

**Presentation Will  
Begin Shortly**

**4:00**



## WI-FI

MAR 7<sup>TH</sup> | Unboxing SiWx917 Wi-Fi 6 + Bluetooth LE Pro Kit

APR 11<sup>TH</sup> | How to Develop Wi-Fi 6 Software Applications  
with SiWx917 SoC

MAY 16<sup>TH</sup> | Measure Power and Throughput on the  
SiWx917 Wi-Fi SoC

JUN 20<sup>TH</sup> | Design Battery Based Wi-Fi Cameras with SiWx917

# Welcome

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Design Battery based Wi-Fi  
Camera with SiWx917

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# Agenda

- 01** Camera Segmentation and Low Power
- 02** Wireless Security Camera System Architecture
- 03** Software Architecture
- 04** Camera Sample Designs Advantage
- 05** Demo and Q&A

# Security Camera Segmentation

LINE POWERED – OUTDOOR/INDOOR



BATTERY POWERED - OUTDOOR



LINE POWERED – PAN TILT ZOOM (PTZ)



BATTERY POWER - DOORBELL



LINE POWERED - DOORBELL



OTHER BATTERY POWERED

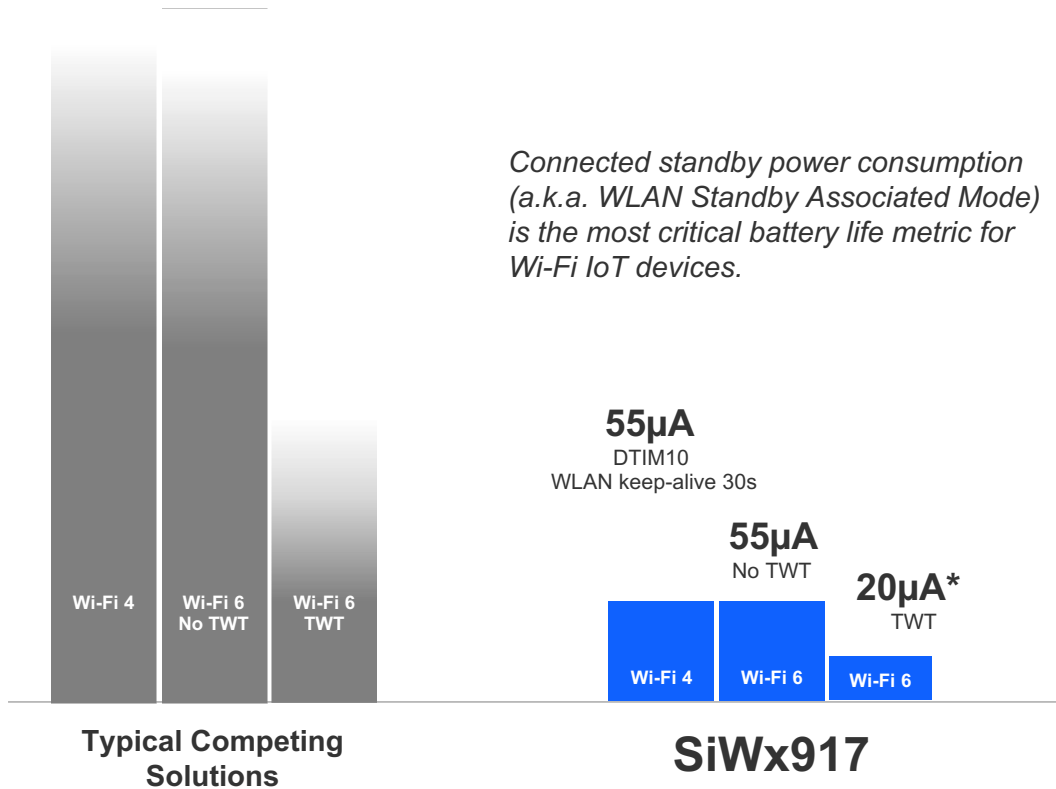


SiWG917 – Solution for Battery Powered Products / WF200 – Solution for Line-Powered Products

# SiWx917: Lowest Wi-Fi Power – Longest IoT Battery Life

## Wi-Fi Standby Current Consumption

Hundreds of  $\mu\text{A}$



Connected standby power consumption (a.k.a. WLAN Standby Associated Mode) is the most critical battery life metric for Wi-Fi IoT devices.

