

# TRENDS IN SECURE MULTICORE EMBEDDED SYSTEMS

MATTHEW SHORT  
SR PRODUCT LINE MANAGER  
DIGITAL NETWORKING  
MATTHEW.SHORT@NXP.COM



EXTERNAL USE



SECURE CONNECTIONS  
FOR A SMARTER WORLD

# A NEW POSITION OF STRENGTH



- #1 Communications Processors
- #1 RF Power Transistors
- #1 Automotive Safety
- ✓ 50+ year history
- ✓ 17,300 employees
- ✓ \$4.59b in revenue
- ✓ \$839m in R&D



**>\$10B**  
IN ANNUAL  
REVENUE

**~45,000**  
EMPLOYEES

**35+**  
COUNTRIES

**11,000+**  
ENGINEERS

**9,000+**  
PATENT  
FAMILIES

**4<sup>th</sup> Largest**  
SEMICONDUCTOR  
COMPANY  
GLOBALLY<sup>1</sup>



- #1 Secure Identification
- #1 Secure Car Access
- #1 Smart Card MCUs
- ✓ 50+ year history
- ✓ 28,000 employees
- ✓ \$6.03b in revenue
- ✓ \$723m in R&D



# ACCELERATING TECHNOLOGY TRENDS DRIVE OPPORTUNITIES FOR NXP

## Secure Connections for a Smarter World

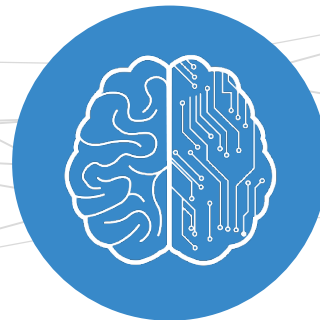
### Everything Connected



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

**Connectivity**

### Everything Smart



**40B+** devices with  
intelligence shipped  
in **2020**

**Processing**

### Everything Secure



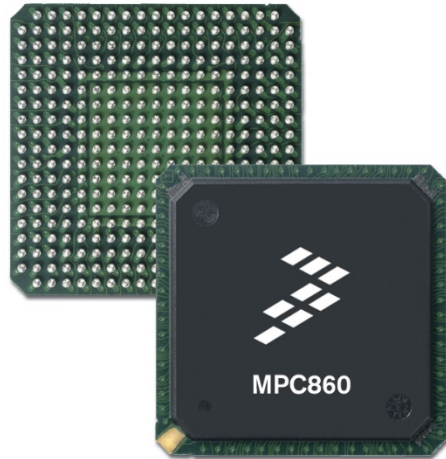
Potential savings to  
economy up to  
**half trillion dollars**

**Security**

# Celebrating Birthdays in September 2015!!!

## 20 years

September 1995  
PowerQUICC I



With Ethernet!

## 15 years

**EE Times** Connecting the Global  
Electronics Community

News & Analysis

**Motorola Unveils Internet Protocol  
Security Solutions for Wired and  
Wireless**

Motorola Unveils Internet Protocol Security  
Solutions for Wired and Wireless

EE Times

9/29/2000 07:00 PM EDT

[Post a comment](#)

NO RATINGS  
[LOGIN TO RATE](#)

# Focus on 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

# TRENDS IN PROCESSING

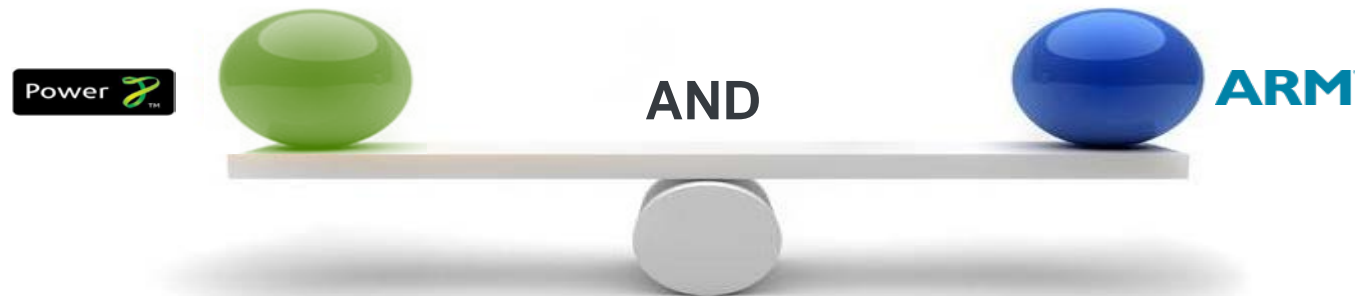
# Power & ARM: A Balanced Strategy for the Market

