A NEW POSITION OF STRENGTH TO BETTER SERVE OUR CUSTOMERS

✓ #1 Automotive
✓ #1 Broad-Based MCUs¹
✓ #1 Secure Identification
✓ #1 Communications Processors
✓ #1 RF Power Transistors
✓ #1 Small Signal Discretes

SECURE CONNECTIONS FOR A SMARTER WORLD

✓ 5th Largest semiconductor company²
✓ 45,000 employees
✓ 11,000 engineers
✓ 9,000 patent families
✓ 50+ year history
✓ $9.8B annual revenue³

Sources for market data: HIS, ABI Research, Strategy Analytics, The Linley Group
¹MCU market excluding Automotive
²Excludes memory
³Pro forma revenue resulting from Dec 2015 acquisition of Freescale Semiconductor and Nov 2015 divestiture of Bipolar Power business
Accelerating Secular Trends Drive Growth Opportunities

Everything Smart

- 40B+ devices with intelligence shipped in 2020

Everything Connected

- 1B+ additional consumers online, 30B+ connected devices

Everything Secure

- Potential economy savings up to half trillion dollars

Processing

Connectivity

Security
Digital Networking Purpose

Vision

Deliver **Advanced Solutions**
that **Enable** **Secure Infrastructure**
For a Smarter World

Mission

Solve **Customer’s Communication Problems**
with **Cost & Power Efficient**
Silicon & SW Solutions

Focus

**Defend** **Service Provider & Enterprise**

**Grow** **Cloud Edge, IOT Infra & Home Gateway**

**Dominate** **Industrial**
Who is Digital Networking…

Enabling Secure Infrastructure with Cost- & Power-Efficient Solutions and unique expertise

Targeted Solution Segments

- Switch & Control
- Storage
- Gateway
- Cellular & Wi-Fi
- Industrial

Virtualization
Security (Trust & Protocol Acceleration)
Software Solutions and Services
Enabling Customers with Software & Solutions

- Significant investment in Software R&D
  - Over 700 networking software engineers
  - Focus on emerging technologies – SDN, NFV, IoE, 5G
  - Top 10% Company Contributor to kernel.org for the last 7+ years!
  - Field hardened & widely deployed >10 Million copies deployed to date
- Driving ARM64 ecosystem in close collaboration with ARM Inc
- Most mature ARMv8 64-bit Software - hardened over 2 years
- Broad range of software products
- SDK, acceleration kits, middleware, commercial & production-ready SW
- Comprehensive HW+SW solutions for next generation networks
- Professional software services and support
- Active involvement and leadership in consortiums, industry forums and working groups

*Representative customer logos
Security is Everywhere

Trust Architecture

Secure Connections

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Secure Routers

Integrated Security Appliance

Network IDS, IPS, Content Security

Industrial Routers, Switches, Secure IoT Infrastructure

Big Data Application/Action

SDN NFV

Secure Infra

SSL Trust Connectivity

App-Id Trust Connectivity

Anti-X Trust Connectivity

IDS Trust Connectivity

VPN Trust Connectivity

Sensor Trust Connectivity

Firewall Trust Connectivity

Crypto Trust Connectivity

VPN Trust Connectivity

SSL Trust Connectivity

Firewall Trust Connectivity

Crypto Trust Connectivity

Sensor Trust Connectivity

Secure Routers

Gateway

Cloud

Edge Nodes

VPN SSL Crypto Firewall Sensor Connectivity

VPN SSL IDS App-Id Connectivity

SDN NFV Secure Infra
NXP Has a 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
How NXP brings Differentiation to Virtualization

- **Virtual Machine**: ARMv8, SMMU, KVM, DPDK
- **Virtual Ethernet**: Networking, Accelerators
- **Virtual Crypto**: Soft Data-path – ARMv8
- **Virtual Switching**: Resource Management
- **Ethernet**: Standard Network interfaces and Accelerators
- **Crypto**: Programmable Data-path provides virtual I/O and networking in Hardware
- **PCIE**: Standard ARMv8 cores with common eco-system

