



# Making IoT Just Work in Industry

John Liu

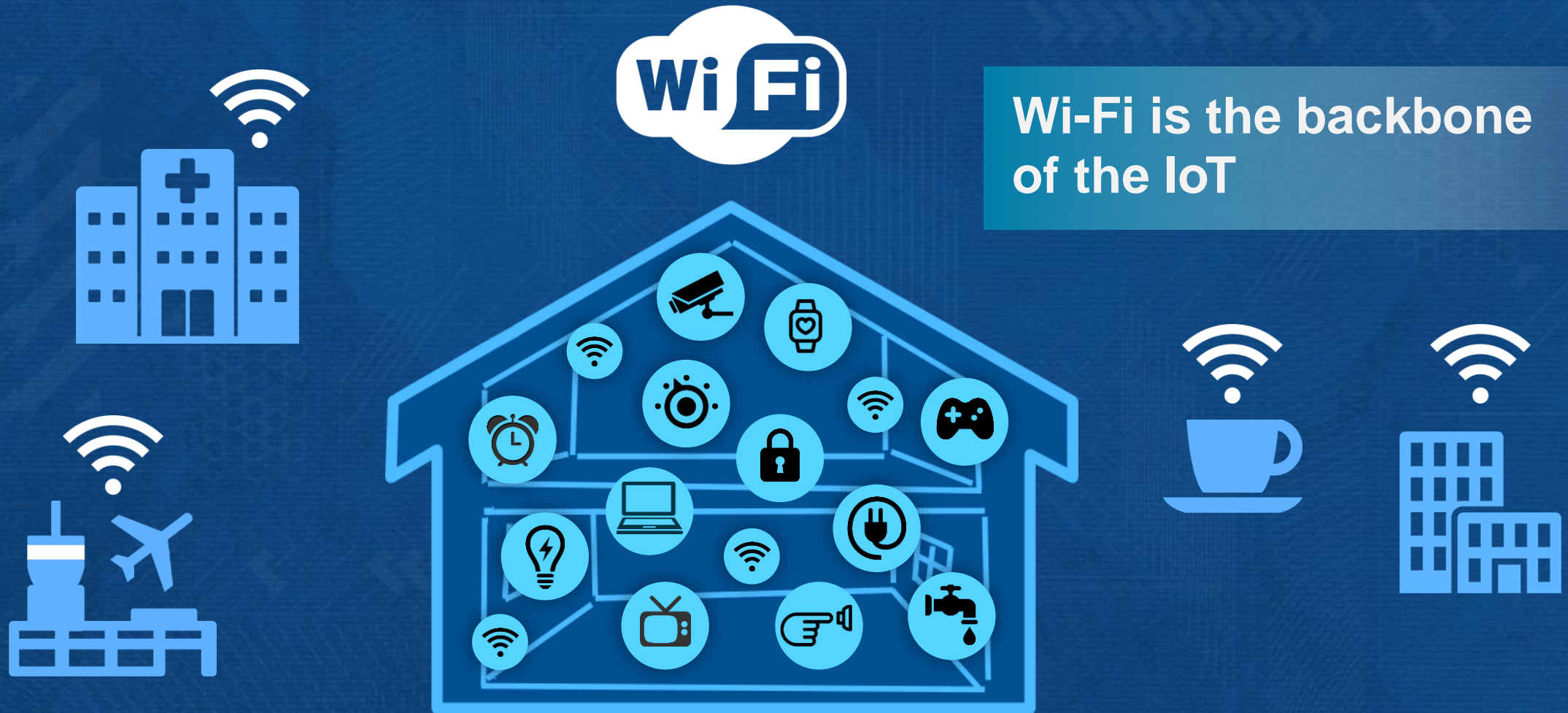
CYPRESS IOT Compute & Wireless Business Unit





