i.MX 8/8X Processors and Roadmap

Patrick Stilwell

i.MX 8 Product Marketing

May 2019 | AMF-AUT-T3544

SECURE CONNECTIONS
FOR A SMARTER WORLD
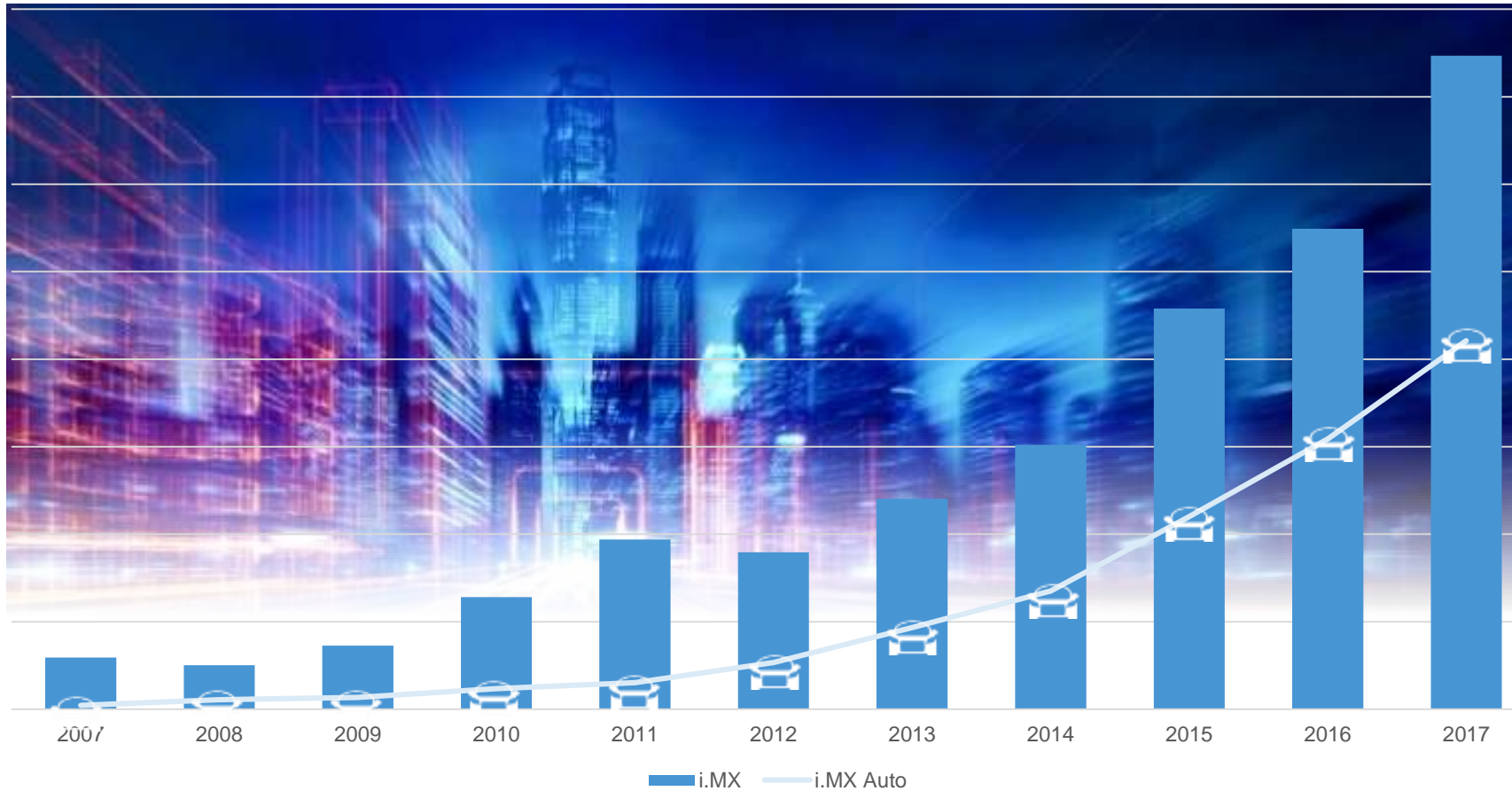
Agenda

- Why i.MX?
  - Trust. Scalability. Support.
- i.MX 8/8X Overview
- i.MX 8 Series Support
  - Operating Systems, Partners
- Demonstrations

i.MX Explosive Growth – Trust. Scalability. Support.

Over 500M i.MX SOCs shipped to date
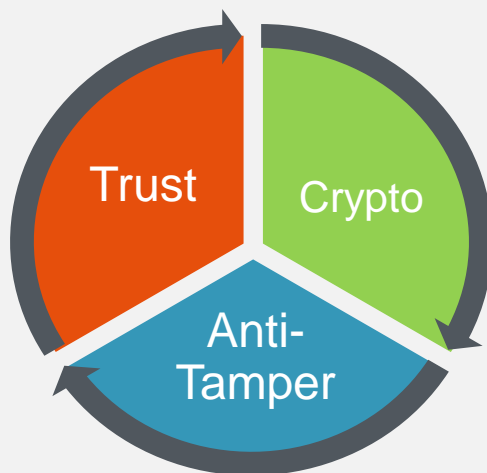
Over 160M i.MX shipped in vehicles since 2007

#1 in eReaders

#1 in Auto Infotainment Applications Processors

#1 in Reconfigurable Clusters

Chart legend: i.MX, i.MX Auto

Chart x-axis: 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017

Product Longevity

i.MX Applications Processor Values

- Trusted Supply
  - Product longevity: Minimum 10 to 15 years
  - Security and safety: Hardware acceleration, software
  - Reliability: Zero-defect methodology, ULA, low SER FIT
  - Quality: Automotive AEC-Q100, Industrial/Consumer JEDEC

- Scalability for Maximum Platform Reuse
  - Pin compatibility and software portability
  - Integration: CPU (single/dual/quad, asymmetric), GPU, IO
  - Software: Linux, Android, FreeRTOS

- Support and Enablement
  - Industry-leading partners and support community
  - Manufacturability: 0.65 to 0.8mm options, fewer PCB layers
  - System solutions: SoC, sensors, memory, PMIC, connectivity, standard products, software

i.MX 8/8X Safety and Reliability Features

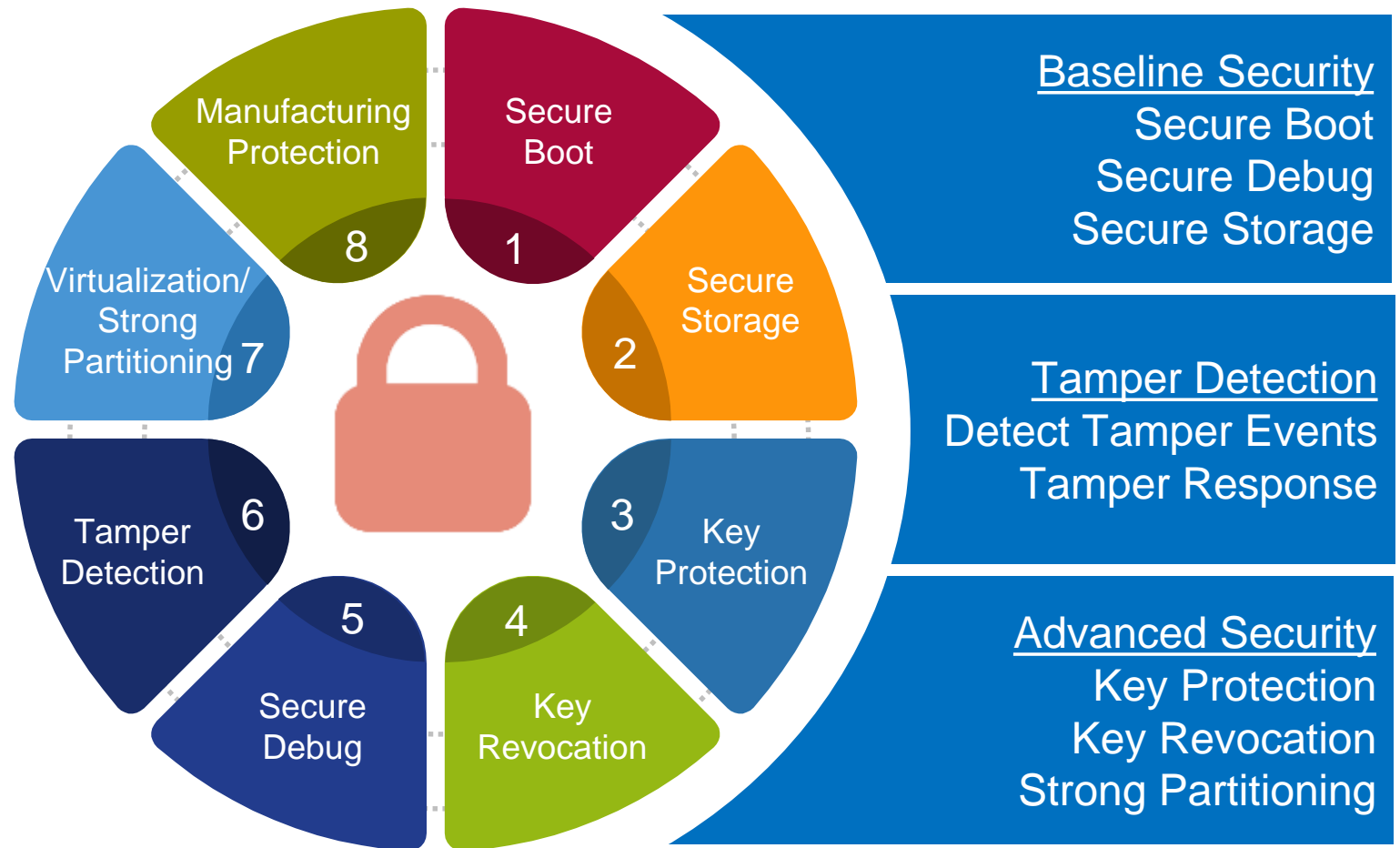| Safety Feature	8QuadXplus, 8DualXPlus, 8DualX	8QuadMax, 8QuadPlus
Ultra Low Alpha (ULA) package	✓	✓
Manufacturing Process	28nm FD-SOI	28nm FD-SOI
Memory Protection (ECC, parity)		
ARM Cortex-A L1 cache	Parity	Parity
ARM Cortex-A L2 cache	ECC	ECC
ARM Cortex-M4 tightly coupled memory	ECC	ECC
DDR memory interface	ECC on DDR3L	-
Failover Displays and Cameras	✓	✓
Highest Automotive Safety Certifiable*	QM	QM
Highest Industrial Safety Certifiable*	SIL3	SIL2

