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LPW-205

Explore the FG28: New Dual Band SoC

Chad Steider



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FG28 Overview

Why FG28?



- **Dual-Band (Sub-GHz + 2.4 GHz) Support with Series 2 Performance**
 - Increased processor performance over FG1x devices including AI/ML hardware accelerator
- **Multi-Protocol Support**
 - Support for static and dynamic multi-protocol use cases for select Sub-GHz and Sub-GHz + Bluetooth scenarios
- **Broader Ecosystem Support for Low Power Devices**
 - Full support for Wi-SUN LFN low power nodes
 - Support for both Bluetooth LE and FSK PHYs for Amazon Sidewalk
- **Up to 49 GPIOs for Better System Integration**
 - Eliminate system complexity by incorporating more into FG28 (QFN68)
- **Migration Path from Earlier FG Devices**
 - Footprint compatible path from FG12 (QFN68) and FG23 (QFN48)

FG28: Dual-Band SoC for the Next Generation of IoT



Dual-Band
Multi-protocol
More GPIOs
Secure

DEVICE SPECIFICATIONS

High Performance Dual-Band Radio

- Up to +20 dBm Sub-GHz
- -125.8 dBm RX @ 915 MHz 4.8 kbps O-QPSK
- Up to +10 dBm 2.4 GHz
- -94.2 dBm @ BLE 1 Mbps

Efficient ARM® Cortex®-M33

- Up to 78 MHz
- Up to 1024kB Flash, 256kB RAM

Low Power

- 82.8 mA TX Current (915 MHz, +20 dBm)
- 26.2 mA Tx Current (915 MHz, +14 dBm)
- 4.6 mA RX (915 MHz 4.8 kbps O-QPSK)
- 22.5 mA TX Current (2.4 GHz +10 dBm)
- 5.2 mA RX (BLE 1 Mbps)
- Active Current: 33 µA/MHz @39 MHz
- 1.3 µA EM2 (16 kB Retained)

Protocol Support

- Wi-SUN
- Amazon Sidewalk
- WM-BUS
- Proprietary
- Bluetooth LE
- Silicon Labs CONNECT

Package Options

- 6x6 QFN48 (31 GPIO), 8x8 QFN68 (49 GPIO)

DIFFERENTIATED FEATURES

Dual-Band

- Supports Sub-GHz + 2.4 GHz Bluetooth LE

Secure Vault™ Mid and High

- Allows for migration path as security needs change
- +20 dBm output power**

- Eliminates the need for an external power amplifier

16-bit ADC

- Up to 14-bit ENOB for better analog resolution

AI/ML Hardware Accelerator

- Reduces current consumption for AI/ML at the edge

Preamble Sense

- Ultra low power receive mode

Sub-GHz Antenna Diversity

- 6-8 dBm better link budget (Sub-GHz only)

