



IoT End Node Concepts

DwF Keynote

Geoff Lees | Senior Vice President & General Manager - Microcontrollers

M A R . 2 6 . 2 0 1 5



External Use

Freescale, the Freescale logo, ABiVec, C-5, CodeTEST, CodeWarrior, GoldFire, ColdFire+, C-Wire, the Energy Efficient Solutions logo, Kinetics, MagniV, mobileGT, PEG, PowerQUICC, Processor Expert, QorIQ, QorIQ Converge, Corvus, Ready Play, SafeAssure, the SafeAssure logo, StarCore, Symphony, VortiGa, Vybrid and Xtrinsic are trademarks of Freescale Semiconductor, Inc., Reg. U.S. Pat. & Tm. Off. Airfast, BeeKit, BeeStack, CoreNet, Flexis, Layercape, MXC, Platform in a Package, QUICC Engine, SMARTMOS, Tower, TurboLink and UMEMS are trademarks of Freescale Semiconductor, Inc. All other product or service names are the property of their respective owners. © 2015 Freescale Semiconductor, Inc.



INTERNET OF THINGS

SMART Cars

Data Analytics

SMART Health

SMART Energy

SMART Homes

Connected World

TECHNOLOGY INNOVATIONS

SOFTWARE

- Ease-of-use
- Open-source
- Device Management
- Security
- Longevity

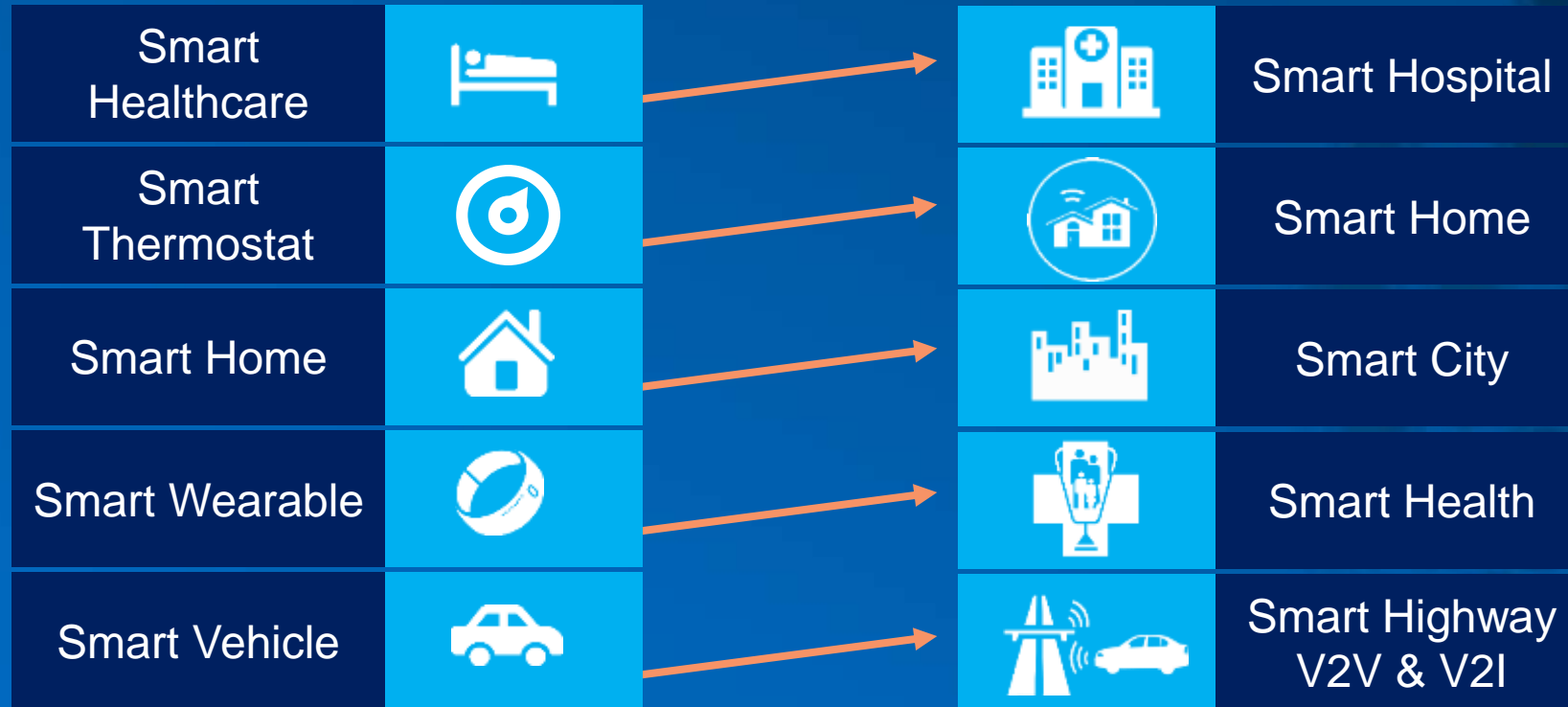
- Advances in flash, analog, RF, and sensors integration
- Powerful, yet low-cost & low-power MCUs
- Miniaturization & advances in packaging technologies
- Energy harvesting

TECHNOLOGY

Sensing
Embedded Processing
Connectivity



Scalable Solutions



← **SCALABLE SOLUTIONS** →

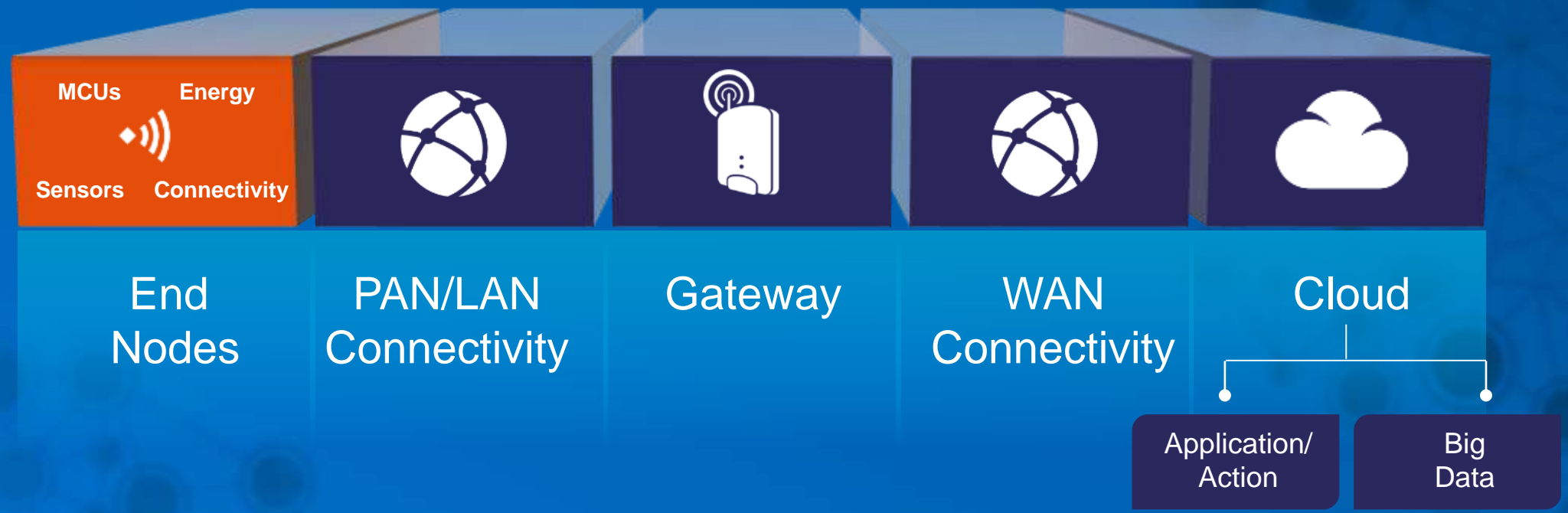
Sensors – Analog – MCU – RF – Applications Processors – Networking Processors

