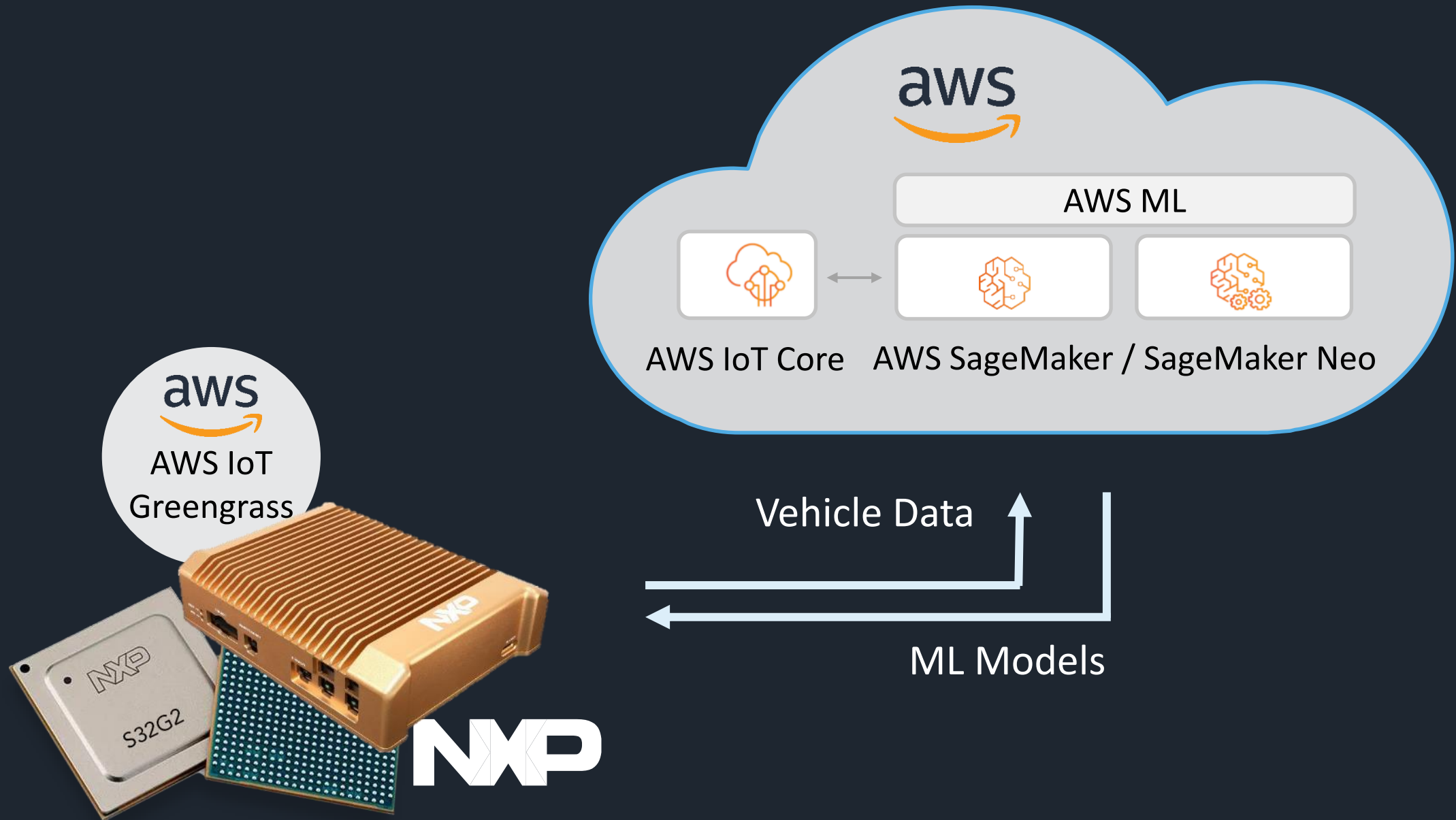
Automotive networks acceleration

Ethernet packet acceleration

## Enabling secure gateways, domain and zonal controllers

\* Compared to NXP's previous family of automotive gateway devices

# COLLABORATION EDGE-TO-CLOUD - NXP AND AWS





# ECOSYSTEM COLLABORATION UNLOCKING NEW DATA-DRIVEN SERVICES



Predictive  
Maintenance



Advanced Vehicle  
Diagnostics



Telematics & Fleet  
Management



Usage Based  
Insurance



Vehicle Safety  
& Security



Upgradeable  
Vehicle



Usage & Feature  
Analytics



Public  
Safety



# INTELLIGENT EDGE

SAFE

SECURE

RESPONSIBLE





SECURE CONNECTIONS  
FOR A SMARTER WORLD



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