*Designed for ASIL A/B Platforms

NXP Leverages Core Competence in End-to-End System Security

Mobile and stationary machines want full access to cloud-based knowledge

This requires faster, more reliable and secure connectivity

NXP is at the forefront of secure communications and tamper resistance

Leadership experience in security markets: over 10 Billion smart cards sold

1 Secure Boot
2 Secure Storage
3 Key Protection
4 Key Revocation
5 Secure Debug
6 Tamper Detection
7 Virtualization/Strong Partitioning
8 Manufacturing Protection

Baseline Security
Secure Boot
Secure Debug
Secure Storage

Tamper Detection
Detect Tamper Events
Tamper Response

Advanced Security
Key Protection
Key Revocation
Strong Partitioning

i.MX Applications Processor Scalability

Software Compatible

Pin-to-pin Compatible

i.MX 6QuadPlus

i.MX 6Quad — A9

i.MX 6DualPlus

i.MX 6Dual

i.MX 6DualLite

i.MX 6Solo — A9

i.MX 6SoloX — M4

i.MX 6SoloLite

i.MX 6SLL

i.MX 6UltraLite — A7

i.MX 6ULL

ARM® v7-A

i.MX 8 family — A72 / A53 / M4
Advanced Graphics & CPU Performance

i.MX 8M family — A53 / M4
Advanced Computing, Audio/Video & Voice

i.MX 8X family — A35 / M4
Safety Certifiable & Efficient Performance

ARM® v8-A (32-bit/ 64-bit)

ARM® v7-A (32-bit)

i.MX 7 family — A7 / M4
Flexible Efficient Connectivity

i.MX 7ULP family
Ultra Low Power with Graphics

i.MX 8 & 8X Subsystem Reuse
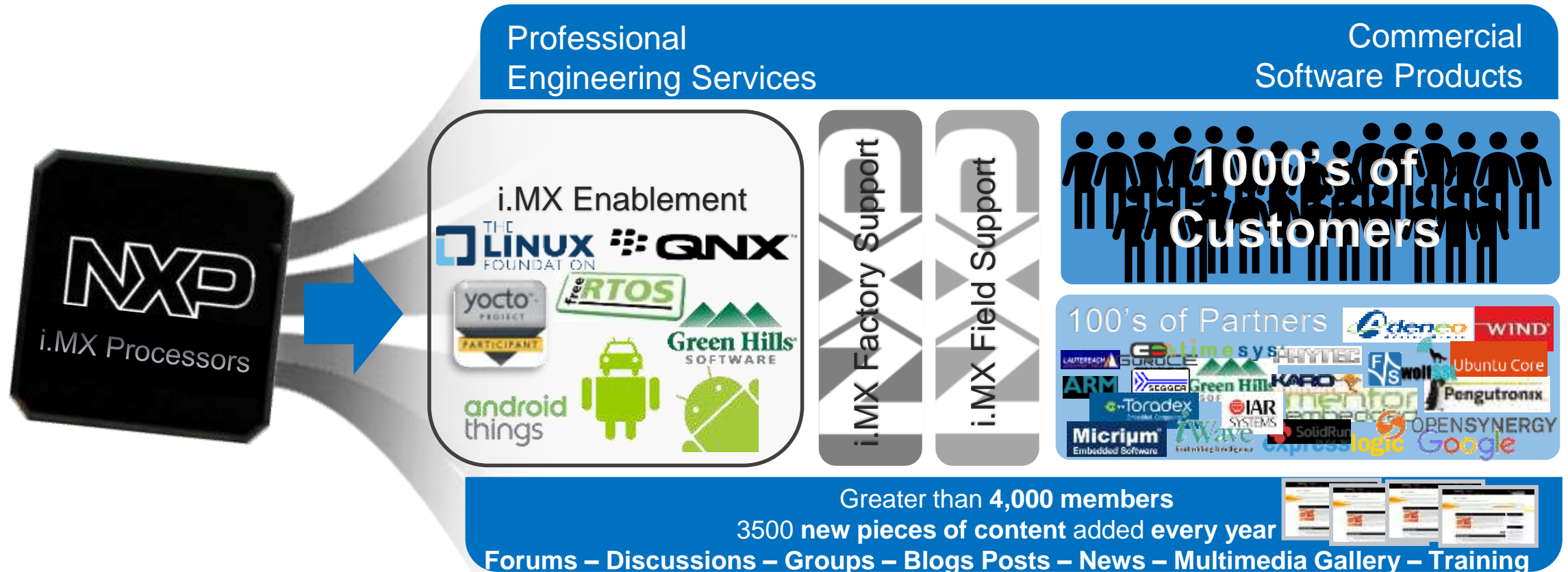
Scalability of Embedded Processing
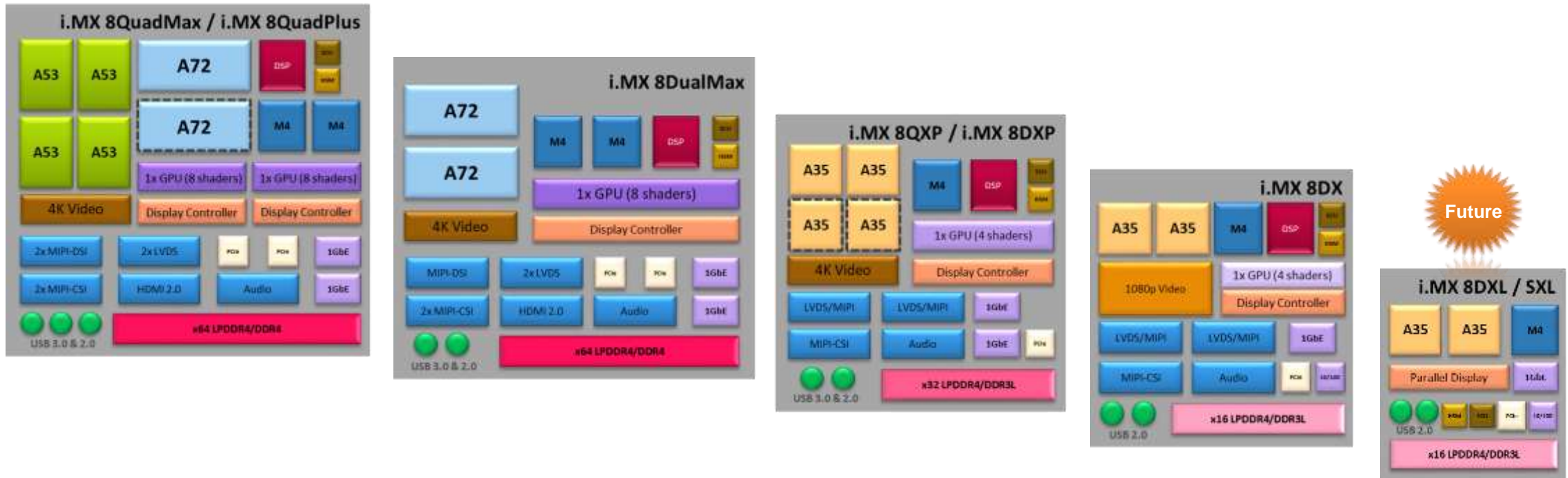
HMI, Vision, Audio and Voice-enabled with i.MX

DSP, Vision Acceleration, Real Time Domain, Safe Camera/Display/Audio, Simplified eCockpit

New TSN Connectivity, Telematics and V2X Optimization with i.MX 8DualXLite / 8SoloXLite

i.MX Market-leading Ecosystem and Support

i.MX Processors

Professional Engineering Services

Commercial Software Products

i.MX Enablement

i.MX Factory Support

i.MX Field Support

1000's of Customers

100's of Partners

Greater than **4,000 members**
3500 **new pieces of content** added **every year**
Forums – Discussions – Groups – Blogs Posts – News – Multimedia Gallery – Training

Built to support thousands of customers with world-class enablement, ecosystem, community, services and field resources

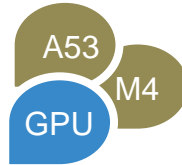# i.MX 8 Series Overview

i.MX 8 and 8X Families

www.nxp.com/imx8

i.MX 8 Series: Target Applications

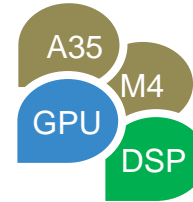## Advanced graphics, video, image processing, vision, audio and voice