Increasing Complexity of Data Collection, Handling & Processing

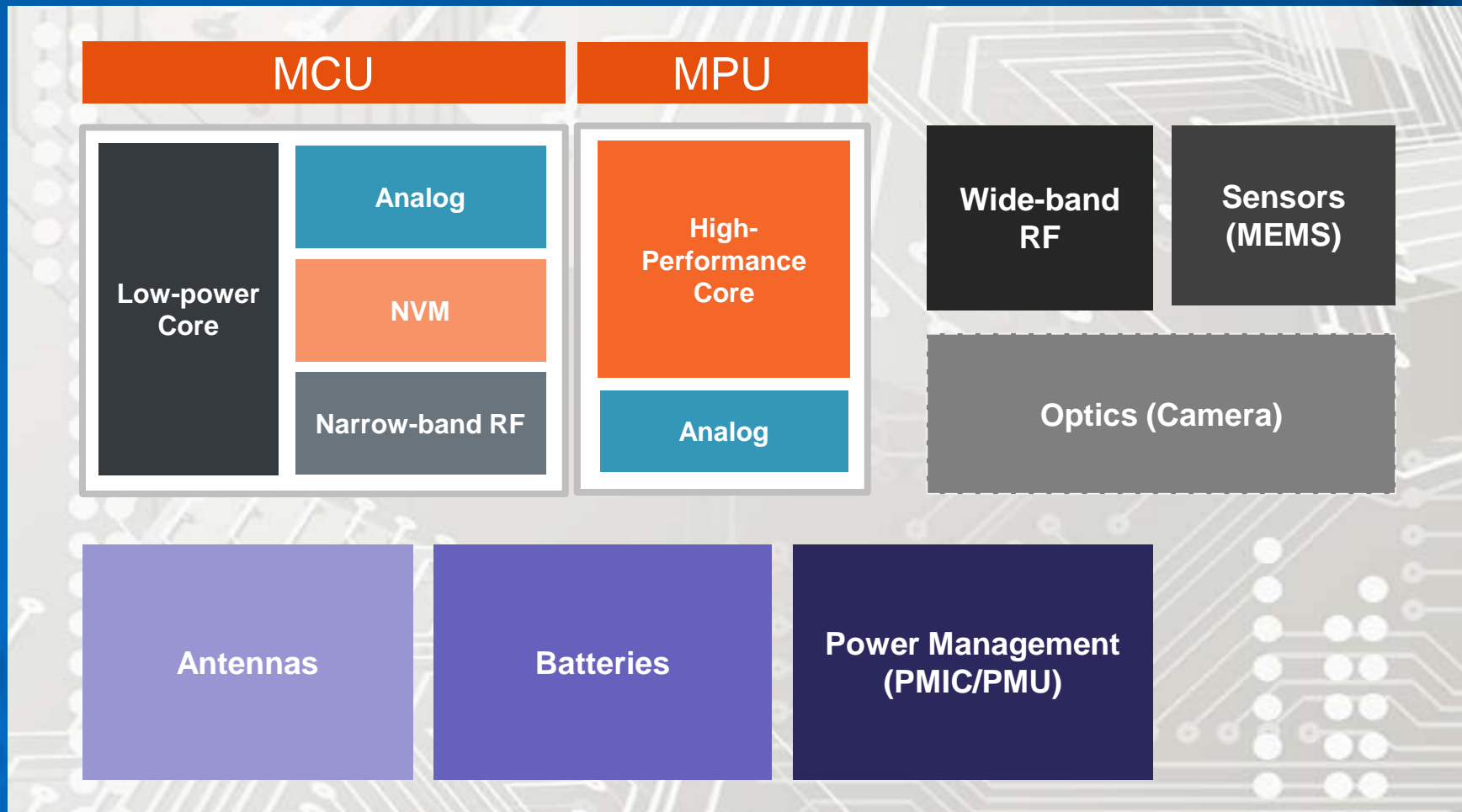
End Nodes

Energy Efficient
Optimum Performance
Highly Integrated

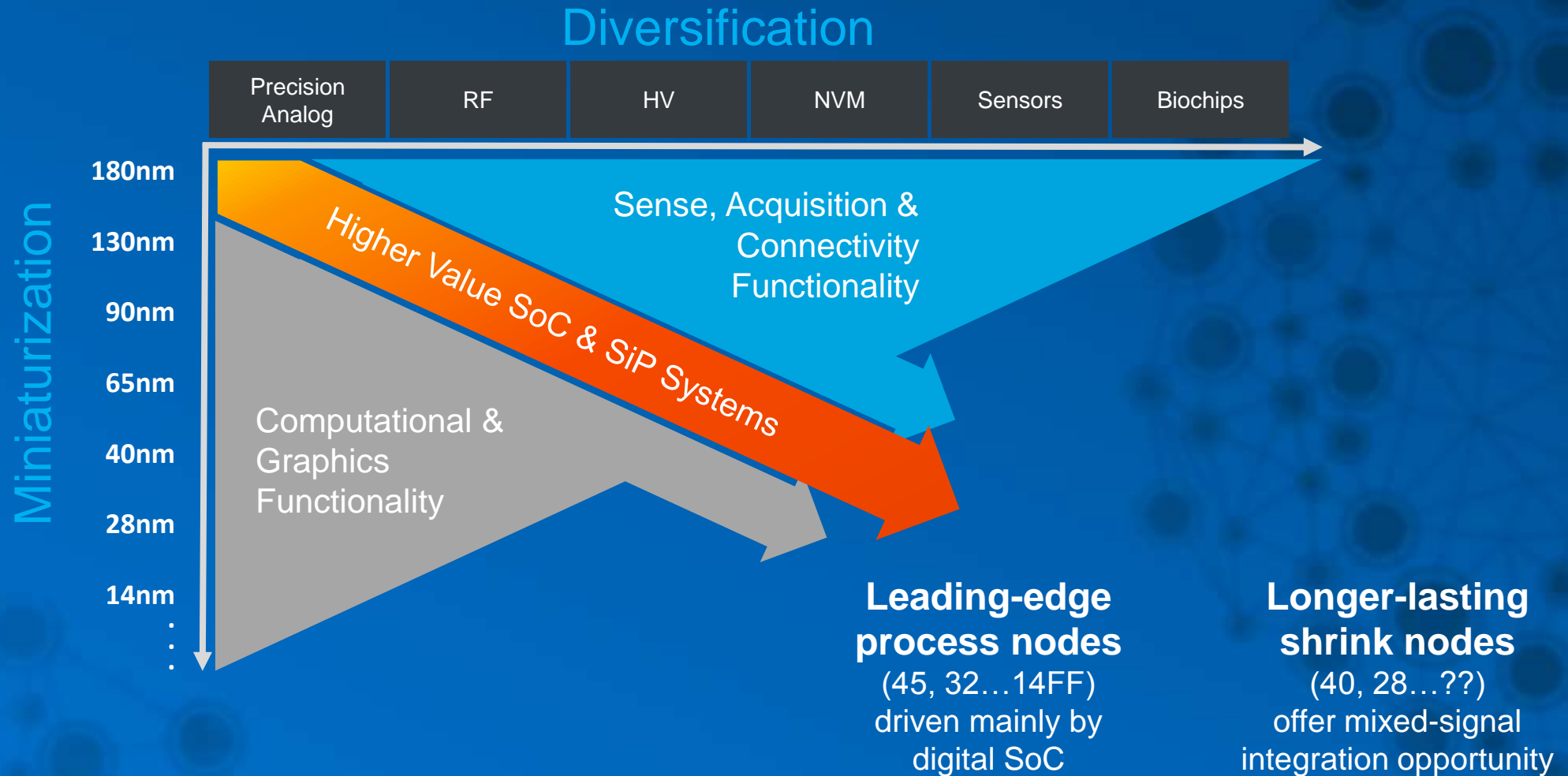
Secure
Small Form Factor
Cost-Effective



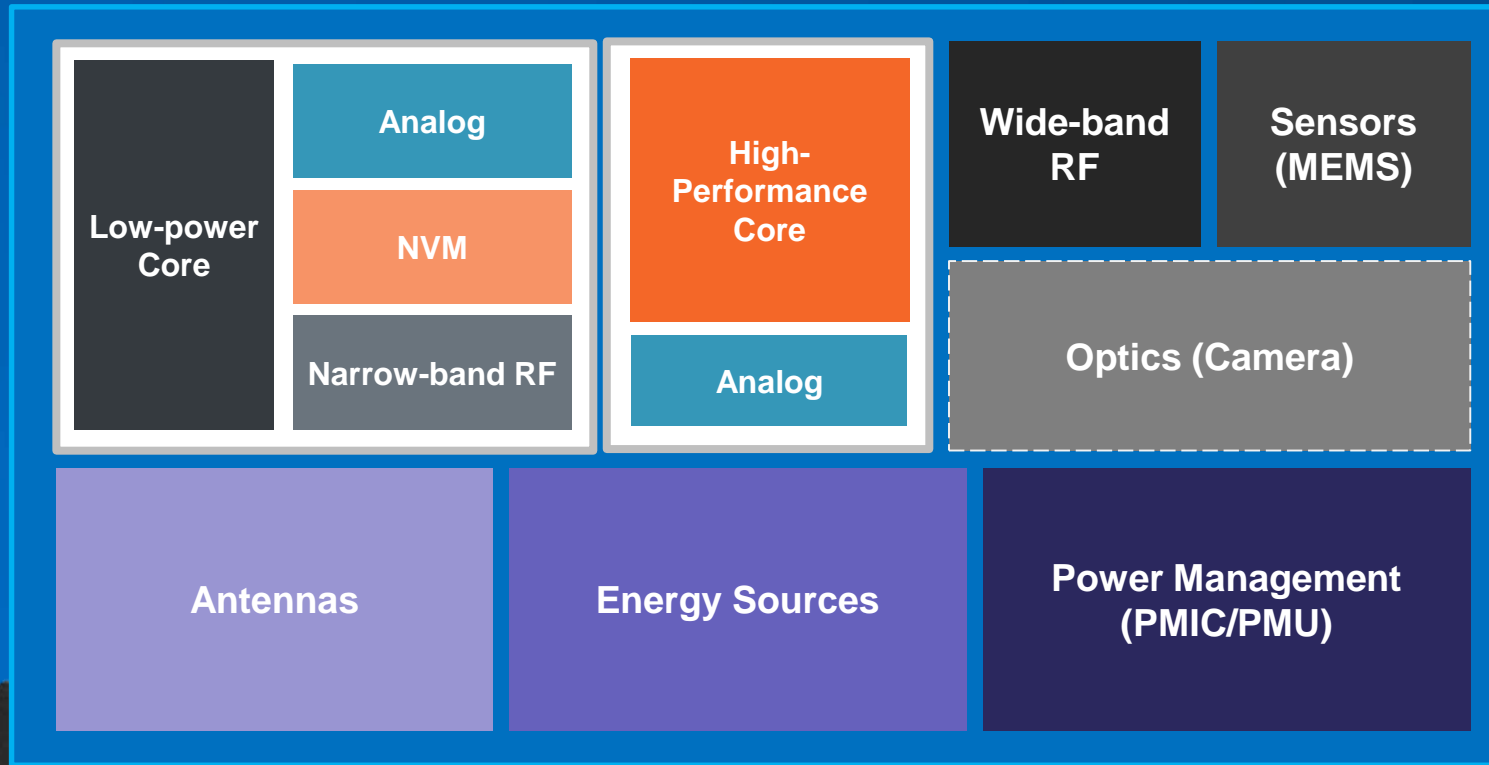
