

Embedded System Design Techniques™

Connecting Edge Devices to the IoT using Amazon FreeRTOS

Class 1: Introduction to Amazon FreeRTOS

March 19th, 2018
Jacob Beningo

Course Overview

Topics:

- **Introduction to Amazon FreeRTOS**
- Amazon Web Services Fundamentals
- Setting up and Configuring Amazon FreeRTOS
- Amazon FreeRTOS Behind the Scenes
- Creating your own a:FreeRTOS Application

The Lecturer – Jacob Beningo



Jacob Beningo

Principal Consultant



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EDN : Embedded Basics

ARM Connected Community

Consulting

- Advising
- Coaching
- Content
- Consulting
- Training

www.beningo.com

Jacobs CEC Courses

CEC 2013 – 2015

Fundamentals of Embedded Software (2013)

Mastering the Software Design Cycle (2014)

Python for Embedded Systems(2014)

Software Architecture Design (2014)

Baremetal C (2015)

Mastering the ARM Cortex-M Processor (2015)

Writing Portable and Robust Firmware in C (2015)

Design Patterns and the Internet (2015)

CEC 2016 - 2017

Bootloader Design for MCUs (2016)

Rapid Prototyping w/ Micro Python (2016)

Debugging (2016)

Professional Firmware (2016)

API's and HAL's February 2017

Baremetal to RTOS April 2017

Designing IoT Sensor Nodes July 2017

From C to C++ October 2017

CEC 2018

Connecting Edge Devices (March 2018)

Building an IoT Connected PLC (April 2018)