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**Other ARMv8 SoC vendors**

**NXP LS-series**
Layerscape Compute Virtualization
Scalable virtualization technology for the deeply embedded network edge

- **KVM** Linux® kernel driver to spin up VMs
- QEMU user space emulator is used in conjunction with KVM
- Solution is open source
- Virtual machines is only limited by particular SoC resources (CPU cycles, memory)

- **Linux® Containers**, OS level virtualization – Docker®, LXC
  - Secure partitioning of Linux apps into domains
  - Lightweight overhead compared to KVM
  - Control resource utilization within domains such as CPU, I/O BW

Deployed with Cloud Orchestration
Supply 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

- **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**
The industry’s most scalable pin compatible communication processor family

- **T1014**
  - e5500
  - 1 core
  - 1.4GHz

- **T1024**
  - e5500
  - 2 cores
  - 1.4GHz

- **T1022**
  - e5500
  - 2 cores
  - 1.5GHz

- **T1020**
  - e5500
  - 4 cores
  - 1.5GHz
  - 8-port GE switch

- **T1042**
  - e5500
  - 4 cores
  - 1.5GHz

- **T1040**
  - e5500
  - 8 heavy threads
  - 1.8GHz
  - 8-port GE switch
  - 2x10GbE

- **T2081**
  - e6500
  - 8 heavy threads
  - 1.8GHz
  - 2x10GbE, 12x1GE

- **T2080**
  - e6500
  - 8 heavy threads
  - 1.8GHz
  - 4x10GbE, 12x1GE

- **T4080**
  - e6500
  - 16-24 heavy threads
  - 1.8GHz
  - 4x10GbE, 12x1GE

- **T4240**
  - e6500
  - 16-24 heavy threads
  - 1.8GHz
  - 4x10GbE, 12x1GE

- **T1040**
  - e5500
  - 4 cores
  - 1.5GHz
  - 8-port GE switch

- **T4240**
  - e6500
  - 16-24 heavy threads
  - 1.8GHz
  - 4x10GbE, 12x1GE

- **Branch Office, Industrial**
  - e5500
  - 2 cores
  - 1.5GHz
  - 8-port GE switch

- **Enterprise, Campus, Line Cards**
  - e5500
  - 4 cores
  - 1.5GHz
  - 8-port GE switch

- **Core Network, Cloud Networking, Wireless**
  - e6500
  - 8 heavy threads
  - 1.8GHz
  - 2x10GbE

