

PROCESSORS SOLUTIONS

NOV 2016

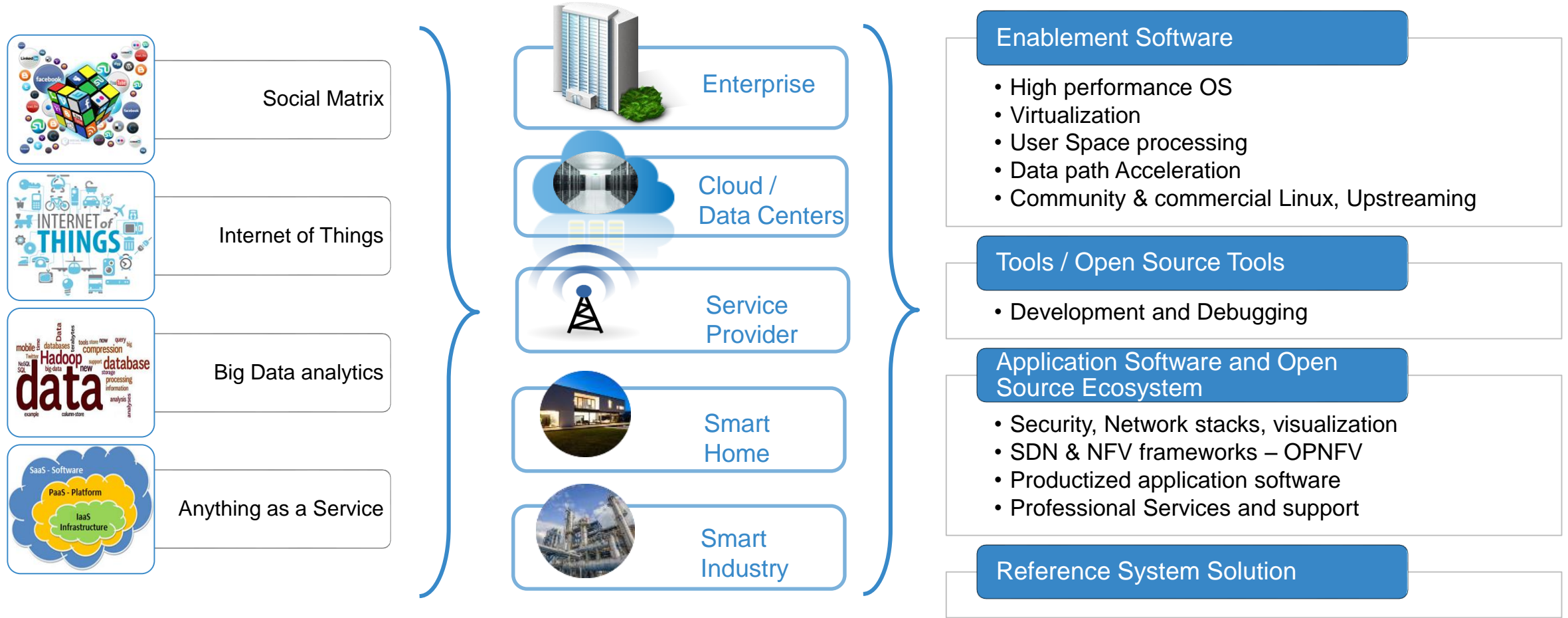


PUBLIC USE



SECURE CONNECTIONS
FOR A SMARTER WORLD

Technology Trends Driving Our HW and SW Roadmap Direction



Leveraging Networking to Drive Expansion in Embedded Technologies



- **Technology leadership in Safety Certification for Multicore**
 - Founder of Multicore for Avionics (MCFA) working group
 - Trust Architecture Users Group (NXP led)
 - Secure, Trustworthy, Assured and Resilient Semiconductors and Systems (STARSS)
- **Product Longevity as a value**
 - Proven commitment to longevity and support
 - 15 year life for T series and Layerscape 28nm devices
- **Real embedded system design focus**
 - Deterministic interconnect for multicore SoCs
 - Focus on minimizing SER, FIT, AE rates for product quality
 - Large temperature ranges for embedded and industrial designs
- **Security, Security and even more Security**
 - Pervasive / Multifaceted
 - Balanced Need