End Nodes TODAY



Increasing Integration of Diverse Components

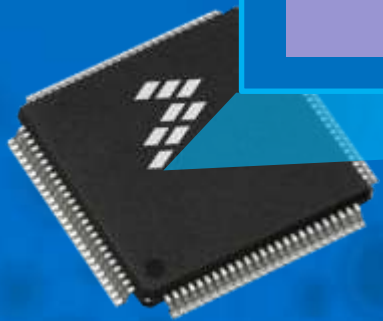


End Nodes of TOMORROW

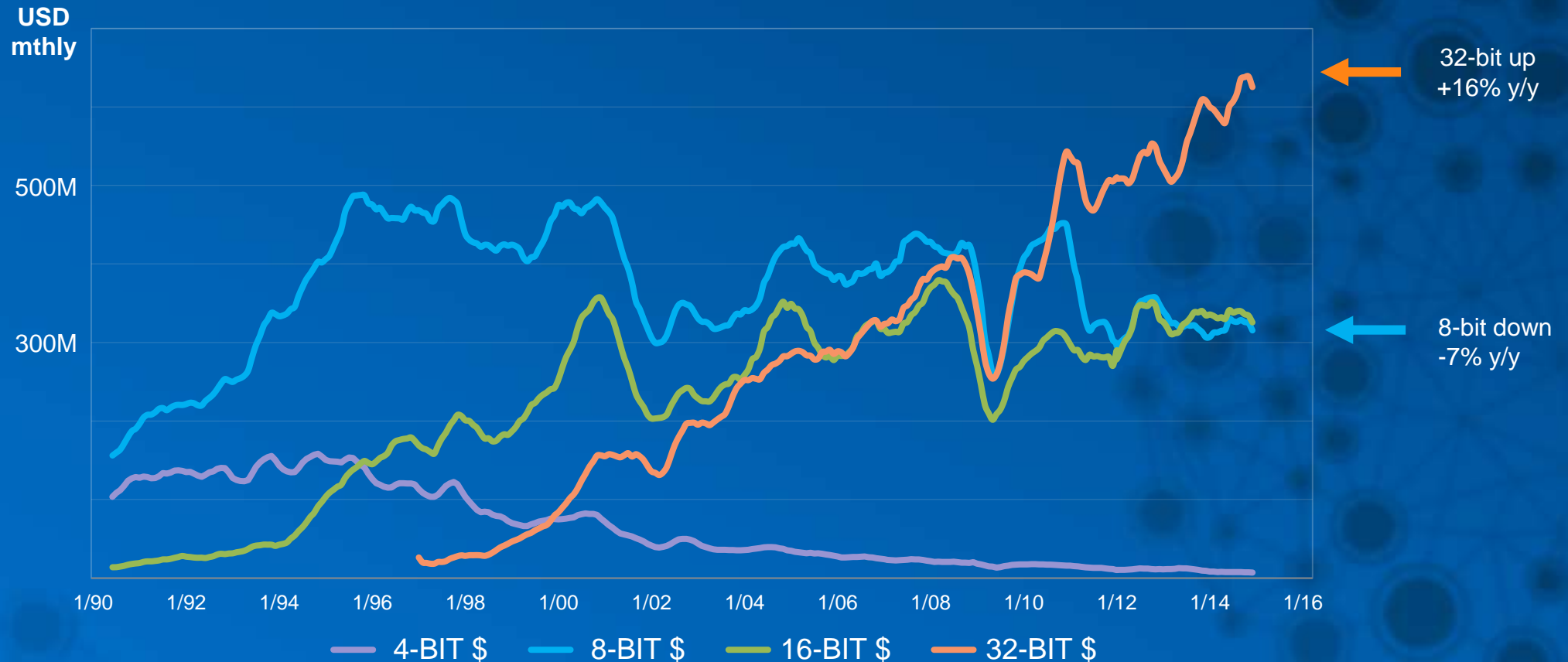


Complete
Integration -

Scaled and all-in-one
small, thin form factor
package



“The Rise of the 32-bit MCU”