- **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
<table>
<thead>
<tr>
<th></th>
<th>P1020, P1011, P1021, P1012</th>
<th>P2020/P2010</th>
<th>T1020</th>
<th>T1022</th>
<th>T1040</th>
<th>T1042</th>
<th>T2081</th>
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<tbody>
<tr>
<td><strong>CPU</strong></td>
<td>1 to 2 e500, Up to 1200MHz</td>
<td>2 e5500, 32K I/D</td>
<td>2 e5500</td>
<td>4 e5500</td>
<td>4 e5500</td>
<td>4 e5500</td>
<td>4 e6500/8 threads</td>
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<td>1 to 2 e500, Up to 1200MHz</td>
<td>32K I/D</td>
<td>1200-1400MHz</td>
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<td>1500 - 1800MHz</td>
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<td>1500-1800MHz</td>
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<td>256KB/512KB</td>
<td>32K I/D</td>
<td>800MHz</td>
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<td>32K I/D</td>
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<td><strong>DDR I/F Type/Width</strong></td>
<td>DDR2/3 16/32-bit, 800MHz</td>
<td>DDR3L/4 32/64-bit, 1600MT/s</td>
<td>256KB/512KB/8</td>
<td>DDR3L/4 32/64-bit, 1600MT/s</td>
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<td>256KB/512KB/8</td>
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<td><strong>10/100/1000 Ethernet (with IEEE1588v2)</strong></td>
<td>3 x 10/100/1000</td>
<td>8-Port GE Switch &amp; 4 x 10/100/1000</td>
<td>3 x 10/100/1000</td>
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<td><strong>TDM</strong></td>
<td>Yes</td>
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<td><strong>QUICC Engine</strong></td>
<td>In P1021/12</td>
<td>Yes</td>
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<td><strong>SATA</strong></td>
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<td>2 controller</td>
<td>1.5 or 3Gbaud</td>
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<td>2 with PHY</td>
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<td><strong>Accelerators</strong></td>
<td>SEC3.3</td>
<td>DPAA, PME SECC.x with Trust Architecture</td>
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<td>DPAA, PME SECC.x with Trust Architecture</td>
<td>DPAA, PME SECC.x with Trust Architecture</td>
<td>DPAA, PME, DCE, SEC5.2 with Trust Architecture</td>
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<td><strong>Power Management</strong></td>
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<td>Power Management with Deepsleep</td>
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**Product Matrix**
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<thead>
<tr>
<th>Processor Type</th>
<th>Core Count</th>
<th>Clock Speed</th>
<th>Features</th>
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<tbody>
<tr>
<td>Cortex™-A53</td>
<td>2 cores</td>
<td>2Gbps Pkt</td>
<td>TSN and GPU for Industrial IoT</td>
</tr>
<tr>
<td>Cortex™-A7</td>
<td>2 cores</td>
<td>2Gbps Pkt</td>
<td>Cortex-v8 2-4 cores 10Gbps Pkt 5Gbps Crypto</td>
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<tr>
<td>Cortex™-v8</td>
<td>2-4 cores</td>
<td>10Gbps Pkt</td>
<td>TSN Ethernet Switch Wireless</td>
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<tr>
<td>Cortex-A72</td>
<td>4-8 cores</td>
<td>20Gbps Pkt</td>
<td>1st Value Tier A72 ARM ® processor for gateways and access points</td>
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<td>Cortex-A9</td>
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<td>2Gbps Pkt</td>
<td>Cortex-v8 2-4 cores 10Gbps Pkt 5Gbps Crypto</td>
</tr>
<tr>
<td>Cortex-A72</td>
<td>8-24 cores</td>
<td>100Gbps Pkt</td>
<td>Cortex-A72 8-24 cores 40G Pkt 20G Crypto</td>
</tr>
<tr>
<td>Cortex-A72</td>
<td>4-8 cores</td>
<td>10Gbps Pkt</td>
<td>Cortex-A72 8-24 cores 40G Pkt 20G Crypto</td>
</tr>
<tr>
<td>Cortex-A9</td>
<td>2 cores</td>
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<td>8-24 cores</td>
<td>100Gbps Pkt</td>
<td>Cortex-A72 8-24 cores 40G Pkt 20G Crypto</td>
</tr>
</tbody>
</table>
Expanding ARM-based Portfolio

- Comprehensive portfolio of 32-bit/64-bit ARM processor

- Pin compatible two to 8-core devices
  - A53 and A72 solutions for scalable performance/watt
  - Integrated Pixel processing and network/data processing
  - Video transcoding
  - Advanced I/O Processor (AIOP) for programmable packet forwarding

- Single-core 64-bit ARM
  - Less than 1W to support battery powered applications
  - PCIe, USB3.0, SATA3.0, 2.5GbE
  - Enables Low-cost 4-layer PCB
  - Small footprint 10mmx10mm
CoreMark and Dhrystone

- Core Performance
  - All numbers are 64b and are actual measured numbers either on silicon or on emulator (unless otherwise indicated)

<table>
<thead>
<tr>
<th>64b</th>
<th>e5500 T1042</th>
<th>A53 LS1043A</th>
<th>A57 LS2080A</th>
<th>A72 LS1046A</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoreMark / MHz -O3 with flag mining</td>
<td>3.84</td>
<td>4.18</td>
<td>5.74</td>
<td>6.37</td>
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<tr>
<td>Dhrystone / MHz</td>
<td>3.39</td>
<td>3.06</td>
<td>5.87</td>
<td>6.1</td>
</tr>
<tr>
<td>SpecINT2006 / GHz</td>
<td>3.2</td>
<td>3.7</td>
<td>6.1</td>
<td>7.07*</td>
</tr>
</tbody>
</table>
NEW