Continue to drive the “Core” - Power

1. **#1** in wireless/wired networking
2. **30+ years** of R&D leadership
3. **Large 3<sup>rd</sup> Party ecosystem** for networking and embedded

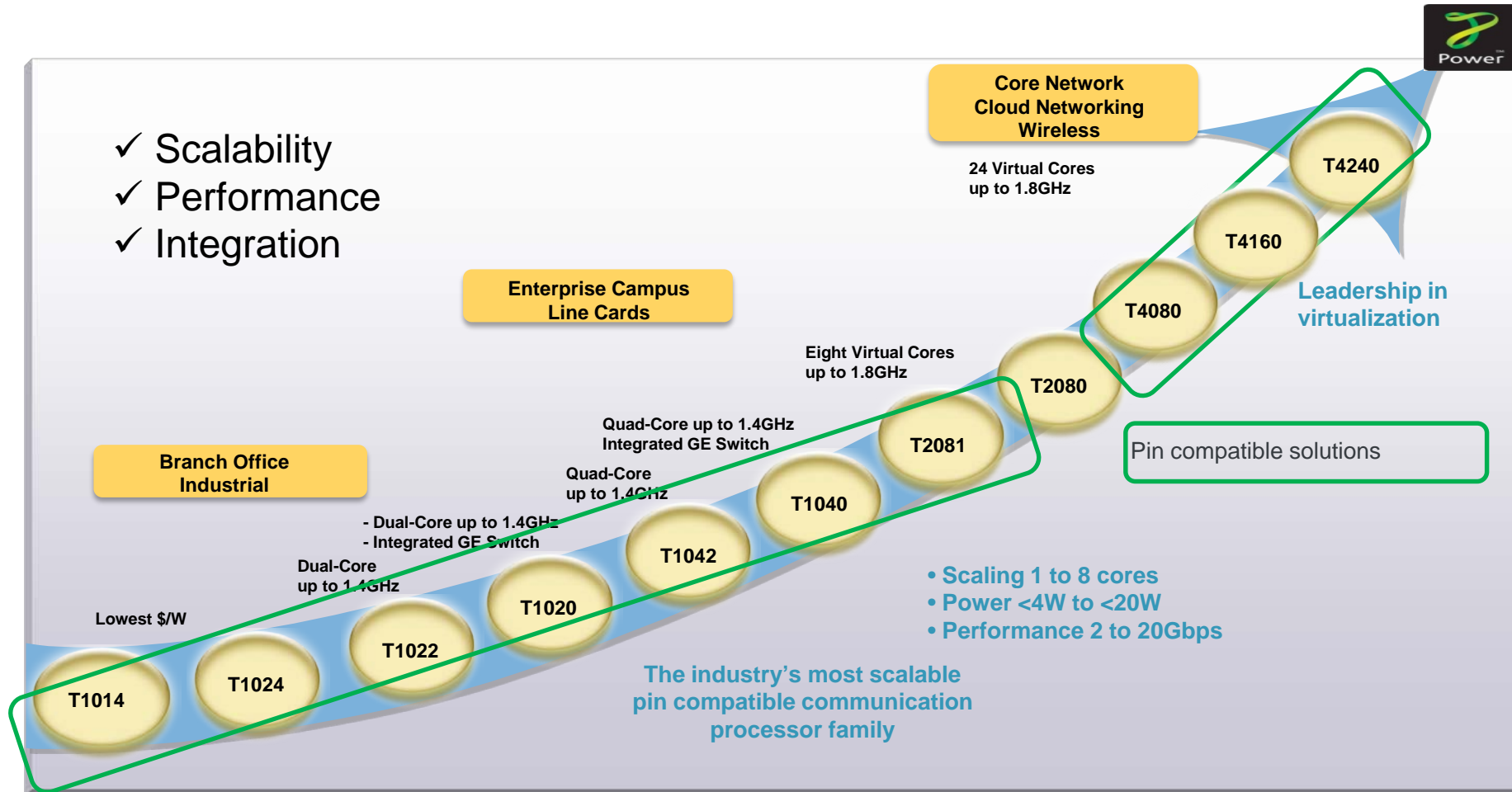
Broaden Market Reach – ARM Addition

