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MIPI ALLIANCE
DEVELOPERS
CONFERENCE

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SEOUL

Ken Foust
Intel, Corp.

Evolving MIPI I3C℠ for New Usages and Industries

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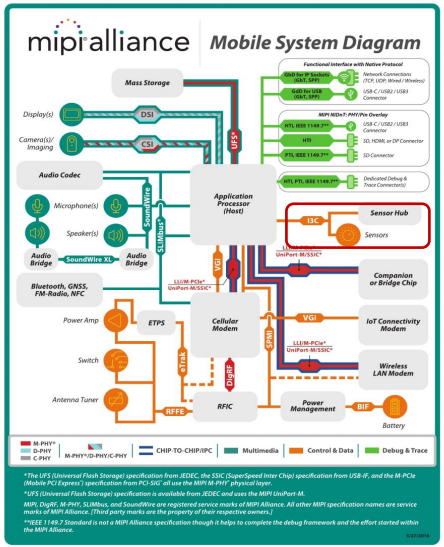
Outline

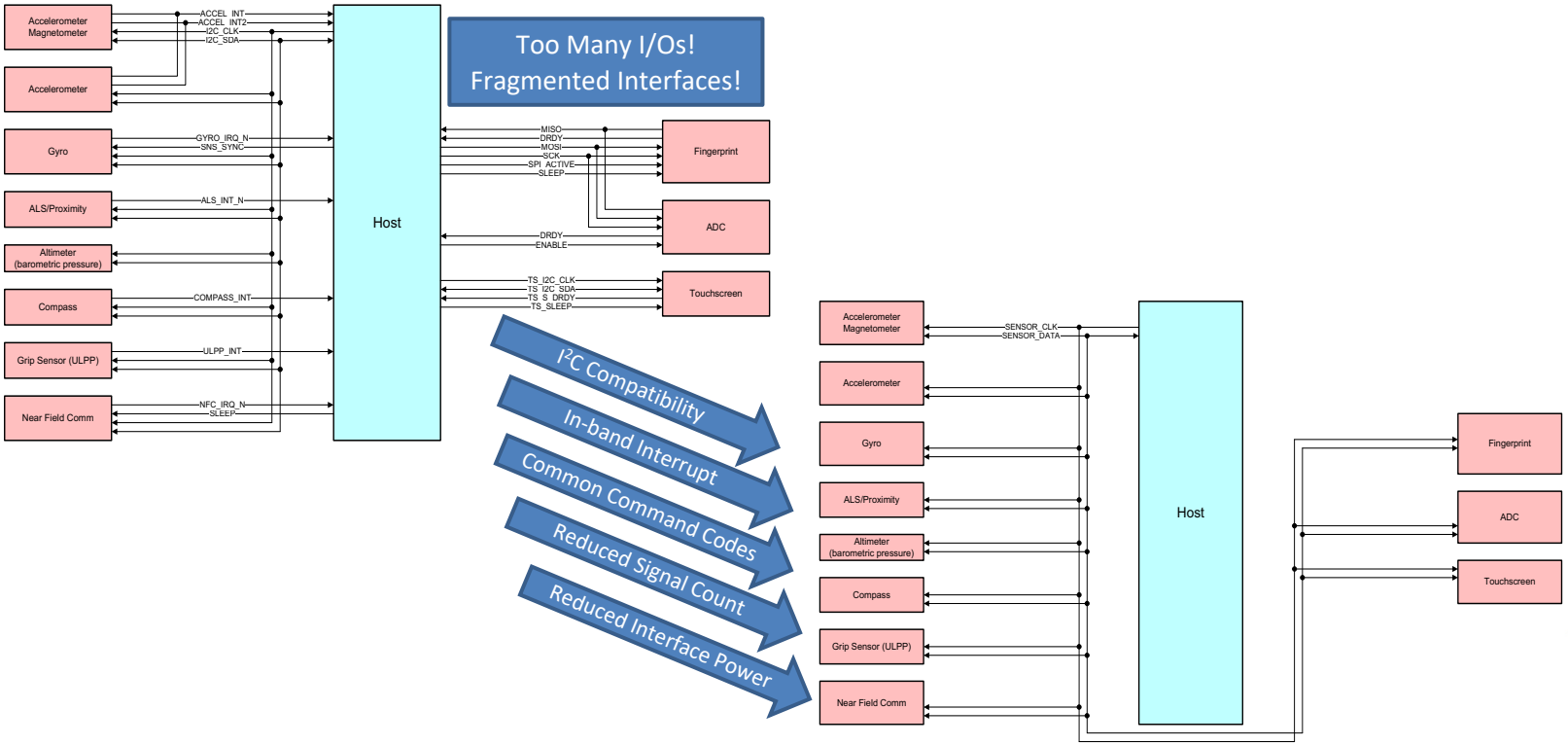
- Introduction to MIPI I3C℠
- Current status
- Industries beyond mobile
  - Internet of Things (IoT)
  - High Performance Compute / Servers
  - Automotive
- Usages beyond sensing
  - MIPI Camera Control Interface (CCI℠)
  - MIPI Touch over I3C℠
  - MIPI Debug for I3C℠
  - System Manageability
- I3C Evolution – Basic vs v1.0 vs v1.1 vs What's Next

