

NXP Helps Industrial-System Developers Apply AI/ML to Their Designs, easy path to Deploy Machine Learning on Application Processors

Gino Gatto – Senior FAE

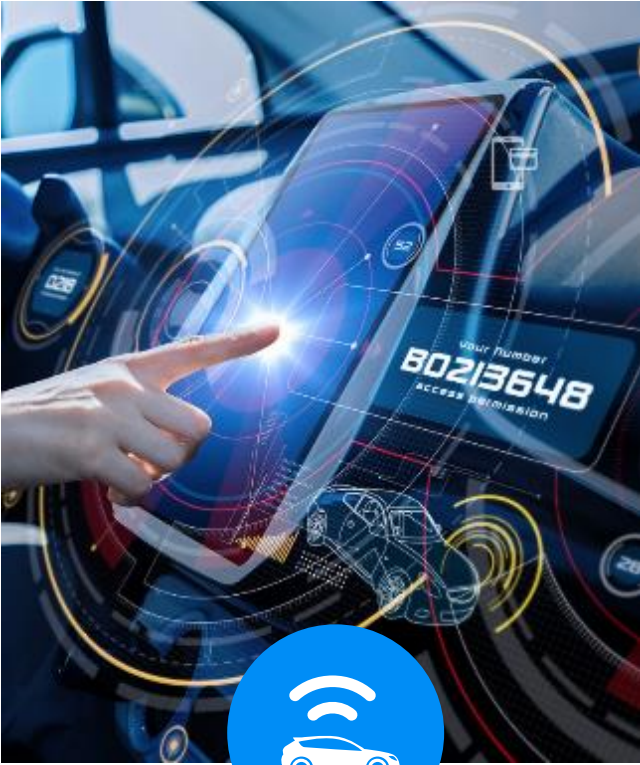
NXP

Oct 3rd , 2019



SECURE CONNECTIONS
FOR A SMARTER WORLD

Our Leadership Focused End Markets



Automotive



Industrial & IoT

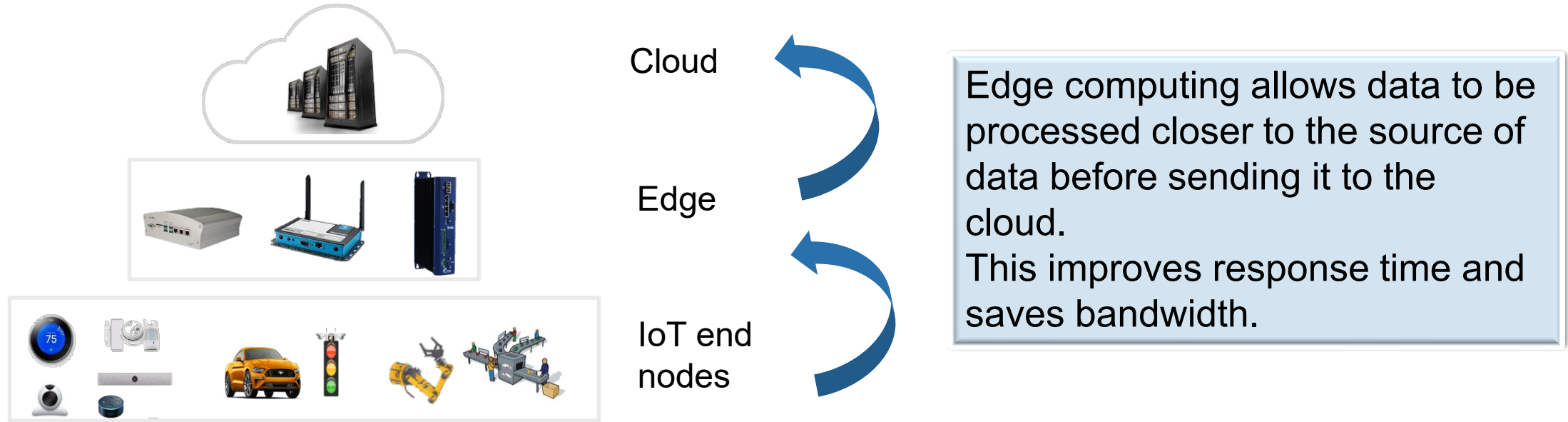


Mobile



Communication
Infrastructure

Edge Computing – What, Why and Where?



Primary drivers of Edge computing

Growth of IoT - Aggregation, control & analytics



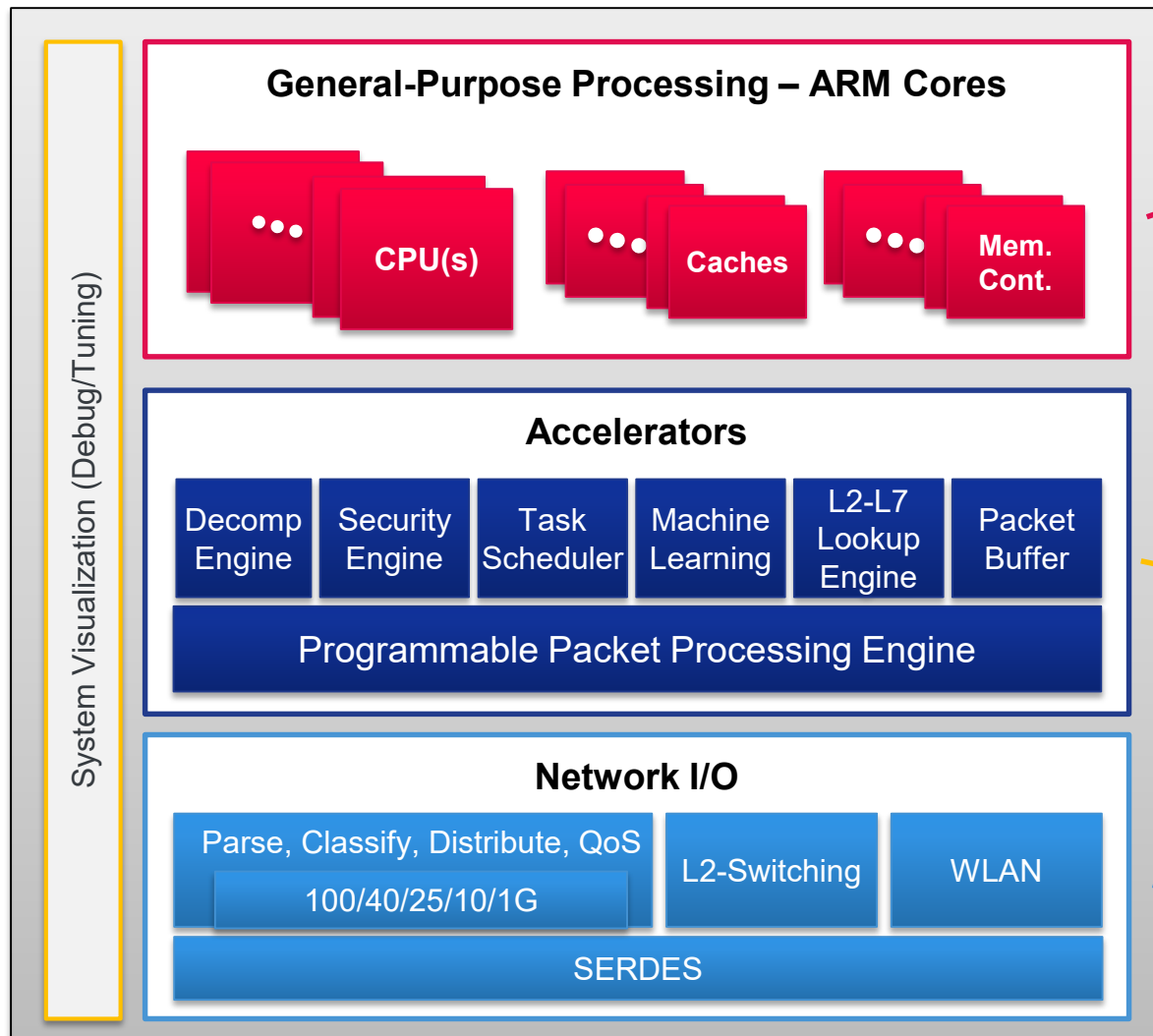
Increase in “intelligent” applications (AI/ML) – Real-time processing