i.MX 8M Family
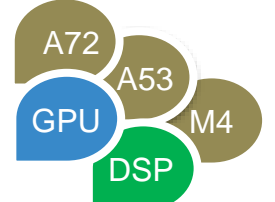
A53
M4
GPU

Advanced Computing,
Audio/Video & Voice

i.MX 8X Family

A35
M4
GPU
DSP

Safety Certifiable &
Efficient Performance

i.MX 8 Family

A72
A53
M4
GPU
DSP
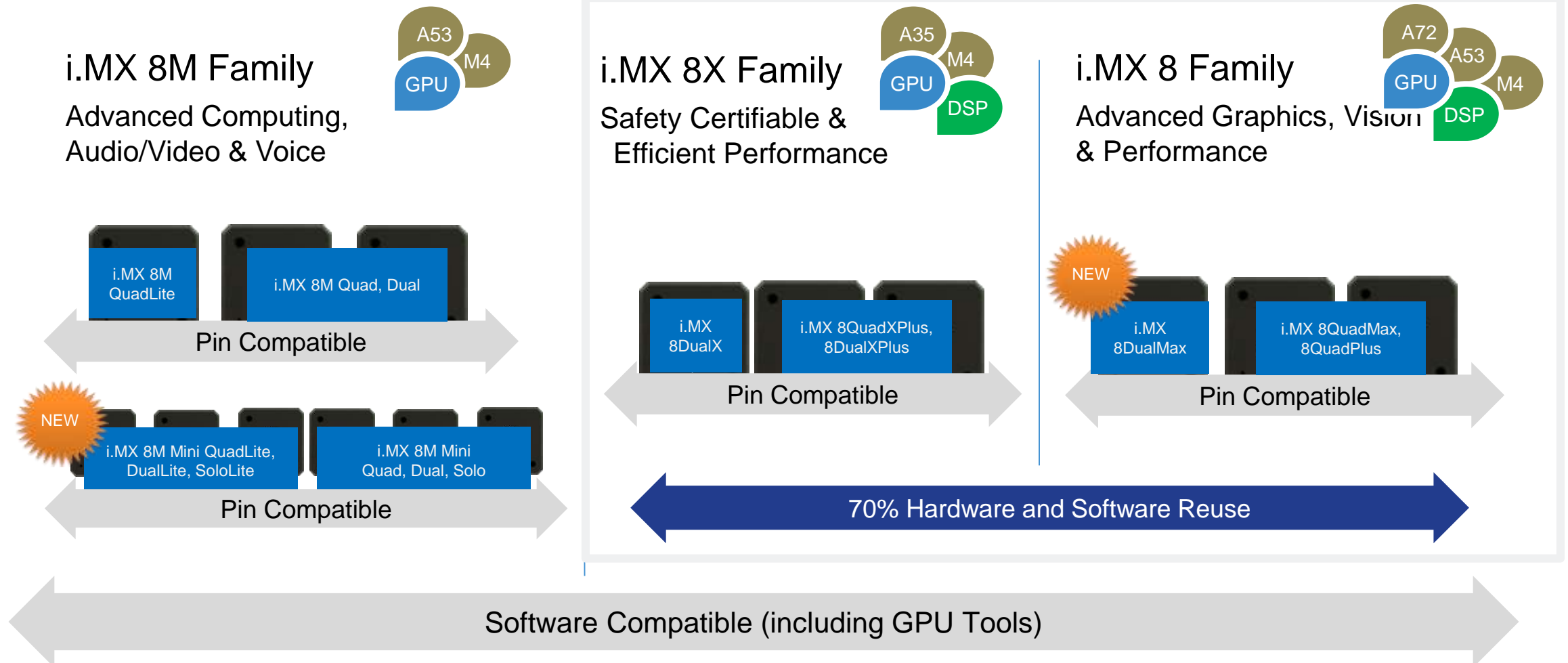
Advanced Graphics,
Vision & Performance

i.MX 8 Series: Scalable Solutions

Scalable series of three Arm V8 64-bit (/32-bit) based SoC Families

i.MX 8M Family
Advanced Computing, Audio/Video & Voice

A53
GPU
M4

i.MX 8M QuadLite

i.MX 8M Quad, Dual

Pin Compatible

NEW

i.MX 8M Mini QuadLite, DualLite, SoloLite

i.MX 8M Mini Quad, Dual, Solo

Pin Compatible

i.MX 8X Family
Safety Certifiable & Efficient Performance

A35
GPU
M4
DSP

i.MX 8DualX

i.MX 8QuadXPlus, 8DualXPlus

Pin Compatible

i.MX 8 Family
Advanced Graphics, Vision & Performance

A72
GPU
A53
M4
DSP

NEW

i.MX 8DualMax

i.MX 8QuadMax, 8QuadPlus

Pin Compatible

70% Hardware and Software Reuse

Software Compatible (including GPU Tools)

NXP

i.MX 8 and 8X Families

i.MX 8

Advanced Graphics
& Performance

ARM® v8-A Cortex-A53 / A72

Scalable family of products for advanced multi-display HMI, eCockpit and vision-enabled systems with security and low virtualization software overhead

i.MX 8X

Safety Certifiable &
Efficient Performance

ARM® v8-A Cortex-A35

Scalable family of products for display audio-enabled HMI, infotainment, reconfigurable instrument clusters and telematics / V2X applications.

32 - 64 bit OS compatibility from entry to premium segments

Safe

Advanced support for ASIL-B Display and Camera Applications
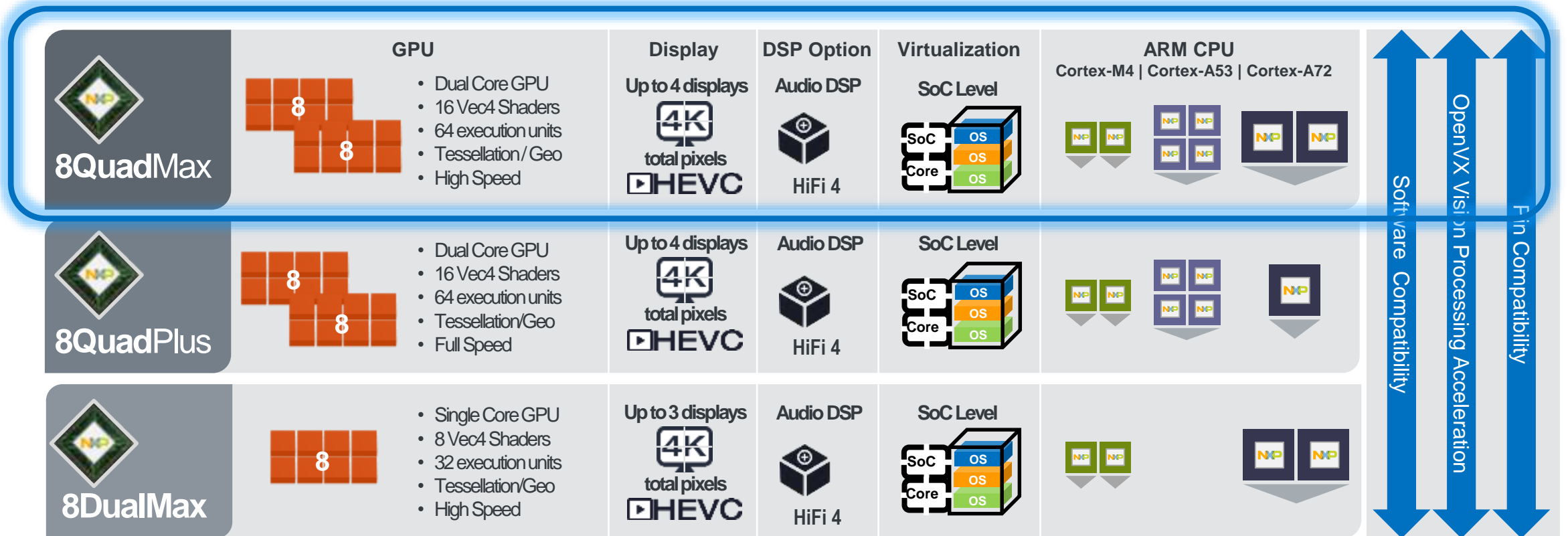
Scalable

Common architecture with ~70% design reuse

ARM v8-A Compatibility to support common applications

Secure

Common security subsystem with advanced crypto and HSM support

i.MX 8 Family of Applications Processors

		GPU	Display	DSP Option	Virtualization	ARM CPU Cortex-M4 | Cortex-A53 | Cortex-A72			
8Quad Max	8 / 8	• Dual Core GPU • 16 Vec4 Shaders • 64 execution units • Tessellation / Geo • High Speed	**Up to 4 displays** 4K total pixels ▶ HEVC	**Audio DSP** HiFi 4	**SoC Level** SoC Core / OS OS OS				
8Quad Plus	8 / 8	• Dual Core GPU • 16 Vec4 Shaders • 64 execution units • Tessellation/Geo • Full Speed	**Up to 4 displays** 4K total pixels ▶ HEVC	**Audio DSP** HiFi 4	**SoC Level** SoC Core / OS OS OS				
8Dual Max	8	• Single Core GPU • 8 Vec4 Shaders • 32 execution units • Tessellation/Geo • High Speed	**Up to 3 displays** 4K total pixels ▶ HEVC	**Audio DSP** HiFi 4	**SoC Level** SoC Core / OS OS OS				

Software Compatibility | OpenVX Vision Processing Acceleration | Pin Compatibility
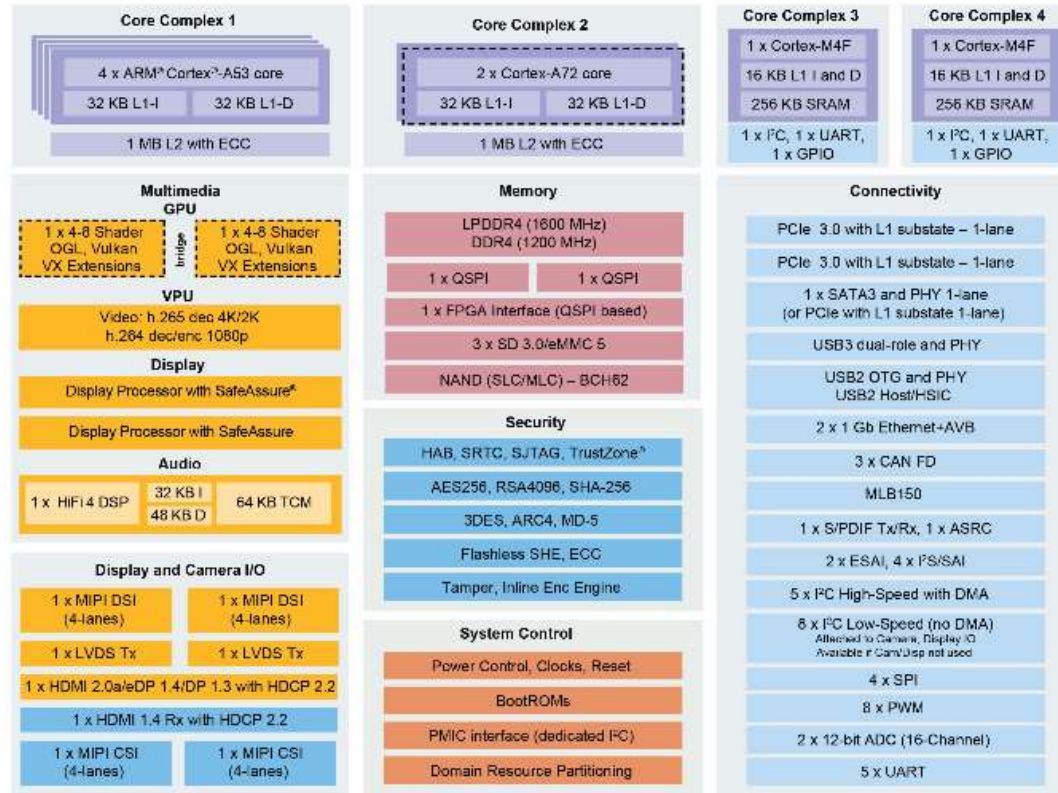
Family of Scalable Multimedia Processors

Multiple Operating Systems

Multiple Domains with Hardware Virtualization

Multiple Displays

Vision Processing Hardware Acceleration

i.MX 8 Family of Applications Processors

Core Complex 1
- 4 x ARM® Cortex®-A53 core
- 32 KB L1-I | 32 KB L1-D
- 1 MB L2 with ECC

Core Complex 2
- 2 x Cortex-A72 core
- 32 KB L1-I | 32 KB L1-D
- 1 MB L2 with ECC