\* Wi-Fi 6 TWT with auto-config feature enabled. TWT Rx latency 60s with 8ms wakeup duration. WLAN keep-alive every 60s. No TCP keepalive. 352kB SRAM retention. Does not include application MCU operation.

## SiWx917 SoC Battery Life Estimation



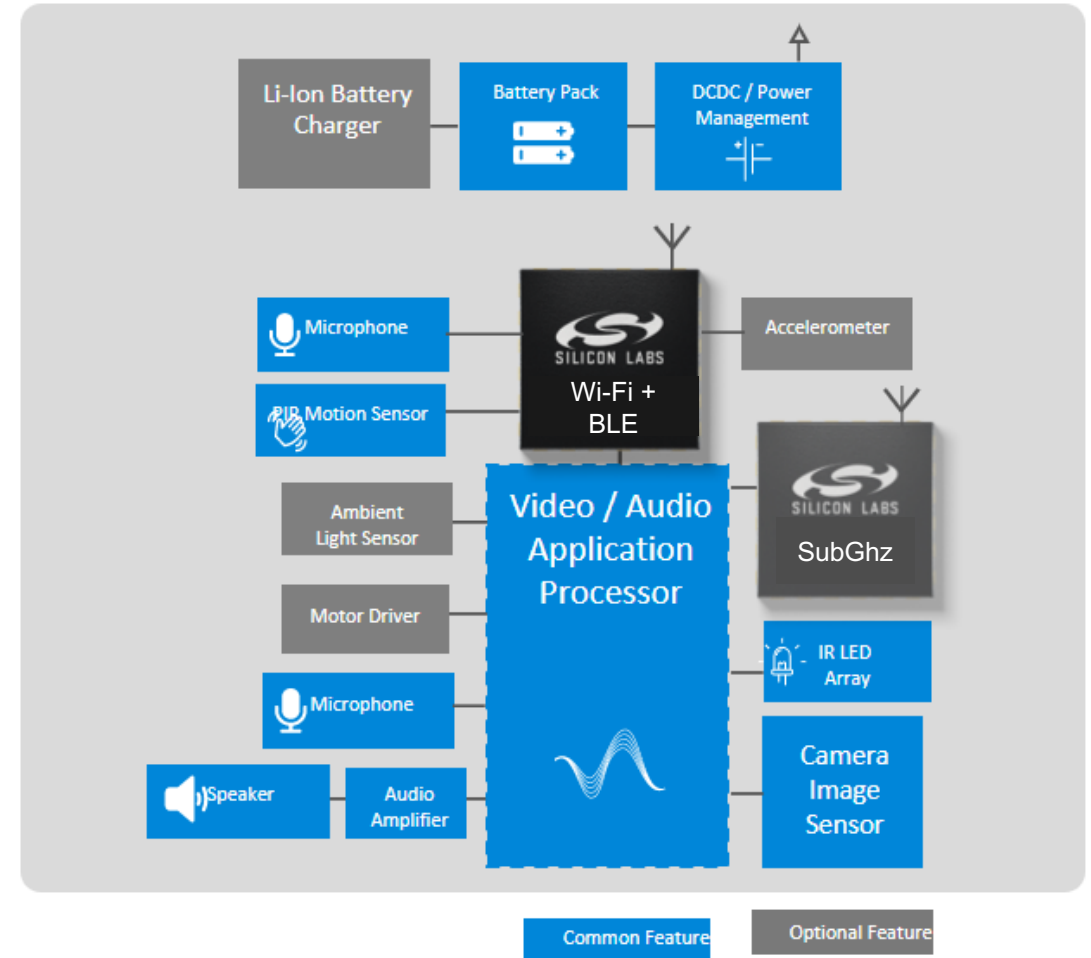
### How the SiWx917 SoC battery life of up to 2.5 years was estimated:

- Associated standby low-power mode
- SiWx917 SoC as TCP client maintains socket connection
- 60 secs TCP keep-alive used. WLAN keep-alive 30 secs. 480kB SRAM retention
- TWT Auto Config feature enabled. TWT Rx latency 60 secs with 8ms wakeup duration
- Arm Cortex-M4 in sleep mode (PS4). 192kB SRAM retention
- Average current consumption for wireless and application **35 $\mu\text{A}$  at 3.3V**
- Measurements are taken in optimal conditions (RF chamber)
- Battery capacity 1000mAh (example AAA rechargeable battery)

# Wireless Security Camera System Architecture

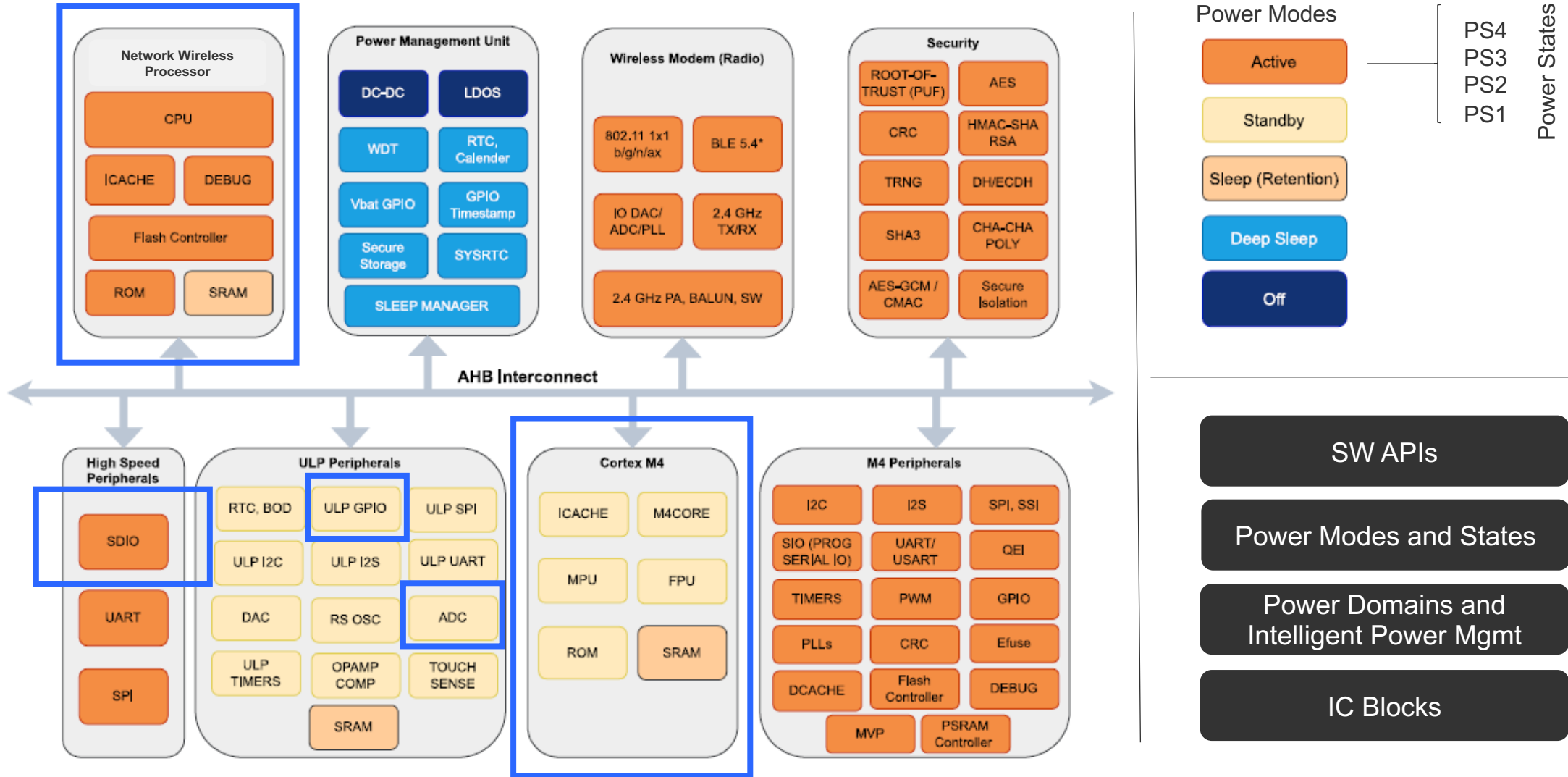