1. **First 64-bit ARM<sup>®</sup> Networking SoC**
2. **10+ years** as a proven ARM supplier
3. **Innovation in Auto, IoT and embedded**



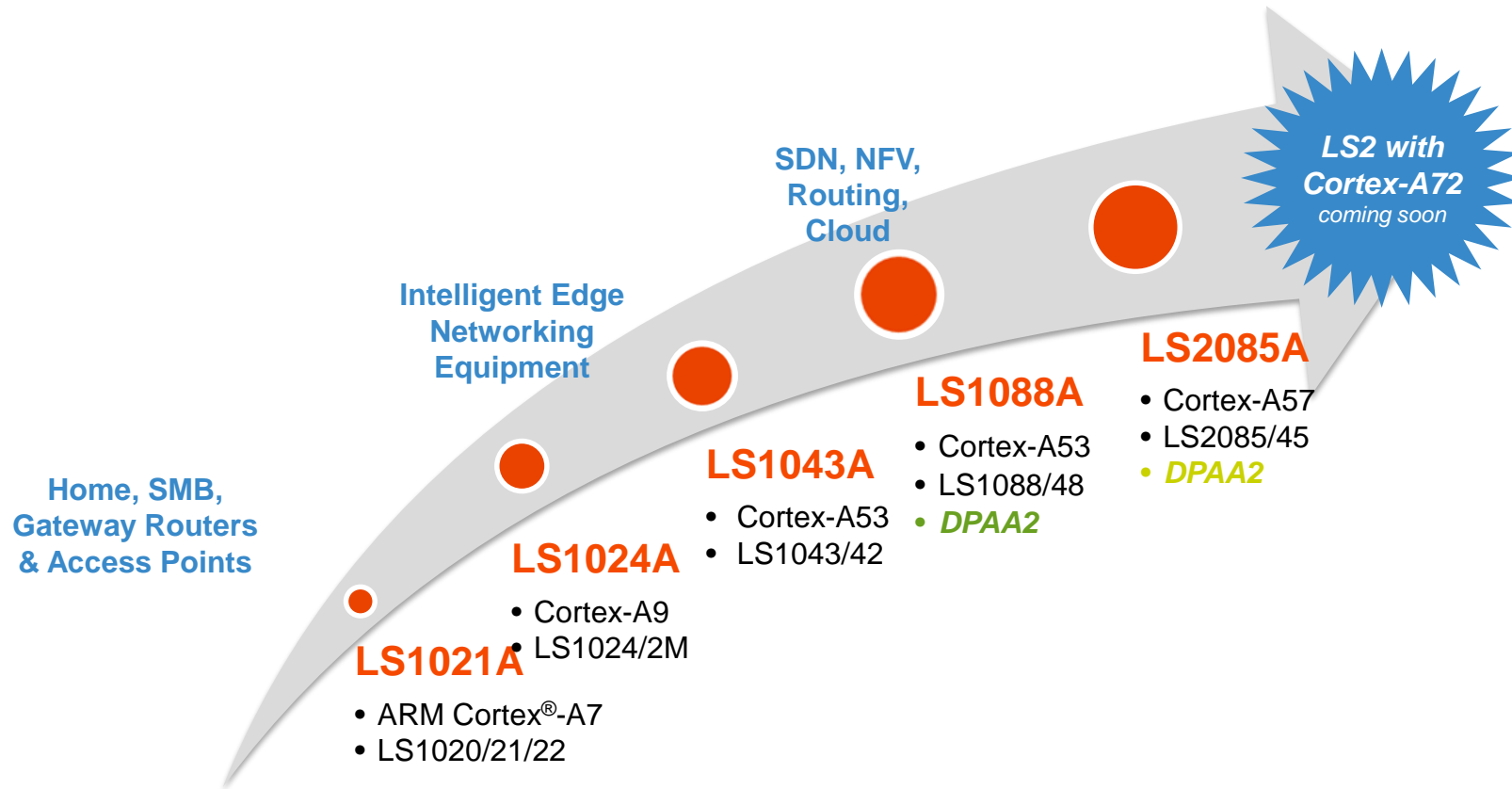
NXP has infrastructure in place to support both Power<sup>®</sup> and ARM