Core Complex 3
- 1 x Cortex-M4F
- 16 KB L1 I and D
- 256 KB SRAM
- 1 x I²C, 1 x UART, 1 x GPIO

Core Complex 4
- 1 x Cortex-M4F
- 16 KB L1 I and D
- 256 KB SRAM
- 1 x I²C, 1 x UART, 1 x GPIO

Multimedia GPU
- 1 x 4-8 Shader OGL, Vulkan VX Extensions | bridge | 1 x 4-8 Shader OGL, Vulkan VX Extensions

VPU
- Video: h.265 dec 4K/2K h.264 dec/enc 1080p

Display
- Display Processor with SafeAssure*
- Display Processor with SafeAssure

Audio
- 1 x HiFi4 DSP | 32 KB I 48 KB D | 64 KB TCM

Display and Camera I/O
- 1 x MIPI DSI (4-lanes) | 1 x MIPI DSI (4-lanes)
- 1 x LVDS Tx | 1 x LVDS Tx
- 1 x HDMI 2.0a/eDP 1.4/DP 1.3 with HDCP 2.2
- 1 x HDMI 1.4 Rx with HDCP 2.2
- 1 x MIPI CSI (4-lanes) | 1 x MIPI CSI (4-lanes)

Memory
- LPDDR4 (1600 MHz) DDR4 (1200 MHz)
- 1 x QSPI | 1 x QSPI
- 1 x FPGA Interface (QSPI based)
- 3 x SD 3.0/eMMC 5
- NAND (SLC/MLC) – BCH62

Security
- HAB, SRTC, SJTAG, TrustZone®
- AES256, RSA4096, SHA-256
- 3DES, ARC4, MD-5
- Flashless SHE, ECC
- Tamper, Inline Enc Engine

System Control
- Power Control, Clocks, Reset
- BootROMs
- PMIC interface (dedicated I²C)
- Domain Resource Partitioning

Connectivity
- PCIe 3.0 with L1 substate – 1-lane
- PCIe 3.0 with L1 substate – 1-lane
- 1 x SATA3 and PHY 1-lane (or PCIe with L1 substate 1-lane)
- USB3 dual-role and PHY
- USB2 OTG and PHY USB2 Host/HSIC
- 2 x 1 Gb Ethernet+AVB
- 3 x CAN FD
- MLB150
- 1 x S/PDIF Tx/Rx, 1 x ASRC
- 2 x ESAI, 4 x I²S/SAI
- 5 x I²C High-Speed with DMA
- 8 x I²C Low-Speed (no DMA) Attached to Camera, Display I/O. Available if Cam/Disp not used
- 4 x SPI
- 8 x PWM
- 2 x 12-bit ADC (16-Channel)
- 5 x UART

□ Available on certain product families   Note: Accessing muxable controller's full capabilities is dependent upon board component choices.

Feature	i.MX 8QuadMax	i.MX 8QuadPlus	i.MX 8DualMax
ARM® Core	2 x ARM Cortex®-A72	1 x Cortex-A72	2 x Cortex-A72
ARM® Core	4 x Cortex-A53	4 x Cortex-A53	-
ARM® Core	2 x Cortex-M4F	2 x Cortex-M4F	2 x Cortex-M4F
DSP Core	Tensilica® HiFi 4 DSP	Tensilica HiFi 4 DSP	Tensilica HiFi 4 DSP
GPU	2 x GC7000XSVX	2 x GC7000Lite/XSVX	1 x GC7000XSVX
PCIe	1 x PCIe (2-lane)* + 1 x PCIe (1-lane)	1 x PCIe (1-lane)	1 x PCIe (1-lane)

*2-lane PCIe can act as 2 x 1-lane PCIe

Packages:
- 29x29 0.75 FC-PBGA
- 23x23 0.75 FC-PBGA

i.MX 8 Family Key Feature Summary

- **Multiple Systems, One Processor**
  - Combine multiple systems into one, easily
  - Run-time system partitioning & isolation
  - Advanced, programmable security (e.g. Flashless SHE)

- **Multi-Display and Multi-Domain Functionality**
  - Up to four screens with independent content
  - Split Media Architecture: Rich Graphics, faster deployment
  - SafeAssure ASIL-B ready hardware
  - Failover capable display and audio controller: Alive during reset or OTA updates

- **Enabling the New World of Seamless Machine Interfaces**
  - Advanced vision-based HMI systems (gesture, object): Local and cloud
  - View the world in 360° via multi-camera support & image stitching
  - Multi-domain voice-recognition and audio processing

Pin Compatible
Subsystem Compatible
Software Compatible

i.MX 8X Family of Applications Processors

	GPU		Video	Displays	DSP	USB	DDR x32	ARM CPU Cortex-A35 + M4
8QuadXPlus	4	• Single Core GPU • 4 Vec4 Shaders **high performance** • 16 execution units • OpenGL ES 3.1 • OpenCL Embedded	4K ▶HEVC H.264 MPEG-4/AVC + Legacy	Up to 3 2x 1080p 1x WVGA	HiFi 4	HI-SPEED CERTIFIED USB SUPERSPEED USB	x32 DDR3L-1866 (ECC option) LP-DDR4-2400 (no ECC)	
8DualXPlus	4	• Single Core GPU • 4 Vec4 Shaders **high performance** • 16 execution units • OpenGL ES 3.1 • OpenCL Embedded	4K ▶HEVC H.264 MPEG-4/AVC + Legacy	Up to 3 2x 1080p 1x WVGA	HiFi 4	HI-SPEED CERTIFIED USB SUPERSPEED USB	x32 DDR3L-1866 (ECC option) LP-DDR4-2400 (no ECC)	
8DualX	4	• Single Core GPU • 4 Vec4 Shaders **power optimized** • 16 execution units • OpenGL ES 3.1 • OpenCL Embedded	H.264 MPEG-4/AVC + Legacy	Up to 2 *1x 1080p + 1x WVGA	HiFi 4	HI-SPEED CERTIFIED USB	x16 DDR3L-1866 (no ECC) LP-DDR4-2400 (no ECC)	

Software Compatibility · Pin Compatibility

* Bandwidth limited

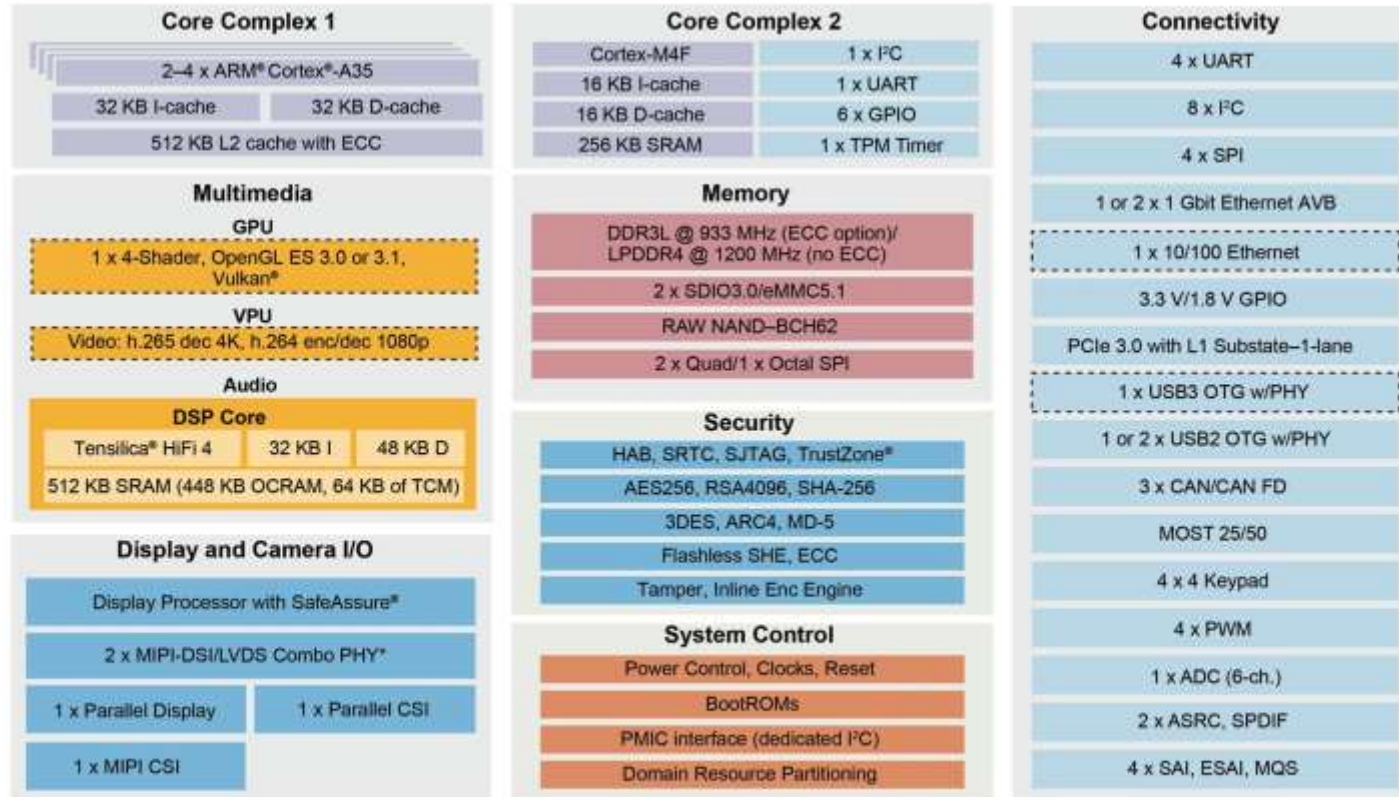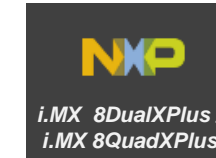## Family of Scalable Multimedia Processors

Industrial Grade Qualification with Error Correcting Code (ECC) on DDR3L interface

Automotive Qualification for high temp, duty cycled applications

i.MX 8X Family of Applications Processors

Core Complex 1

2–4 x ARM® Cortex®-A35	
32 KB I-cache	32 KB D-cache
512 KB L2 cache with ECC	

Multimedia

GPU
1 x 4-Shader, OpenGL ES 3.0 or 3.1, Vulkan®

VPU
Video: h.265 dec 4K, h.264 enc/dec 1080p

Audio

DSP Core

Tensilica® HiFi 4	32 KB I	48 KB D
512 KB SRAM (448 KB OCRAM, 64 KB of TCM)		

Display and Camera I/O

Display Processor with SafeAssure®

2 x MIPI-DSI/LVDS Combo PHY*

1 x Parallel Display	1 x Parallel CSI

1 x MIPI CSI

Core Complex 2

Cortex-M4F	1 x I²C
16 KB I-cache	1 x UART
16 KB D-cache	6 x GPIO
256 KB SRAM	1 x TPM Timer

Memory

DDR3L @ 933 MHz (ECC option)/ LPDDR4 @ 1200 MHz (no ECC)

2 x SDIO3.0/eMMC5.1

RAW NAND–BCH62

2 x Quad/1 x Octal SPI

Security

HAB, SRTC, SJTAG, TrustZone®

AES256, RSA4096, SHA-256

3DES, ARC4, MD-5

Flashless SHE, ECC

Tamper, Inline Enc Engine

System Control

Power Control, Clocks, Reset

BootROMs

PMIC interface (dedicated I²C)

Domain Resource Partitioning

Connectivity

4 x UART

8 x I²C

4 x SPI

1 or 2 x 1 Gbit Ethernet AVB

1 x 10/100 Ethernet

3.3 V/1.8 V GPIO

PCIe 3.0 with L1 Substate–1-lane

1 x USB3 OTG w/PHY

1 or 2 x USB2 OTG w/PHY

3 x CAN/CAN FD

MOST 25/50

4 x 4 Keypad

4 x PWM

1 x ADC (6-ch.)