- Single ARM Cortex-A53 processor
  - 1840 DMIPS / 2240 Coremark @ 800MHz
  - NEON Co-processor and DP FPU
  - 256 KB L2 cache with ECC
- Memory Controller
  - DDR3L up to 1000 MHz
  - 16-bit data bus, 1 chip select
- High Speed Interconnect
  - 1x PCI Express Gen2
  - 1x SATA Gen3
  - 1x USB 3.0 w/PHY
  - 1x USB 2.0 w/ULPI
- Ethernet Packet Accelerator
  - 2x GbE (2.5G or 1G)
- Datapath
  - Packet Acceleration Engine (PPFE)
  - Security acceleration engine (SEC)
  - 2x SD 3.0/SDIO/eMMC
  - QSPI, 1x SPI, 2x UART, 2x I2C
  - 2x I2S, 5x SAI
  - Secure Boot, Trust Architecture, ARM TrustZone
  - Advanced Power Management
  - Package: 10x10mm, routable in 4-layers

LS1012A Block Diagram
LS1012A: Lethal Combination!

- 64b ARM CPU
- 1W Low Power
- <$10 Price Point
- Extreme connectivity
  - USB 3.0
  - 1Gig / 2.5Gig Ethernet
  - SATA 3 6Gb/s
  - PCIe 2.0
- Network-Class Security & Application Software
  - Networking Kit
  - Wireless Kit
  - Storage Kit

Low W + Low $ + Fast I/O + SW = Fastest Time to $$

I/O

For Maximum Flexibility

<$10 price point

1W for lowest BOM cost

Low W + Low $ + Fast I/O + SW = Fastest Time to $$

Network-Class Security & Application Software

- Networking Kit
- Wireless Kit
- Storage Kit

For Maximum Flexibility

<$10 price point

1W for lowest BOM cost
NEW APPLICATIONS MADE POSSIBLE WITH THE LS1012A

Better home automation & security
Higher performance, battery-backed aggregation

Ethernet Drives
Enable scale-out data storage

Consumer NAS
Value tier IOT gateway
Battery Powered Mobile NAS
Entry BB Ethernet Gateway
Trusted Gateway
Industrial Automation & Control
Building Control systems
Ethernet Drives
Networked Audio

Portable Wireless Storage
On the go access to Terabytes of data

Industrial IoT
Making high-speed low-power networks pervasive
LS1012A: Success Story

**VoIP gateway**

**Challenge:**
- Low power VoIP gateway
  - Supporting multi channel VoIP Codec
  - <2W
  - <$10 CPU
  - Scalable for future

**Solution:**
- LS1012A + SW Application Kit for VoIP offload and lowest power

**Tiny Home WiFi**

**Challenge:**
- Design smart Home WiFi
  - with 100’s Mbps WiFi
  - Plus routing
  - Plus security
  - Small consumer form factor
    - no fan
    - no heatsink

**Solution:**
- LS1012A + SW Application Kit delivers unmatched WiFi performance at the best competitive power.

**Portable Storage**

**Challenge:**
- Create consumer WiFi NAS
  - Tiny, portable form factor
  - Supports SSD storage
  - Batter powered system

**Solution:**
- LS1012A + SW Application Kit delivers unmatched 1Gbps WiFi & 100MB/s storage performance at <2W.
Leading in the Value Tier: Power Efficient QorIQ LS1043A

Data path Acceleration
- SEC- crypto acceleration
- L2/3 & Custom Classification
- Tunnel Header Offload
- Reassembly
- Traffic Management & Shaping

Processor
- 4x A53, 64b, up to 1.5GHz
- 1MB L2 cache shared by all cores (and platform elements)

Memory Subsystem
- 32b DDR3L/4 Controller up to 1600MHz

CCI-400 Switch Fabric
- Advanced VM hardware support

High Speed Serial IO
- 3x PCIe Gen2 Controllers
- 1x SATA 3.0, 6Gb/s
- 3x USB 3.0 with PHY