On-premise applications – security and privacy

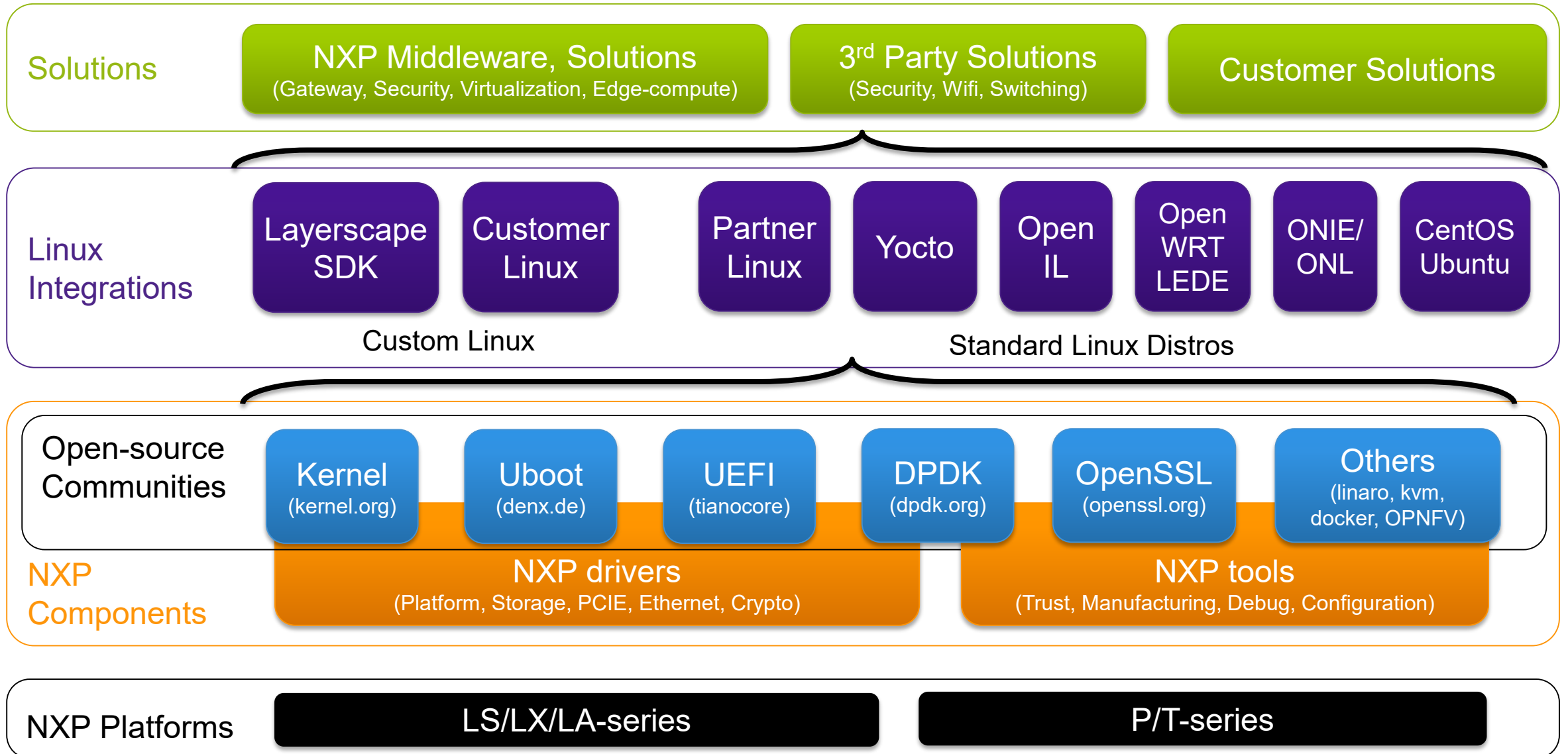


Acceleration and Cores on a Single Chip



- Powerful 64b ARMv8 cores – comparable to x86
 - Layer 4-7 processing, control, mgmt.
 - Rich Linux Distros, DPDK etc.
 - Virtualization with VMs, Containers.
 - 2-16 cores upto 2.4 Ghz
-
- C programmable Packet Engine
 - Layer 2-4 processing, IPsec, Firewall.
 - 5-10x better performance/watt
 - 10-100+ Gbps Packet processing
 - 10-100+ Gbps Crypto
-
- 8 x 1GE to 2 x 100GE ports
 - Integrated L2 switching

NXP Linux Software



A Broad and Scalable Edge Computing Portfolio



- All LS-series processors have rich set of IO – USB, PCIE, SATA, GPIO, I2C, SPI, UART
- All support Trust Architecture for platform security
- Support both embedded and PC Linux distros
- Support industrial temperature ranges
- Support long lifecycles

Large-scale video/image processing, data aggregation, backhaul

LS2084A

- Cortex-A72
- 4-8 cores
- 2.0GHz
- 8 x 10GE
- 20-35W

LX2160A

- Cortex-A72
- 8-16 cores
- 2.2GHz
- 10/25/40/100 GE
- 31W

LS1028A

- Cortex-A72
- 2 cores
- 1.6GHz
- 4-9W
- *Integrated TSN switch, GPU*

LS1043A

- Cortex-A53
- 2-4 cores
- 1.6GHz
- 1/10G Ethernet, USB, PCI
- 5-10W

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LS1088A

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- 8-16W

Video/image processing, large-scale analytics, TSN ethernet, Gateway applications

LS1012A

- Cortex-A53
- 1 core
- 1GHz
- 1-2W
- Ethernet, USB, PCI

LS1021A

- Cortex-A7
- 2 cores
- 1GHz
- 2W
- Ethernet, USB, PCI

Data acquisition, analytics, monitoring, remote control



Networking Software and Systems

Complete project lifecycle capability

Planning	Development			Production
Pre-project	Tools+	Runtime SW	Service & Support	Post-project
<ul style="list-style-type: none"> Consulting <ul style="list-style-type: none"> Architecture Security Project Planning Software Discovery Training Proof of Concept <ul style="list-style-type: none"> Hardware Software Customized demos Advanced simulation Algorithm development 	<ul style="list-style-type: none"> CodeWarrior <ul style="list-style-type: none"> IDE Debug Compiler Trace DDR Validation SerDes Validation Simulation Hardware Platform <ul style="list-style-type: none"> Schematics Layouts Thermal/RF Manufacture <p>nxp.com/cw4net</p>	<ul style="list-style-type: none"> Complete Applications (ASK) <ul style="list-style-type: none"> NAS, BHR, Gateway Middleware (ADK+) <ul style="list-style-type: none"> Security offloads Communications offloads Routing VortiQa Software Products <ul style="list-style-type: none"> SDN Solutions Open networking standards Virtualization Connected Edge Compute Mobile Transport Layer 1 <p>Key Idea: Provide NXP communications requirements - we likely have software</p> <p>nxp.com/vortiqa</p>	<ul style="list-style-type: none"> Support Long Term Yearly Emergency Situations Services Application-Specific Hardening Feature Acceleration WiFi Performance Turnkey SW Services Porting Test outsource Training <p>Key Differentiators: Deep Linux, crypto & trust, communications</p> <p>nxp.com/networking-services</p>	<ul style="list-style-type: none"> Long Term Support Private Branch Support & Maintenance Forward Port/Kernel Refresh

QorIQ

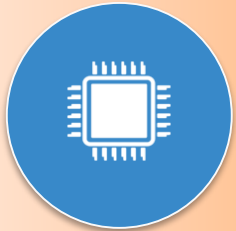
CodeWarrior



VortiQa



Supply Longevity



Longevity



Industrial applications require product longevity

- Long product lifecycles
- Special product certification required



NXP Industrial Application Processors

- 10 and 15-year supply longevity options
- Formal program with products listed at www.nxp.com/productlongevity

Extreme Operating Conditions



Extreme
Operating
Conditions

- **10-year product life** with continuous operation
- Product Life Application Notes
- Extreme **temperature conditions**
 - -40° C cold start
 - 70-85° C ambient operating conditions
 - Up to 125° C junction temperature
- Low power consumption for **fanless designs**
- Small footprint for **space-constrained designs**



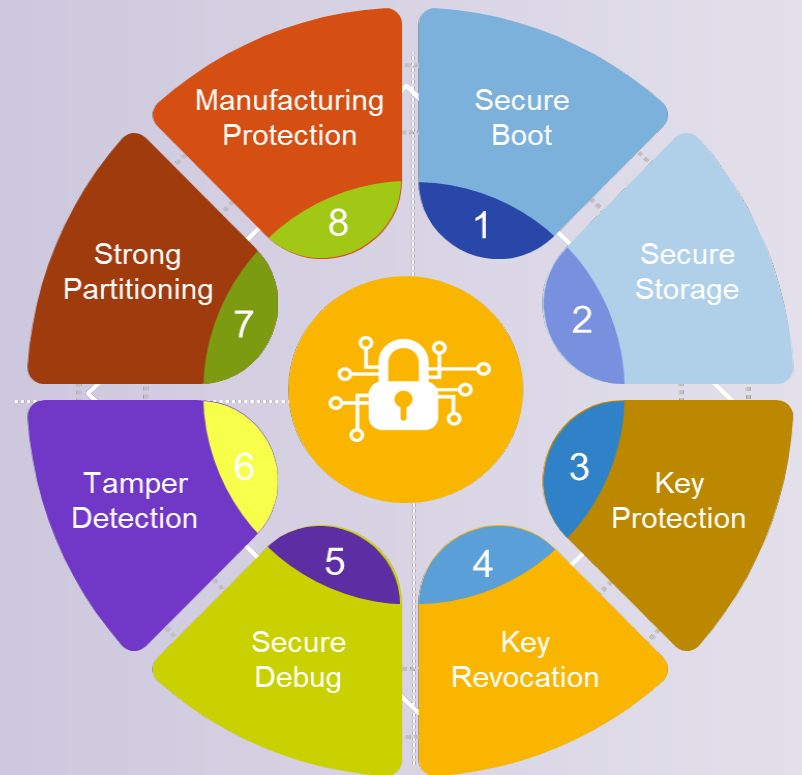
Security



Security

Covering every system vulnerability of the Product Life-Cycle

- Design – Hardware, IO, Storage: Trust Architecture
- Manufacturing – Key Generation, Provisioning, Updates: Secure Provisioning Tool
- Software – Operating System, Applications, Permissions: Trusted Linux
- Connectivity – Remote Access, Communications: Network Security Suite