2 x ASRC, SPDIF

4 x SAI, ESAI, MQS

☐ Available on certain product families   Note: Accessing muxable controller's full capabilities is dependent upon board component choices.

Feature	i.MX 8DualXPlus i.MX 8QuadXPlus	i.MX 8DualX
ARM® Core	2 x Cortex-A35 (i.MX 8DualXPlus) 4 x Cortex-A35 (i.MX 8QuadXPlus)	2 x Cortex-A35
ARM® Core	1 x Cortex-M4F	1 x Cortex-M4F
DSP Core	Tensilica® HiFi 4 DSP	Tensilica HiFi 4 DSP
DRAM	32-bit DDR3L (ECC option)/ LPDDR4 (no ECC)	16-bit DDR3L (no ECC) / LPDDR4 (no ECC)
GPU	1 x GC7000Lite (4-shader)	1 x GC7000Lite (4-shader) power optimized
VPU	4K h.265 dec 1080p h.264 enc/dec	1080p h.264 enc/dec
Ethernet	2 x Gigabit with AVB	1 x Gigabit with AVB 1 x 10/100
USB with PHY	1 x USB 3.0 (or USB 2.0) 1 x USB 2.0	2 x USB 2.0

i.MX 8X Key Feature Summary

- **Safeguard Mission Critical Displays and Control Functions**
  - Increase system accuracy – ECC to support SIL 3
  - Ensure displays stay up and correct – SafeAssure® ASIL-B ready HW protects critical info with fail-over-capability
  - Advanced programmable security
  - Improved system reliability with FD-SOI
  - Offload time-critical tasks

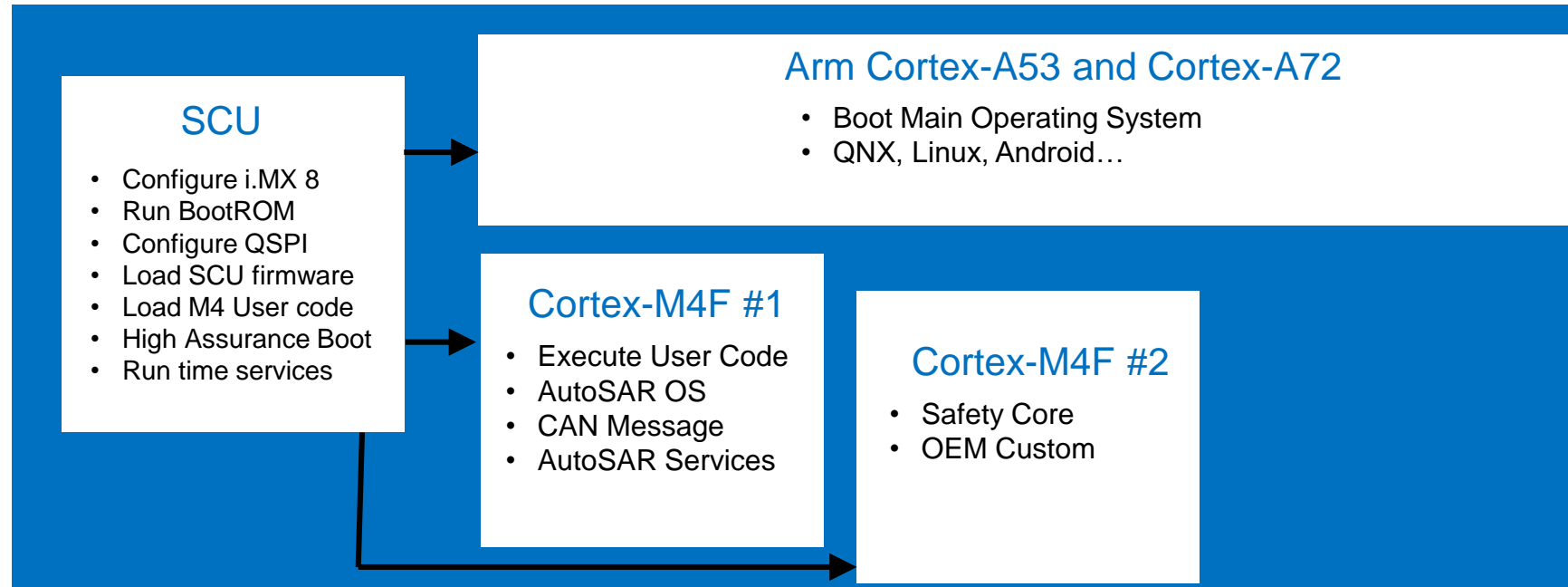- **Advanced Integration**
  - Multi-domain voice recognition: ARM core & DSP
  - Up to 3 screens of independent content
  - Flexible memory options
  - Unmatched range of cost-performance scaling with pin-compatible options and the highest level of software reuse
  - Flexible audio partitioning between radio and apps processor

- **Low-power Optimized Performance**
  - Up to four 1.2 GHz Cortex-A35 processors
  - Multiple systems, one processor
 - Optimized power with the Cortex-M4 core for real-time processing

i.MX 8 and 8X Flexible and Fast Boot

SCU

- Configure i.MX 8
- Run BootROM
- Configure QSPI
- Load SCU firmware
- Load M4 User code
- High Assurance Boot
- Run time services

Arm Cortex-A53 and Cortex-A72

- Boot Main Operating System
- QNX, Linux, Android…

Cortex-M4F #1

- Execute User Code
- AutoSAR OS
- CAN Message
- AutoSAR Services

Cortex-M4F #2

- Safety Core
- OEM Custom

i.MX 8 and 8X Boot Flow

- Flexible multi-boot options

- Critical function alignment (Cortex-M4 versus Cortex-A53)

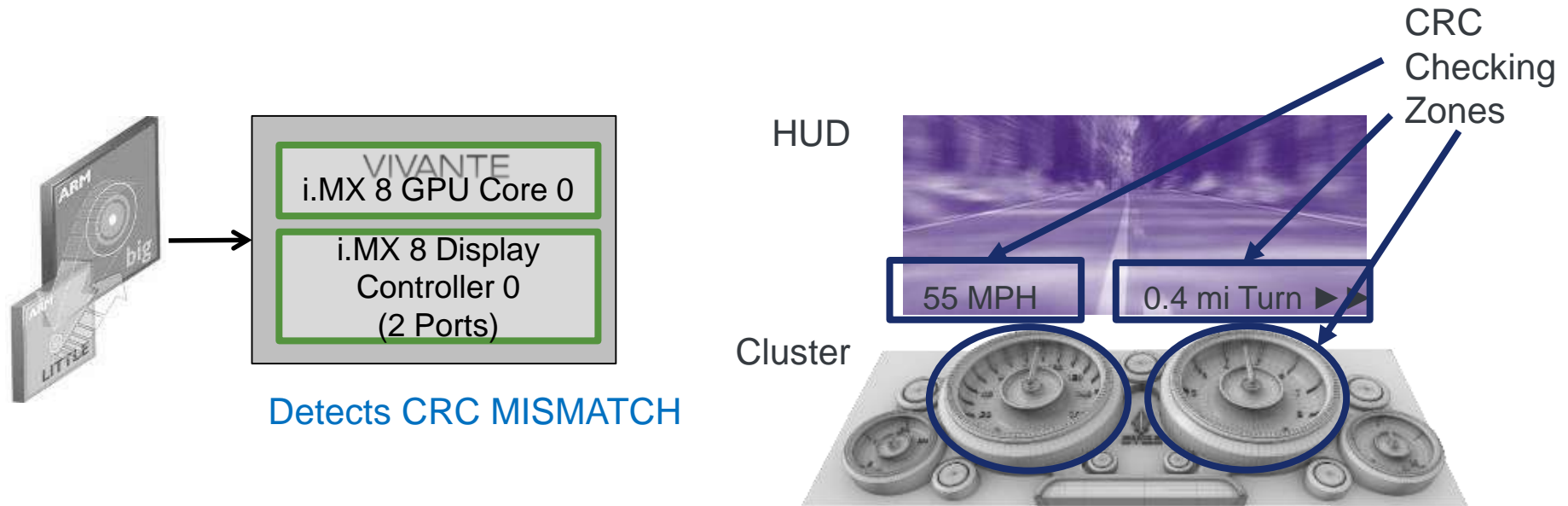- Enables early backup camera, CAN receipt and display