Network IO
- 1x10G + QSGMII or 3x 1/2.5G SGMII + 2x 1G RGMII
- Proven Packet Parse/Classify/Distribute
- Up to 2.5Gbps IMIX
- IPSec, GRE, CAPWAP, DTLS Offload
- Lossless Flow Control

Device
- 28HPM Process
- FCBPGA, 0.8mm pitch

Power target
- 6-9W

Industry’s most efficient quad core communications SoC solution
Leadership 10Gbps NAT performance at convection cooled thermal design; Support for POE

Production Now with 10-year Longevity Program!
LS-series DPAA Core Scalability Using SNORT Use Case Study

**LS1043 and LS1046 Achieve Linear Scaling from 1 to Many Cores**

<table>
<thead>
<tr>
<th></th>
<th>LS1 as Client X86 as Server</th>
<th>LS1043A single core</th>
<th>LS1043A Quad Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>LS1043A at 1.2Ghz</td>
<td></td>
<td>1.36Gbps</td>
<td>4.16Gbps</td>
</tr>
<tr>
<td>LS1043A at 1.6Ghz</td>
<td></td>
<td>1.84Gbps</td>
<td>5.13Gbps</td>
</tr>
</tbody>
</table>

- **Hardware setting:**
  - LS1043ARDB:
    - CPU: 1600MHz; BUS: 400MHz; DDR: 1600MT/s; DDR size: 2GB, 32bit
    - L1 cache: 32KB I-Cache and 32KB D-Cache
    - L2 cache: 1MB shared
    - 1 Intel x540 10Gb NIC
  - Intel Xeon E5-1620 v3 @3.5GHz 8Cores
- **Software setting:**
  - LS1043ARDB-v0.4 (Linux-3.19.3)
  - Iperf-2.0.5
  - Snort-2.9.4.6 GRE (Build 73)
LS1046A: Performance & Power Optimized Cortex A72 Processor

**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
- 3x 1GbE

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

**Other Parameters**
- Package: 23x23mm, Lidded FCBGA

---

**Leading Quad A72 processor with two 10GbE ports**

100% IP design reuse from LS2088 & LS1043 in production!

**Samples | Production**
---
July 2016 | Dec 2016
LS1046A: Features

- 4x 64-bit ARM v8 A72 CPUs, up to 1.6 GHz operation, 32 KB L1 data cache and 48 KB L1 instruction cache, shared 2 MB L2 cache, Neon SIMD engine, ARM v8 cryptography extensions
- Cache coherent interconnect (CCI-400), up to 600 MHz operation
- 1x 64-bit DDR4 SDRAM memory controller with ECC, up to 2.1 GT/s, supports 32/64-bit operation, x8 & x16 devices
- QorIQ data path acceleration architecture (DPAA) incorporating acceleration for the following functions:
  - FMan: Packet parsing, classification, and distribution
  - QMan: Queue management for scheduling, packet sequencing, and congestion management
  - BMan: Hardware buffer management for buffer allocation and de-allocation
  - SEC5.4: Cryptography acceleration
- 2x MACs supports 10G/2.5G/1G/100M/10M, 1x MAC for 2.5G/1G/100M/10M MAC, 5x MACs for 1G/100M/10M MACs, support for RGMII, SGMII (and 1000Base-KX), SGMII 2.5x, XFI (and 10GBase-KR), Energy efficient Ethernet support (802.3az), IEEE 1588 support
- 3x PCIe 3.0 controllers, 1x supporting x4 operation, 1x SATA 3.0 controller
- Additional peripheral interfaces
  - IFC supporting NAND and NOR flash with 28-bit addressing and 16-bit data
  - 3x USB 3.0 controllers with integrated PHY, 1x QSPI, 1x SPI controllers, 1x SDXC/eMMC, 4x I2C controllers
  - 2x 16550 compliant DUARTs and 6x low-power UARTS (LPUART), GPIO supports
  - 8x Flextimers and generic timers
QorIQ & Layerscape Distribution Markets and Applications