Great Silicon is just the Start



NXP has 1,000+ software engineers, 500+ focused on Digital Networking

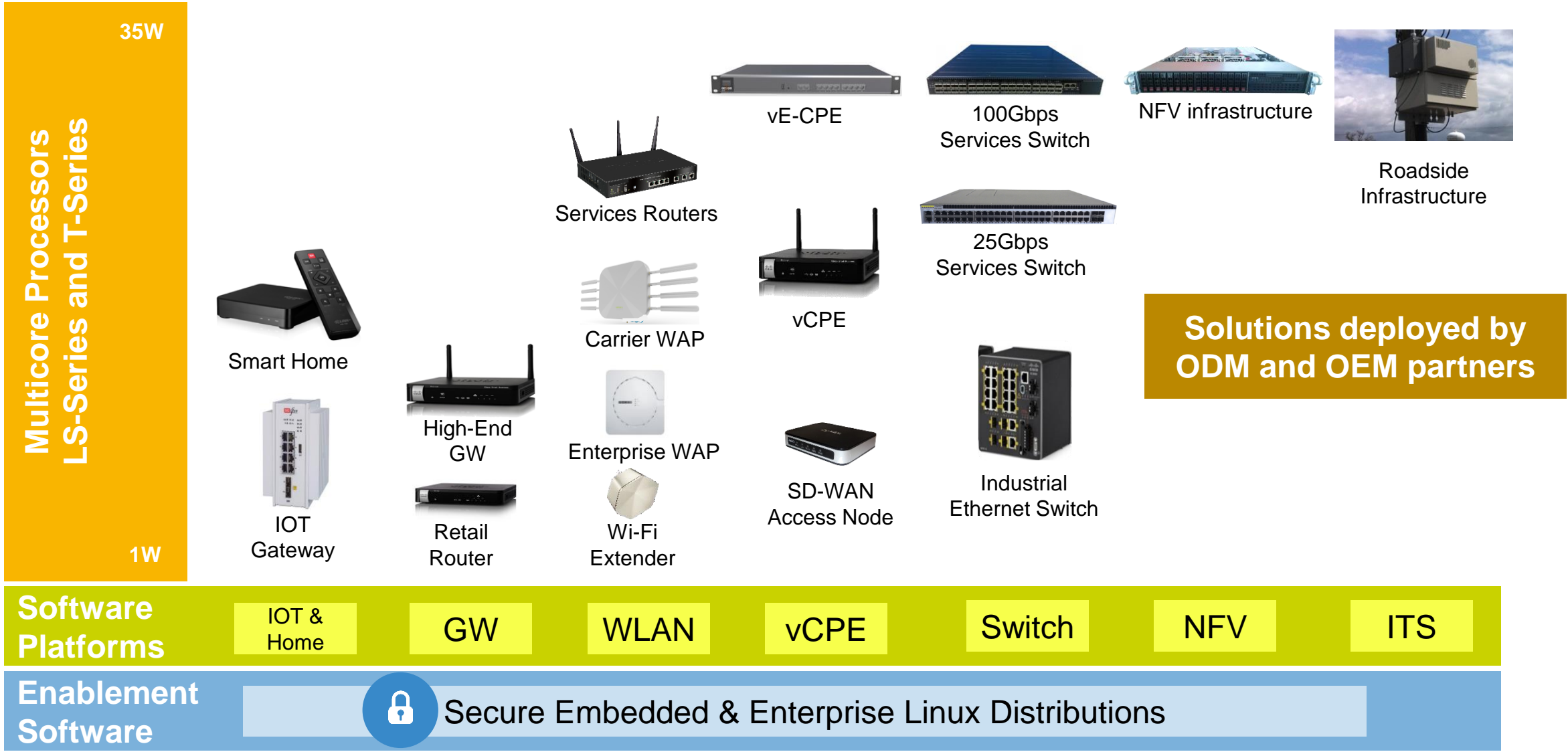
- Increasing investment on software through hiring and acquisition

Networking run-time technologies, multicore, tools, key applications

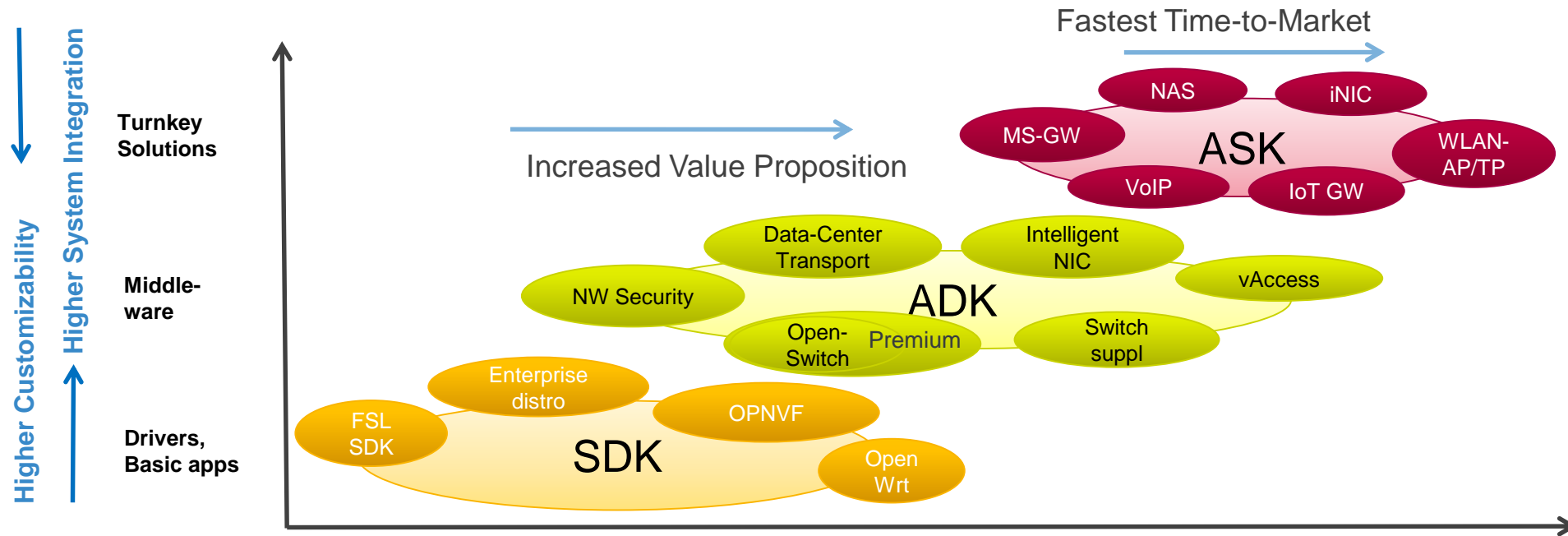
300+ Customer engagements – *Global Successes*