Segment LCD

- Lower system cost by integrating LCD controller

High GPIO count

- Supports up to 49 GPIO

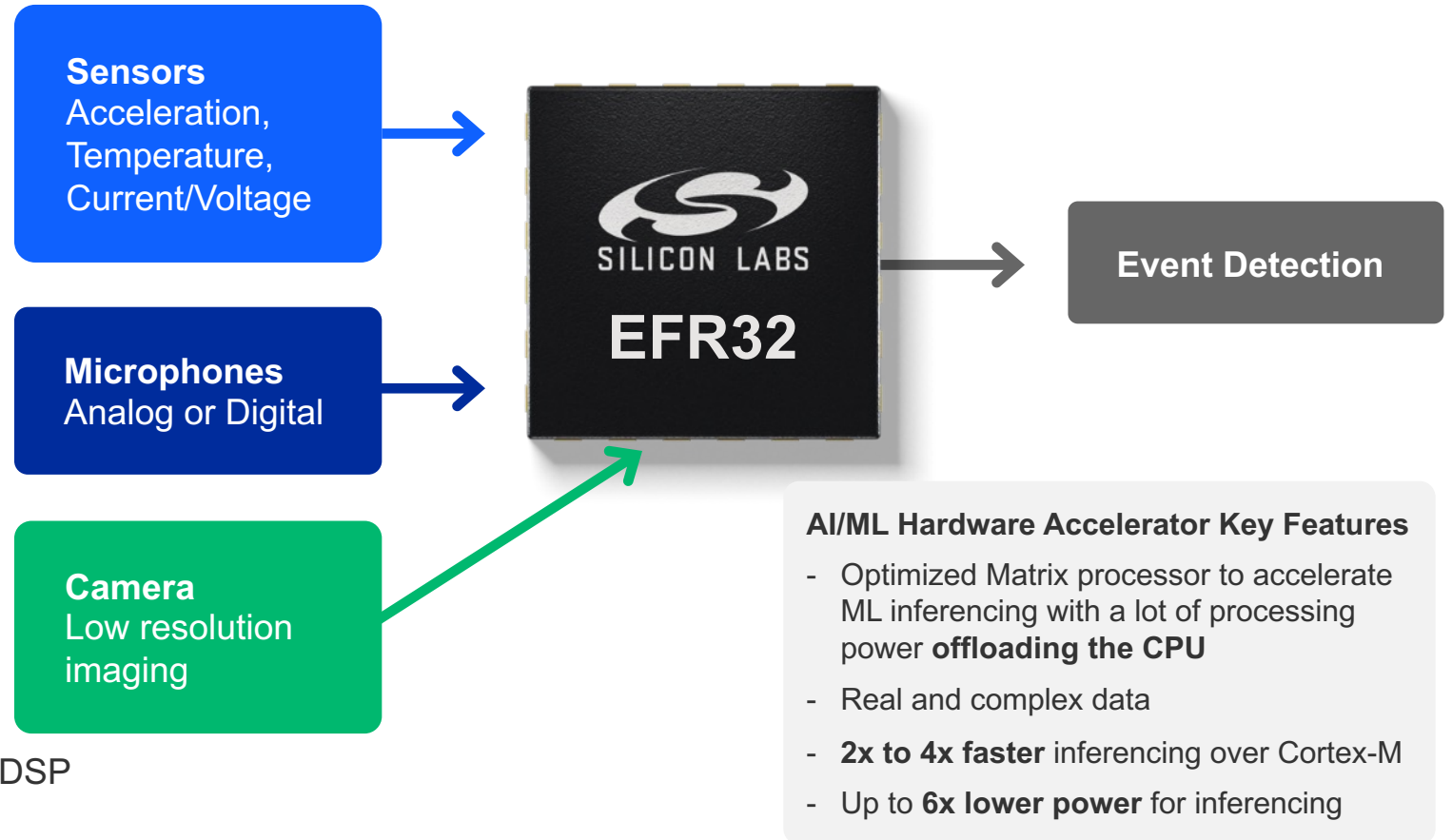
AI/ML on Edge Devices

Benefits of processing AI/ML in device

- Lower power
- Save Bandwidth
- Lower Latency
- Ensure Privacy
- Higher Security
- Lower Cost

Use Cases for AI/ML

- Timeseries data on ADC or GPIO
- Audio mic array with beamforming
- Audio mic input with Audio Front End, DSP
- Image capture (incl. fingerprint reader)