MIPI I3C℠ for Ubiquitous Low Speed Interfacing

- Anywhere sensors are used, MIPI I3C belongs
- Aimed toward historical I²C, SPI and UART applications in…

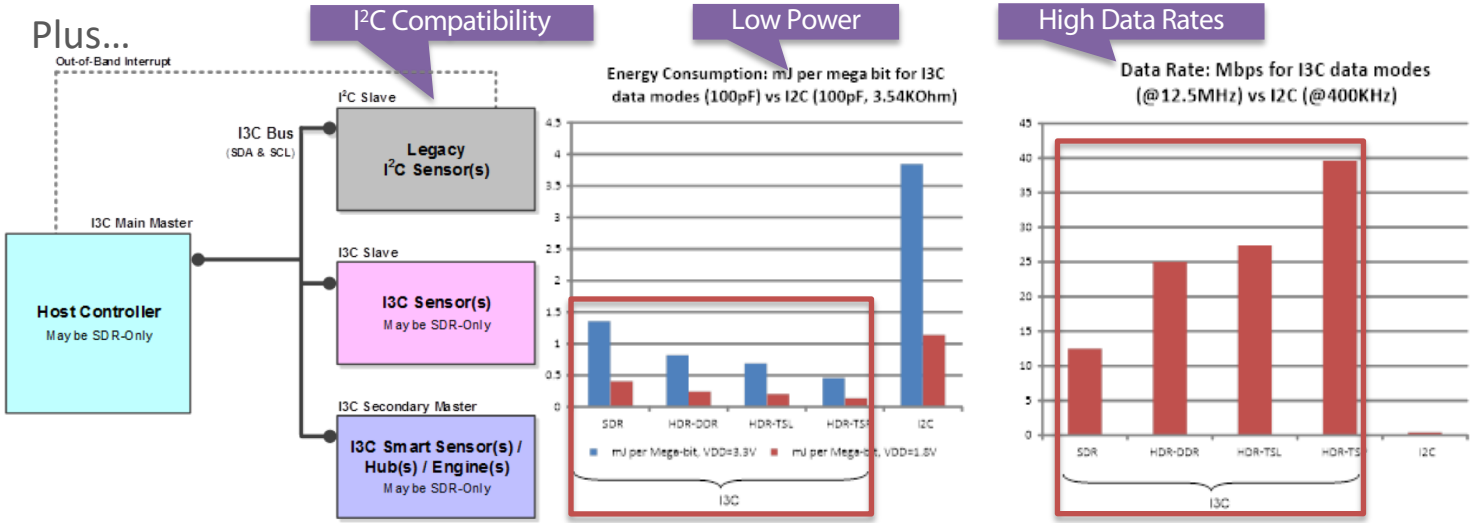


MIPI I3C℠ Vision



What is MIPI I3C℠?

- Innovative new 2-Wire Sensor interface
- Key features address historical pain points
  - In-band Interrupt, Dynamic Addressing, Multi-Master, Standardized Commands, Time Control, Hot-Join, Error Detection and Recovery
  - Plus…