# Continuing the Leadership: Power-based SoC Solutions





# ARM provides balance of Architecture and Innovation



First to announce the highest performance 64-bit capable Cortex-A72 core in a networking processor

**SECURITY  
EVERYWHERE**



# Examples of Security Hacks



## Automobile

- Telematics (e.g., OnStar) hacked to:
  - Eavesdrop
  - Control ECU
  - Reflash ECU to trigger on TPMS values



## Point of Sale

- Memory scraper installed on POS
- POS exfiltrates credit card info



## Smart TV

- Exfiltration of user data
- Root access and program installation

### Vulnerabilities Exploited

Flawed Authentication

Stack Overflow

Promiscuous Communication

Unsigned Code

No ACL

No Memory Protection

No End-to-End Security



SECURE CONNECTIONS  
FOR A SMARTER WORLD

# Security Is Multifaceted



## PRIVACY

preventing **eavesdropping**

**EXAMPLE**  
Encryption

System Load **HIGH**

## AUTHENTICATION

guaranteeing **identity**

**EXAMPLES**  
Passwords, PINs  
Key exchange

System Load **MED**

## ACCESS CONTROL

limiting **use** and **communication**

**EXAMPLE**  
Access control lists

System Load **MED**

## SYSTEM INTEGRITY AND AVAILABILITY

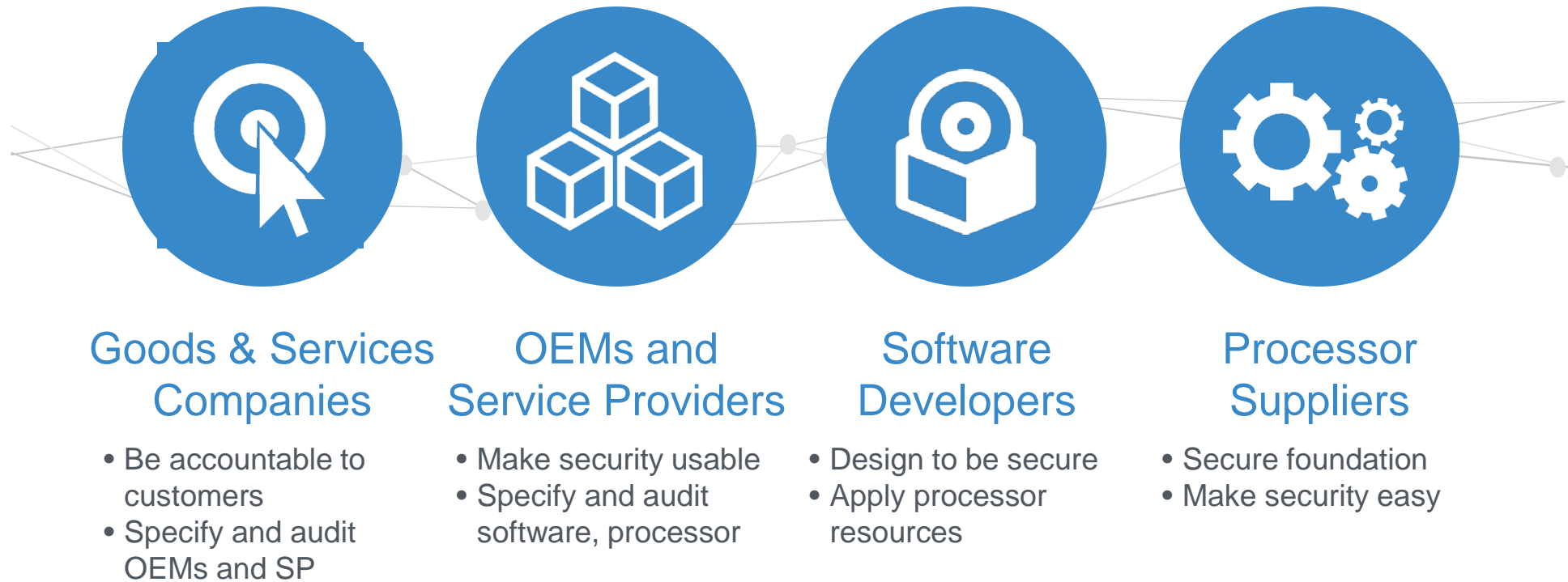
ensuring data and code **accuracy**

preventing service **theft** and **denial, cloning**

**EXAMPLES**  
Platform trust  
Antivirus

System Load **LOW**

# Call to Action: We the Ecosystem Must Solve Security

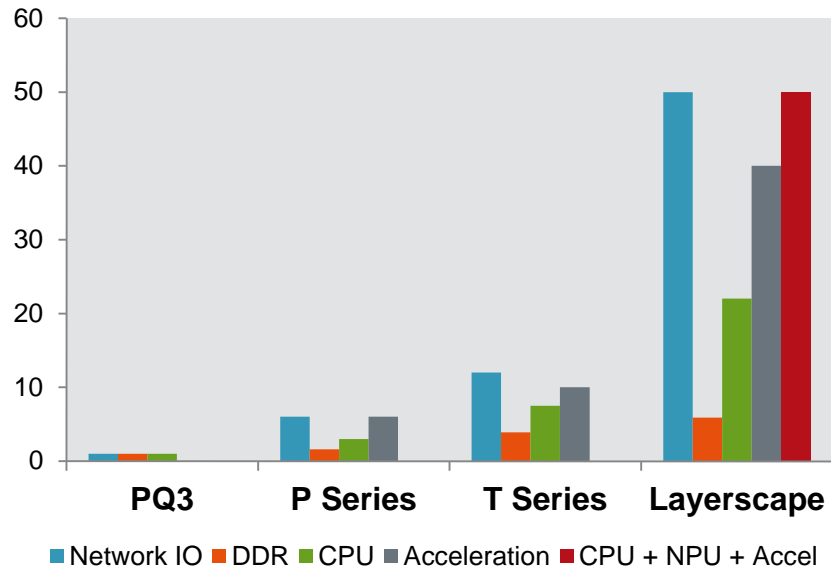


NXP well positioned to lead Security Ecosystem for Embedded

**EXCITING FUTURE**



# DPAA2 – A New Architecture for a New Network



Many-core processor approach is not sustainable due to power, software complexity and integration costs