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LS1021A

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Data acquisition, analytics, monitoring, remote control



LS1046A: Applications Examples



Industrial



Broadband Access



Wireless Backhaul



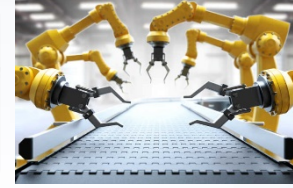
Satellite Comm Equip



DPI, Firewall, VPN



Robotics



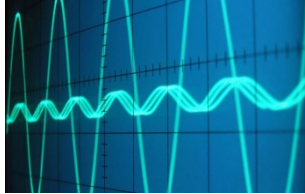
Digital Forensics



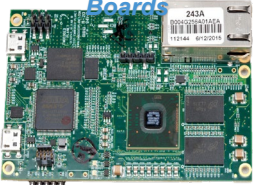
Smart Grid



Test & Measurement



Embedded Boards



Aerospace



Smart NICs



Networking



Data Acquisition



Industrial PC



Train Control/Signaling



Server



MFP



5G Repeater



Autopilot



60GHz Wireless



Medical Electronics



Near Field Protection



IP CAM Concentrator



PLC



Motion Controller



CNC Control



Video Gateway



Camera - Deep Learning



Storage



Personal Server



LS1046A at a Glance

Power efficient quad-core A72 processor, ~8W typical power, integrating:

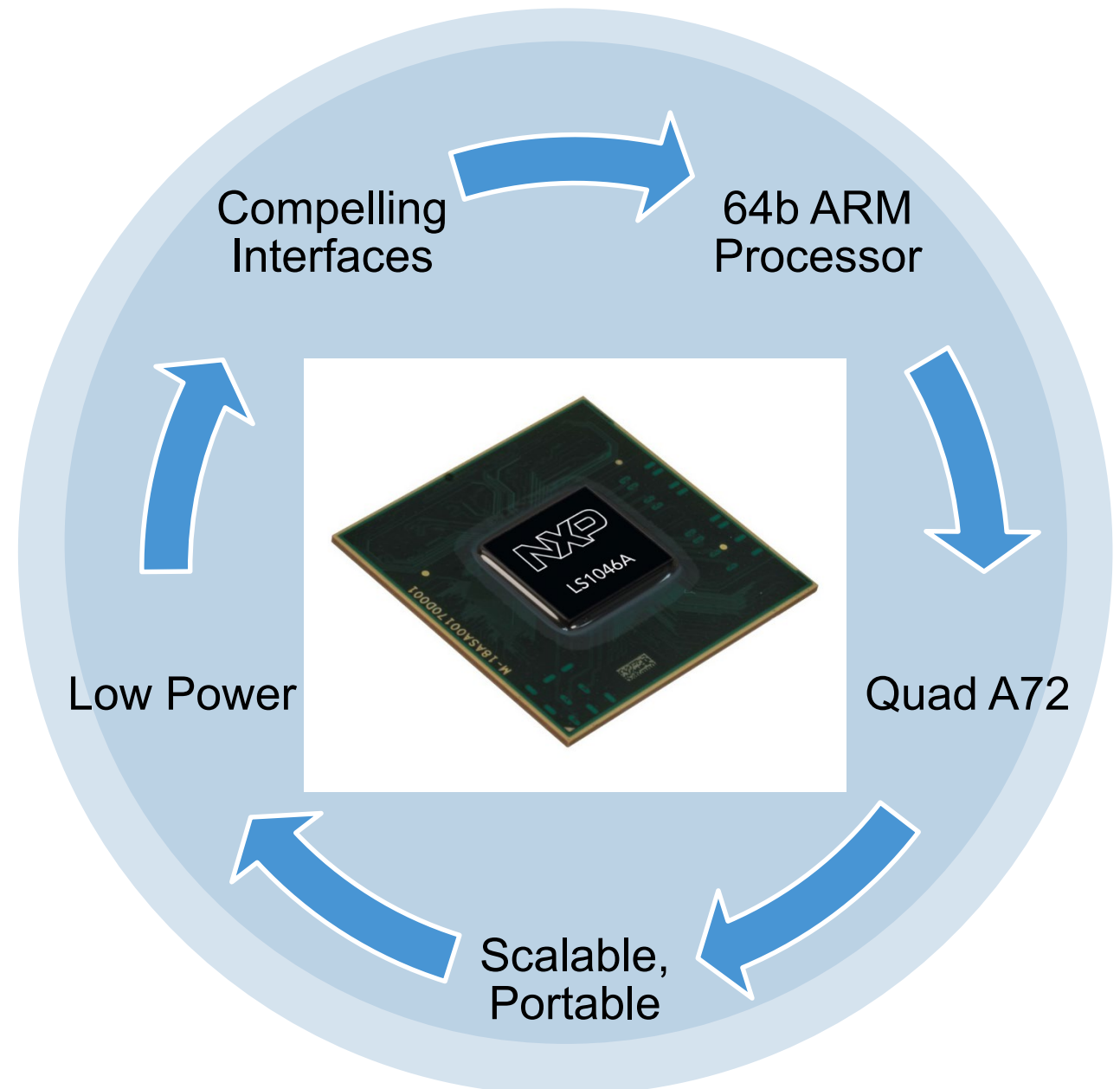
- 2x 10GbE + 1x 2.5GbE + 5x 1GbE
- 3x PCIe Gen 3.0
- 1x SATA 3.0
- 3x USB 3.0

Seamless performance scaling from dual-A53 to quad-A72 processor

- Pin compatible with LS1 portfolio
- Software portability with same offload architecture
- 15 years longevity

Suitable for high-performance networking applications for:

- Wireless & gateway solutions
- Industrial & storage solutions
- Security & UTM solutions



Layerscape LS1046A at a Glance

High Performance A72 Cores for Broad Applications Across the Embedded Networking Space



Enterprise Access Points

- ✓ 3xPCIe 3.0 + 3xUSB 3.0
- ✓ Proven with variety of radio partners
- ✓ Maximum headroom (upto 70%) for 11ac, 11ad (60GHz) wifi



Industrial Automation

- ✓ High performance/watt at 1.8GHz
- ✓ Spread of compute performance b/w pin compatible LS1023/43/26/46A
- ✓ 3xPCIe 3.0 + 3xUSB 3.0 and I/Os for sensors



Virtualized CPE (vCPE)

- ✓ 2x 10GbE + 1x 2.5GbE + 5x 1GbE
- ✓ 8W fanless design
- ✓ DPDK support, UEFI installation
- ✓ KVM, Docker container support

Best CPU headroom in its class for Smart Edge, virtual Branch Router & WLAN applications

High Performance Power Efficient SoC

- Quad ARM A72 CPUs, 64b, up to 1.8GHz
- Future Proof, Low Power Memory DDR4 64b support
- Extensive Hardware Virtualization
- Secure Boot

Advanced Packet Processing

- Packet Parse/Classify/Distribution engines
- Lossless flow control & granular traffic management
- Upto 7.9Gbps of crypto acceleration

Fast, Flexible Network Interfaces

- Up to 4x GbE with 2.5G options and dual 10GbE XFI for extreme connectivity
- 3x USB 3.0 interfaces for highest speed LTE, Storage & Peripheral options

Highest Processing Efficiency

- Up to 45K Coremarks at 8 watts typical
- Upto 20Gbps of IP Forwarding

Scalable and Portable

- Pin compatible with the LS1 family of processors (LS1043A/LS1088A)
- Software portability with same offload architecture

TARGET MARKET SEGMENTS

Broad Applications Across the Embedded Networking Space

Enterprise Access Points

- ✓ 3xPCIe 3.0 + 3xUSB 3.0
- ✓ Proven with variety of radio partners
- ✓ Maximum headroom (upto 70%) for 11ac, 11ad (60GHz) wifi



Network Attached Storage

- ✓ ARMv8 CPU w/ TrustZone
- ✓ 3xPCIe 3.0 + 3xUSB 3.0
- ✓ 64-bit DDR4 controller
- ✓ SATA 3.0

Virtualized CPE (Intelligent Edge)

- ✓ 2x 10GbE + 1x 2.5GbE + 5x 1GbE
- ✓ 8W fanless design
- ✓ Linux 4.4 LTS
- ✓ DPDK support, UEFI installation
- ✓ Virtualized access to crypto acceleration
- ✓ KVM, Docker container support



Robotics

- ✓ High performance/watt at 1.8GHz
- ✓ Spread of compute performance b/w pin compatible LS1023/43/26/46A
- ✓ 3xPCIe 3.0 + 3xUSB 3.0 and I/Os for sensors