Current Status

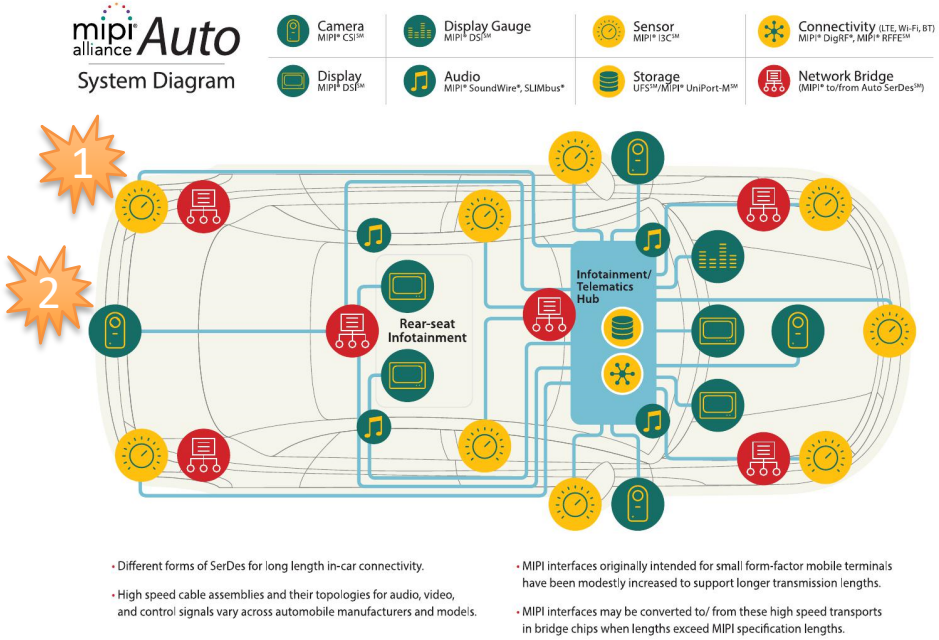
- MIPI I3C℠ v1.0 and MIPI I3C℠ Basic Specifications are released and interoperability is confirmed via multiple MIPI sponsored plugfests
- Developing a Conformance Test Suite (CTS)
- Authoring a System Integrator's Application Note
- Revising the I3C FAQ's to support upcoming features
- Finishing up the I3C v1.1 specification
  - Clarifying ambiguities
  - Fixing editorial bugs
  - Adding new capabilities

Looking at Capabilities Beyond the Mobile Industry

- Internet of Things (IoT)
  - Sensor WG to make key contributions to new MIPI IoT BoF and roll learnings back into future I3C development
- High Performance Compute / Servers
  - MIPI driving Industry liaisons to ensure adoption while shunting fragmentation
- Automotive
  - Let's discuss these new challenges on next slide…

MIPI I3C℠ for Automotive

- Opportunities
  1. Sensor data transport
  2. Control/manageability
- Challenges
  - Functional Safety (FuSa)
  - Reliability
  - Security
  - EMI/EMC
  - Long reach
  - Policies



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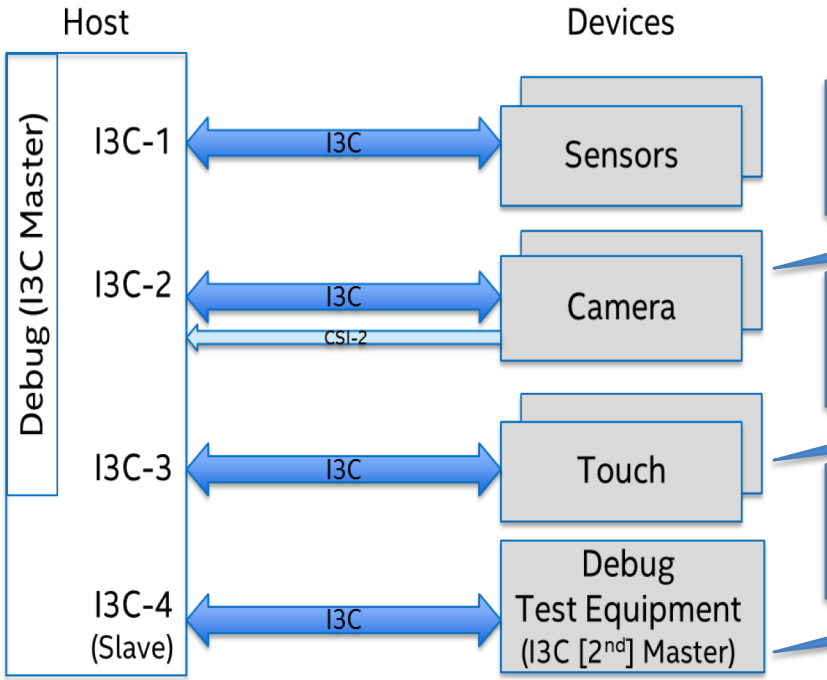
Usages Beyond Sensing