Need to provide right mix of high performance and programmability

## MUST HAVE:

### Advance Packet Processing

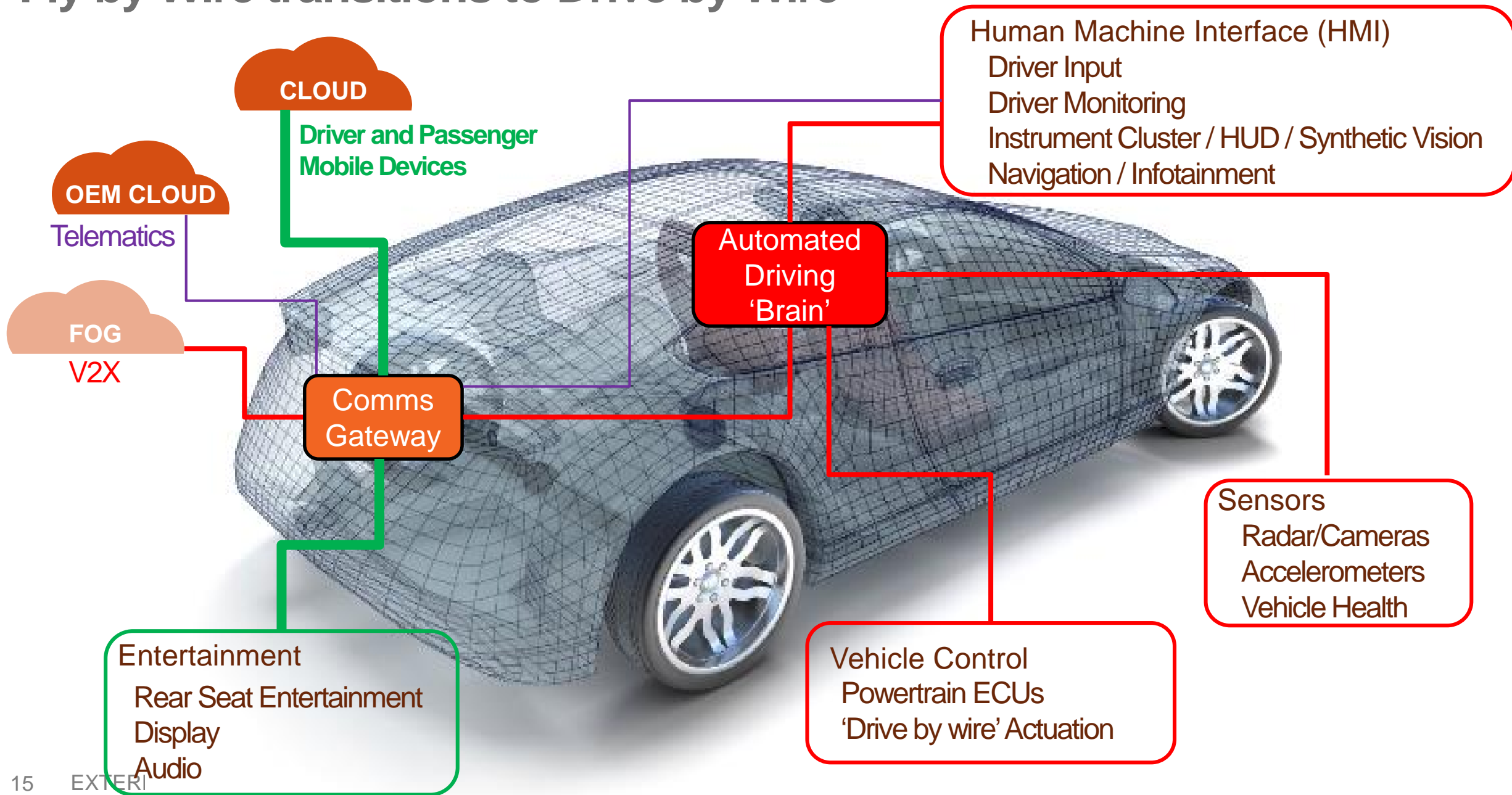
- Tightly coupled accelerators called as C functions
- H/W preloaded task state, headers, stack frame
- Customer programmable
- Run-to-completion model using standard C (C99)



**4-6x Performance**  
over general-purpose cores  
in a lower power envelope



# Fly by Wire transitions to Drive by Wire





# Summary, Questions, Comments, Cheers, Jeers or Rebuttals

- High-performance multicore solutions that transport, analyze and secure data from the edge of the network to the cloud
- Balanced architecture
  - 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



SECURE CONNECTIONS  
FOR A SMARTER WORLD