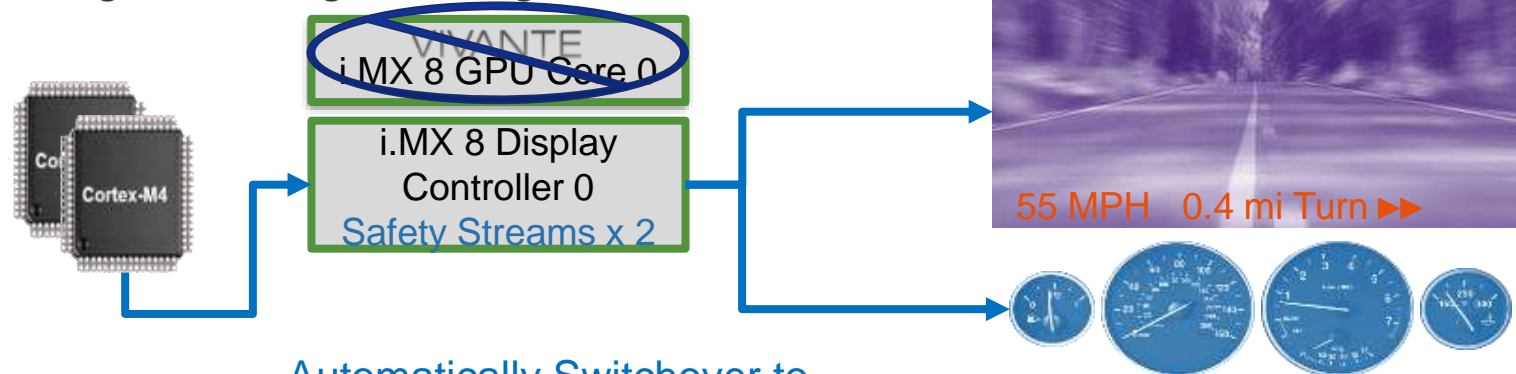# i.MX 8 and 8X Family Display Processor with Failover Feature
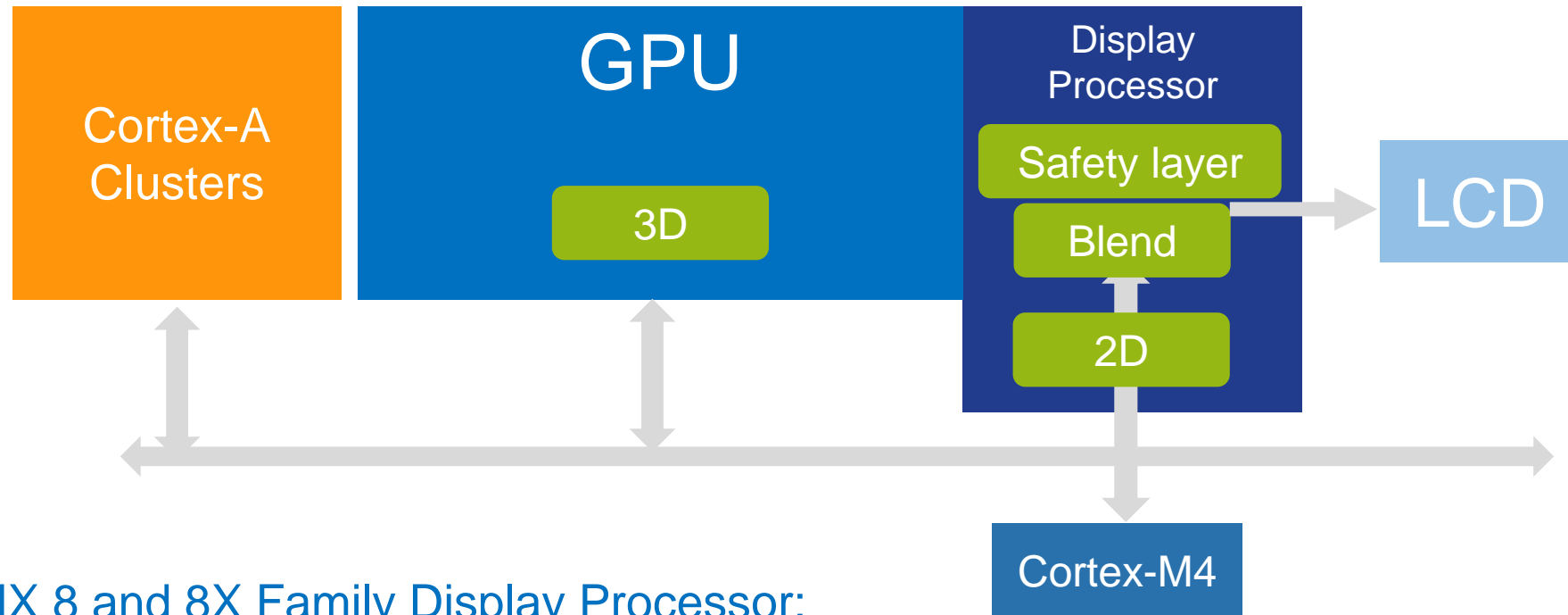
i.MX 8 and 8X Family Display Processor:
- Runs independently, even if GPU and Cortex-A cores crash
- Has integrated 2D graphics unit
- Can be driven by Cortex-M4 core (safety layer support)
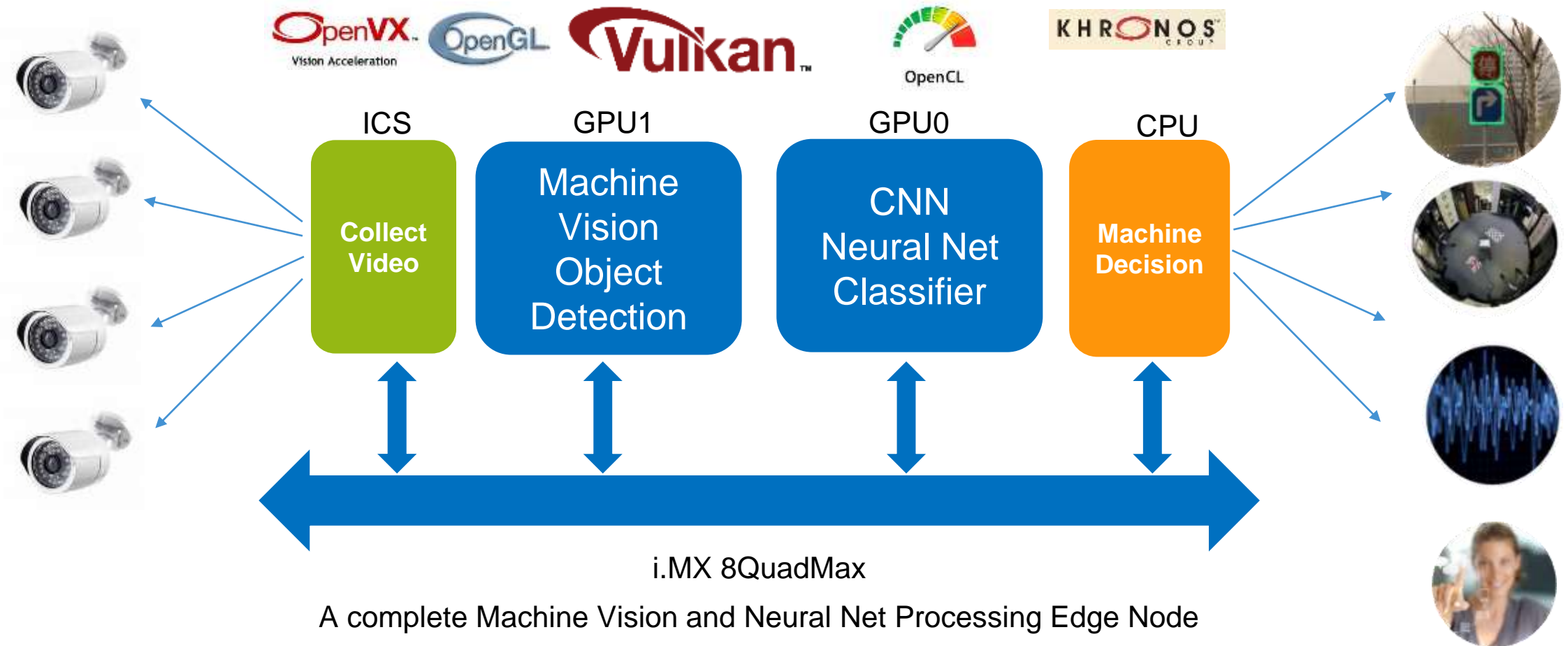- Can drive 4x independent displays without the GPU

i.MX 8 Display Failover Strategy

VIVANTE
i.MX 8 GPU Core 0

i.MX 8 Display
Controller 0
(2 Ports)

Detects CRC MISMATCH

Failover images running in background

Cortex-M4

VIVANTE
i.MX 8 GPU Core 0

i.MX 8 Display
Controller 0
Safety Streams x 2

**Automatically Switchover to
Simplified Cluster / HUD**

CRC
Checking
Zones

HUD

55 MPH   0.4 mi Turn ▶

Cluster

55 MPH   0.4 mi Turn ▶▶

i.MX 8QuadMax – Automotive Edge Computing

ICS	GPU1	GPU0	CPU
Collect Video	Machine Vision Object Detection	CNN Neural Net Classifier	**Machine Decision**

i.MX 8QuadMax

A complete Machine Vision and Neural Net Processing Edge Node

I Want to Run Two Operating Systems. Competition's Limitations?