- As part of its Charter, the Sensor WG carries the responsibility to ensure MIPI I3C℠ “maintains a relevant feature set and scope”
- The following notable usages, among others, have been instrumental in evolving I3C forward:
  - MIPI Camera Control Interface (CCI℠)
  - MIPI Touch over I3C
  - MIPI Debug for I3C
  - System Manageability

Usages Beyond Sensing – Collaborations in MIPI



- MIPI CCI[SM] (Camera Control Interface) over I3C[SM] offers faster, lower latency and more efficient camera control with future abilities to support grouped data write and AON imaging

- Current touch screen controller interfaces are fragmented
- For many touch screens, MIPI Touch over I3C presents a converged interface option for processed and raw touch data, leveraging IBI and HDR modes

- MIPI Debug for I3C offers a more complete closed chassis, scalable and power aware platform debug capability with minimum boundary pin count

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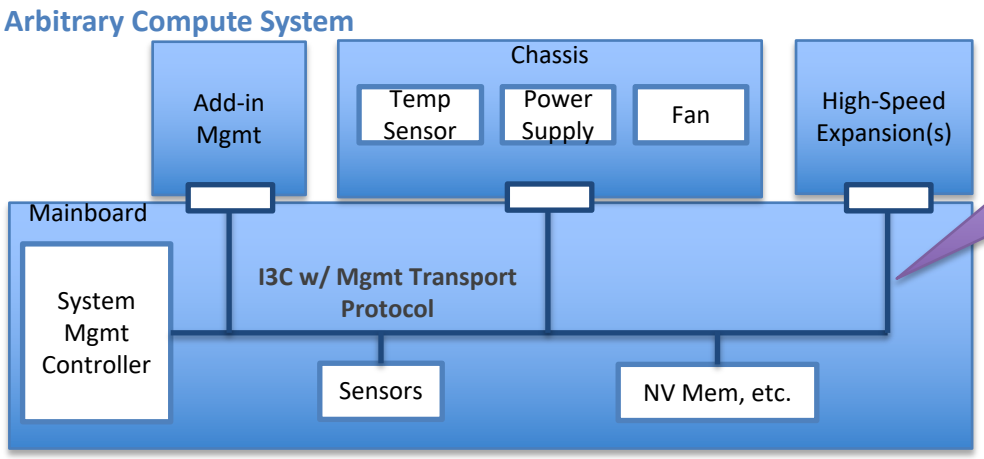
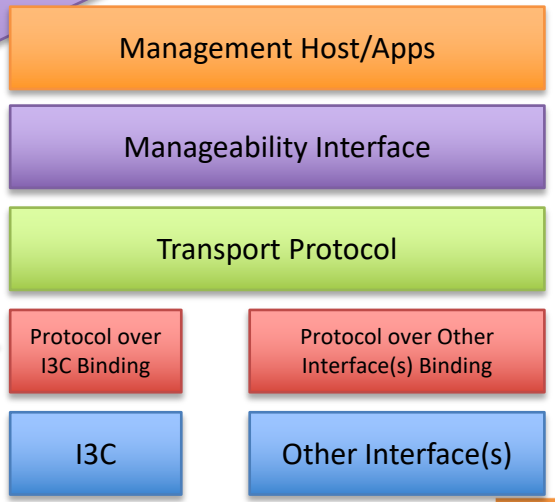
Usages Beyond Sensing – System Manageability

- MIPI I3C℠ can be used to manage complex systems when a common Management Transport Protocol is adopted (e.g. MCTP)





- A simple binding can allow a common Transport Protocol over the MIPI I3C interface