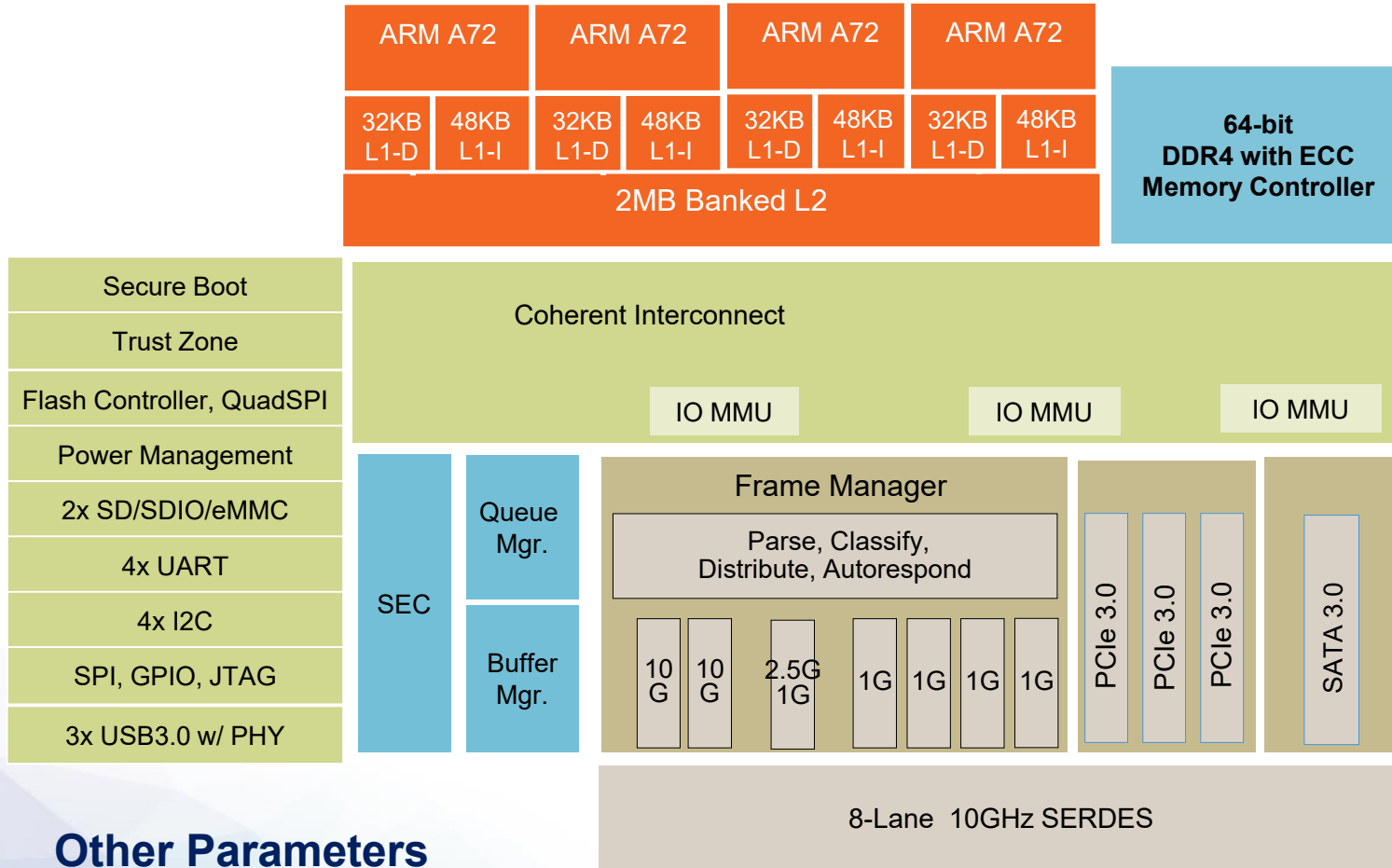
Substation Automation

- ✓ High performance/watt at 1.8GHz
- ✓ 1x 2.5GbE + 5x 1GbE Ethernet
- ✓ Networking offload with dedicated engine for RTUs



LS1046A

Optimized for highest compute power



Core & Memory Subsystem

- 4x ARM Cortex A72 up to 1.8GHz
- 2MB total L2 cache
- 64-bit DDR4 up to 2.1GT/s

Interfaces

- Three PCIe Gen3 controllers (x4, x2 and x1)
- 1x SATA 3.0
- 3x USB 3.0 with PHY
- 2x SD3.0/SDIO/eMMC 4.5

Network IO

- 2x 10GbE + 5x 1GbE + 2x 2.5GbE
- XFI, SGMII, RGMII, QSGMII
- Proven Packet Parse/Classify/Distribute
 - VxLAN, IPSec, GRE, CAPWAP, DTLS Offload
 - Lossless Flow Control

Datapath Acceleration

- SEC- crypto acceleration
 - Up to 7.9Gbps of Crypto processing
- Data path Acceleration Architecture 1.x

Software

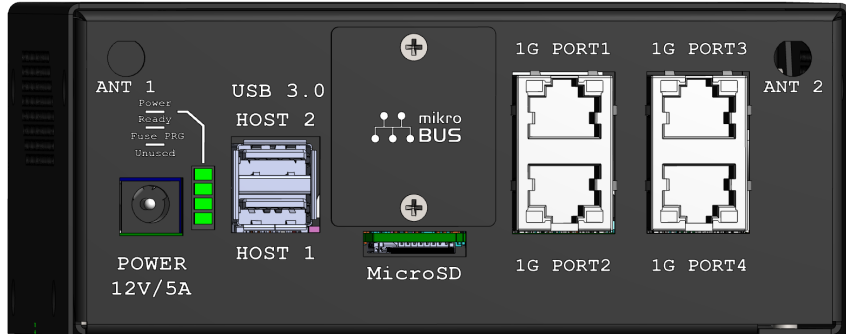
- LSDK 1806 – Ubuntu based components
 - Open source and upstreamed

Other Parameters

- Package:
 - 780 pin 23x23mm, Lidded FCBGA

In production now

FRWY-LS1046A-AC : Edge Compute Platform



Processor

- LS1046A: Arm Cortex A72, 64-bit CPU
- Up to 1.6GHz Quad-Core
- 32KB L1 data cache / 48KB L1 instruction cache
- 2MB L2 Cache

Power Management

- 12V / 5A Power connector

Connectivity

- 4x Gigabit Ethernet
- 2x M.2 Type E sockets (Wi-Fi, LTE, AI/ML)
- 2x USB 3.0
- Mikro-Click for expansion (NFC, BLE/ZigBee, LoRa)
- Headers for I2C, SPI, Clocks, Interrupts, GPIO
- MicroSD slot

Memory

- 4GB DDR4 with ECC
- 4GB NAND Flash
- 64MB QSPI Flash

Debug

- Micro USB debug port

General

- LED's (Power, Ready, Fuse Prog)
- LED's Ethernet Link, Activity

Demonstration Kits

- FRWY-LS1046A-AC
- FRWY-LS1046A-PA

FRWY-LS1046A Product Options



FRWY-LS1046A-PA - \$395 Resale

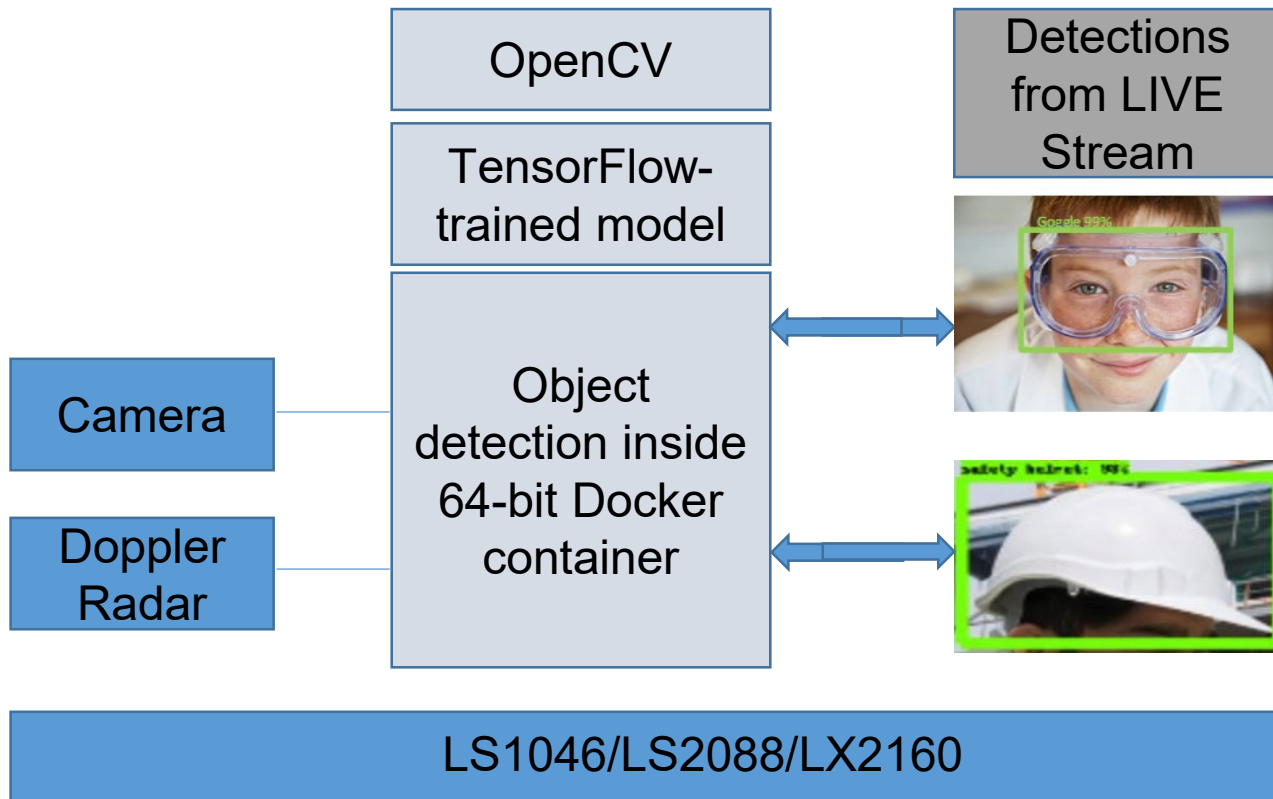


FRWY-LS1046A-AC - \$495 Resale



Just bought a usb camera

Industrial Safety Demo Using NXP Layerscape



- Demonstrates AI for detection of PPE in safety zone
- Doppler radar sets safety zone
- Cameras capture operators
- AI/ML software using TensorFlow and OpenCV and custom training data detect helmet and goggles

Connect my mobile or lap top to LS1046 freeway board via Wifi

NXP
version 1.0.4

FRWY-LS1046A

Video Vault

Detailed CPU Analysis

FRWY-LS1046A
Platform for Edge Computing

FRWY-LS1046A
CPU Performance Benchmarking

FRWY-LS1046A
Cold Storage Data Analytics

FRWY-LS1046A
Accelerometer Sensor Data Analytics

FRWY-LS1046A
Object Detection And Facial Recognition

CPU Performance

Data Analytics

Machine Learning/Video Analytics

Video Vault

Overview:

- Video Vault show case different demo videos stored on LS1046FRWY board (SD card).
- User can show case quick demos through video vault.