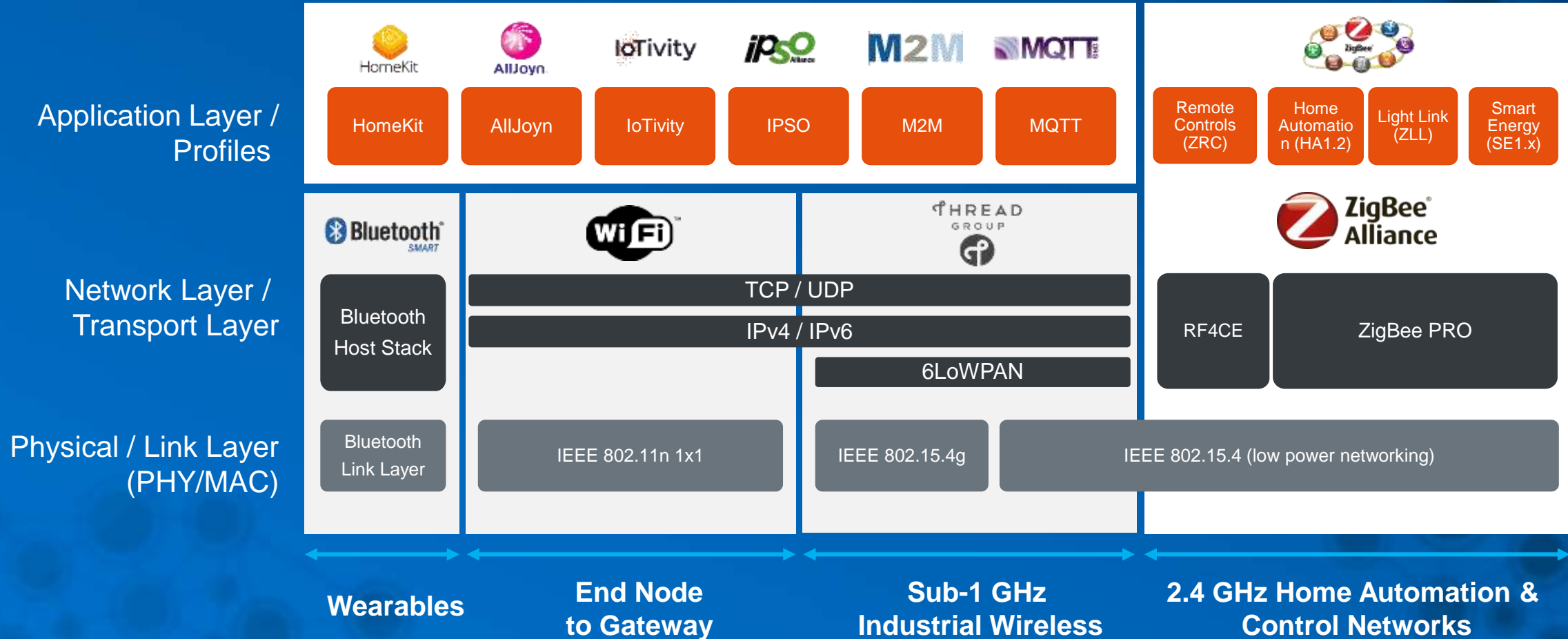


32-bit revenue: +16% YoY

32-bit units: +78% YoY 4Q14 exceeded 8-bit

Source: WSTS Jan '15
Revenue 6MMA

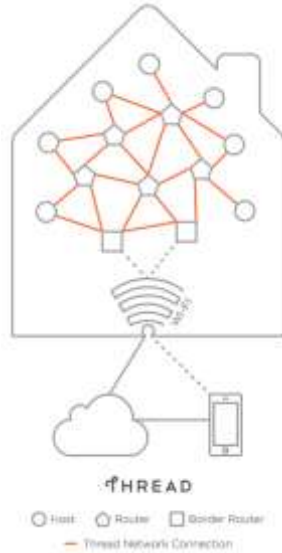
IoT End Node Connectivity Landscape



Thread for the Connected Home







-  **POWERFUL TECHNOLOGY**
-  **SIMPLE, SECURE, SCALABLE**
-  **BATTERY FRIENDLY DESIGN**

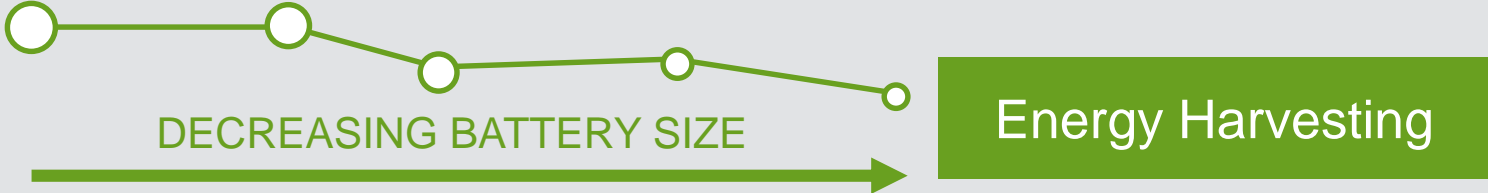


- **IP-based mesh networking protocol** for connecting devices in the home
- **7** founding sponsor members grown to **9** sponsor members