AI/ML Hardware Accelerator enables efficient Edge ML inferencing

FG28 Target Applications



Smart Meters



Home Automation and Security



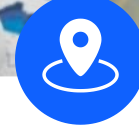
Access Control



Public Infrastructure



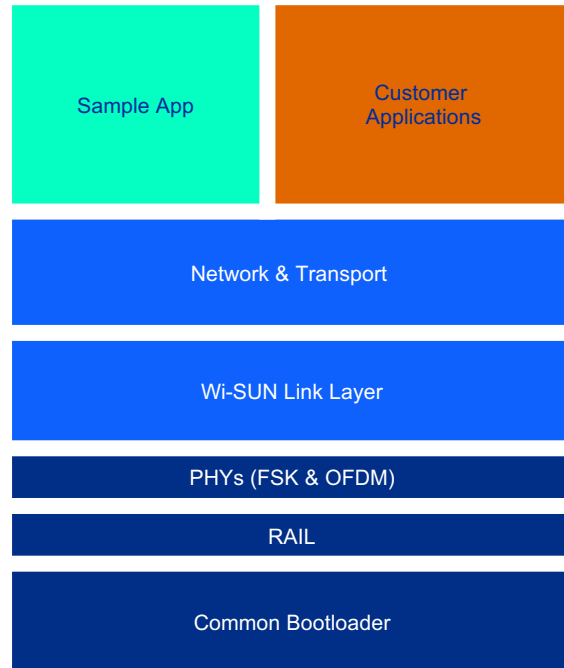
Agriculture



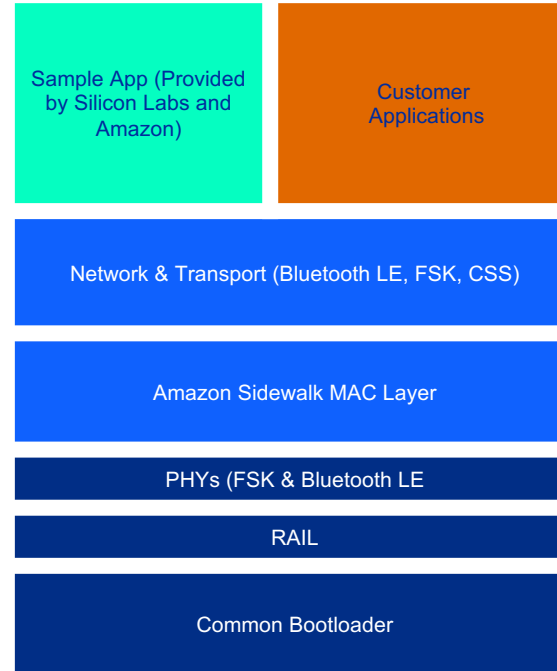
Asset Tracking & Logistics

Simplicity Studio: Common Platform & Tools

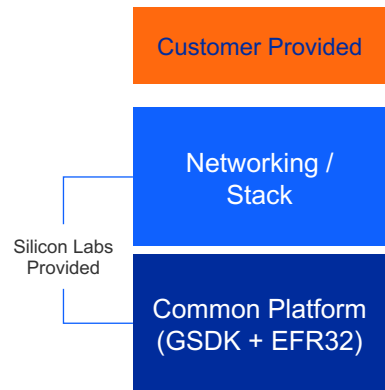
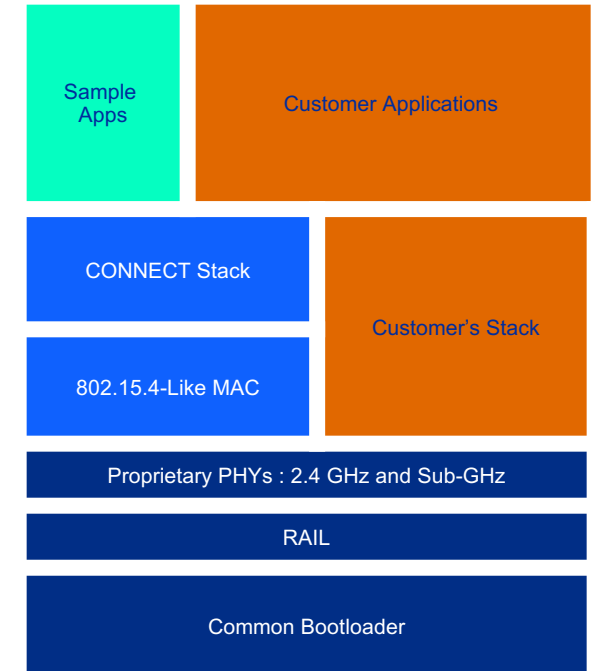
Wi-SUN SDK