# Essential Ingredients for IoT That Just Works

Robust, Multi-Protocol, IoT – Optimized Solution

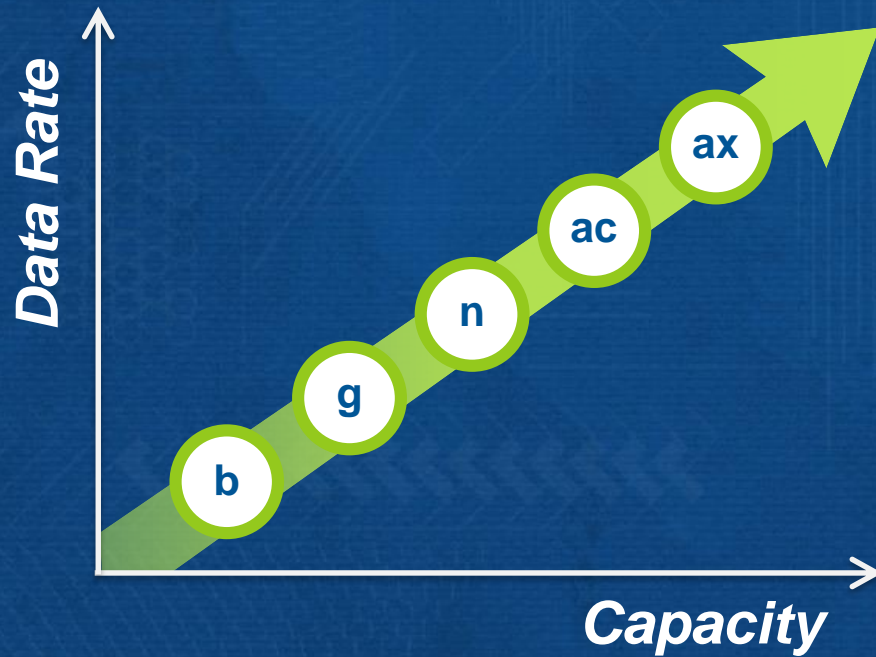


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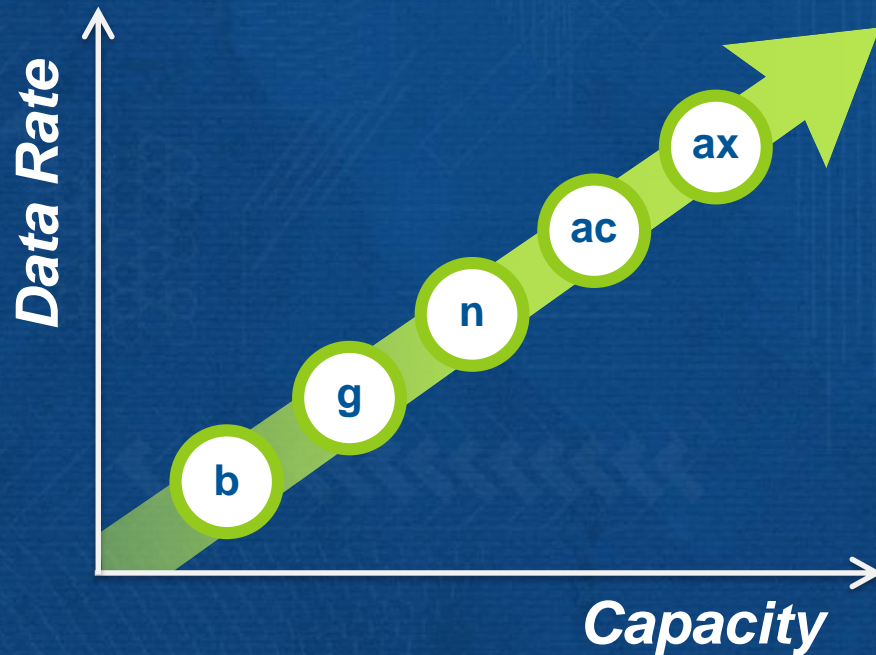
Wi-Fi: A collection of solutions