Transportation/Defense
- Mobile Gateways
- Train Control
- Heads up display
- Radar Imaging
- UAV
- Surveillance

Industrial Automation
- Power & Energy
- Robotics
- M2M Gateway
- Machine Vision
- Programmable Logic Controllers
- Access Gateway

Networking
- IoT Gateways
- Wireless LAN
- Router
- Top of Rack Switch
- Customer Premise Equipment
- Security Appliance
- SAN Controller

- RNC
- Metro networking
- Core/edge router
- Femto/Pico Cell
- ADC
- WAN Optimization Controller
- Server appliance
- Network Attached Storage
## Where to sell:

<table>
<thead>
<tr>
<th>Market Segment</th>
<th>Application</th>
<th>Target Products</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy/Smart Grid</strong></td>
<td>Substation Ethernet Switch</td>
<td>LS1012A, LS1021A, LS1023A/43A</td>
</tr>
<tr>
<td></td>
<td>Gateway / Router / Energy Harvesting</td>
<td>LS1012A, LS1021A</td>
</tr>
<tr>
<td></td>
<td>Remote Terminal Unit (RTU)</td>
<td>LS1021A</td>
</tr>
<tr>
<td></td>
<td>Relay Switching Equipment</td>
<td>T101x/2x, T102x/4x, T208x, LS1012A, LS1023/43A</td>
</tr>
<tr>
<td></td>
<td>PLCs</td>
<td>T101x/2x, T102x/4x, LS1021A, LS1023A/43A</td>
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<tr>
<td></td>
<td>Intelligent Electronic Device (IED)</td>
<td>T101x/2x, T102x/4x, LS1021A, LS1023A/43A</td>
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<tr>
<td></td>
<td>Merging Unit (MU)</td>
<td>T101x/2x, LS1021A, LS1023A/43A</td>
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<tr>
<td></td>
<td>Physical Security (Entry, Surveillance)</td>
<td>T101x/2x, LS1021A, LS1023A/43A</td>
</tr>
<tr>
<td></td>
<td>Phasor Measurement Unit (PMU)</td>
<td>LS1021A</td>
</tr>
<tr>
<td></td>
<td>Power Meters</td>
<td>LS1021A</td>
</tr>
<tr>
<td></td>
<td>Wireless (WiFi)</td>
<td>T101x/2x, T102x/4x, LS1021A, LS1023A/43A</td>
</tr>
<tr>
<td></td>
<td>Human Machine Interface (HMI)</td>
<td>T101x/2x, T102x/4x, T2, T4, LS1021A, LS1023/43A</td>
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<tr>
<td><strong>Home</strong></td>
<td>FTTH Gateway</td>
<td>LS1021A, LS1024A, LS1023/43A</td>
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<tr>
<td></td>
<td>Residential Gateway / Business vCPE</td>
<td>LS1012A, LS1023A/43A</td>
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<tr>
<td><strong>Industrial</strong></td>
<td>Industrial Ethernet Switch</td>
<td>LS1012A, LS1021A</td>
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<tr>
<td></td>
<td>Industrial Firewall</td>
<td>T101x/2x, T102x/4x, T2, T4, LS1021A, LS1023/43A</td>
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<tr>
<td></td>
<td>Gateway / Router</td>
<td>LS1012A, LS1021A, LS1023A/43A</td>
</tr>
<tr>
<td></td>
<td>Automation/Machine Controllers</td>
<td>T101x/2x, T102x/4x, T2, T4, LS1021A, LS1023/43A</td>
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<tr>
<td></td>
<td>Distributed Control System (DCS)</td>
<td>T101x/2x, LS1021A, LS1023A/43A</td>
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<tr>
<td></td>
<td>Remote Terminal Unit (RTU)</td>
<td>T208x, T4xxx, LS2xxx</td>
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<tr>
<td></td>
<td>PLC</td>
<td>LS1012A, LS1021A</td>
</tr>
<tr>
<td></td>
<td>Wireless (WiFi)</td>
<td>LS1021A</td>
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<td></td>
<td>Human Machine Interface (HMI)</td>
<td>LS1012A, LS1021A, LS1023A/43A</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>Point of Sale (POS)</td>
<td>LS1021A</td>
</tr>
<tr>
<td></td>
<td>Automatic Teller Machine (ATM)</td>
<td>LS1021A</td>
</tr>
<tr>
<td></td>
<td>Elevator Control</td>
<td>LS1021A</td>
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<tr>
<td><strong>Surveillance</strong></td>
<td>NVR Video Surveillance</td>
<td>LS1024A, LS1021A, LS1043A</td>
</tr>
<tr>
<td><strong>Transportation</strong></td>
<td>Mobile Gateway</td>
<td>LS1021A</td>
</tr>
</tbody>
</table>
1. SOLUTIONS ROADMAPS