Amazon Sidewalk SDK



FLEX SDK



Battery Powered Sensor Node



DESIGN CONSIDERATIONS

- Battery Life
- Range
- Size
- Robust connectivity
- Environmental conditions

HARDWARE SOLUTIONS

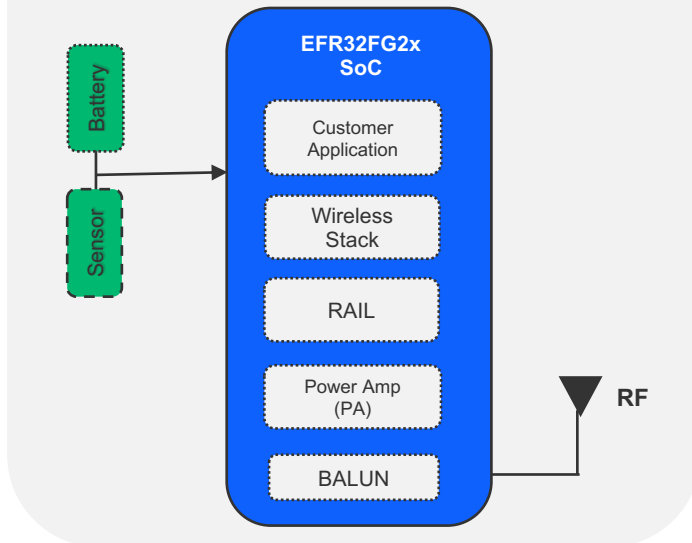
- **FG23**
 - Superior RF Performance (Link budget of ~146 dB)
 - Lower cost BOM with integrated DC/DC power supply, PA and BALUN
 - Optimized for single protocol support
- **FG28**
 - High GPIO count (49)
 - AI/ML Accelerator for battery power consumption
 - Suitable for Wi-SUN battery-powered LFN nodes
 - Dual band support (Sub-GHz, 2.4G BLE)
 - Ideal for multi-protocol support

RECOMMENDED KITS

- **FG23**
 - xG23-PK6068A - EFR32xG23 Pro Kit
- **FG28**
 - FG28-PK6025A Pro kit (+20 dBm)
 - xG28-EK2705A Explorer Kit

SOFTWARE SOLUTIONS

- **Wi-SUN (FG28)**
 - Certified stack
 - Complete ecosystem support -LFN (Limited Function Nodes) - FG28
- **Amazon Sidewalk (FG28)**
 - Sidewalk Application Layer library
 - Amazon Sidewalk Stack
 - Silicon Labs Platform Abstraction Layer
 - Bluetooth Stack
 - RAIL
- **Power management solutions for low power by**
 - Option to turn off the power to unused RAM blocks
 - Voltage Scaling
 - Peripheral Reflex System (PRS)
 - Low Energy Sensor Interface (LESENSE)
 - Optimized analog peripherals for low power performance

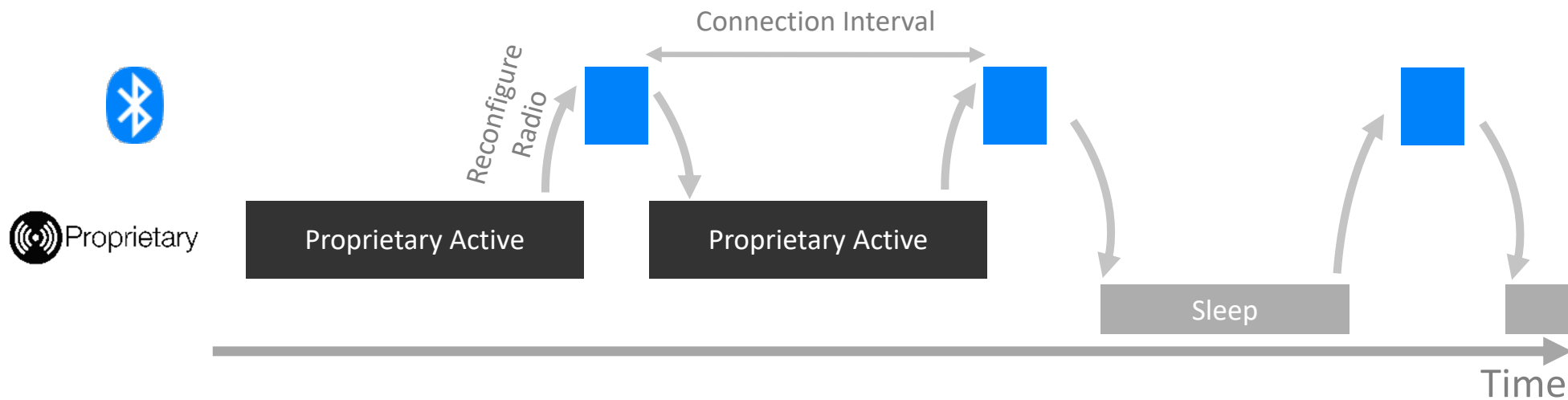
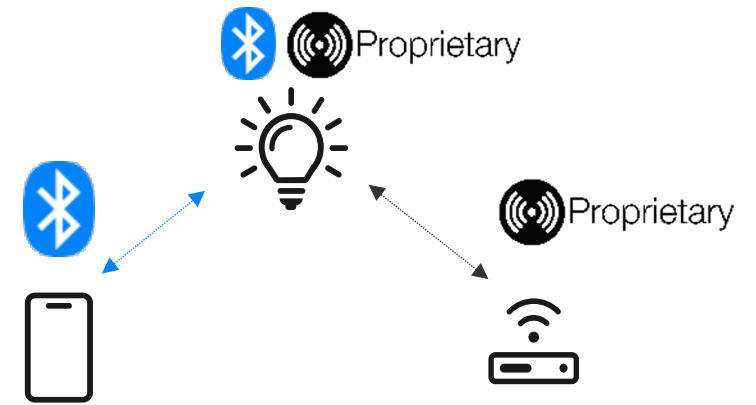