# Essential Ingredients for IoT That Just Works

Robust, Multi-Protocol, IoT – Optimized Solution



## IoT Optimizations:

- Efficiency
- Capacity
- Cooperation

# Essential Ingredients for IoT That Just Works

Robust, Multi-Protocol, IoT – Optimized Solution



## BT/ BLE

- Discovery
- Provisioning
- Mobile: Ubiquitous UI



# Cypress' Industry-Leading Portfolio of IOT Solutions

## Wireless radio standards and combinations

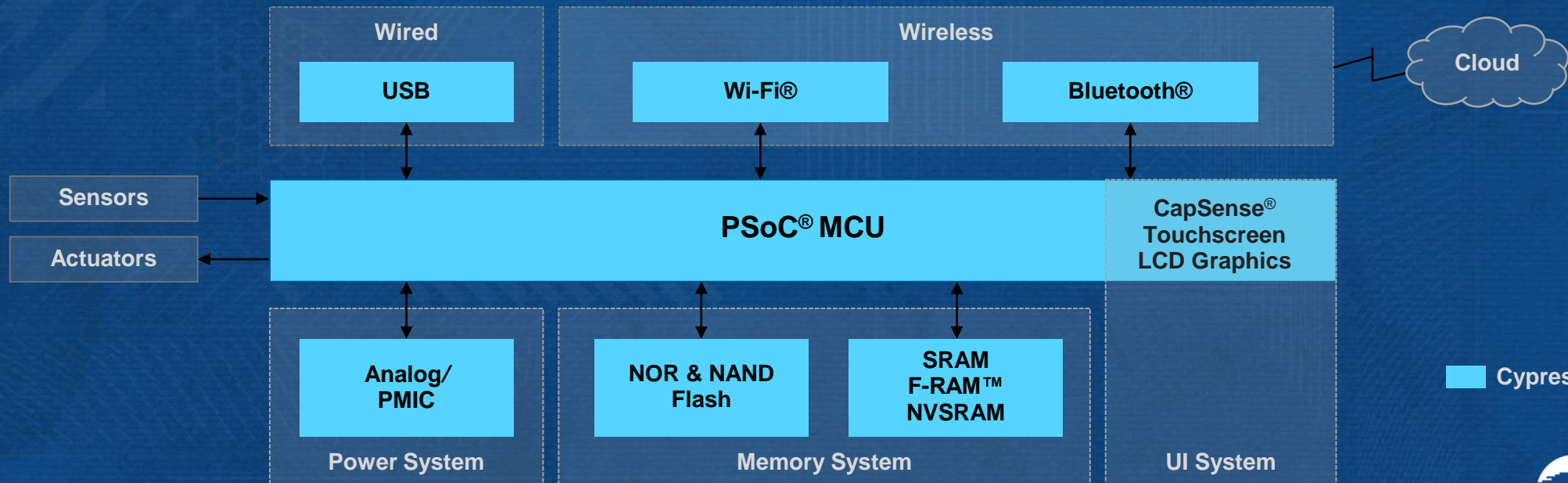
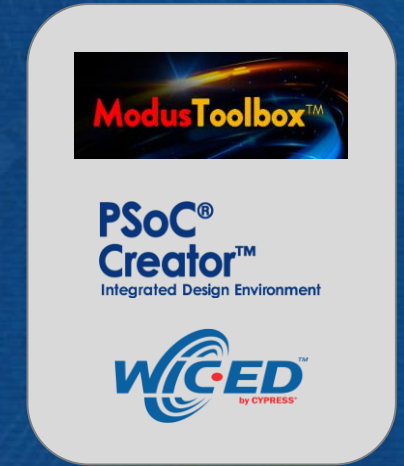
- Wi-Fi (802.11ac, 802.11bgn), Bluetooth (BR, EDR, BLE)
- Advanced coexistence algorithms for multi-radio (Wi-Fi + Bluetooth) platforms

## Broad portfolio of Arm<sup>®</sup>-based MCUs

- PSoC<sup>®</sup> 4: Arm Cortex<sup>®</sup> M0 and M0+ devices ideal for HMI, sensor hubs, and other mixed-signal subsystems
- PSoC 6: Most-flexible, lowest-power, dual-core Arm Cortex-M4 and M0+ MCU—purpose-built for the IoT

## Robust development tools and ecosystem partners

- WICED<sup>®</sup> IoT platform provides turnkey wireless connectivity
- PSoC Creator<sup>™</sup> IDE speeds system configuration and design
- New ModusToolbox<sup>™</sup> unifies MCU and wireless development environments



# Industrial (Enterprise) Roaming

- Devices that operate within an Enterprise environment must provide roaming support. Even when a device is sitting still in an Enterprise environment the RSSI levels can change and trigger a roaming event – moving from one AP to another AP.
- Mobile devices require a higher level of roaming performance, supporting AP to AP handoffs can be a big challenge (navigating the Enterprise AP Security variability).
- Wi-Fi Voice-Enterprise adds the complexity of ensuring high quality Wi-Fi VoIP support. Applications can include moving quickly (driving a fork lift) using a BT headset + Wi-Fi VoIP call.