## ▪ Wireless Connectivity

- 2.4Ghz Wi-Fi + BLE
- Optional
  - SubGhz
- Sensor Input
  - Motion PIR
  - Microphone (noise detection)
  - IR Lamp
  - Accelerometer
- Memory Option
  - MicroSD Card
- External Interfaces
  - Charging Status LED
  - Reset button/hole
  - Power button
  - USB Port
  - Speaker
- Camera Battery
  - Battery Life
    - Wi-Fi connectivity maintenance and control
    - Number of activations and video streaming time



Three Critical Design Decisions – Image Signal Processor, Image Sensor and Connectivity

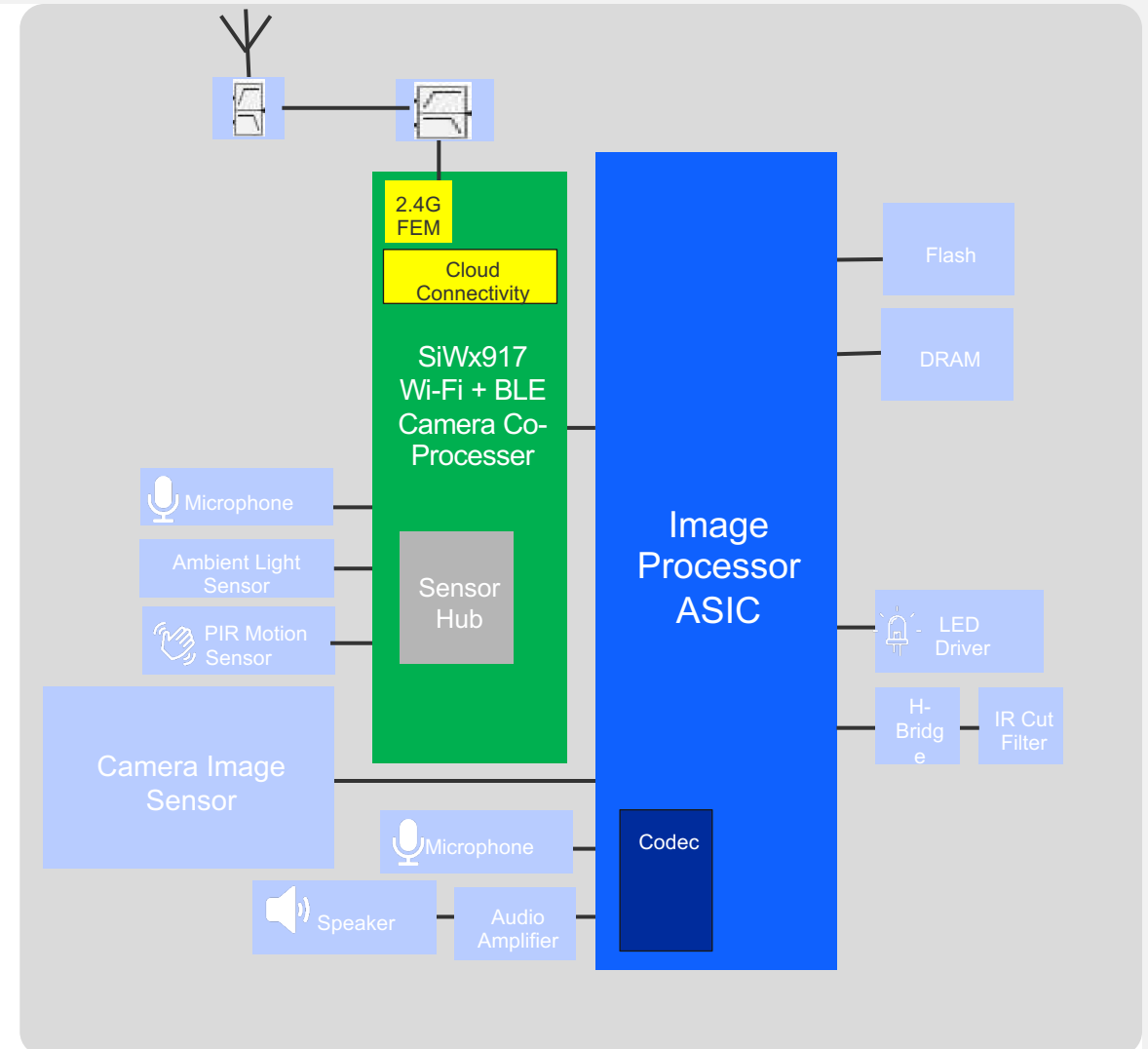
# Optimized for Low-Power IoT Designs - SiWx917 IC