1.1. Service Provider and Enterprise
   - WLAN Solutions
   - Services Routers & Appliances Solutions
   - Evolved Control Plane and Switching
   - Virtualized Networks

1.2. IoT Infrastructure
   - Smart Home Solutions
   - Industry 4.0

1.3. Cloud Edge
   - Intelligent NIC
   - Storage infrastructure

Defend the Base and Drive Expansion for Revenue Growth
Solutions for the Service Provider and Enterprise Segments

WLAN Access Point
- Shipping to leading global players
- Scalability for Low, Mid, High-End Solutions
- Complete protocol offload for IPSec, DTLS, CAPWAP
- Complete SW solution with OpenWRT support

Services Routers, Network Appliance
- Scalable portfolio of SoCs with common SW
- Complete software stack with offload support
- Offload provides compelling performance in a smaller power envelope: 10G and 20G fanless design options
- Protocol aware offload with 25% performance advantage over crypto only architecture: e.g. x86, Cavium
- Strong ODM support

Evolved Control Plane and Switching
- Increasing adoption of services as differentiators
- DNG offers strong portfolio of SoC + SW solutions
- Enabling new services like network visualization for OEM customers
- Leverage our installed base with leading global OEMs

Virtualized Networks
- Leadership in virtualization technology (HW and SW) and acceleration assist for virtualization
- Strong performance analysis to demonstrate virtualization performance
- Driving industry standardized approach for ease of adoption
NXP – DNG: The Only Solution Provider for Small Business Router

NXP Small Business Router SDK (SMB Router) with enhancements (LAN, WAN, NAT, Routing, Firewall, VPN, QoS, IPv6, Network Management, others)

Additional functions and 3rd party functions inclusions – Anti-Virus, Web security, IPS, Wireless, Application Control etc.

Linux OS: customization of BSP/LSP & drivers for switch etc.

Bootloader s/w: Potential customization on top of default bootloader -memory address space, I/O access

Customer H/W Platform: Freescale QorIQ processor + 3rd party switch & WiFi etc. and any electrical & environmental certification for h/w

Responsibility sharing scenario

NXP  ODM partner  Customer
Right Recipe for your Security Appliance

Secure Router
Gateway/Router Solution: OpenWRT, Linux, OpenSSL, HW - Firewall, IPSec

Integrated Security Appliance
SSL VPN: Open-SSL, U/S engine, lib-fiber
NW Security Pkg: IPSec, Firewall

Network IDS/IPS, Content security
App-Ident-SW: L4-L7 inspection, Application recognition

Industrial, IoT infrastructure
Trusted Applets: Key Mgmt, TPM
Security offloads: IPSec, DTLS

Industry Standard Crypto API: Linux kernel space - Linux crypto API
Linux user-space - OpenSSL EVP API, ODP/DPDK Crypto API
VMs - Virtio-Crypto, ODP/DPDK Crypto API

Carrier-Grade OS: Wind-River Linux, MV CGEL, MGL


Scalable Hardware Platforms with Security Acceleration

NXP value proposition: Data-path offload in HWProgrammable for custom applications; Easy-to-use NF API to integrate with customer stack; Complete turnkey solution – ready to deploy
NXP Virtual Access Demo