- **80+** companies have joined Thread Group since Oct 1
- **Millions** of Thread devices already in the field running a version of Thread

Freescale **beta development program** with **Kinetis wireless MCUs** in progress to jump start next-generation IoT products

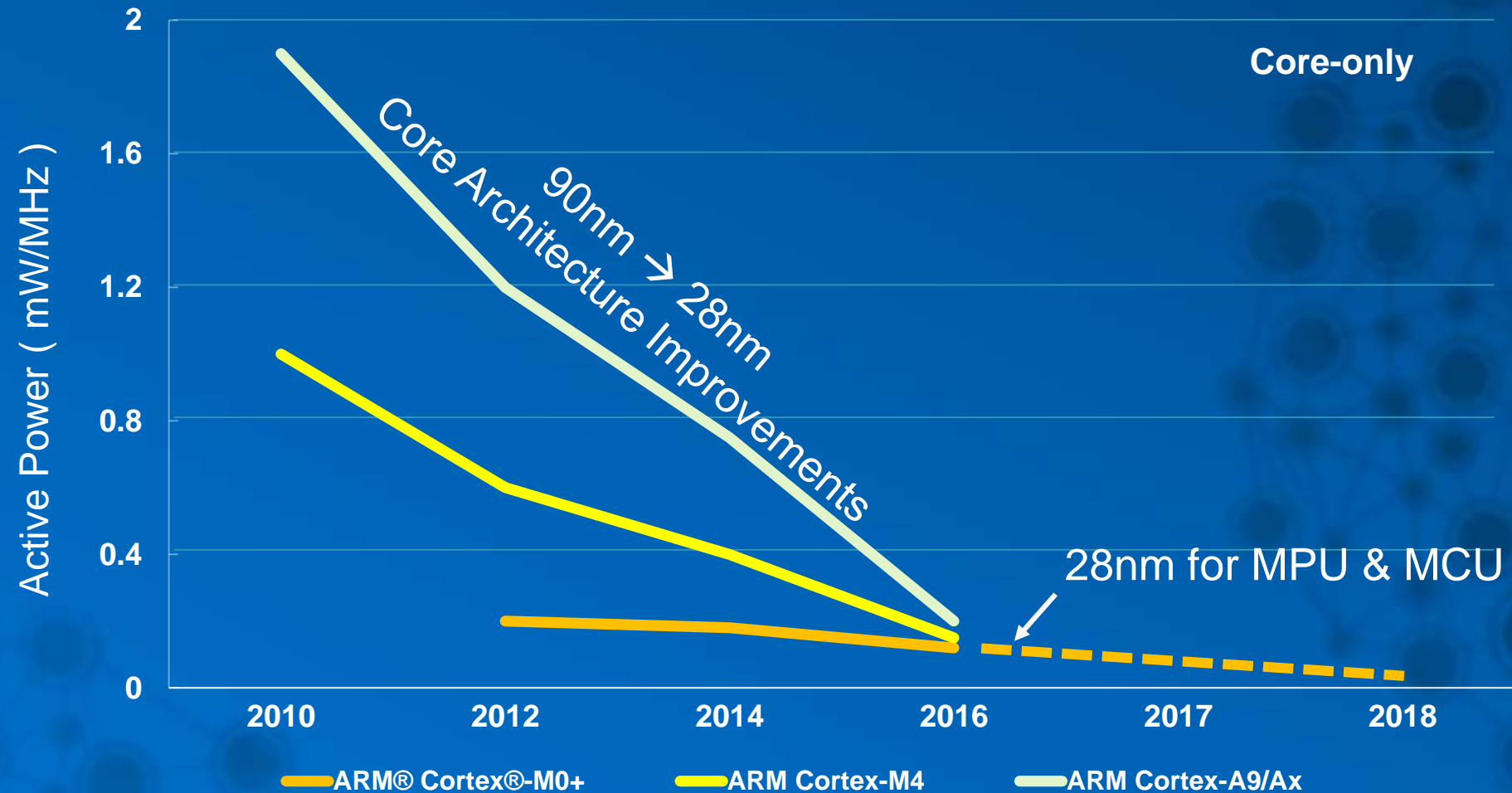
Energy Efficiency

				
	Li-ion Battery	Alkaline (AA)	Coin Cell	Electrodynamic
Nominal Voltage	~3.7	~1.3	~3V	~2V
Capacity	~2000mAh	1000-2000mAh	~250mAh	~0.00005mAh/Press
Peak Current	~2000mA	~500mA	~15mA	~15mA??