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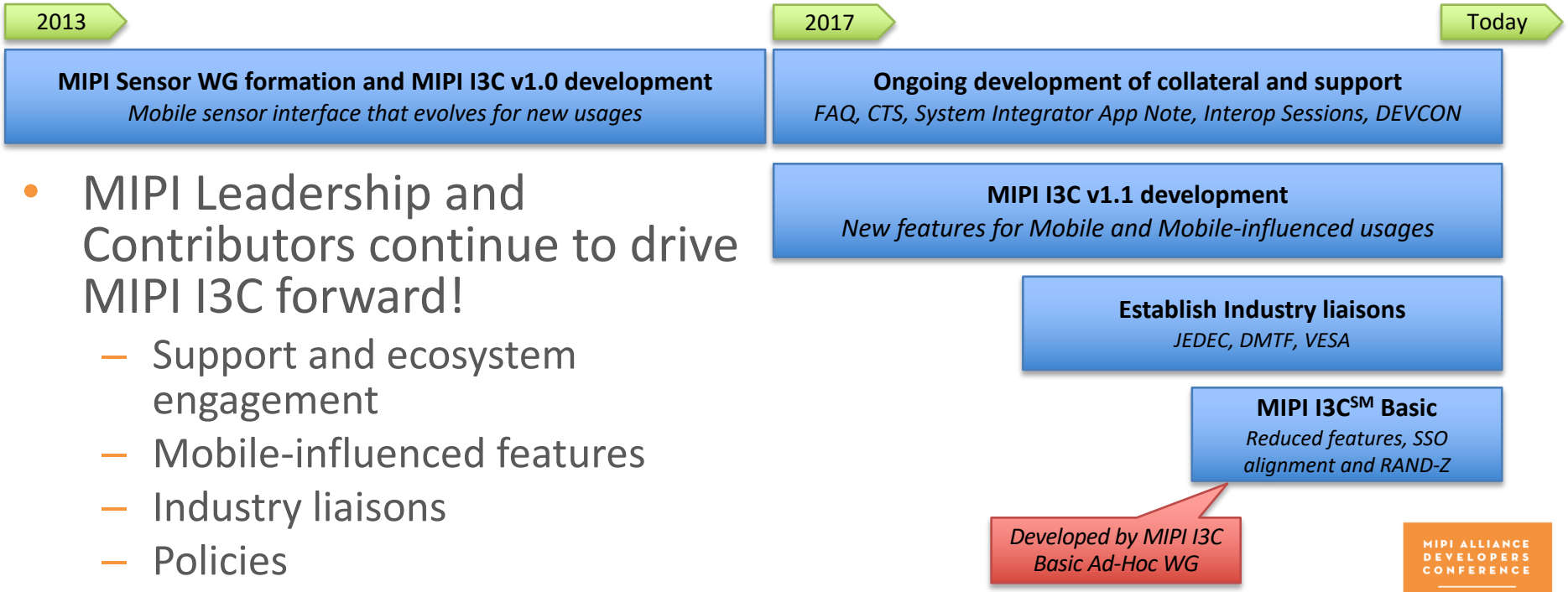
MIPI I3C^{SM} Evolution at a Glance

- MIPI Leadership and Contributors continue to drive MIPI I3C forward!
  - Support and ecosystem engagement
  - Mobile-influenced features
  - Industry liaisons
  - Policies



I3C Basic vs I3C v1.0 vs I3C v1.1 (1/2)

Feature	I3C Basic	I3C v1.0	I3C v1.1
12.5 MHz SDR (Master w/Stall, Slave and Legacy I2C Slave Compatibility)			
1.0V Operation for 100pf C_{load}			
Slave Reset			
Set Static Address as Dynamic Address CCC (SETAASA)			
1.2V-3.3V Operation for 50pf C_{load}			
In-band Interrupt (w/MDB)			
Dynamic Address Assignment			
Error Detection and Recovery			
Common Command Codes (Required / Optional)	Yes / No		
Secondary Master			
Hot-Join Mechanism			

I3C Basic vs I3C v1.0 vs I3C v1.1 (2/2)

Feature	I3C Basic	I3C v1.0	I3C v1.1
Synchronous Timing Control			
Asynchronous Timing Control (Modes 0-3)			
HDR-DDR			
HDR-TSL/TSP			
HDR-BT (Bulk Transfer)			
Grouped Addressing			
Device to Device Data Transfer			
Multi-lane for Speed (Dual/Quad for SDR and HDR-DDR)			
Monitoring Device Early Termination			

What is next for MIPI I3C?

- Sensor WG ramping up discussion on the next evolution of MIPI I3C
- Considering multiple capabilities / improvements
  - Automotive requirements
  - Speed increases
  - New multi-lane uses
  - Industry liaisons
  - New PHY approaches
  - Standardized connectors
  - Feature refinements
- Join us now to ensure that MIPI I3C evolves to meet the needs of new industries and usages!

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Any Questions?

ADDITIONAL RESOURCES

- MIPI Sensor WG
  - https://www.mipi.org/groups/sensor
- MIPI I3C℠ Spec
  - https://www.mipi.org/specifications/i3c-sensor-specification
- Whitepaper: Introduction to the MIPI I3C Standardized Sensor Interface
  - http://resources.mipi.org/i3c-sensor-specification-whitepaper-from-mipi-alliance
- MIPI I3C Frequently Asked Questions
  - https://www.mipi.org/resources/I3C-frequently-asked-questions

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THANK YOU

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