- Traditional Wired and Wireless networks
- Systems Level Products
- Aerospace and Defense
- Multicore, Virtualization, Security, Optimization, Commercial Support

Silicon and Software Provide the Solutions our Customer Require



Software Development and Solution Kits Speed Time to Market



| | Software Development Kit | Application Development Kit | Application Solution Kit |
|-----------------|---|--|---|
| Differentiation | Market Enablement, Optimized Drivers | Customization and Differentiation | Time-to-Market and cost effective dev |
| Baseline | IP Enablement, Standard API, Open-source software | Protocol/Application Differentiation | Solution Deployment |
| Performance | Competitive | Leading | Leading |
| Other | | Non-Standard tool development, customized protocol development | Maintenance & Support, Services Offered (HW as well) |

NXP Turnkey Application Solutions Kits (ASKs)

BHR ASK

- Broadband Home Router
- Security Gateway
- Enterprise Access Points
- Consumer Wireless Access Point
- Mi-Fi
- Home Routers
- VoIP Gateways
- Tiny WiFi
- Small Business Routers
- Mobile Broadband Router
- Integrated Services

NAS ASK

- Network Attached Storage
- Personal Storage
- Wireless Personal Storage
- Chip on Drive
- Media Gateway

IoT ASK

- Smart Home
- Smart Health
- Industrial 4.0
- Smart Grid
- Industrial Gateway

The screenshot shows a web browser window displaying the NXP website. The address bar shows the URL: www.nxp.com/products/software-and-tools/run-time-software/vortiqa-software-for-networking/vortiqa-application-solutions-kits/qorIQ-LS1012A-NAS-ASK. The page features the NXP logo, a navigation menu with 'PRODUCTS', 'APPLICATIONS', 'SUPPORT', and 'ABOUT', and a search bar. The main content area displays the product title: 'QORIQ-LS1012A-NAS-ASK: QorIQ® LS1012A Network Attached Storage Application Solutions Kit'. Below the title are several tabs: 'Overview', 'Documentation', 'Downloads', 'Buy / Specifications', and 'Hardware & Tools'.