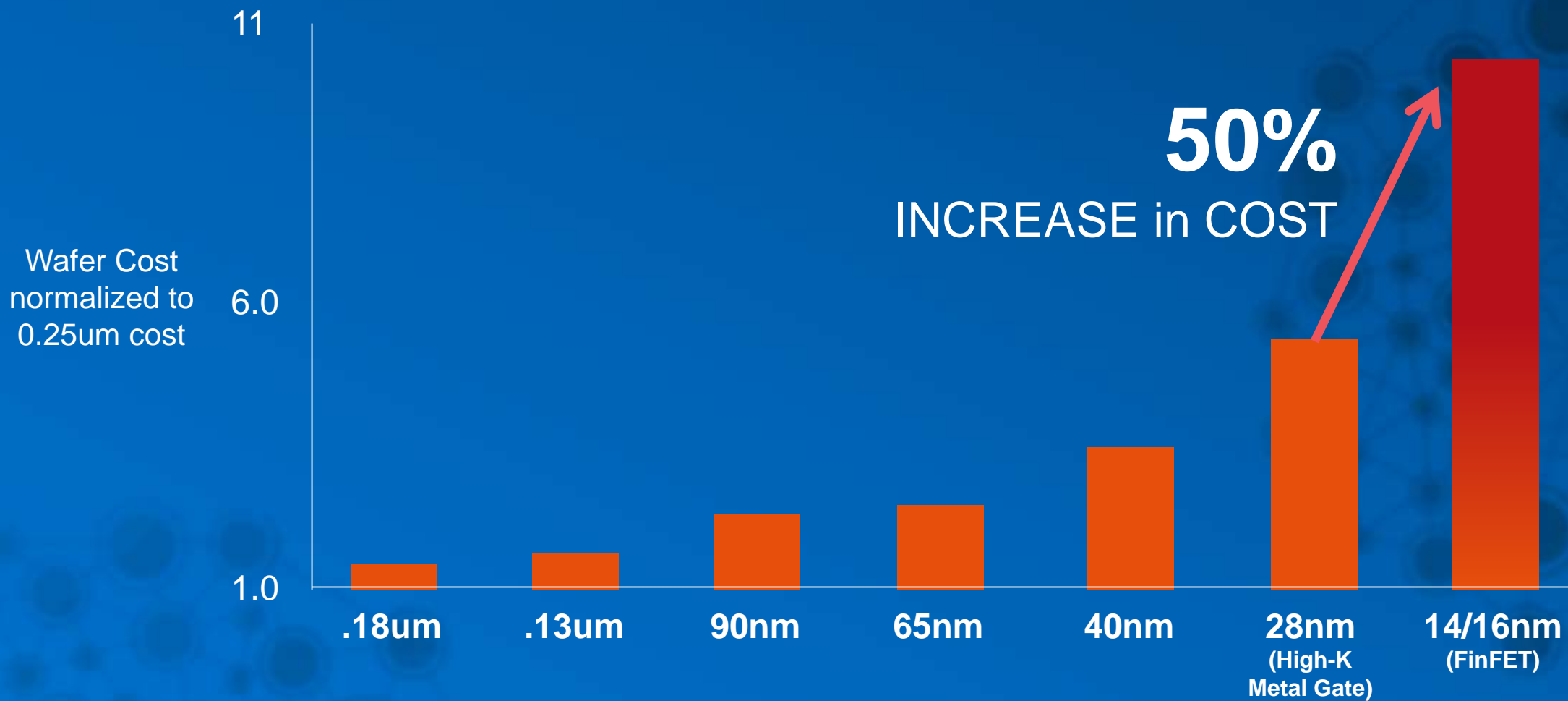


From End Node to the Gateway, IoT requires improved power management and power conversion efficiency

Processing Power Efficiency



28nm – ‘Last Simple Node?’



Process Technology Implications

28nm & Beyond	High-K Metal Gate	FD-SOI	FinFET
Energy Efficiency	●	●	●
Cost Competitiveness	●	●	●
Ease of Design	●	●	●
Ease of Diversification	●	●	●