# Today's Battery Powered Camera Architecture vs Legacy Wi-Fi Device

Parameter	MediaTek MTK7682	Silicon Labs SiWx917
Rx Active Current	99 mW	59.4 mW
Deep Sleep (0KB RAM retained)	8.91 uW	8.25 uW
Deep Sleep (RAM retained)	15.5uA (8KB)	11.88 uA (16KB)
Deep Sleep (RAM retained)	356 uW (384KB)	59.4 uW (672KB)
Standby Associated (DTIM = 1)	2046 uW	1135 uW
Standby Associated (DTIM = 3)	957 uW	448.8 uW
Standby Associated (DTIM = 10)	??*	181.5 uW

\* MTK7682 DTIM 10 not in published in publicly available datasheet



Lowest Power Wi-Fi6 w/ BLE providing longer battery life vs other solutions



# Key Design Decisions to Reduce Power Consumption

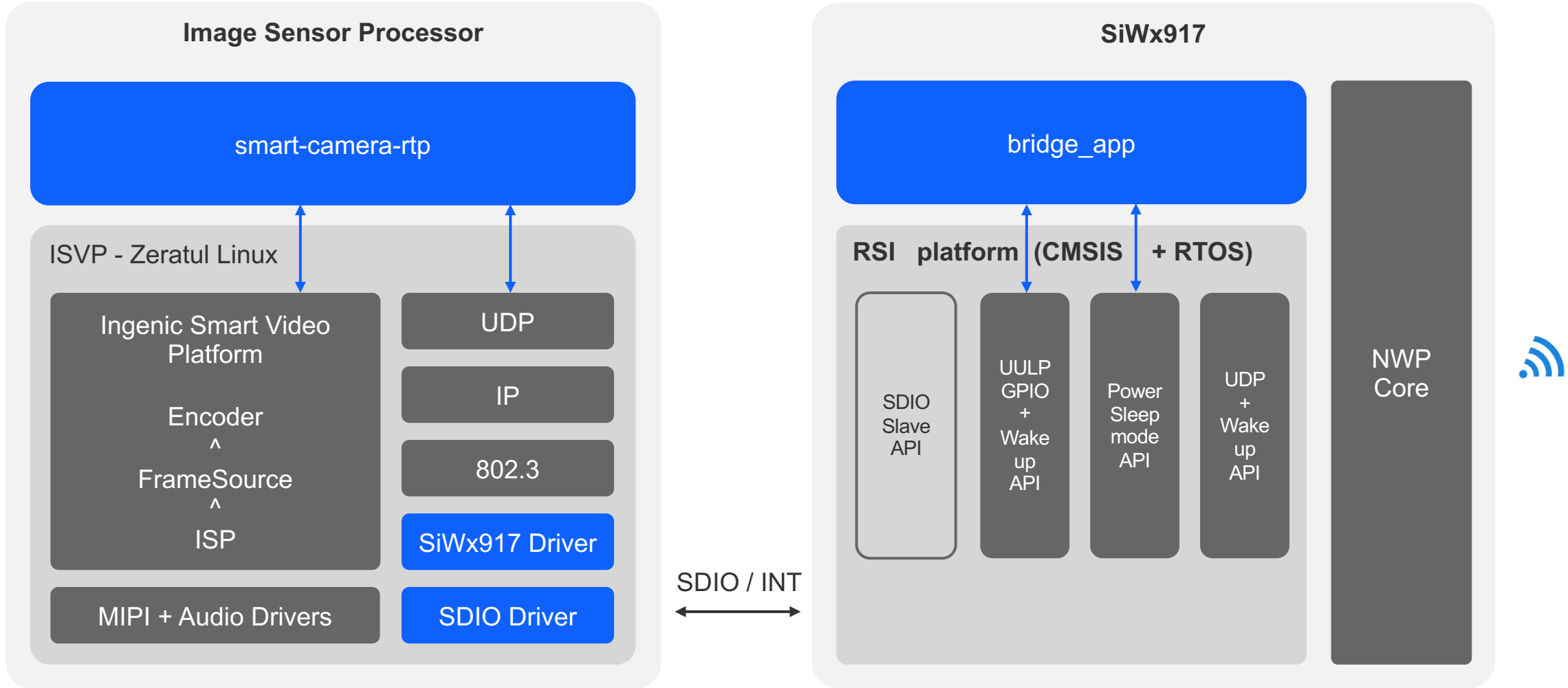
## ▪ Hardware:

- Ultra low power consumption Wi-Fi 6 plus BLE
- Fast boot to streaming video state from power-down for Image Processor ASIC (ISP)
- Sub-system power tree optimization
  - Battery control, sensing and management
  - Integrated circuit to turn on/off Camera Sensor Module and T31 ISP
  - Low Power & Low Noise PIR Circuit
  - Light sensor optimization

## ▪ Software:

- Optimized data streaming path for 1 video and 2 audio streams running in parallel
- Implement a lightweight SDIO protocol and tune the SDIO bus (ISP-Primary and SiWx917-Secondary)
- Allocate the segmentation task within the ISP to convert the H.264 frames to many smaller RTP packets prior to sending over SDIO and Wi-Fi
- Utilize multi-tasking mode in the SiWx917 & ISP to pipeline transmission packets using interrupt handlers
- Support multiple wake up interrupt sources (GPIO, Occupancy Sensors and Wi-Fi)

# Software Architecture



# Camera Sample Design Benefits

- Deliver Application specific platform to test/validate SiWx-917 performance
- Easy migration path for Ingenic T31 customers using Wi-Fi 4 to a superior Wi-Fi 6 + BLE solution
- Sample Design provides battery and line powered camera support
- Decrease customer time-to-market / Reduce customer development cost and risk
- Tested Application specific Wi-Fi Drivers and SoC source code
- Reduce Architecture complexity
  - Provide SoC solution for Battery Powered vs combined SoC to RCP
- Reference materials do not supersede or replace SiWx917 reference resources