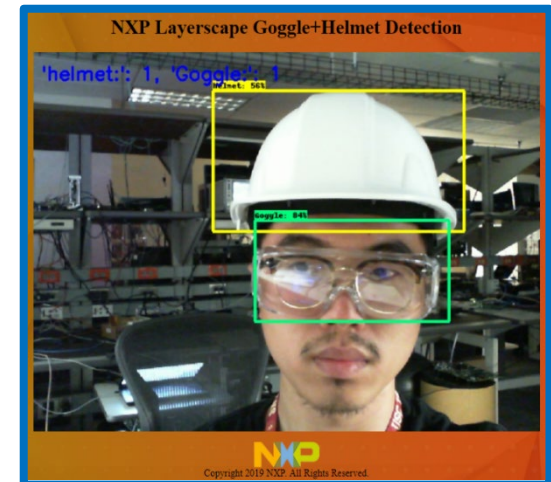
Demo 3.1: Face Recognition Using NCNN

- **Face Recognition** using NCNN shows Machine learning and AI capabilities of FRWY-LS1046A.
- Instant training and addition of new user's face without depending on cloud. Convolutional Neural Network is used.
- ML/AI capabilities powered by TensorFlow and OpenCV which provide ease of use and smooth deployment and development options to users.



Demo 3.2: Industrial Safety and Security Using TensorFlow

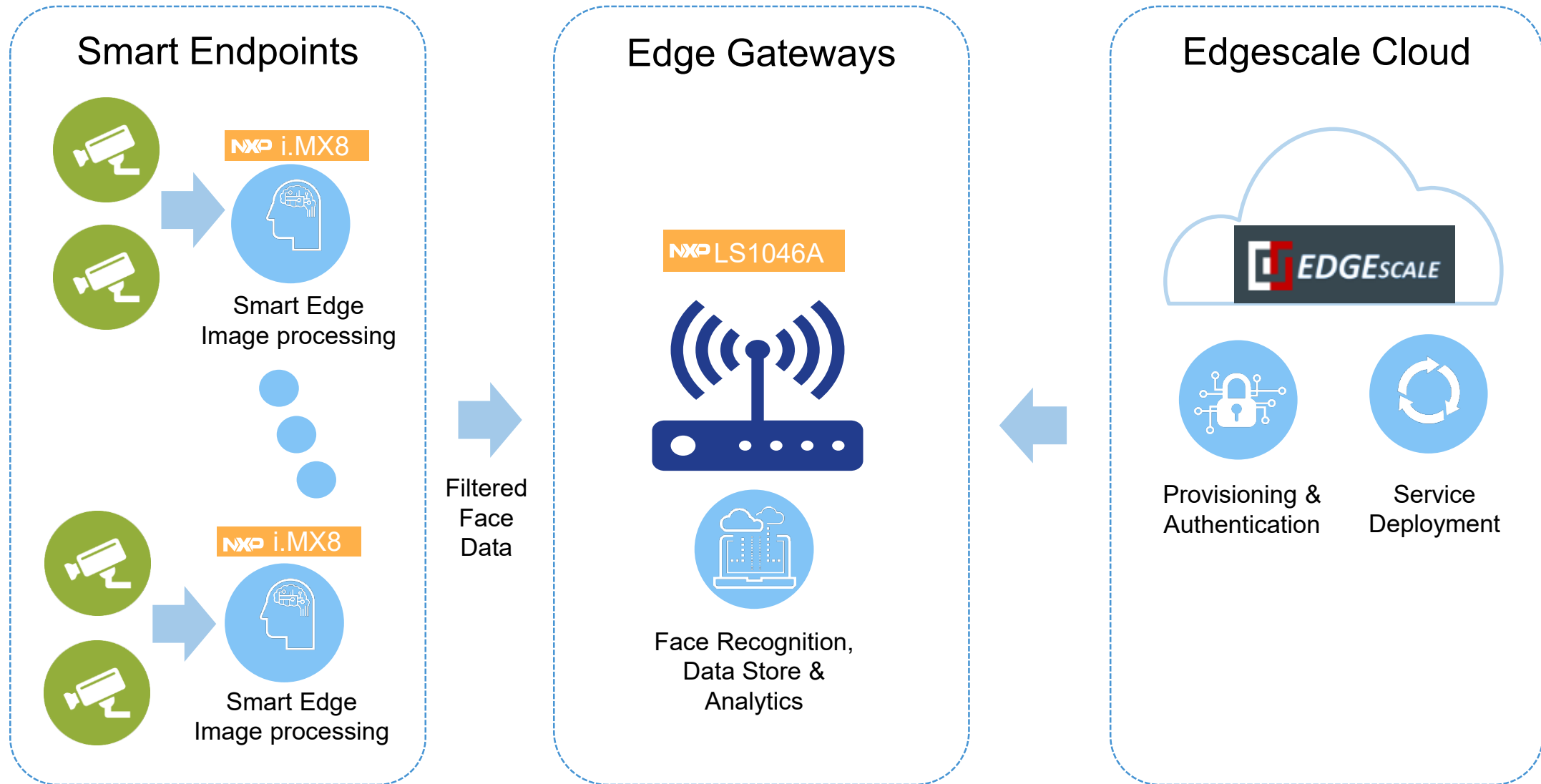
- **Object detection** using TensorFlow shows Machine learning and AI capabilities of FRWY-LS1046A.
- Trained model for almost any object can be added using this method.
- ML/AI capabilities powered by TensorFlow and OpenCV which provide ease of use and smooth deployment and development options to users.



Demo 3.3: People Counting Using Yolo

- YOLO—You only look once, real time object detection.
- Detection Speed using yolo is 45 frames per second.
- Network understands generalized object representation (This allowed them to train the network on real world images and predictions on artwork was still accurate).

Scalable Video Analytics solution



AI @ the Edge vs. Cloud – Performance vs. Practicality

	Cloud Server + GPU	Edge Appliance	Edge App w/TPU
Compute	AMD Ryzen 2600 + nVidia GTX 1080Ti (12 TOps)	Layerscape LS1046	Layerscape LS1046 + TPU
Power	~250W	~10W	~11W
Input Video	MI 6 trailer – 1080p	MI 6 trailer – 720p	MI 6 trailer – 720p
Algorithm	YOLOv3	YOLOv3	YOLOv3
Performance – (FPS)	25 fps	3 fps	30 fps
CPU Utilization	100% 2 cores @ 3.4 Ghz + 85% GPU	100% 4 cores @ 1.8 Ghz	30% 4 cores @ 1.8 Ghz

Great for Formula 1 close finishes.

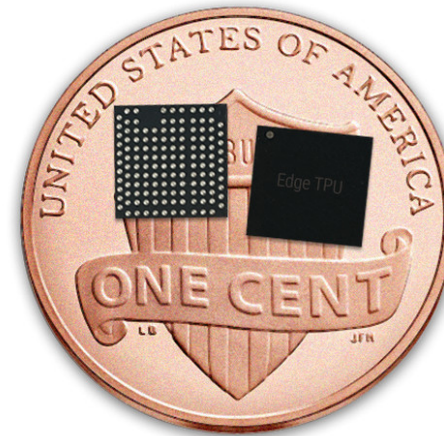
Efficient at counting cars and people in a parking lot.

Great again.