Multi-Cores

- Power Management
- Performance
- Security / Trust Zone

Memory

- Secure Java / OS support
- Connectivity S/W stack

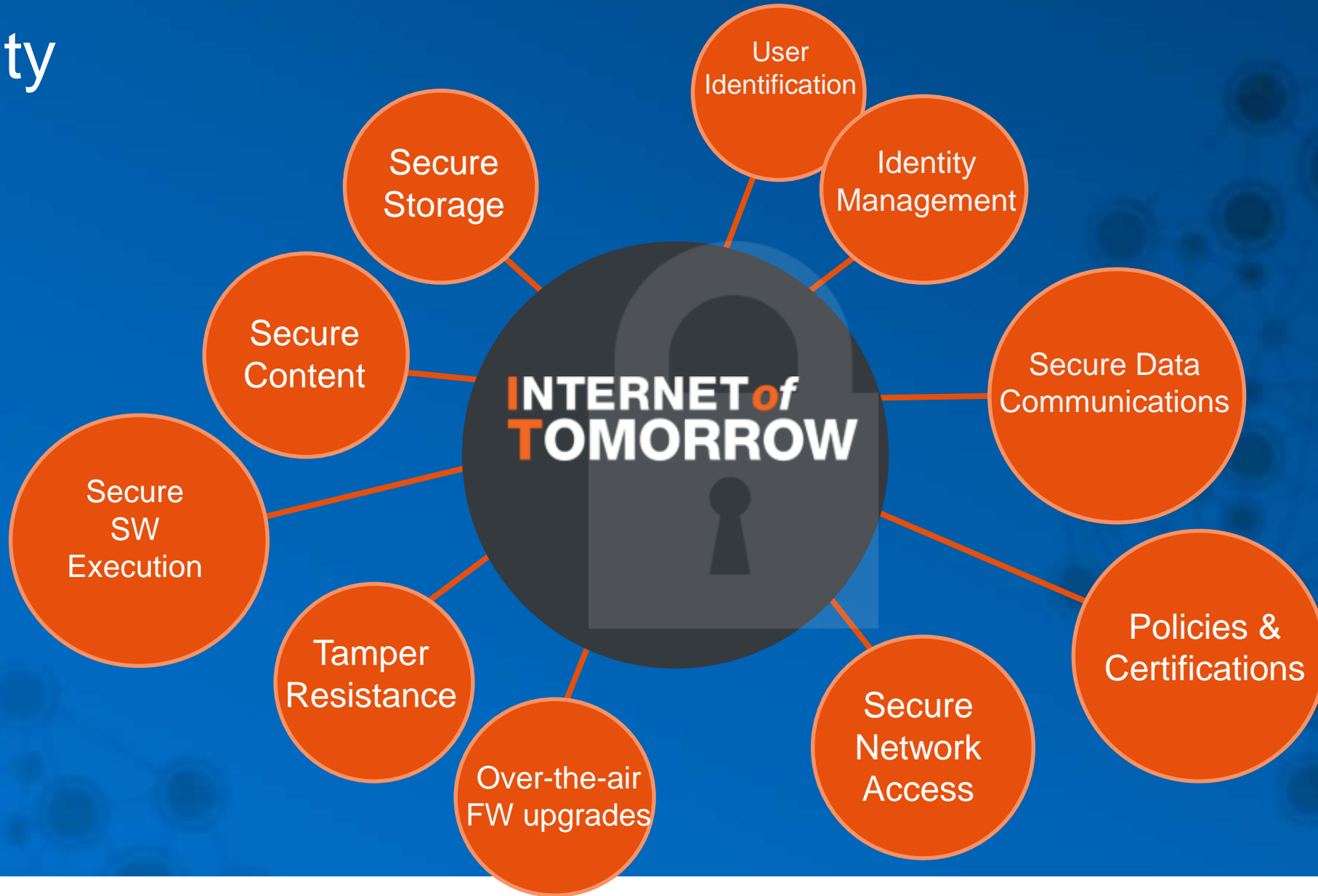
Non-volatile Memory

- Program Complexity
- Data Collection

RF Connectivity

- Wireless Everywhere

Security





Secure Embedded Processing Solutions for the Internet of Tomorrow

Freescale Security

John Dixon | Director, Corporate Marketing

M A R . 2 6 . 2 0 1 5

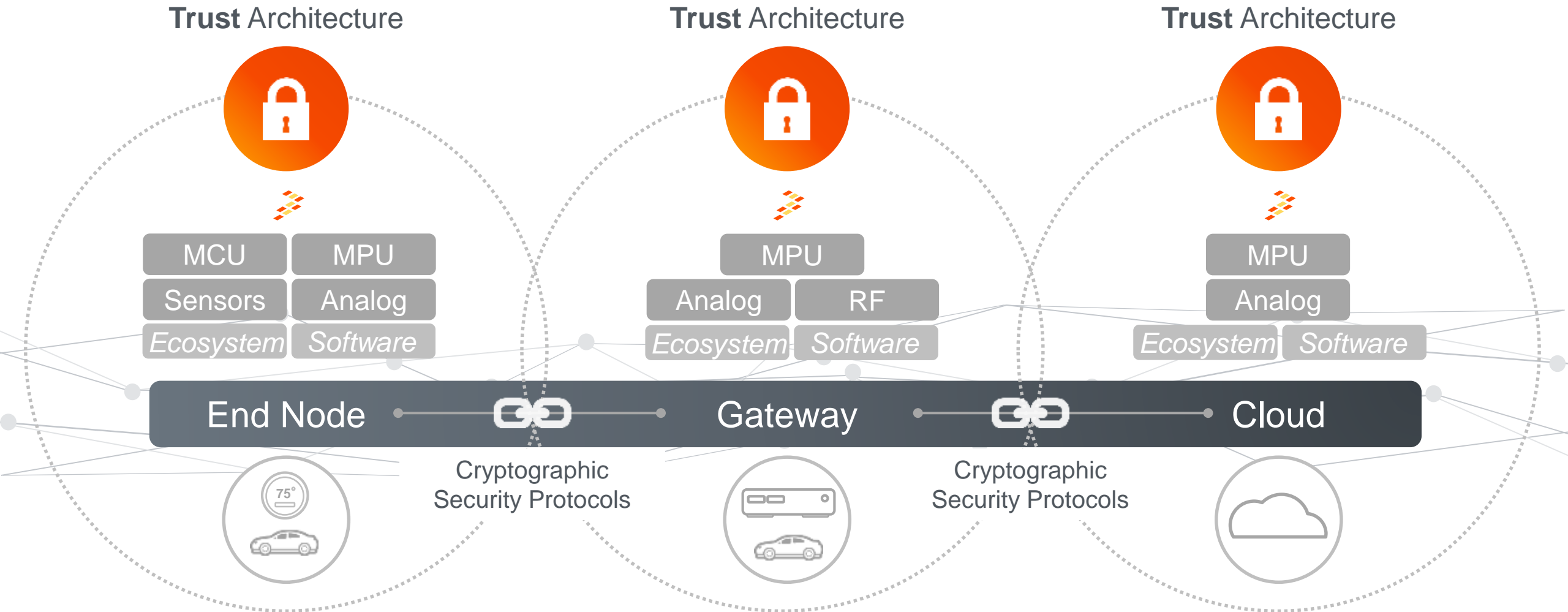


External Use

Freescale, the Freescale logo, ABiVec, C-5, CodeTEST, CodeWarrior, GoldFire, GoldFire+, G-Wire, the Energy Efficient Solutions logo, Kinetics, MagniV, mobileGT, PEQ, PowerQUICC, Processor Expert, QorIQ, QorIQ Converge, Qorvix, Ready Play, SafeAssure, the SafeAssure logo, StarCore, Symphony, VortiGa, Vybrid and Xtrinsic are trademarks of Freescale Semiconductor, Inc., Reg. U.S. Pat. & Tm. Off. Airfast, BeeKit, BeeStack, CoreNet, Flexis, Layercape, MXC, Platform in a Package, QUICC Engine, SMARTMOS, Tower, TurboLink and UMEMS are trademarks of Freescale Semiconductor, Inc. All other product or service names are the property of their respective owners. © 2015 Freescale Semiconductor, Inc.



Freescale IoT Security Solutions



IoT Market Challenges



Securing data with the move to Software Defined Networks (SDN)



Complex security needs for the connected car



Lack of system security standards for IoT end nodes



Emergence of IoT solutions coming from start-ups

Freescalé's Response to Market Challenges



Leverage Leadership.

Leverage our security leadership to drive IoT end node security guidelines



Security Guidelines. Educate.

Educate IoT customers on these security guidelines



Security Center of Excellence.