What I want to do:
2x independent platforms, same chip

Someone Else's Processor

What I want to do:
2x independent platforms, same chip

Platform 1

Platform 2
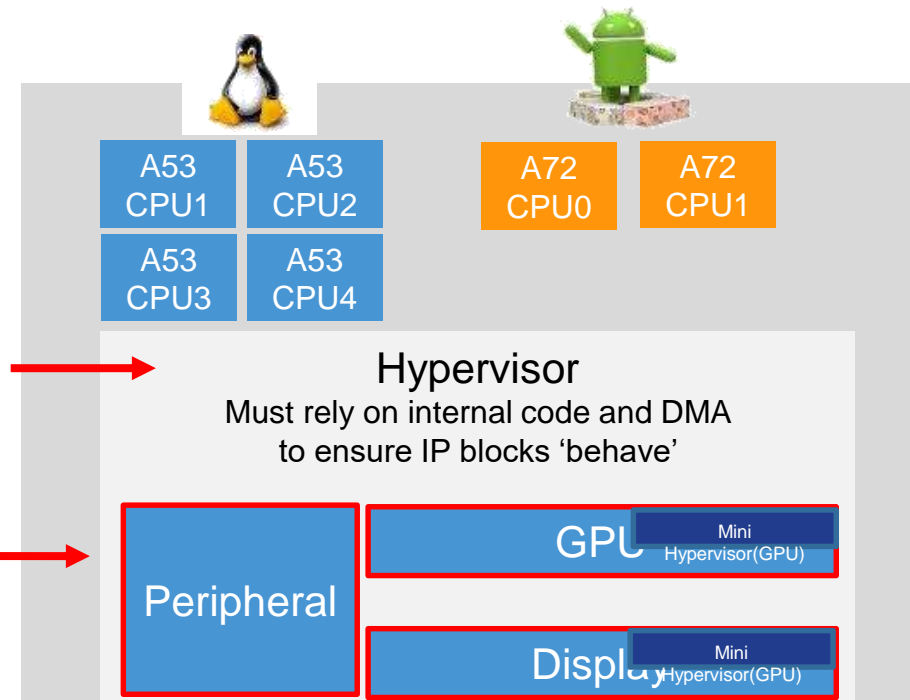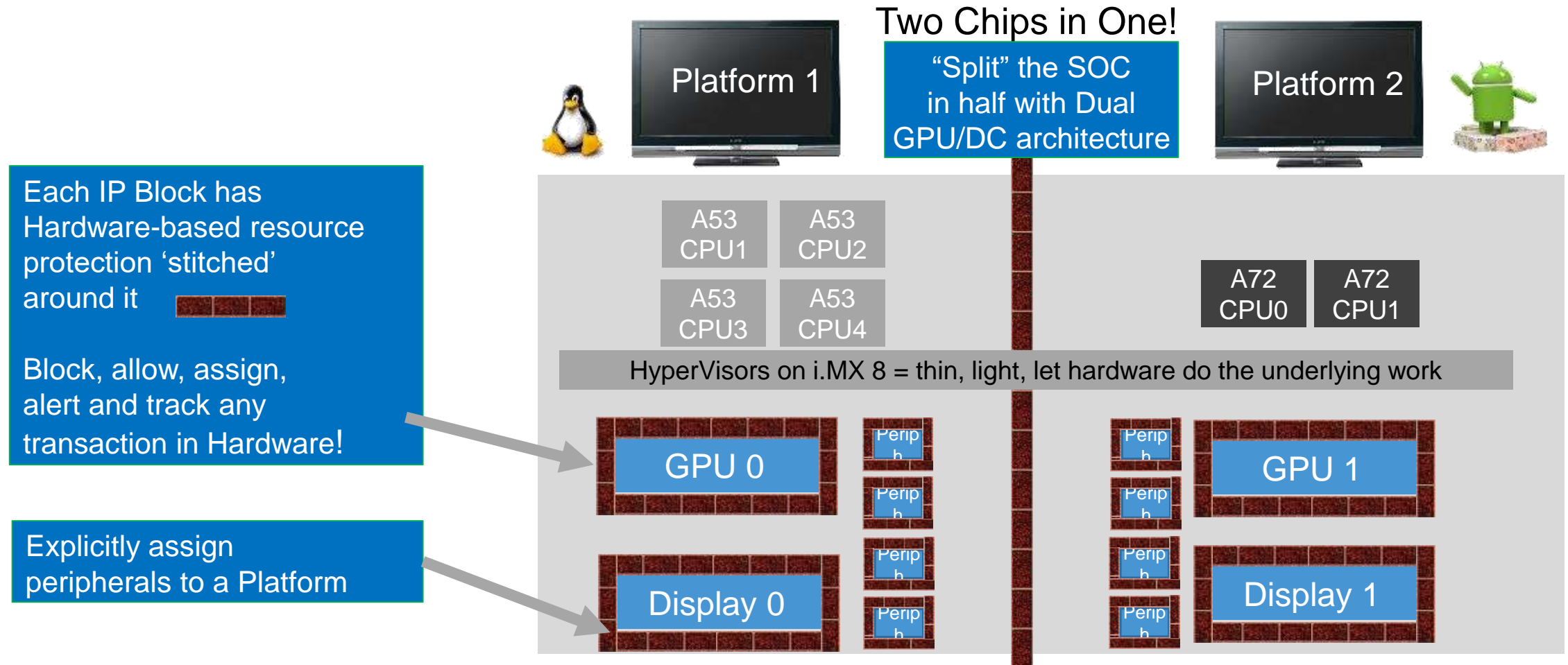
| A53 CPU1 | A53 CPU2 |
| A53 CPU3 | A53 CPU4 |

| A72 CPU0 | A72 CPU1 |

Steers requests, ensures no access conflicts, protects domain secrets

'Shares' all IP resources <u>with only SW to guarantee protection</u>

Hypervisor
Must rely on internal code and DMA to ensure IP blocks 'behave'

Peripheral

GPU
Mini Hypervisor(GPU)

Display
Mini Hypervisor(GPU)

i.MX 8Quadmax/QuadPlus Family: Full Chip Hardware Virtualization with Resource Domain Protection

Two Chips in One!

Platform 1

"Split" the SOC in half with Dual GPU/DC architecture

Platform 2

Each IP Block has Hardware-based resource protection 'stitched' around it

Block, allow, assign, alert and track any transaction in Hardware!

Explicitly assign peripherals to a Platform

A53 CPU1
A53 CPU2
A53 CPU3
A53 CPU4

A72 CPU0
A72 CPU1

HyperVisors on i.MX 8 = thin, light, let hardware do the underlying work

GPU 0

Periph
Periph
Periph
Periph

Periph
Periph
Periph
Periph

GPU 1

Display 0

Display 1

NXP

Resource Partitioning on i.MX 8 Family

How Partitioning Works:

- The system controller commits peripherals and memory regions into a specific domains. (This is customer defined in the System Configuration Data)

- Any communication between domains are forced to use messaging protocols through Messaging Units (MU's)

- If a domain peripheral tries to access other domains illegally, a bus error will occur.

Benefits of Partitioning:

- Reporting of immediate illegal accesses helps track down hard to find race conditions before they go to production (AKA Sandbox Methods)

- Provides security on a finished product: protects system critical SoC peripherals from less trusted apps and intentional security breaches
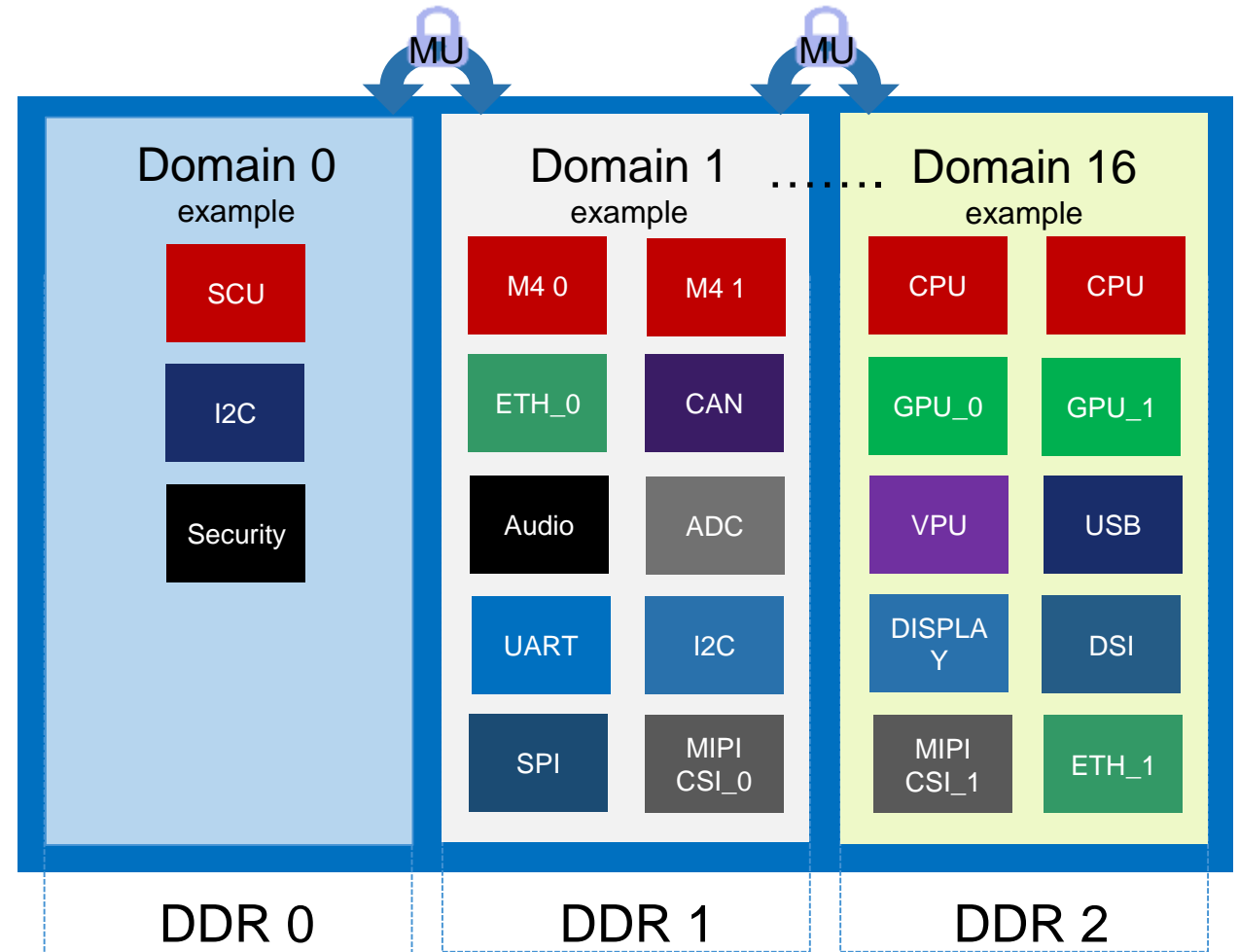
Tensilica HiFi 4 High Performance Audio DSP Core

- **Offload the ARM core:** Highly optimized audio processor geared for efficient execution of audio and voice codecs and pre- and post-processing module

- **Expansive Range** of Audio Software

- The HiFi 4 Audio Engine is a configuration option that can be included with the Xtensa LX 6 processor

- **Ease of Programming:** All HiFi 4 Audio Engine operations can be used as intrinsic in standard C/C++ applications. Simplifies maintenance of existing codecs and development of new codecs.