Watch LS1046 object detection sample @ <https://youtu.be/EEc5-oiccuM>

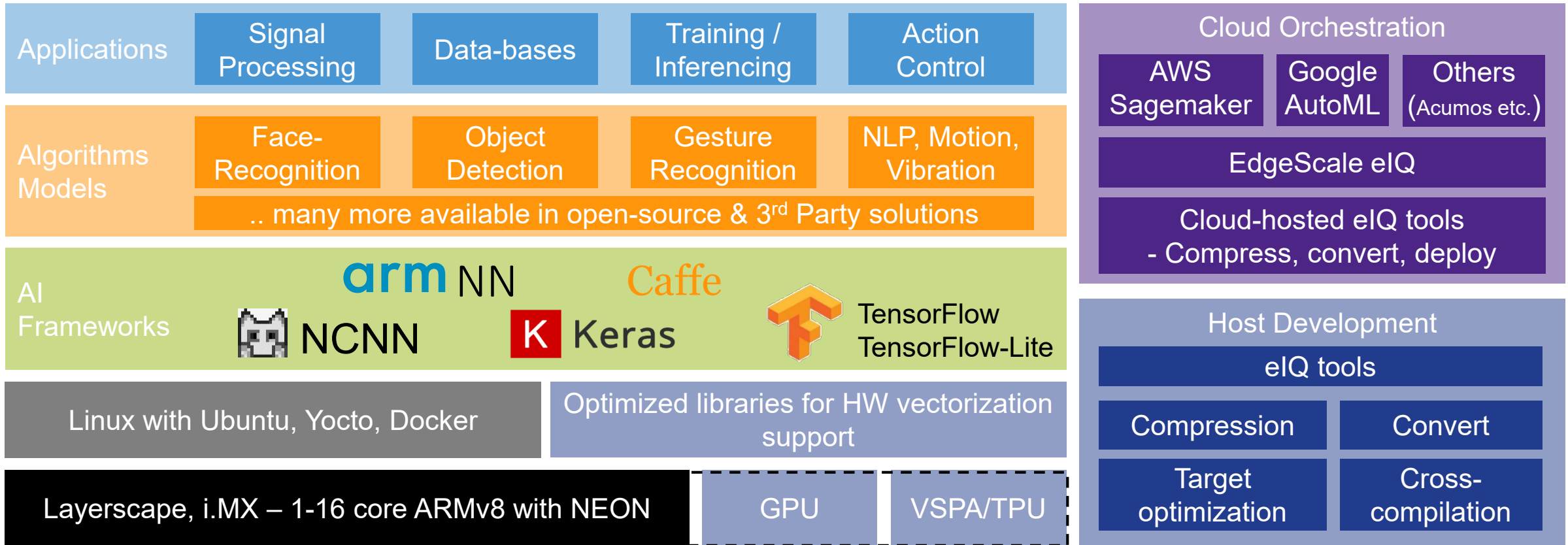
External Coprocessors Like Google Edge TPU Turbocharges AI on Layerscape

Model	Performance (connected through USB or PCIe)
GoogleNet:	600 fps
Inception v2:	400 fps
MobileNet:	700 fps



NXP is working with Google to explore Edge TPU usage in professional/industrial markets.

Edgescale and eIQ for AI on Layerscape & i.MX



- NXP provides the right enablement for cloud-connected AI/ML applications @ Edge.
- Host-based eIQ tools for model conversion, optimization and target optimization.
- Edgescale leverages eIQ tools for cloud-based orchestration and integration with Sagemaker, AutoML etc.
- Helps customer leverage open-source frameworks, models and communities.

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LX2160A: Applications Examples



Unmanned Vehicles



Industrial



Broadcast Video



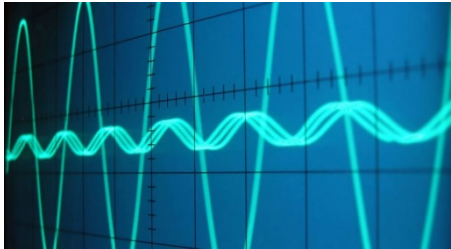
Storage



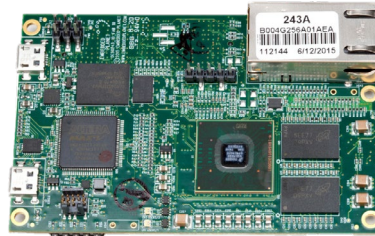
DPI, Firewall, VPN



Test & Measurement



Embedded Boards



Aerospace



Satellite Comm Equip



Networking



5G



Smart Grid



Digital Cinema



Production Printers



Modular Computers



+MORE everyday

LX2160 Family of Devices

LX21xxA Family

LX2160A

- 16x A72
- 8 MB Cache
- 6x PCIe Gen4
- 2x DDR4 3200 MT/s
- 130Gbps, 2x 40/50/100GE + 16x 1/2.5/10/25GE WRIOP
- 50 Gbps SEC
- 100 Gbps DCE
- 30W Thermal VDD power

LX2120A

- 12x A72
- 6 MB Cache
- 6x PCIe Gen4
- 2x DDR4 3200 MT/s
- 130Gbps, 2x 40/50/100GE + 16x 1/2.5/10/25GE WRIOP
- 50 Gbps SEC
- 100 Gbps DCE
- 27W Thermal VDD power
-

LX2080A

- 8x A72
- 8 MB Cache
- 6x PCIe Gen4
- 2x DDR4 3200 MT/s
- 130Gbps, 2x 40/50/100GE + 16x 1/2.5/10/25GE WRIOP
- 50 Gbps SEC
- 100 Gbps DCE250W Thermal VDD power

Core Complex

A72	A72	A72	A72	A72	A72	A72	A72	72-bit (64-bit with ECC) Memory Controller
A72	A72	A72	A72	A72	A72	A72	A72	
1 MB L2 Cache	1 MB L2 Cache	1 MB L2 Cache	1 MB L2 Cache	1 MB L2 Cache	1 MB L2 Cache	1 MB L2 Cache	1 MB L2 Cache	72-bit (64-bit with ECC) Memory Controller

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A72	A72	A72	A72	A72	A72	
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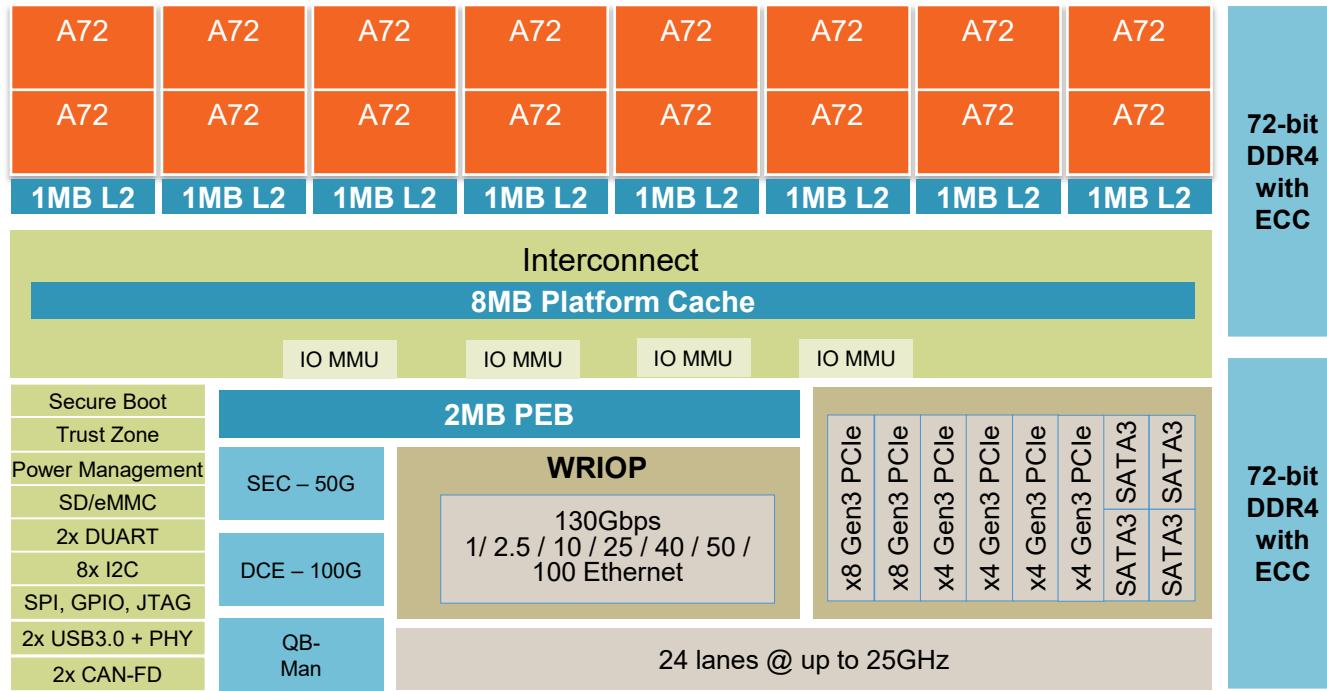
Core Complex

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A72	A72	A72	A72					
1 MB L2 Cache	1 MB L2 Cache	1 MB L2 Cache	1 MB L2 Cache	1 MB L2 Cache	1 MB L2 Cache	1 MB L2 Cache	1 MB L2 Cache	72-bit (64-bit with ECC) Memory Controller

	LX2160A	LX2120A	LX2080A
Cores	16	12	8
L2	8	6	8
SerDes	24		
PCIe	6x Gen4		
DDR	2x DDR4 3200MT/s		
Plat \$ + PEB	10MB		
WRIOP	130Gbps, 2x 40/50/100GE + 16x 1/2.5/10/25GE		
SEC	50Gbps		
DCE	50Gbps		
Package	40 x 40 mm, 1517 pins		
Thermal power, 105C, 2.2GHz	31	29	27

Cores	Device
16-core	LX2160A
12-core	LX2120A
8-core	LX2080A

LX2160A



General Purpose Processing Layer

- 16 ARMv8.0 A72 CPUs, 64b, 2.2GHz
 - 1MB L2 cache / cluster
 - 8 Clusters
- Neon SIMD in all CPUs
- 800MHz Interconnect