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Multi-Protocol on xG28

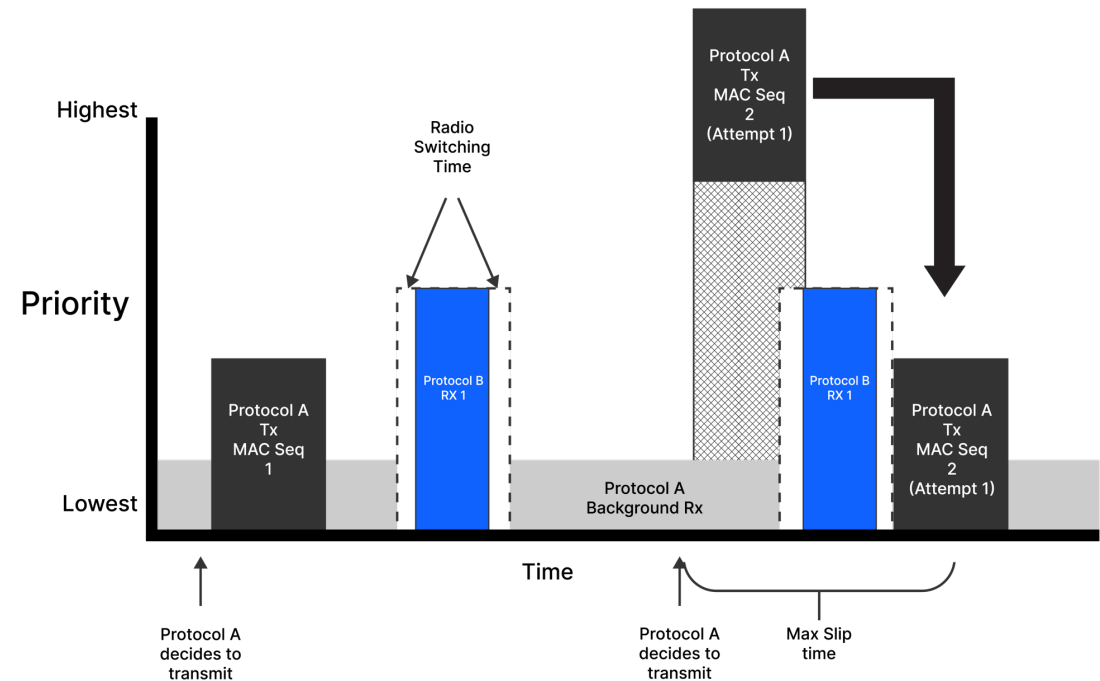
Dynamic Multi-Protocol

- Both stacks loaded at boot and active throughout operation
- Time-sliced operation between stacks running on the device
- Allows device to maintain active connections on both networks
- Typically managed by an RTOS