- **Toolchain is flexible** to build what you want
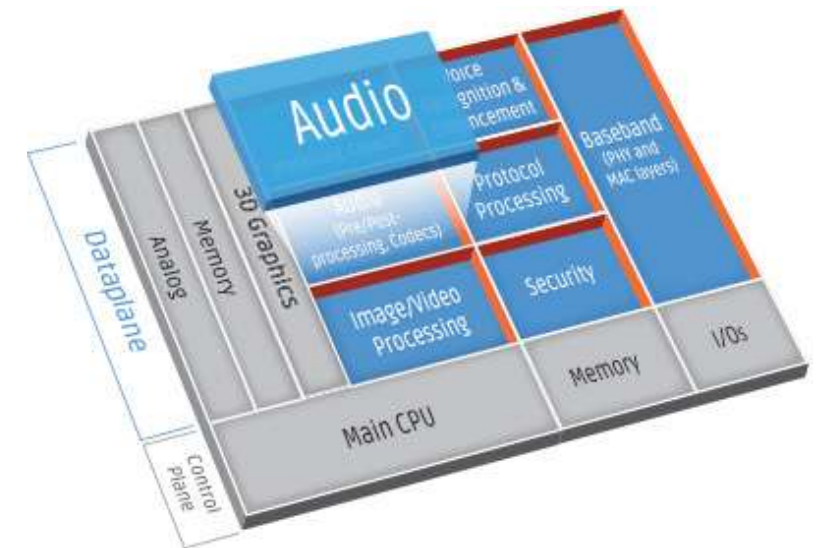
i.MX 8 Family Connectivity

DDR4

LPDDR4

OctoSPI

PCI **3.0** EXPRESS™

SERIAL ATA **3**

USB2OTG

USB **3.0**

I²C BUS **3.4Mbps**

HDMI HIGH-DEFINITION MULTIMEDIA INTERFACE **2.0**

DisplayPort

(((HDCP))) **2.2**

MIPI **DSI**

MIPI **CSI**

embedded DisplayPort

NXP

i.MX 8X – Connectivity

USB2OTG

PCI **3.0** EXPRESS™

USB **3.0**

DDR3L

LPDDR4

I²C BUS *3.4Mbps*

OctoSPI

MIPI **DSI**

MIPI **CSI**

NXP

Power Management IC – PF8100/8200

- Proven robustness, lower risk, & shorter time to market
  - Co-developed with MCU team
  - Support of advanced MCU technologies with high precision and enhanced thermal management
- Reduced complexity for functional safety implementation
  - Scalable Functional safety from QM to ASIL-B
  - Inputs to monitor additional supplies enables system level functional safety
- Reduced system cost
  - Scalable Architectures matched to MCU and application
  - OTP configurability allows flexibility during development
  - Optimize BOM size (<200mm2 component area)
- Faster certification through radiation reduction
  - Multiple frequency tuning optimization (Spread Spectrum, freq sync, Manual tuning)

i.MX Support

Operating Systems and Partners

Strongest Operating Systems for i.MX Applications Processors

Supplier	i.MX 6, 7 and 8 series ARM Cortex-A technology	i.MX 6SoloX, i.MX 7 and 8 series ARM Cortex-M technology
NXP Semiconductor	Linux Long Term Support (LTS) OS, supported in the Yocto Project and Android OS (Android Things on selected devices)	FreeRTOS AUTOSAR MCALs (separate license)
Mentor Embedded	Linux OS and Nucleus RTOS	Nucleus RTOS
Micrium (Silicon Labs)	uC/OS II and III RTOS, Micrium OS	uC/OS II and III RTOS, Micrium OS
QNX	Neutrino RTOS (background IP from NXP)	-
Green Hills	INTEGRITY RTOS (background IP from NXP)	-
Embedded Access	-	MQX RTOS
Express Logic	ThreadX RTOS (coming soon)	ThreadX RTOS (coming soon)
Microsoft	Win10 (pilot)	-
Timesys, Wind River, Canonical, and others	Commercial Linux	

Early Access Partners Launching with i.MX 8/8X Series

i.MX 8X Family: i.MX 8QuadXPlus, 8DualXPlus, 8DualX	i.MX 8 Family: i.MX 8QuadMax, 8QuadPlus
Digi International (USA, Global)	Advantech (Taiwan, Global)
Phytec (Germany, EMEA +AMEC)	BCM Advanced (USA, Taiwan, China, Denmark, Japan)
TQ (Germany, China, AMEC)	Congatec (Germany, USA, Taiwan)
Toradex (Switzerland, Global)	iWave (India, Japan, Global)
Variscite (Global)	Phytec (Germany, EMEA+AMEC)
Kontron (Global)	Toradex (Switzerland, Global)
	Variscite (Global)

i.MX 8QuadXPlus MEK System – Available

Part Number: MCIMX8QXP-CPU – works standalone w/o baseboard
Includes LVDS to HDMI adapter (IMX-LVDS-HDMI)

Overview
- NXP i.MX 8QuadXPlus
  - i.MX 8DualXPlus emulation on 8QuadXPlus
- NXP MMPF8100 PMIC
- 3 GB LPDDR4 memory, x32
- 32 GB eMMC 5.0
- 64 MB Octal SPI Flash
- 5.24" x 5.24" 8-layer PCB

Display Connectors
- 2x mini-SAS MIPI / LVDS connectors (Combo PHY)
- Camera MIPI-CSI through mini-SAS connector

Audio
- Audio Codec
- Microphone and headphone jacks

Connectivity
- 1x full-size SD/MMC card slot
- 10/100/1000 Ethernet port
- 1x USB 3.0 Type C

Debug
- JTAG connector
- Serial to USB connector

Expansion Connector
- M.2 Connector (PCIe, USB, UART, I2C and I2S)

Additional Features
- NXP 3-axis accelerometer & eCompass [not populated]
- NXP Gyroscope
- NXP Light Sensor
- NXP Pressure Sensor
- RGB LED
- Power supply
- No battery charger

OS Support
- Linux, Android and FreeRTOS BSPs from NXP
- Others: 3rd parties

Tools Support
- Lauterbach
- ARM (DS-5)

WiFi: (not included with kit)
- Murata WiFi module

Part Numbers:
MCIMX8-8X-BB
Includes Audio Board (IMX-AUD-IO)

Connectivity
- 1x I2C Auxiliary Connector
- 1x Tamper Head
- 1x Parallel CSI Connector
- 1x UART, 2x CAN
- 1x uUSB OTG connector
- 1x Audio In Connector,
- 1x Audio Out Connector
- 1x 10/100/1000 Ethernet connector Muxed w/ Audio port)

Expansion Connector
- Arduino Connector / MikroBus Interface

i.MX 8QXP MEK Board & Accessories

i.MX 8QXP MEK CPU Card
Standalone Powered
MCIMX8QXP-CPU

MEK Common Baseboard
Works with i.MX 8QM& 8QXP
MCIMX8-8X-BB

OV10635 MIPI Camera
MCIMXCAMERA1MP

MIPI to HDMI
miniSAS Convertor
IMX-MIPI-HDMI

LVDS to HDMI
miniSAS Convertor
IMX-LVDS-HDMI

OV5640 MIPI CSI board
miniSAS based
MINISASTOCSI
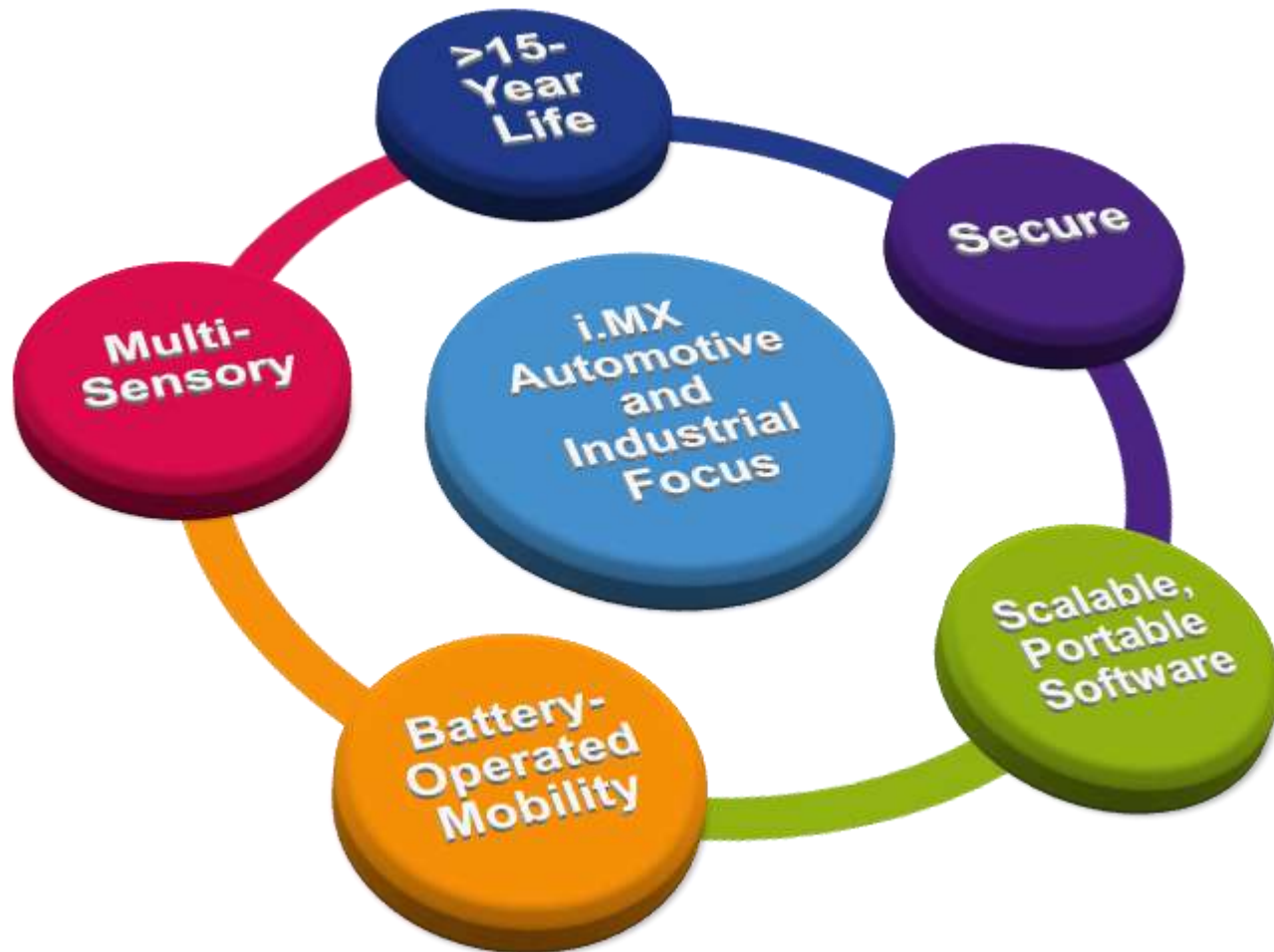
BroadReach 100 Mbps PHY
IMX-RMII-BRPHY

Std 1Gbps PHY
IMXAI2ETH-ATH

BroadReach Switch (100Mb/s)
IMXAI2SWCH-NXP

i.MX 8 and 8X Applications Processors

Built for scalable, safe and secure multimedia and computing

- Sampling now for alpha and beta customers
- www.nxp.com/imx8

Thank-you for considering the i.MX 8 Series!

SECURE CONNECTIONS
FOR A SMARTER WORLD