Memory

- 2x72b (including ECC) DDR4 up to 3.2GT/s, up to 256GB total capacity
- 8MB Platform Cache
- 2MB packet buffer (PEB)

Accelerated Packet Processing

- QMan for QoS
- 50Gb/s SEC
- 100Gb/s Data Compression Engine (50 Compress + 50 Decompress)

High Speed Serial IO

- 6x PCIe Gen3 controllers
 - x8, x8, x4, x4, x4, x4 Gen3
 - 2 with SR-IOV
- 2x USB 3.0 with PHY
- 24 SerDes lanes: 8 up to 25GHz and 16 up to 16GHz
- 4x SATA3

Device

- 16nm FinFET Compact
- 40 x 40 mm, 1mm pitch, 1517 pins
- 25W VDD (thermal) at 105C at 2.0GHz
- AEC-Q100 Grade 3 reliability stresses

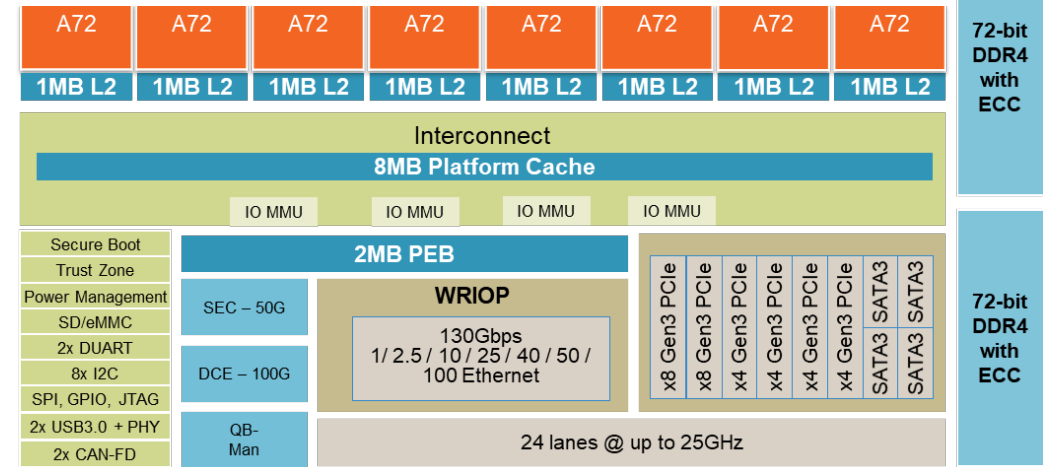
Network IO

- Wire Rate IO Processor:
- L2 switch with 1G, 2.5G, 10G, 25G, 40G, 50G, 100G
 - MACSec on 4x 10GE
 - Priority Flow Control (802.1Qbb)
 - 1588 timestamping, SyncE
 - 2x RGMII

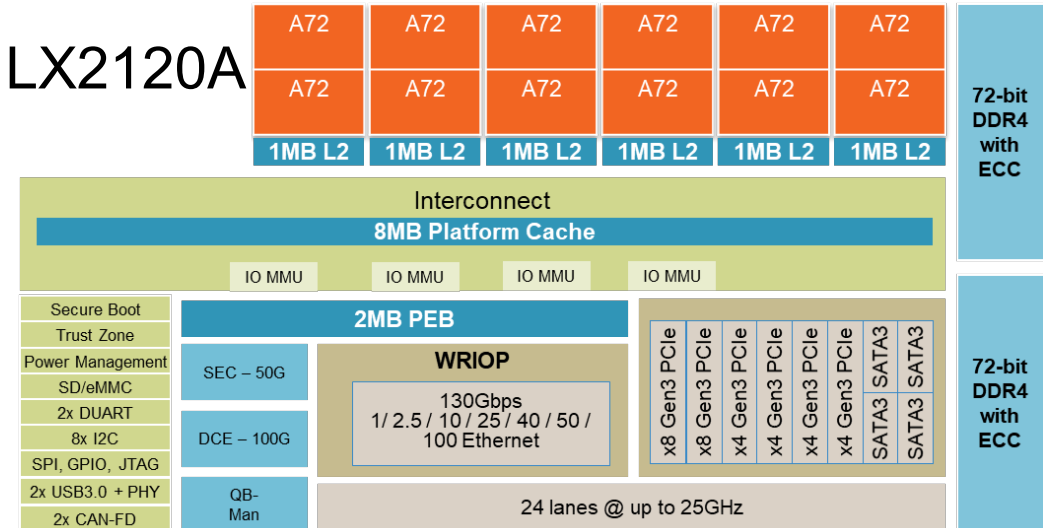
LX2120A and LX2080A

	LX2160A	LX2120A	LX2080A
Cores	16	12	8
L2	8	6	8
SerDes	24		
PCIe	6x Gen3		
DDR	2x DDR4 3200MT/s		
Plat \$ + PEB	10MB		
WRIOP	130Gbps, 2x 40/50/100GE + 16x 1/2.5/10/25GE		
SEC	50Gbps		
DCE	100Gbps		
Package	40 x 40 mm, 1517 pins		
Thermal VDD power, 105C, 2.0GHz	25	23	20

LX2080A



LX2120A



LX2160 SerDes Table – Choose each bank independently

SERDES1 (x8)							
0	1	2	3	4	5	6	7
H	G	F	E	D	C	B	A
1	PCIe.1 x4			PCIe.2 x4			
2	SGMII.3	SGMII.4	SGMII.5	SGMII.6	PCIe.2 x4		
3	USXGMII / XFI.3	USXGMII / XFI.4	USXGMII / XFI.5	USXGMII / XFI.6	PCIe.2 x4		
4	SGMII.3	SGMII.4	SGMII.5	SGMII.6	SGMII.7	SGMII.8	SGMII.9
5	PCIe.1 x4			USXGMII / XFI.7	USXGMII / XFI.8	USXGMII / XFI.9	USXGMII / XFI.10
6	USXGMII / XFI.3	USXGMII / XFI.4	SGMII.5	SGMII.6	SGMII.7	SGMII.8	SGMII.9
7	USXGMII / XFI.3	USXGMII / XFI.4	USXGMII / XFI.5	USXGMII / XFI.6	SGMII.7	SGMII.8	SGMII.9
8	USXGMII / XFI.3	USXGMII / XFI.4	USXGMII / XFI.5	USXGMII / XFI.6	USXGMII / XFI.7	USXGMII / XFI.8	USXGMII / XFI.9
9	PCIe.1 x1	SGMII.4	SGMII.5	SGMII.6	PCIe.2 x1	SGMII.8	SGMII.9
10	PCIe.1 x1 (gen 1,2)	USXGMII / XFI.4	USXGMII / XFI.5	USXGMII / XFI.6	PCIe.2 x1 (gen 1,2)	USXGMII / XFI.8	USXGMII / XFI.9
11	PCIe.1 x2	SGMII.5	SGMII.6	PCIe.2 x2		SGMII.9	SGMII.10
12	PCIe.1 x4			PCIe.2 x2			
13	100GE.1			100GE.2			
14	100GE.1			PCIe.2 x4			
15	50GE.1		50GE.2		PCIe.2 x4		
16	50GE.1		25GE.5	25GE.6	PCIe.2 x4		
17	25GE.3	25GE.4	25GE.5	25GE.6	PCIe.2 x4		
18	USXGMII / XFI.3	USXGMII / XFI.4	25GE.5	25GE.6	USXGMII / XFI.7	USXGMII / XFI.8	USXGMII / XFI.9
19	USXGMII / XFI.3	USXGMII / XFI.4	25GE.5	25GE.6	40GE.2		
20	40GE.1			40GE.2			
21	25GE.3	25GE.4	25GE.5	25GE.6	PCIe.2 x2		25GE.9
22	USXGMII / XFI.3	USXGMII / XFI.4	USXGMII / XFI.5	USXGMII / XFI.6	PCIe.2 x2		USXGMII / XFI.9

SERDES2 (x8)							
0	1	2	3	4	5	6	7
A	B	C	D	E	F	G	H
1	PCIe.3 x2 (gen1, Gen2)		SATA.1	SATA.2	PCIe.4 x4 (gen 1,2)		
2	PCIe.3 x8						
3	PCIe.3 x4			PCIe.4 x4			
4	PCIe.3 x4 (gen 1,2)			PCIe.4 x2 (gen 1,2)		SATA.1	SATA.2
5	PCIe.3 x4			SATA.3	SATA.4	SATA.1	SATA.2
6	PCIe.3 x4 (gen 1,2)			SGMII.15	SGMII.16	USXGMII / XFI.13	USXGMII / XFI.14
7	PCIe.3 x1 (gen1, 2)	SGMII.12	SGMII.17	SGMII.18	PCIe.4 x1 (gen 1,2)	SGMII.16	USXGMII / XFI.13
8	X	X	SATA.1	SATA.2	SATA.3	SATA.4	USXGMII / XFI.13
9	SGMII.11	SGMII.12	SGMII.17	SGMII.18	SGMII.15	SGMII.16	SGMII.13
10	SGMII.11	SGMII.12	SGMII.17	SGMII.18	PCIe.4 x4		
11	PCIe.3 x1	SGMII.10	SGMII.17	SGMII.18	PCIe.4 x1	SGMII.16	SGMII.13
12	SGMII.11	SGMII.12	SGMII.17	SGMII.18	PCIe.4 x2 (gen 1,2)		SATA1
13	PCIe.3 x4			PCIe.4 x2		SGMII.13	SGMII.14
14	PCIe.3 x2		SGMII.17	SGMII.18	PCIe.4 x2		SGMII.13

SERDES3 (x8)							
0	1	2	3	4	5	6	7
A	B	C	D	E	F	G	H
1	PCIe.5 x8						
2	PCIe.5 x4			PCIe.6 x4			

SolidRun's CEx7 LX2K Computer-on-Module based on the COM Express Type 7 form factor was designed to provide a robust and modular networking computing platform. The CEx7 LX2K features extended processing power, connectivity options and high-end networking capabilities.