Industry-leading Power-based SoC Solutions



Branch Office, Industrial

Enterprise, Campus, Line Cards

Core Network, Cloud Networking, Wireless

T1014

- e5500
- 1 core
- 1.4GHz

T1024

- e5500
- 2 cores
- 1.4GHz

T1022

- e5500
- 2 cores
- 1.5GHz

T1020

- e5500
- 2 cores
- 1.5GHz
- 8-port GE switch

T1042

- e5500
- 4 cores
- 1.5GHz

T1040

- e5500
- 4 cores
- 1.5GHz
- 8-port GE switch

T2081

- e6500
- 8 heavy threads
- 1.8GHz
- 2x10GbE

T2080

- e6500
- 8 heavy threads
- 1.8GHz
- 4x10GbE

T4080

- e6500
- 8 heavy threads
- 1.8GHz
- 2x10GbE, 12x1GE

T4240

- e6500
- 16-24 heavy threads
- 1.8GHz
- 4x10GbE, 12x1GE

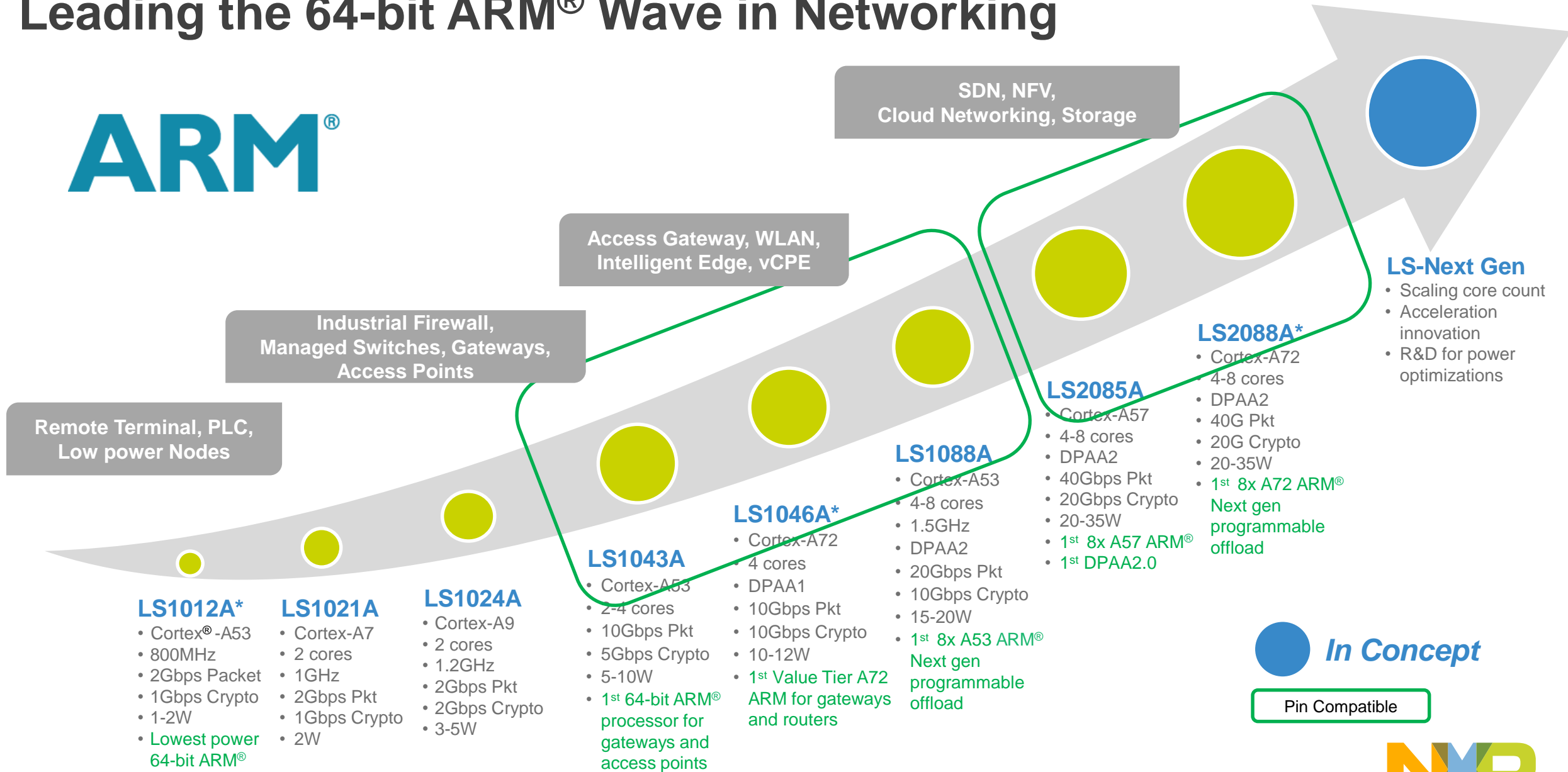
Pin Compatible

The industry's most scalable pin compatible communication processor family

- Scaling from single core to 24 heavy threads
- Power <4W to <25W
- Performance 2 to 40Gbps



Leading the 64-bit ARM® Wave in Networking



Remote Terminal, PLC,
Low power Nodes

Industrial Firewall,
Managed Switches, Gateways,
Access Points

Access Gateway, WLAN,
Intelligent Edge, vCPE

SDN, NFV,
Cloud Networking, Storage

LS1012A*

- Cortex®-A53
- 800MHz
- 2Gbps Packet
- 1Gbps Crypto
- 1-2W
- **Lowest power 64-bit ARM®**

LS1021A

- Cortex-A7
- 2 cores
- 1GHz
- 2Gbps Pkt
- 1Gbps Crypto
- 2W

LS1024A

- Cortex-A9
- 2 cores
- 1.2GHz
- 2Gbps Pkt
- 2Gbps Crypto
- 3-5W

LS1043A

- Cortex-A53
- 2-4 cores
- 10Gbps Pkt
- 5Gbps Crypto
- 5-10W
- **1st 64-bit ARM® processor for gateways and access points**

LS1046A*

- Cortex-A72
- 4 cores
- DPAA1
- 10Gbps Pkt
- 10Gbps Crypto
- 10-12W
- **1st Value Tier A72 ARM for gateways and routers**

LS1088A

- Cortex-A53
- 4-8 cores
- 1.5GHz
- DPAA2
- 20Gbps Pkt
- 10Gbps Crypto
- 15-20W
- **1st 8x A53 ARM® Next gen programmable offload**

LS2085A

- Cortex-A57
- 4-8 cores
- DPAA2
- 40Gbps Pkt
- 20Gbps Crypto
- 20-35W
- **1st 8x A57 ARM® Next gen programmable offload**
- **1st DPAA2.0**

LS2088A*

- Cortex-A72
- 4-8 cores
- DPAA2
- 40G Pkt
- 20G Crypto
- 20-35W
- **1st 8x A72 ARM® Next gen programmable offload**