| Wi-Fi CERTIFIED™ Interoperability Certificate   |   | Certification ID: WFAxxxxx   |  |      |          |   |   |         |   |   |  |  |
|---|---|--|--|------|----------|---|---|---------|---|---|--|--|
| <p>This certificate lists the capabilities and features that have successfully completed Wi-Fi Alliance interoperability testing. Additional information about Wi-Fi Alliance certification programs is available at <a href="http://www.wi-fi.org/certification_programs.php">www.wi-fi.org/certification_programs.php</a>.</p>                                |   |  |  |      |          |   |   |         |   |   |  |  |
| <p><b>Tested Spatial Streams</b></p> <table border="1"> <tr> <th>Dual-Band Concurrent</th> <th>2.4GHz</th> <th>5GHz</th> </tr> <tr> <td>Transmit</td> <td>3</td> <td>3</td> </tr> <tr> <td>Receive</td> <td>3</td> <td>3</td> </tr> </table>  |   | Dual-Band Concurrent   | 2.4GHz   | 5GHz | Transmit | 3 | 3 | Receive | 3 | 3 | <p><b>Certificate Date:</b> date_of_last_product_certification</p> <p><b>Company:</b> company_name</p> <p><b>Product:</b> product_name</p> <p><b>Model/SKU#:</b> model_number/sku</p> <p><b>Primary Category:</b> primary_product_category</p> |  |
| Dual-Band Concurrent  | 2.4GHz  | 5GHz   |  |      |          |   |   |         |   |   |  |  |
| Transmit  | 3   | 3  |  |      |          |   |   |         |   |   |  |  |
| Receive   | 3   | 3  |  |      |          |   |   |         |   |   |  |  |
| <p><b>IEEE Standard</b></p> <p>IEEE 802.11a<br/>IEEE 802.11b<br/>IEEE 802.11g<br/>IEEE 802.11n<br/>IEEE 802.11i</p> <p><b>Optional 802.11n Capabilities</b></p> <p>Short Guard Interval<br/>Greenfield Preamble<br/>TX M-OFDM<br/>STBC<br/>40 MHz operation in 2.4 GHz with coexistence mechanisms<br/>40 MHz operation in 5 GHz<br/>HT Duplicates (MCS 32)</p> | <p><b>Security</b></p> <p>WPA™ - Enterprise/Personal<br/>WPA2™ - Enterprise/Personal<br/>Protected Management Frames</p> <p><b>EAP-Types(s)</b></p> <p>EAP-TLS<br/>EAP-TLS/MSCHAPv2<br/>PEAPv0/EAP-MSCHAPv2<br/>PEAPv1/EAP-GTC<br/>EAP-SIM<br/>EAP-AKA<br/>EAP-FAST</p> <p><b>Vendor EAP-Types(s)</b></p> <p>EAP-TLS<br/>EAP-TLS/MSCHAPv2<br/>PEAPv0/EAP-MSCHAPv2<br/>PEAPv1/EAP-GTC<br/>EAP-SIM<br/>EAP-AKA<br/>EAP-FAST</p> | <p><b>Multimedia</b></p> <p>WMM@<br/>WMM@-Power Save<br/>WMM@-Admission Control<br/>TDS</p> <p><b>Convergence</b></p> <p>Voice - Personal<br/>Voice - Enterprise</p> <p>CYG-RF</p> | <p><b>Special Features</b></p> <p>Wi-Fi Protected Setup™</p> <ul style="list-style-type: none"> <li>- PIN</li> <li>- PBC</li> <li>- Internal Registrar (APs only)</li> <li>- External Registrar support options</li> </ul> <p>Wi-Fi Direct™</p> <p>IBSS with Wi-Fi Protected Setup</p> <p>Passpoint™</p> <ul style="list-style-type: none"> <li>- Network Selection and Security</li> <li>- On-line Setup and Policy Provisioning</li> </ul> |      |          |   |   |         |   |   |  |  |
| <p>For more information: <a href="http://www.wi-fi.org/certification_programs.php">www.wi-fi.org/certification_programs.php</a></p>   |   |  |  |      |          |   |   |         |   |   |  |  |