Create a security center of excellence to invest for future leadership

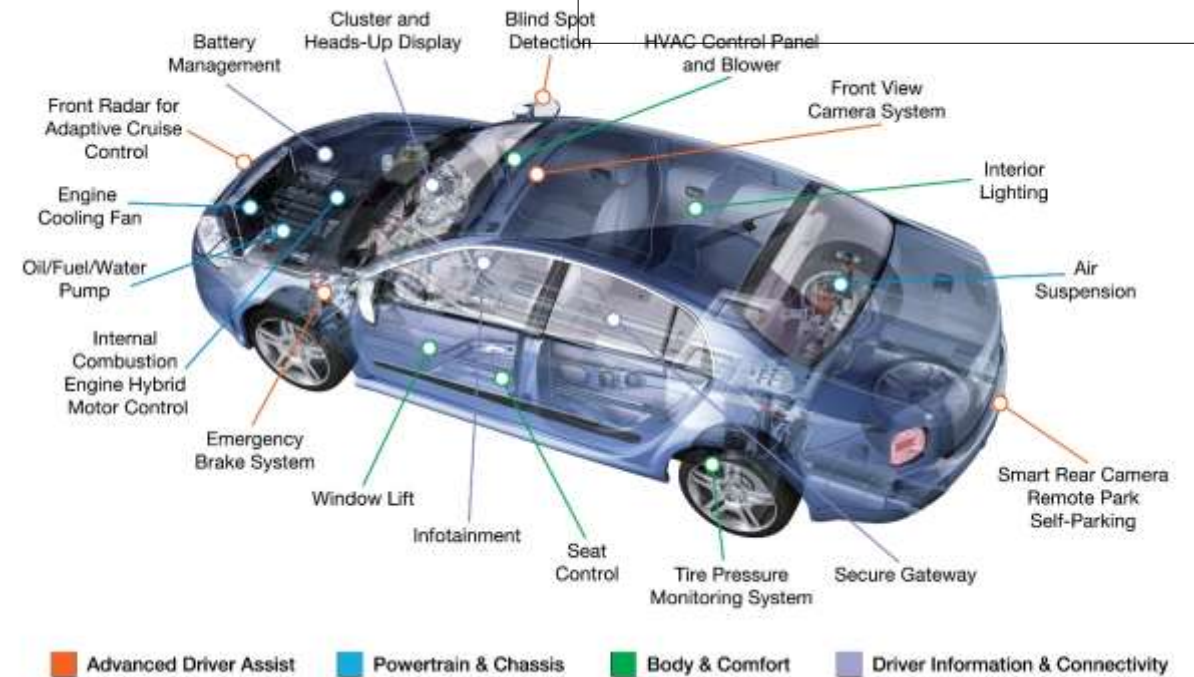
Leverage Leadership SDN Security

- **49%** market share in Wired and Wireless communication processors*
- **20 years** of SoC and SW experience in security
- Over **100 million chips sold** to date with security functions
- **\$100m** yearly investment in security HW & SW
- Freescale was **first to market** with communication processor with integrated security
- **Enhanced security application portfolio** through to (VortiQa) acquisition
- Driving **ecosystem for SW API/standards**



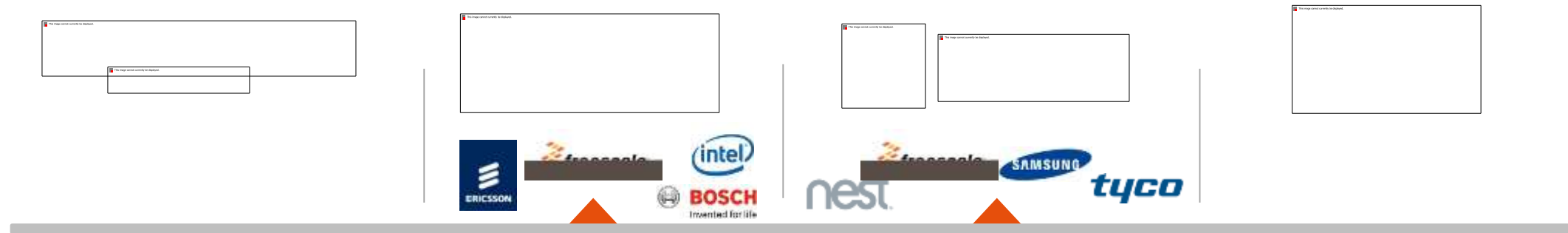
Leverage Leadership Automotive Connectivity Security

- Helped drive **HSM and SHE automotive security standards** and first to implement into Silicon
- Integrating **SHE security into ARM based MPU**
- Designed into **all critical security systems** in cars today
- Leveraging **networking (QorIQ) expertise** for Connected car emergence

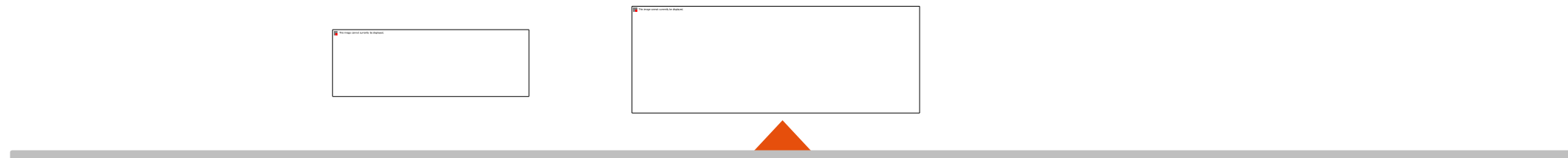


Leverage Leadership Standardize IoT Alliances

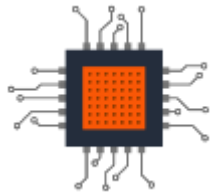
Addressing End node network security, not device security



Guidelines for developing secure end node systems



Educate Start-up/Incubator Program



Provide Start-ups with Silicon & Tools



Freescale Technical Community



Security Training



IDH & ODM Connections

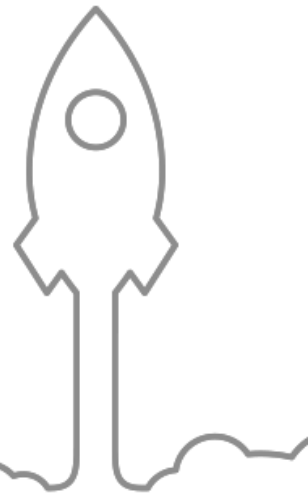


Free FTF, IoT Social Media

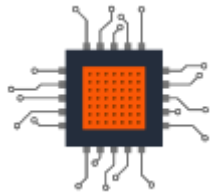


Locations:

BOSTON | CHIGACO | TORONTO | AUSTIN | DALLAS
SHENZHEN | NEW YORK | CAMBRIDGE



Educate Start-up/Incubator Program



Provide Start-ups with Silicon & Tools



Freescale Technical Community



Security Training



IDH & ODM Connections

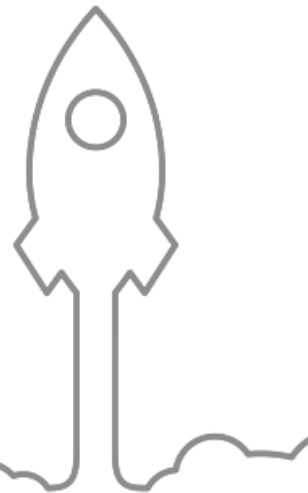


Free FTF, IoT Social Media



Locations:

BOSTON | CHICAGO | TORONTO | AUSTIN | DALLAS
SHENZHEN | NEW YORK | CAMBRIDGE



Center of Excellence Freescale Security Labs

Drive security standards and solve customer security node to Cloud system issues

- Drive IoT technical security advancement across FSL
- Manage security from end node to Cloud
- Provide security system services

Labs in ATX, PHX, EKB, Romania, Shanghai starting 2Q15

- Physical locations with production quality IoT end-cloud demos and development platforms

Freescale Security Labs

System

Services

Standards

Investment

Ecosystem



IoT Market Challenges



Securing data with the move to Software Defined Networks



Complex security needs for the connected car



Lack of system security standards for IoT end nodes



Emergence of IoT solutions coming from start-ups



www.Freescale.com