LS-Next Gen

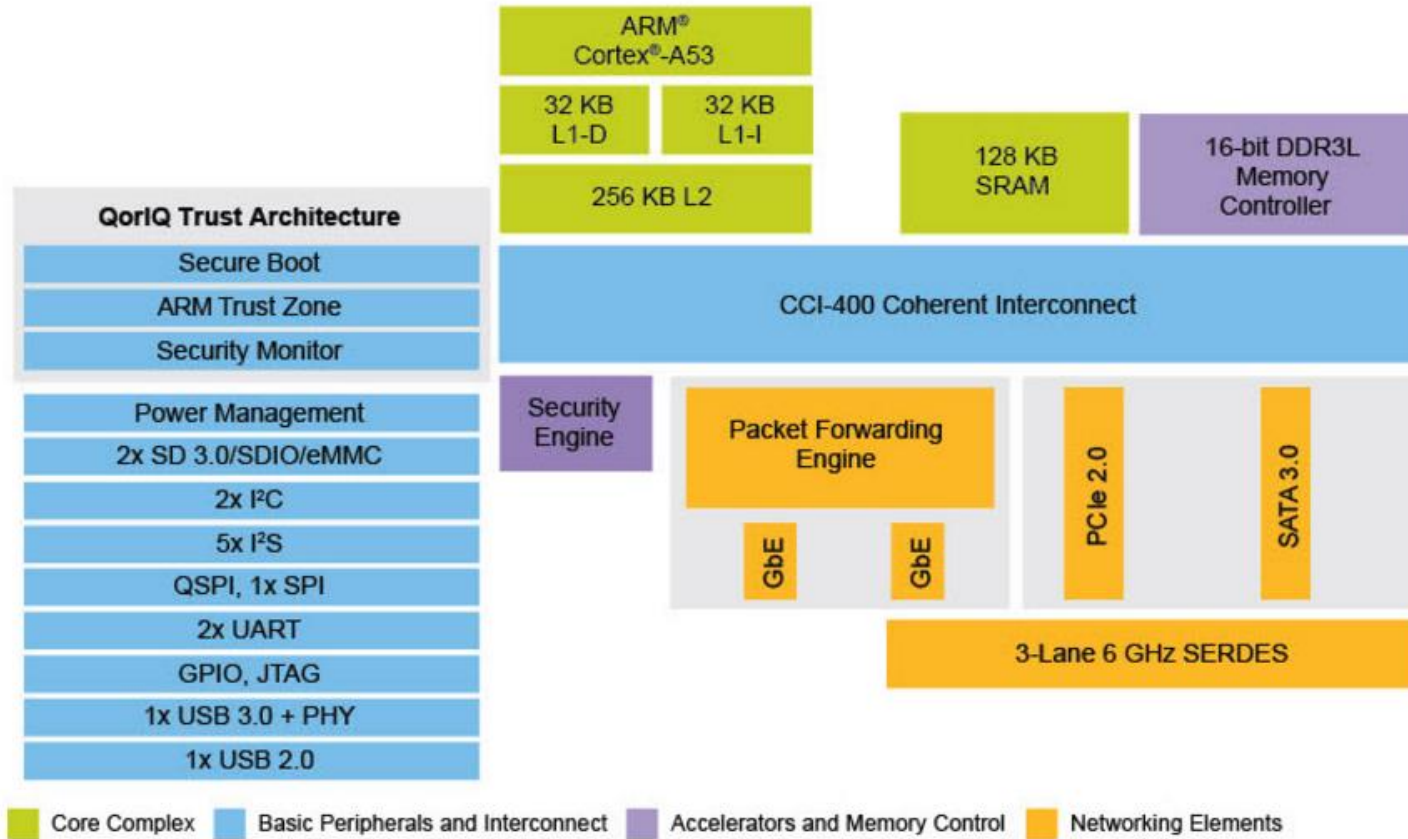
- Scaling core count
- Acceleration innovation
- R&D for power optimizations