Key Features

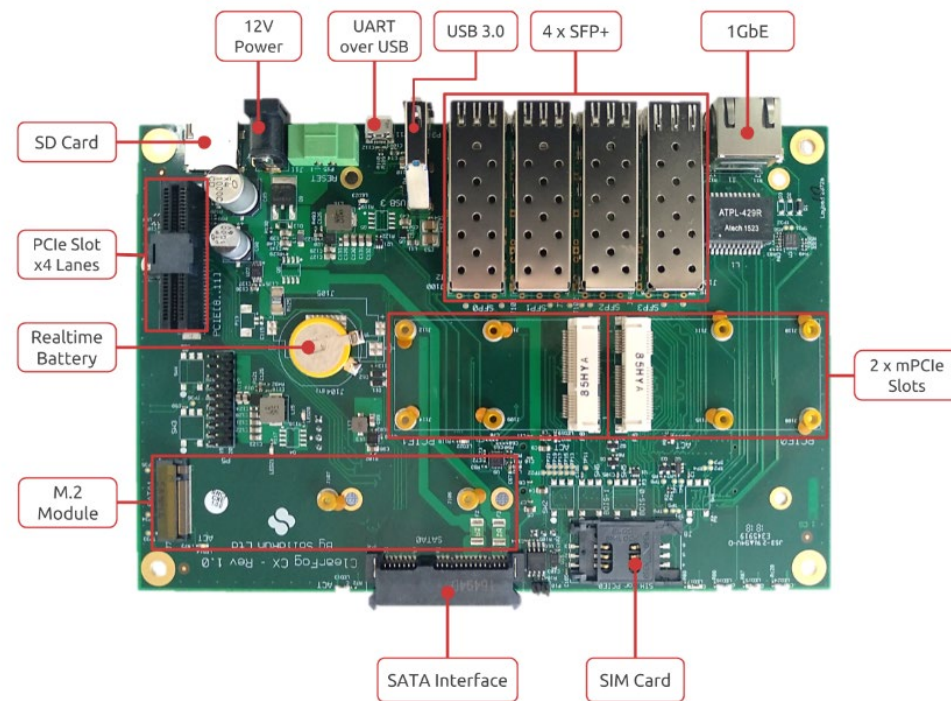
- COM Express type 7 form factor (125mm x 95mm)
- NXP LX2160A 16 core Arm Cortex-A72 (2.2GHz)
- Up to 100GbE with integrated 130Gbps Layer 2 Ethernet switch
- Dual Channel 64-bit DDR4 3200 (up to 64GB)
- Network function virtualization
- 5G packet processing
- 100Gbps data compression/decompression engine
- 18 lanes across 5 PCIe controllers (up to 4 lanes each)
- 2 x SATA
- 2 x USB 3.0



ClearFog CX is a robust embedded platform designed for the COM Express type 7 form factor – offering a flexible and feature-rich carrier for the LX2160A COM. This carrier board features an array of 4 x 10GbE SFP+ connections and 1GbE RJ45 interface.

Key Features

- COM Express type 7 carrier board (basic) form factor
- Low cost, small sized production level board
- 4 x 10GbE via SFP+
- 1 x 1GbE via copper (RJ45)
- M.2 2240/2280 slot, 1 lane (SATA)
- PCIe slot, 4 lanes
- 2 x mPCIe
- Micro SD card slot
- Secondary 64Mb SPI memory
- UART over MicroUSB interface for Debug



Networking Software and Systems

Complete project lifecycle capability

Planning	Development			Production
Pre-project	Tools+	Runtime SW	Service & Support	Post-project
<ul style="list-style-type: none"> Consulting <ul style="list-style-type: none"> Architecture Security Project Planning Software Discovery Training Proof of Concept <ul style="list-style-type: none"> Hardware Software Customized demos Advanced simulation Algorithm development 	<ul style="list-style-type: none"> CodeWarrior <ul style="list-style-type: none"> IDE Debug Compiler Trace DDR Validation SerDes Validation Simulation Hardware Platform <ul style="list-style-type: none"> Schematics Layouts Thermal/RF Manufacture <p>nxp.com/cw4net</p>	<ul style="list-style-type: none"> Complete Applications (ASK) <ul style="list-style-type: none"> NAS, BHR, Gateway Middleware (ADK+) <ul style="list-style-type: none"> Security offloads Communications offloads Routing VortiQa Software Products <ul style="list-style-type: none"> SDN Solutions Open networking standards Virtualization Connected Edge Compute Mobile Transport Layer 1 <p>Key Idea: Provide NXP communications requirements - we likely have software</p> <p>nxp.com/vortiqa</p>	<ul style="list-style-type: none"> Support Long Term Yearly Emergency Situations Services Application-Specific Hardening Feature Acceleration WiFi Performance Turnkey SW Services Porting Test outsource Training <p>Key Differentiators: Deep Linux, crypto & trust, communications</p> <p>nxp.com/networking-services</p>	<ul style="list-style-type: none"> Long Term Support Private Branch Support & Maintenance Forward Port/Kernel Refresh

QorIQ

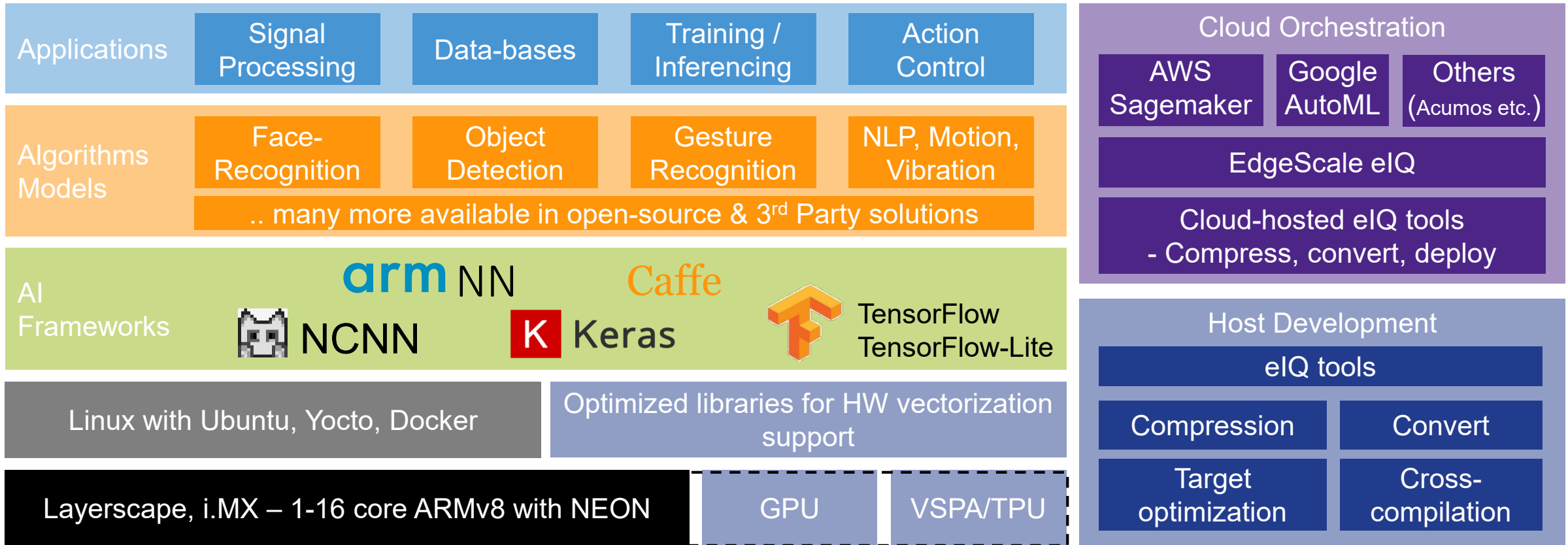
CodeWarrior



VortiQa



Edgescale and eIQ for AI on Layerscape & i.MX



- NXP provides the right enablement for cloud-connected AI/ML applications @ Edge.
- Host-based eIQ tools for model conversion, optimization and target optimization.
- Edgescale leverages eIQ tools for cloud-based orchestration and integration with Sagemaker, AutoML etc.
- Helps customer leverage open-source frameworks, models and communities.

Summary

- NXP has a broad portfolio of processing solutions, well enabled for the demanding smarter edge
- NXP provides the hardware, reference designs, software tools, and services to enable customers to implement Edge computing solution
- LS1046 , LX2160 are available now ! Including in NXP longitivity program
- Demo available in the LAB

Wrap-Up and Q&A





SECURE CONNECTIONS
FOR A SMARTER WORLD

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