Figure 3. Wi-Fi CERTIFIED Interoperability Certificate

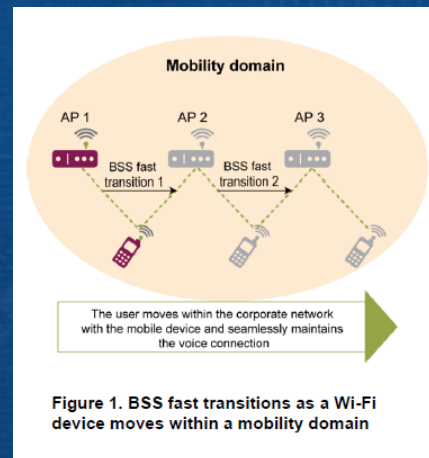


Figure 1. BSS fast transitions as a Wi-Fi device moves within a mobility domain

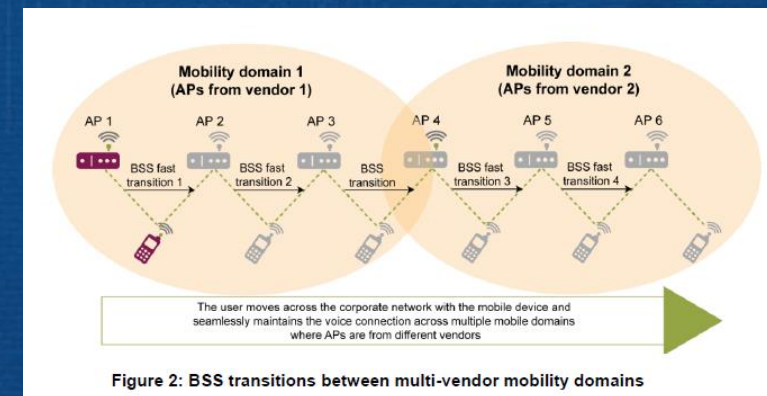
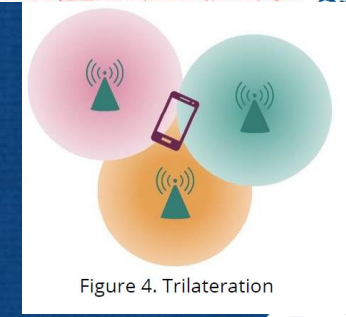
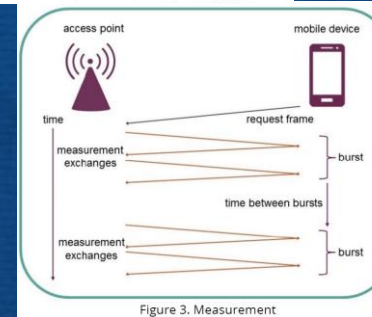
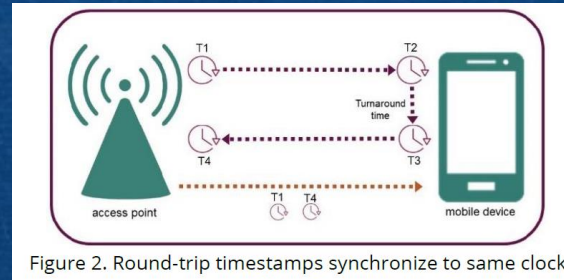
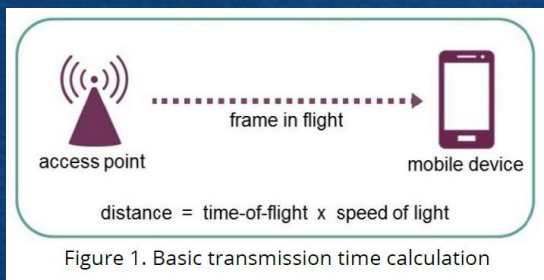
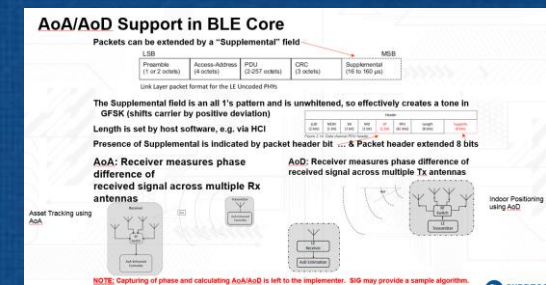
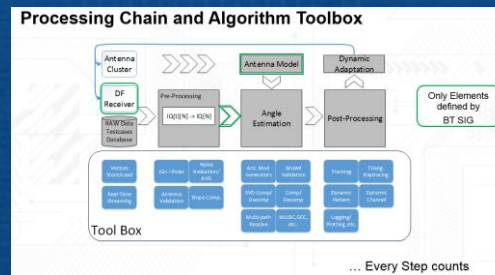
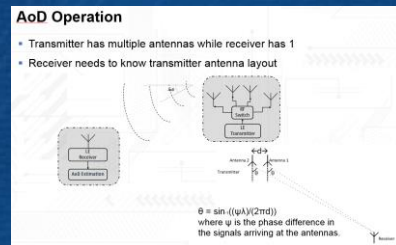
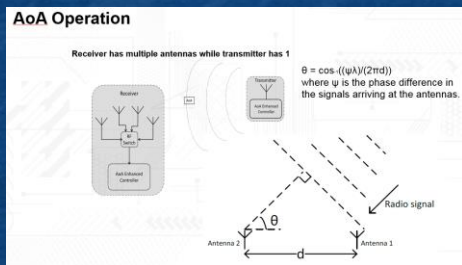


Figure 2: BSS transitions between multi-vendor mobility domains



# Industrial (Enterprise) – Indoor Location Tracking

- Customers are asking for enhanced solutions to help with Indoor Location Tracking – moving beyond RSSI triangulation solutions used today.
- Industry standards have been in process for many years, but we are getting closer to having technologies such as AoA/AoD and 802.11mc (RTT/FTM) finalized.