In Concept

Pin Compatible



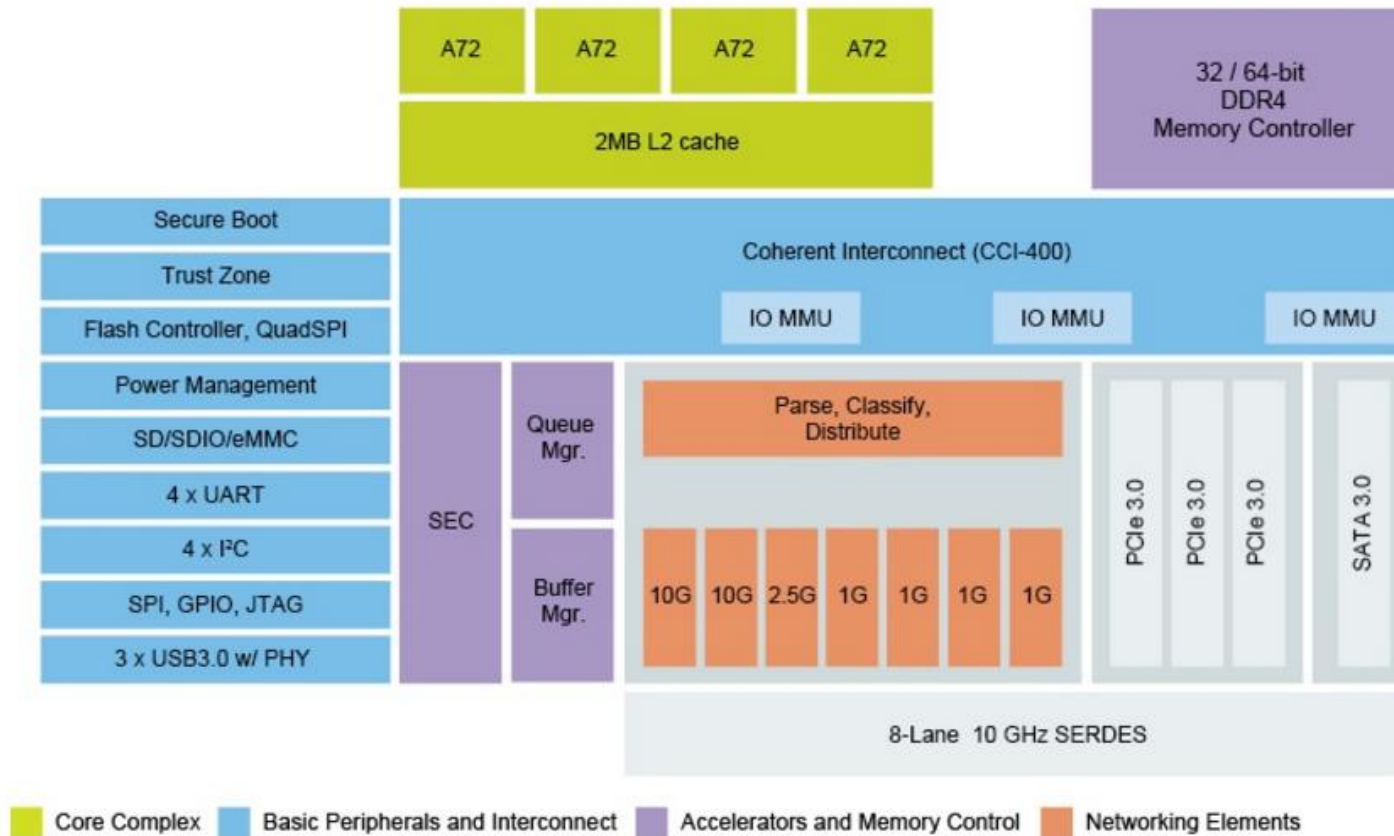
LS1012A Block Diagram



- Single **ARM[®] v8 64-bit Cortex[®]-A53** processor
 - 1840 DMIPS / 2240 Coremark @ 800MHz
 - NEON Co-processor and DP FPU
 - 256 KB L2 cache with ECC
- **DDR Memory Controller**
 - DDR3L up to 500 MHz/1GT/s
 - 16-bit data bus, 2GByte max
- **High Speed Interconnect**
 - 1x PCI Express Gen2 (RC/EP)
 - 1x SATA Gen3
 - 1x USB 3.0 w/PHY
 - 1x USB 2.0 w/ULPI
- **Ethernet Interfaces**
 - 2x GbE 2.5G/1G MACs
 - 1x RGMII, 2xSGMII interfaces
- **Datapath**
 - Packet acceleration engine (PFE)
 - Security acceleration engine (SEC)
- 2x SD 3.0/SDIO/eMMC
- QSPI, 1xSPI, 2xUART, 2xI2C
- 2xI2S, 5xSAI, MDIO
- Secure Boot, Trust Architecture, ARM[®] TrustZone, Security Monitor
- Advanced Power Management, Thermal Diode/Sensor
- Package: 9.6x9.6mm, routable in 4-layers

Lowest power 64-bit ARM

LS1046A Block Diagram



Core & Memory Subsystem

- 4x ARM® Cortex® A72 up to 1.6GHz
- 2MB total L2 cache
- 32/64-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
- 4x 1GbE

Datapath Acceleration

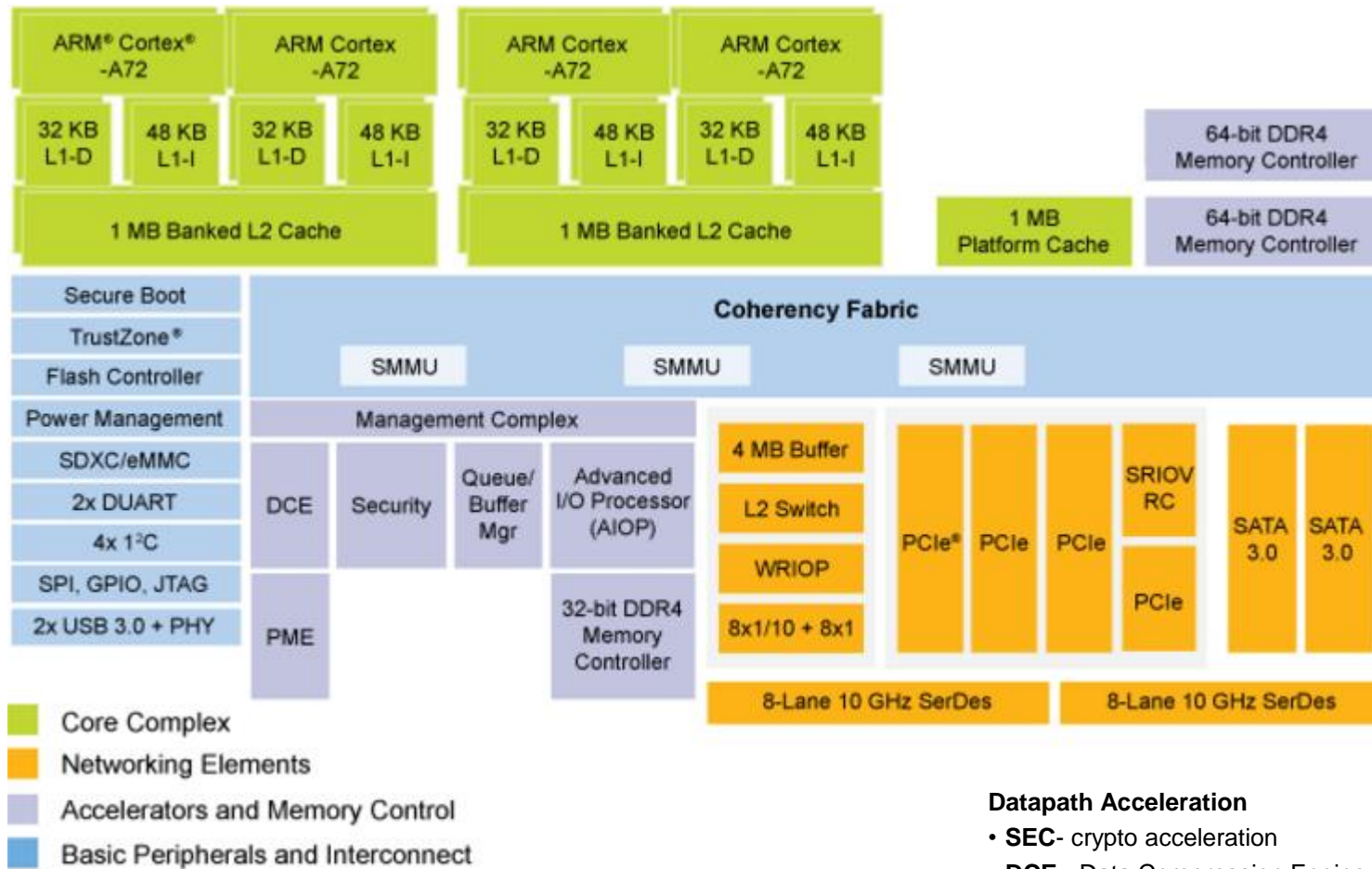
- SEC- crypto acceleration
- Datapath Acceleration Architecture 1.x