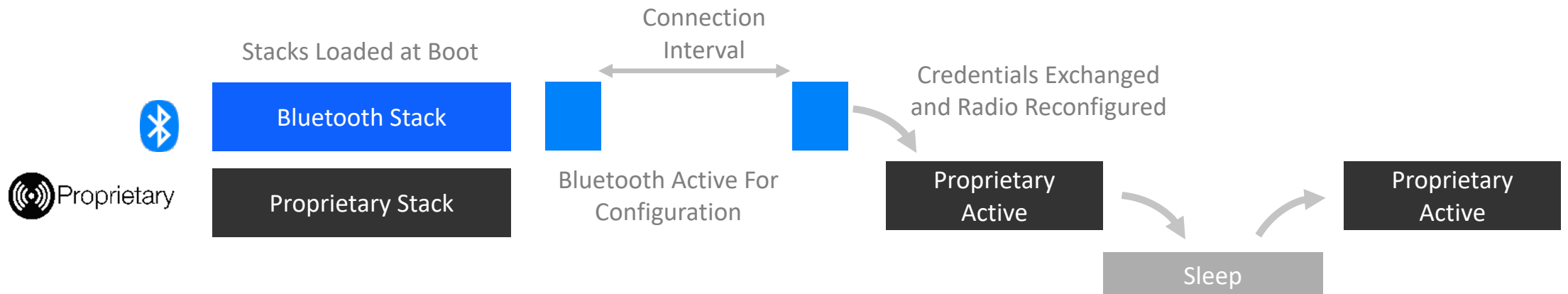
Dynamic Multi-Protocol Architecture

- Common API with single protocol RAIL library: DMP specific API is ignored in single protocol.
- Radio scheduler provides the tools for time-slicing between protocols
- Each protocol can have one radio operation running or requested
- Requesting radio:
 - startTime – When the operation should start (part of the single protocol API)
 - priority – Higher priority requests to the radio hardware preempt running operations
 - slipTime – Amount of time a task can be delayed to let a lower priority protocol finish without interruption of the higher priority task
 - transactionTime – Amount of time the radio hardware expected to be used
- Giving up the radio:
 - Protocol has the radio hardware until it yields it (or a higher priority protocol preempts it)