# Broad Wi-Fi and Wi-Fi + BT Portfolio

The industry's most widely deployed, state-of-the-art Wi-Fi and Wi-Fi + Bluetooth (BT) combo solutions

Wi-Fi + BT combos with 802.11ac for throughput-intensive applications



CYW43340<sup>1,2</sup>



Widely Adopted Combo  
802.11n, Dual Band  
SISO, BT 4.0

CYW88373<sup>1,2</sup>



Low-Power Combo  
802.11n  
SISO, BT 4.1

CYW43455<sup>1,2</sup>



Next-Gen. Combo  
802.11ac, Dual Band  
SISO, BT 4.1

CYW88359<sup>1,2</sup>



High-Performance Combo  
802.11ac, Dual Band  
2x2 MIMO, BT 4.1

Wi-Fi solutions with integrated host MCUs offer a single-chip solution to add Wi-Fi connectivity



CYW43903<sup>1,2</sup>



Wi-Fi + Powerful MCU  
802.11n, SISO  
160-MHz CR4, 1MB RAM

CYW43907<sup>1,2</sup>



Dual Band Wi-Fi + Powerful MCU  
802.11n, SISO  
320-MHz CR4, 2MB RAM

P6<sup>1,2</sup>



CYW43438<sup>1,2</sup>



Widely Adopted Combo+ + Powerful MCU  
802.11n, Single Band  
SISO, BT 4.2

Wi-Fi-only solutions reduce power consumption while maintaining performance and reliability



CYW43362<sup>1,2</sup>



Widely Adopted Wi-Fi  
802.11n, SISO

CYW43364<sup>1,2</sup>



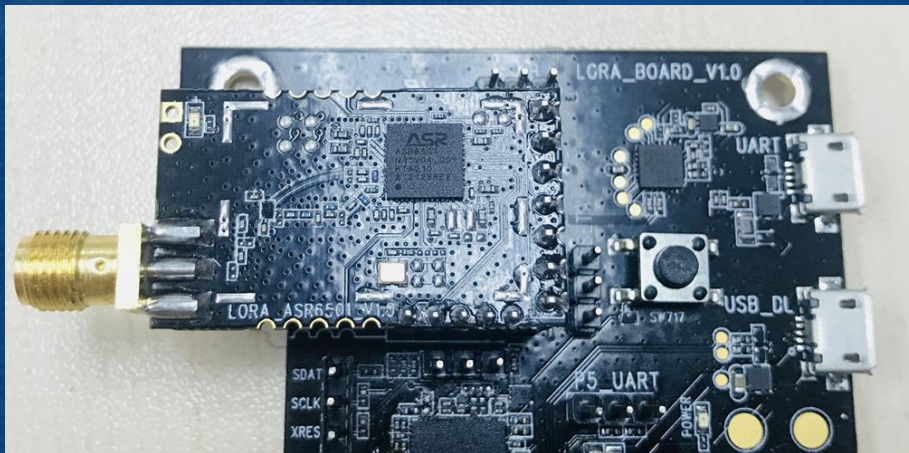
Low-Power Wi-Fi  
802.11n, SISO

<sup>1</sup> In production    <sup>2</sup> Cypress is changing the BCM prefix for Broadcom IoT parts to CYW



# PSoC 4100S Plus MCU Inside LoRaWAN SoC (ASR650x)

- First LoRaWAN SoC combining Cypress PSoC 4 MCU and Semtech SX1262 radio for smart-city, smart-factory and smart-farming applications in China
- Enabling IoT developers with ultra-low Power, ultra-small form-factor, optimized cost LPWAN Solution based on PSoC leading technology and design flexibility
- Strengthen the partnership with Alibaba on IoT ecosystem deep down to the chip level besides all the software cooperation all around



More details about the PSoC 4100S Plus MCU can be found on Cypress website at <http://www.cypress.com/psoc4>.

More details about the ASR6501 can be found on ASR Microelectronics' website at <http://www.asrmicro.com>





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