NXP Revolutionizes Gateways to Unlock Value of Connected Vehicle Data
NXP Enables Service-Oriented Gateways for Automakers to Unlock Value of Connected Vehicle Data

• MPC-LS chipset combines proven NXP automotive microcontroller with enterprise networking communications processor

• Provides high level of performance and networking required for new Service-oriented Gateways

• Supported by evaluation board, enablement software and growing ecosystem to accelerate product development

• Catalyst to unlock connected vehicle data for new opportunities that will transform the automotive industry
VEHICLE BIG DATA opportunities

VEHICLE DATA
4+ TERABYTES
Vehicle data generated per hour**

CONNECTED VEHICLES
38 MILLION
Shipped in 2018*

Represents global data
Sources: *Strategy Analytics, 2019; **ABI Research, 2018
Vehicle Data Opportunities Will Transform the Automotive Industry

**New Revenue Streams**
Up to $750B* for data-driven services by 2030
77.4% millennials** willing to pay for updates

**Enhanced Safety and Security**
Fault detection & notification
Intrusion detection and prevention
Crash detection / emergency response

**Improved User Experiences**
Personalization, comfort and convenience
Post-sale feature upgrades
Location-based services

**Reduced Costs**
Predictive maintenance
Reduced warranty / recall exposure
Fleet management

Sources: McKinsey & Company, Monetizing Car Data, 2016; IHS Markit forecast, 2018
The gateway has central access to vehicle data

However, it must evolve to fully realize these opportunities.
Gateway to Service-oriented Gateway Evolution

CURRENT GATEWAY
Performance
~1000 DMIPS

SERVICE-ORIENTED GATEWAY
Performance
>10,000 DMIPS

Networking
100 Megabit Ethernet

Vehicle Data Growth
Up to 1-10 Gigabit Ethernet

Service-oriented gateways require ~10x performance and networking
<table>
<thead>
<tr>
<th>Service-oriented Gateway Services</th>
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<tbody>
<tr>
<td><strong>Vehicle-wide Over-the-Air (OTA) Updates</strong></td>
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<tr>
<td>Deployment of remote apps, machine learning models, security and safety patches…</td>
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<tr>
<td><strong>Edge-to-Cloud Data Analytics</strong></td>
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<td>Edge processing of vehicle data, pre-processing for cloud analysis and machine-learning models</td>
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<tr>
<td><strong>Virtual ECUs</strong></td>
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<tr>
<td>Consolidation of vehicle ECUs to reduce system cost, weight, cable harness complexity</td>
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<td><strong>Intrusion Detection and Prevention</strong></td>
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<tr>
<td>Real-time vehicle network security monitoring and updates for protection against new cyber threats</td>
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<tr>
<td><strong>Data Logging and Forensics</strong></td>
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<td>Centralized “black box” capability for analysis, including filtering and pre-processing of vehicle data</td>
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<tr>
<td><strong>Centralized Vehicle Security</strong></td>
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<tr>
<td>Remote key provisioning, secure key management, cryptographic functions and secure OTA and services</td>
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<tr>
<td><strong>Many more services to come…</strong></td>
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<tr>
<td>Provides platform for services innovation and supports new initiatives like Mobility-as-a-Service (MaaS)</td>
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Learning from Mobile Market Product Evolution

Communications → Applications & Services
kbps → Gbps Data Rates
Massive Increase in Processor Performance
Over-the-Air Updates
Enhanced Security

Evolution of Products

Higher-speed Connectivity + Applications/Services + OTA Updates =
Growth and New Opportunities
The Catalyst to Unlock Connected Vehicle Data

**MPC-LS Vehicle Network Processing Chipset for Service-oriented Gateways**

Heterogenous multi-core processing
Real-time + high-performance applications

Automotive meets enterprise networking
CAN FD, LIN, FlexRay™ interfaces
Up to 10 Gigabit Ethernet with packet acceleration

End-to-end security from vehicle to cloud
Embedded hardware security module for cryptography and secure key management
Big Data, Big Opportunities Today

Carmakers
- Proof of concept
- Benchmarking
- Vehicle data insights
- New services deployment

Application Developers
- Innovation platform
- Software development
- Test and validation
- Demo showcase