Other Parameters

- Package:
-23x23mm, Lidless FCBGA

Leading Quad A72 processor with two 10GbE ports

LS2088A Block Diagram



1st 8x A72 ARM Next gen programmable offload

General Purpose Processing

- 8x ARM® A72 CPUs, 64b, 2.0GHz
 - 1MB L2 cache
- HW L1 & L2 Prefetch Engines
- Neon SIMD in all CPUs
- 1MB L3 platform cache w/ECC
- 4MB Coherent Cache
- 2x64b DDR4 up to 2.4GT/s

Accelerated Packet Processing

- 20Gbps SEC- crypto acceleration
- 10Gbps Pattern Match/RegEx
- 20Gbps Data Compression Engine

Express Packet IO

- Supports 1x8, 4x4, 4x2, 4x1 PCIe Gen3 controllers
 - SR-IOV support, End Point
- 2 x SATA 3.0, 2 x USB 3.0 with PHY
- Network IO
- Wire Rate IO Processor:
 - 8x1/10GbE + 8x1G
 - XAUI/XFI/KR and SGMII
 - MACSec on up to 4x 1/10GbE
- Layer 2 Switch Assist

Other Parametrics

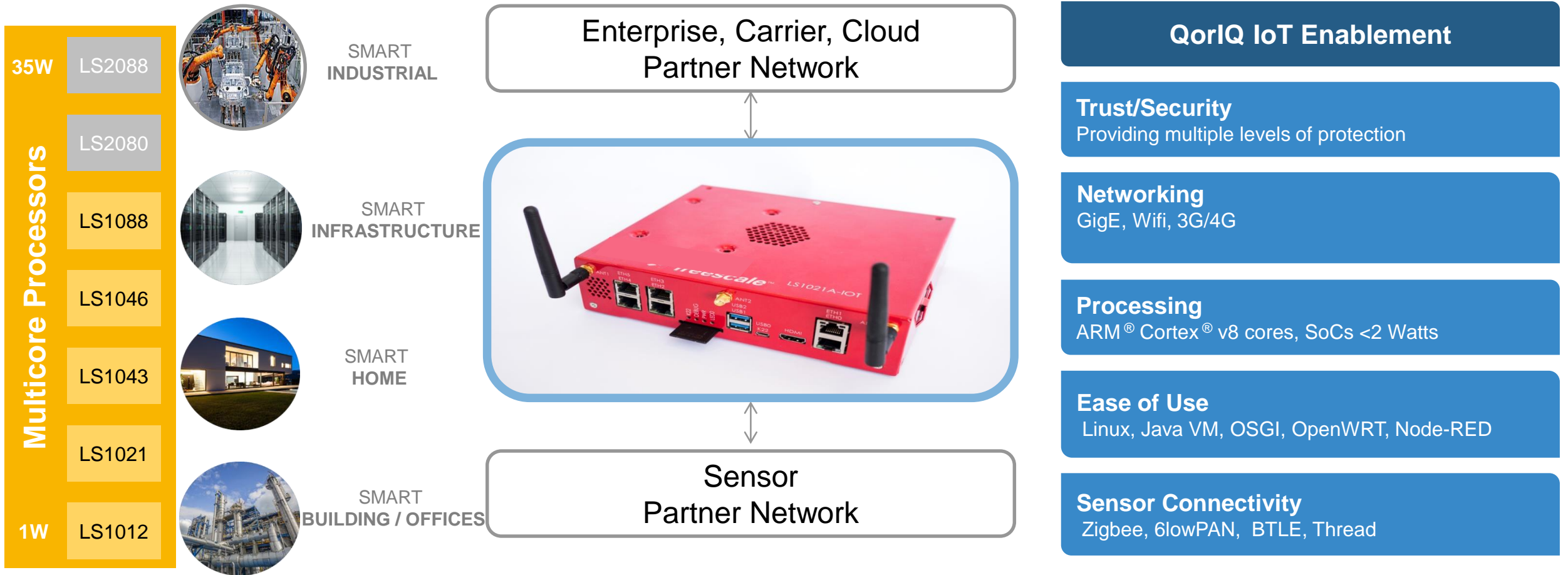
- 37.5x37.5 Flipchip
- 1mm Pitch
- 1292pins

Datath Acceleration

- **SEC**- crypto acceleration
- **DCE** - Data Compression Engine
- **PME** – Pattern Matching Engine
- **L2 Switching** -- via Datath Acceleration Hardware
- **Management Complex** – Configuration Abstraction