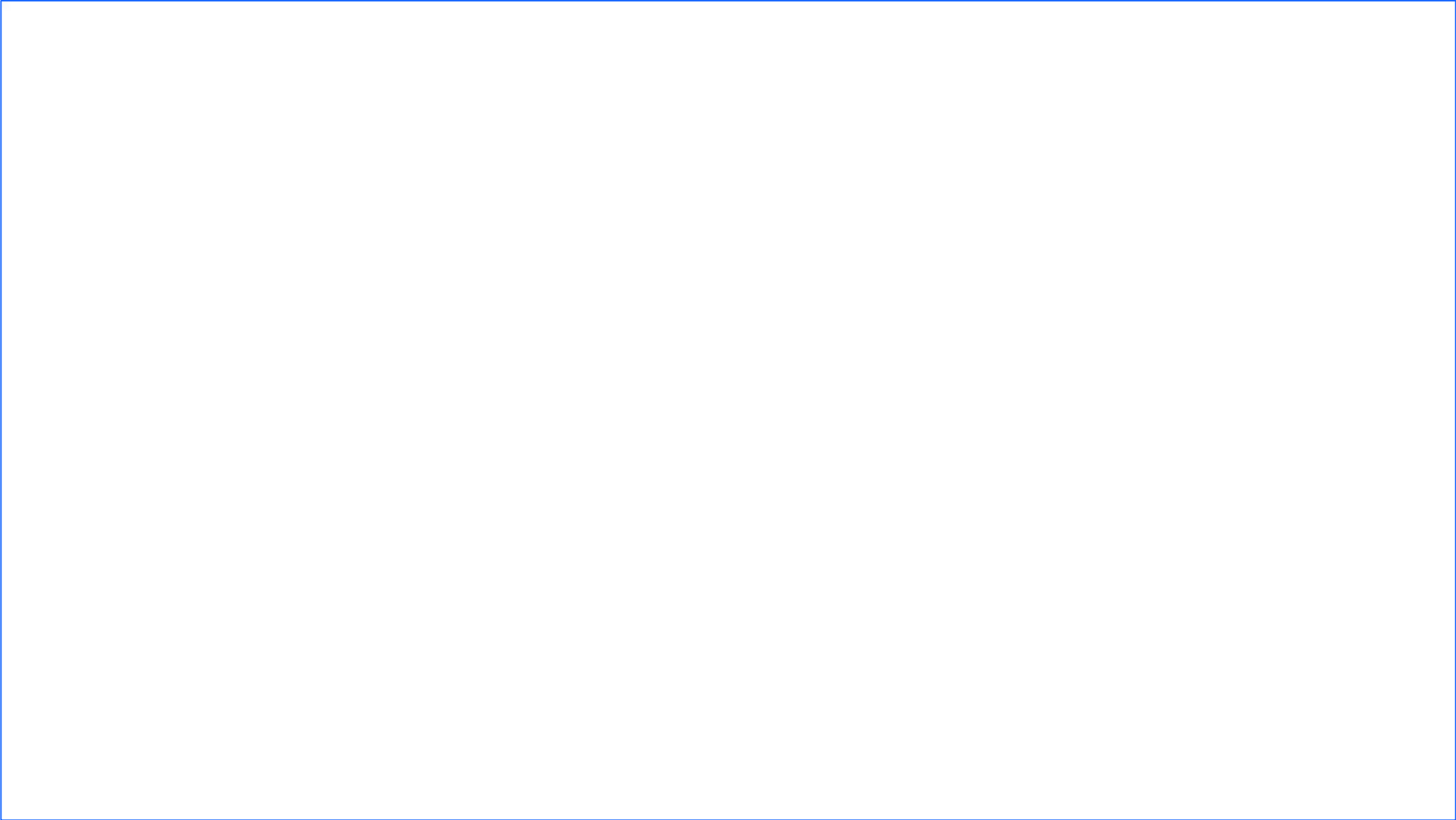
Silicon Labs  
Sample Design

# Camera demo

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Scott Farester  
Segment Marketing Manager  
Home Business Unit

# SiWx917 Camera Reference Design



# Q&A

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# Summary

- **Lowest power consumption while delivering reliable Wi-Fi and Cloud connectivity**
- **Optimized to reduce power consumption monitoring sensors, fast control for wake & sleep state, and transmission of video and audio**
- **What we provide:**
  - Schematics, Assembly Document and BOM
  - Reference Design User Guide
    - Procedure to test and measure Average Standby Associated Power provided
  - Hardware and Software Reference Manual
  - Bridge App Firmware
  - SiWx917 Driver
  - SiWx917 + T31 Hardware EVK
- **Not a finished product/manufacture ready total solution**
- **Reference materials do not supersede or replace SiWx917 reference resources**

# Thank You

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