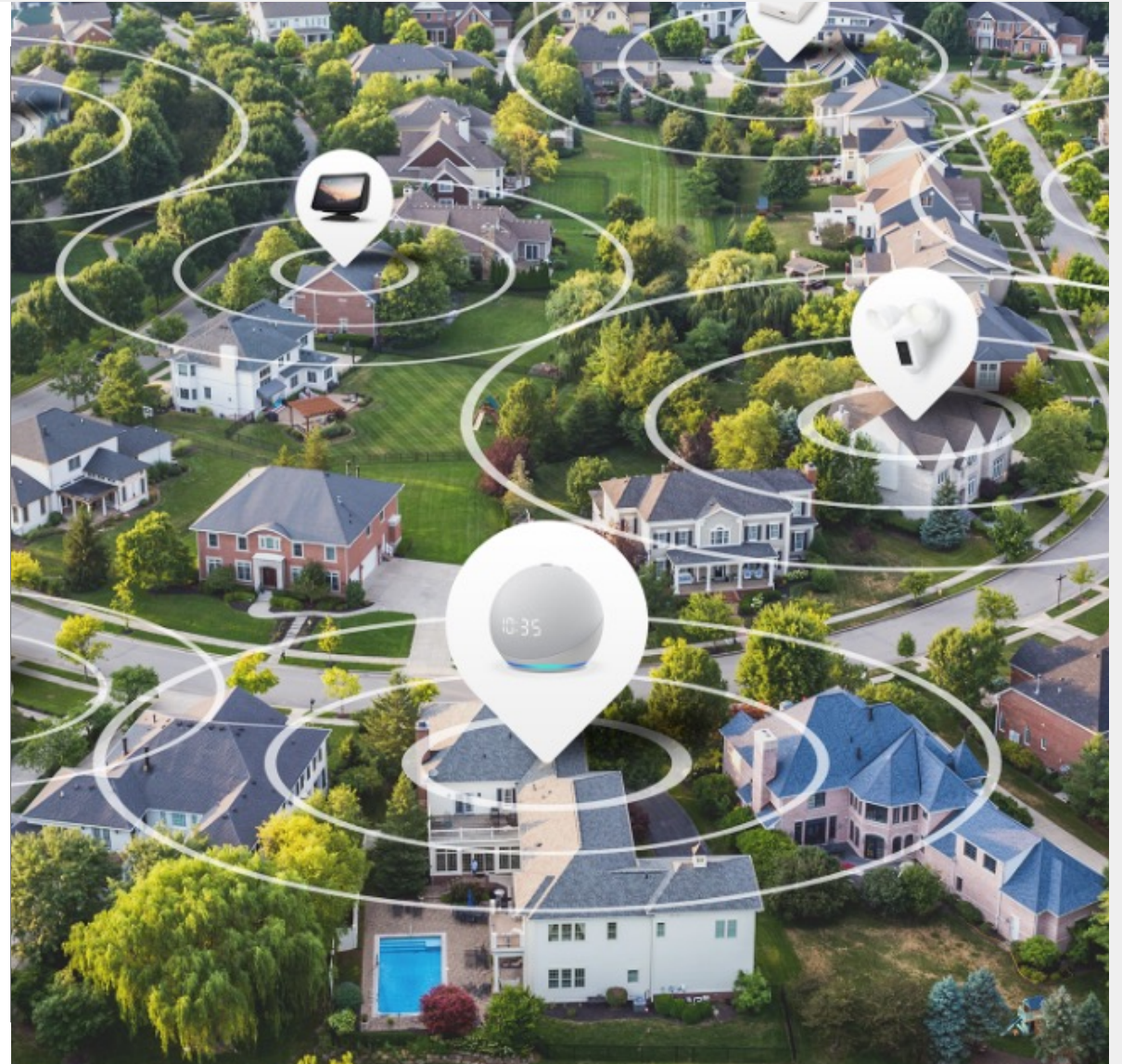
Static Multi-Protocol

- Implemented on the Dynamic Multi-Protocol architecture, but the application code is simpler
- Can switch from primary to secondary stack operation at any time as both are still active in program memory
- Application guarantees no protocol overlap
- Timing and Priority configuration can be ignored



Multi-PHY

- **Can be used by protocols or applications that utilize multiple PHYs**
 - WM-Bus: Mode T, C, S, N on the same hardware
 - Amazon Sidewalk
 - Wi-SUN Mode Switch
- **Functionality currently supported with simple RAIL calls**
 - Can switch between proprietary and standard PHYs quickly and easily
- **Possibility to load full PHY configuration or just different register settings via changing channel during scan**



Dynamic Multi-Protocol, Static Multi-Protocol or Multi-PHY?

	Dynamic Multi-Protocol	Static Multi-Protocol	Multi-PHY
Protocol switch time	510 us	510 us	~150 (PHY-dependent) us
OS Requirement	Yes	Recommended	No
Memory footprint	RTOS dependent	RTOS dependent	Negligible
Typical usecase	Time-slicing between protocols	Provisioning	One protocol stack, multiple RF configurations

xG28 Protocol Support

Protocol	ZG28	FG28	SG28
Z-Wave	✓		
Amazon Sidewalk (Bluetooth LE + FSK)	✓	✓	✓
Wi-SUN	✓	✓	
Proprietary	✓	✓	
Bluetooth	✓	✓	
Static Multi-Protocol Support	Z-Wave + Amazon Sidewalk	Roadmap Item	
	Z-Wave + Amazon Sidewalk + Bluetooth LE	Roadmap Item	
	Amazon Sidewalk + Bluetooth LE	Roadmap Item	Roadmap Item
	Proprietary + Bluetooth LE		
Dynamic Multi-Protocol Support	Proprietary + Bluetooth LE	✓	✓

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Dynamic Multiprotocol Demo

Up Next: Join these related Works With Sessions



THE LATEST

LPW-201 Advanced Features Coming to Sub-GHz Networks



WI-SUN

LPW-202 Wi-SUN Ecosystem for Large-Scale Outdoor IoT Wireless Networks



AMAZON SIDEWALK

LPW-203 Ecosystem Developer Journeys for Amazon Sidewalk



SMART CITIES

LPW-102 LPWAN for Smart City and Smart Agriculture

W

Thank you!