Cloud & Service Providers
- Symbiotic compute
- Over-the-Air (OTA) updates
- Machine learning deployment
- Edge service deployment

✓ Evaluation Board (EVB)
✓ Reference Development Board (RDB)
✓ Software Enablement
✓ Demonstrations

Accelerating Transformation Across the Automotive Ecosystem
MPC-LS Vehicle Network Processing Ecosystem
Airbiquity & NXP Vehicle OTA & Data Management Service
MPC-LS Vehicle Network Processing Ecosystem
Cloudera & NXP Edge-to-Cloud Streaming Data Analytics
Vehicle Service-oriented Gateway Enables Opportunities

The NXP MPC-LC Chipset Uniquely Enables Service-oriented Gateways
Design with the MPC-LS Chipset Today to Unlock Disruptive Vehicle Data Opportunities

- Auto-qualified chipset scheduled to be deployed in volume vehicle production starting in 2020
- Provides high level of performance and networking required for new Service-oriented Gateways
- Supported by evaluation board, enablement software and growing ecosystem to accelerate product development
- Catalyst to unlock connected vehicle data for new opportunities that will transform the automotive industry
MPC-LS
VEHICLE NETWORK PROCESSING CHIPSET

SERVICE-ORIENTED GATEWAY
NXPMPC5748G
NXPLS1043A
Bringing Together Automotive and Enterprise Networking to Enable Disruptive Opportunities

Technology Convergence
- Automotive Networking
  - CAN/LIN/FlexRay Interfaces
  - Real-time
  - Gateway
- Gigabit ethernet
- OS/Virtualization
- Data Analytics
- App/Services

Edge-to-Cloud Processing
- Automotive Sensors
- Service-oriented Gateway

New Opportunities
- Vehicle Health
- Usage-Based Insurance
- Over-the-Air Upgradeable Vehicles
- Other Monetization Opportunities
MPC-LS Vehicle Network Processing (VNP) Enablement

- MPC5748G Automotive Controller
- LS1043A Auto-Qualified Communications Processor
- NXP CAN/CAN FD/LIN/FlexRay® Transceivers
- NXP SJA1105 Ethernet Switches and PF8200 PMIC

- Real-time Gateway Processing
- Applications and Network Processing
- Gigabit Ethernet Acceleration
- Embedded Hardware Security

Includes SW enablement (AUTOSAR, Bare metal, Linux) and demonstrations

ORDERING INFORMATION: MPC-LS-VNP-EVB
MPC-LS Vehicle Network Processing (VNP) Reference Design Board (RDB)

- Real-time Gateway Processing
- Applications Processing
- Gigabit Ethernet Acceleration
- Embedded Security

Part Number: MPC-LS-VNP-RDB
- Price: $995
- Reference Design: 90% of BOM is Automotive Grade
- Includes SW enablement and demonstrations

NXP Components:
- MPC5748G (MCU), LS1043A (Comms Processor), SJA1105SEL (5-port Ethernet switch), PF8200 (Power Management IC)
- TJA1081TS (FlexRay), TJA1024HG (Quad LIN), TJ1102HN (Dual Ethernet PHY), TJA1048T (Dual CAN Transceiver)
- NTS0102 (Dual Supply Transceiver), NX5P3090UK (USB Power Switch)

www.nxp.com/MPC-LS-VNP-RDB
MPC-LS-VNP-RDB Block Diagram

- **Processors**
  - MPC5748G Automotive Microcontroller
  - LS1043A Communications Processor

- **Memory**
  - 2 GB DDR3L @ up to 1.6 GT/s
  - 1 GB NAND flash
  - 64 MB Serial NOR flash
  - 8 GB eMMC

- **Storage**
  - M.2 M-Slot for optional PCIe SSD

- **NXP Support Devices**
  - PF8200 Power Management IC
  - SJA1105SEL Ethernet Switch
  - TJA1024 LIN PHY
  - TJA1048 CAN PHY
  - TJA1081 FlexRay PHY
  - TJA1102 100 Mbps Ethernet PHY

- **PCB**
  - Single 6-layer board ~ 6.1 x 6.4 inches
  - 90% of BOM Automotive Grade