NXP IoT Gateway off the shelf solutions



THE ONLY SUPPLIER TO PROVIDE COMPLETE IOT SOLUTIONS



Going Broader in Industrial

T1040 Family

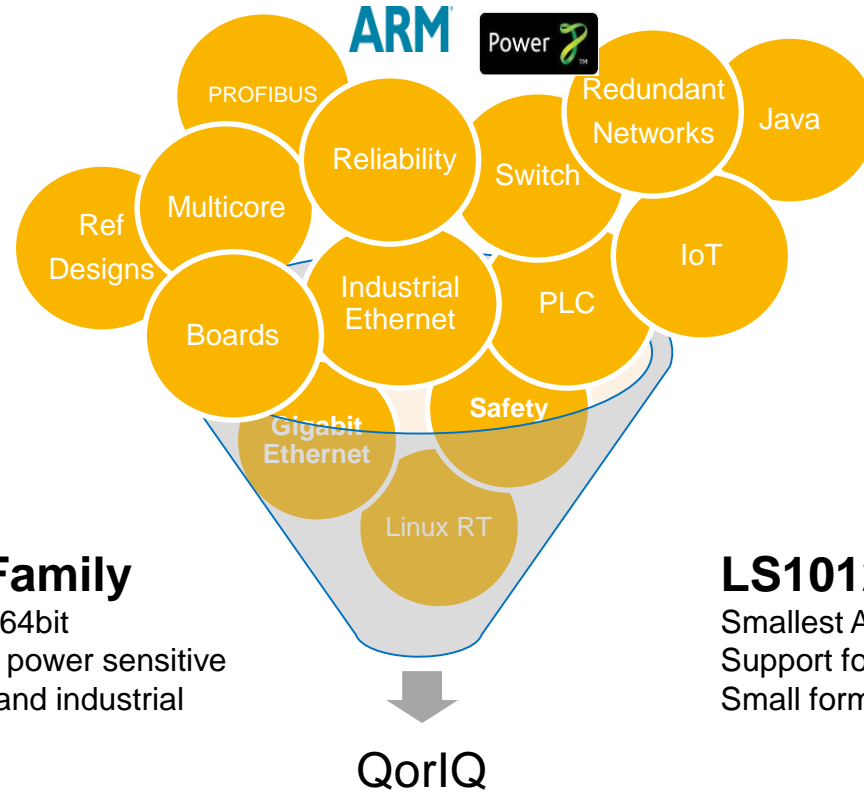
Quad-core power optimized
Gigabit Ethernet Switch

T1024 Family

Leadership performance for WLAN
Unmatched performance efficiency
Acceleration strategy

T1013 Family

Single core 64bit
for cost and power sensitive
networking and industrial
systems



LS1043 & LS1046 Families

A53 scaling to High performance A72 Quad Core
Pin compatibility across two families
Multi-10GbE support – driving adoption in industrial

LS1020A Family

Good performance, great power efficiency
and unmatched integration

LS1012A Family

Smallest ARM® 64bit SoC Solution
Support for advanced 2.5GbE & packet, security engines
Small form factor & Battery powered applications



Power



Factory



Transport



Buildings

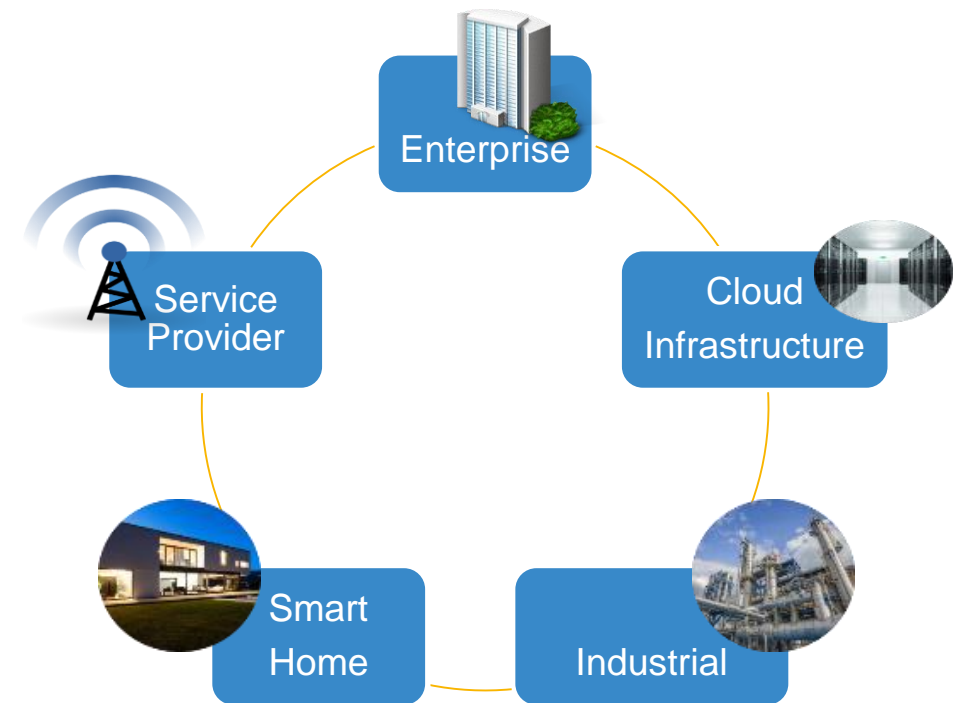


Infrastructure



Summary: NXP Offers the Broadest Processor Solutions Portfolio

- Solutions portfolio enabling the broadest number of market segments spanning Smart Home, Cloud Edge, Service Provider, Enterprise Networking and Industrial
- High-performance multicore solutions that transport, analyze and secure data from the edge of the network to the cloud, in the home, the factory, and the city
- Balanced architecture, broad ecosystem, global support
 - Multicore processing optimized for scalability
 - High performance interfaces
 - Offload for key applications
 - Deterministic performance for real time embedded systems
 - Proven distributed security architecture
 - Longevity and trusted supplier





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FOR A SMARTER WORLD

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