Internet Service Provider Cloud

LS 2088

Edge of the ISP Cloud

Virtualized Services Flowing upstream and downstream

Customer Premises

v.CPE white box
LS 1043
Quad Cortex-A53

v.IoT Gateway
LS 1021
Dual Cortex-A7

v. Access (v. BTS)
BSC 9131

Clients

Cloud Orchestration

Service Chaining

OpenStack

OPNFV Compliant
NXP Driving Solutions for the Smart Home / CPE Market

Broadband Gateway
- Shipping to leading global gateway players
- First to market with 10GbE support
- Broadest ecosystem of WLAN support
- 10Gbps performance with min CPU loading
- Complete SW solution with OpenWRT support

Network Attached Storage (NAS)
- Scalable portfolio of SoCs with common SW
- Complete software stack with offload support
- RAID performance well above competition
- Strong ODM support

IoT Gateway
- Flexible platform with broad industry support
- Innovative solution for sensor aggregation
- High performance networking with wide range of protocol support

Wireless Audio
- Differentiated Features for Networked Audio
- Architected for line-rate networking with low CPU overhead
- High-performance 64b ARM CPU with NEON & FPU
- 5x serial audio ports
- Low power ultra-compact package for portable applications
Our Vision for the Smart Home

Set of solutions focused on Ease of Use, Mobility, Assurance and Automation

Leverage NXP portfolio, relationships, customer reach, DNG Software and SoC differentiation
Wireless Speaker

Multi speakers based on DLNA(UPnP) Protocol
play music independently
Smart Voice Assistant + Wireless Speaker Ref Design
Voice Assistant

How’s the weather today?

Microphone Array

LS1012A

Voice Awake

Voice Sample

Voice Synthesize

WIFI Data Transfer

Speech Recognition Cloud Platform

Today is cloudy to sunny…
Multi Speakers Synchronous Playback

Master Role

LS1012A Based WIFI speaker

LS1012A Based WIFI speaker

LS1012A Based WIFI speaker

Request
UPnP Player- QQ Music Player Screenshot

Master
Speaker

Slave
Speaker
# Cloud-based IoT Fog Computing Platform

<table>
<thead>
<tr>
<th>Container Engine</th>
<th>Protocol Adaptor</th>
<th>Data processing</th>
<th>Data filter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xenomai</td>
<td>IEEE158</td>
<td>TSN</td>
<td>OP-TEE</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td></td>
<td>SEC</td>
</tr>
</tbody>
</table>

**Kernel**

- Xenomai
- IEEE158
- TSN
- OP-TEE
- SEC

**Cloud-based IoT SDK**

- IBM IoT SDK Docker
- Alibaba IoT SDK Docker
- Google IoT SDK Docker
- Azure IoT SDK Docker
- Private IoT SDK Docker
- AWS IoT SDK Docker
- Greengrass

**Data processing**

- Docker

**Platform**

- Cloud-based
- IoT
- Fog Computing

**SDKs**

- IBM IoT SDK
- Alibaba IoT SDK
- Google IoT SDK
- Azure IoT SDK
- Private IoT SDK
- AWS IoT SDK
- Greengrass
Cloud IoT Gateway Solution

• WIFI Gateway based on NXP LS1012A

• IoT Gateway with rich connections:
  • WiFi
  • Bluetooth
  • Zigbee/Thread
  • Zigbee
  • NFC

• Support IoT clouds:
  • IBM Bluemix(MQTT), Node-Red
  • Alibaba Aliyun(Alink)

• Support OpenWRT, Docker/LXC, Secure Boot

• Target Market: Smart Home, Industry 4.0
IOT Gateway by LS1012A

- Wi-Fi Security Cameras (up to 8)
- Wireless speaker
- Smart Lock
- Bluetooth 4.0

IoT Gateway (LS1012A)

Rich IoT Ecosystem

- Node-RED
- aliyun.com