Side Topics 2018

Bootloader Design

RTOS Workshop

Debugging Techniques

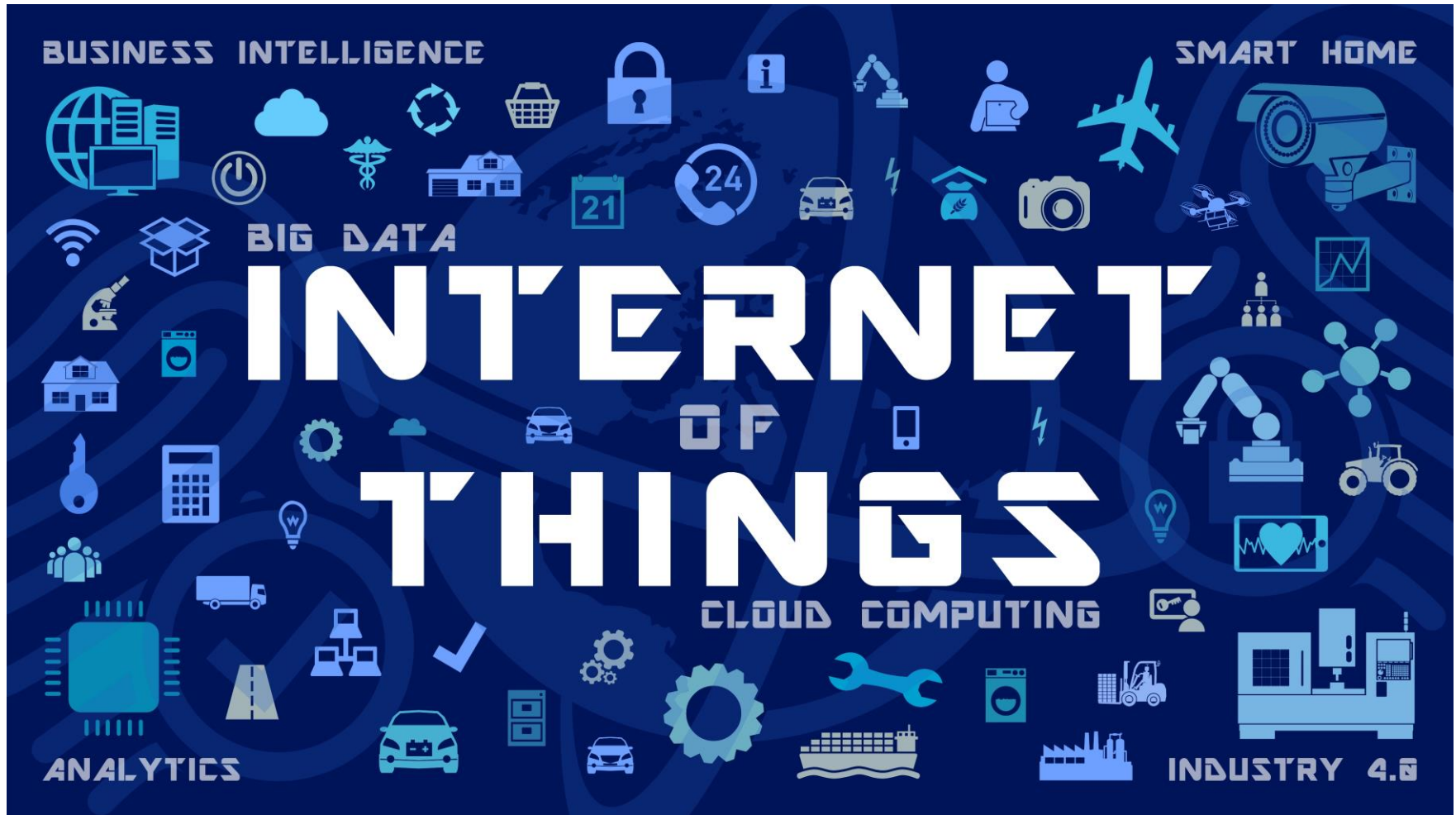
Session Overview

- IoT Challenges
- Amazon FreeRTOS Overview
- FreeRTOS
- Hardware Support
- The Simple Link
- What you will need ...



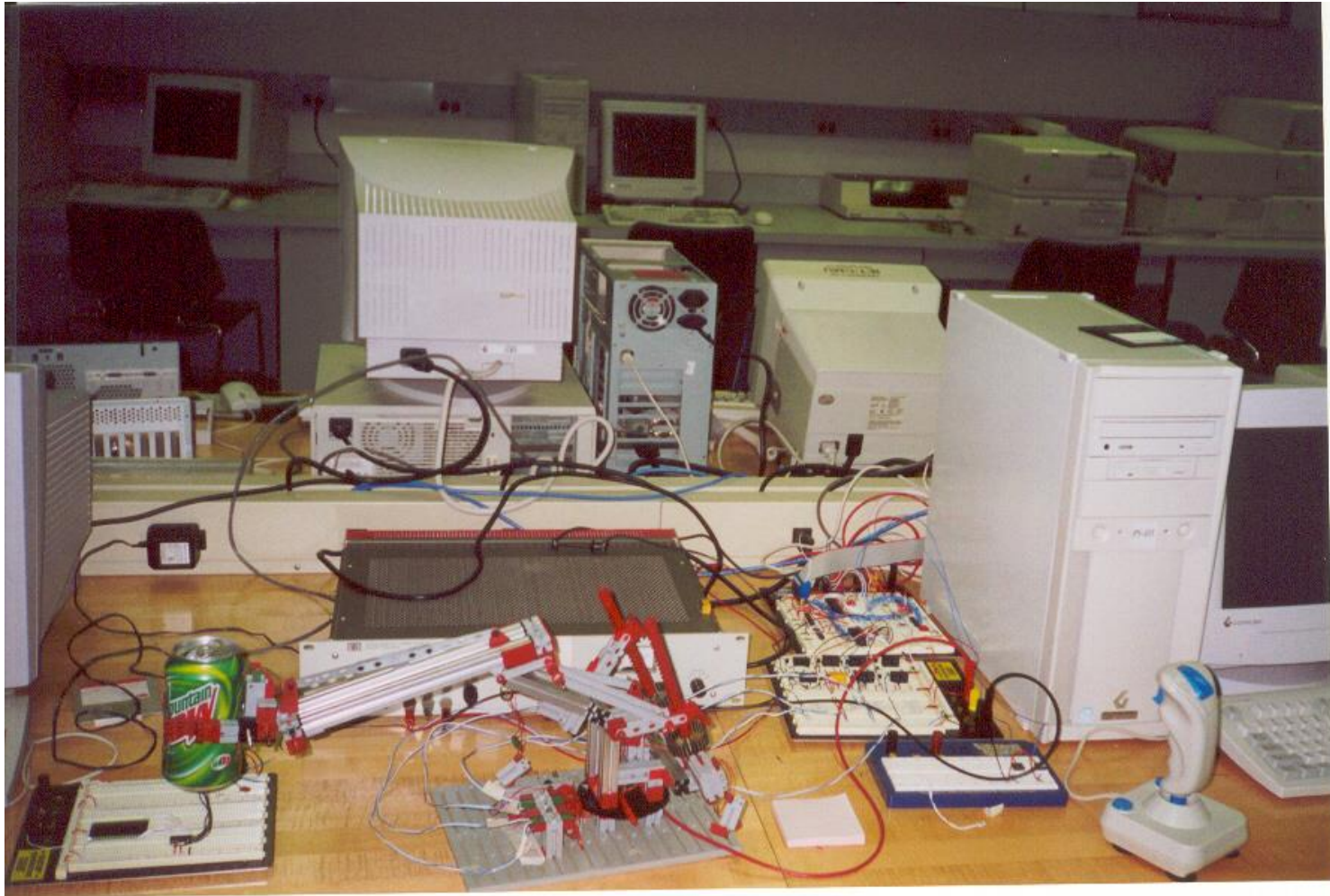
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IoT Challenges

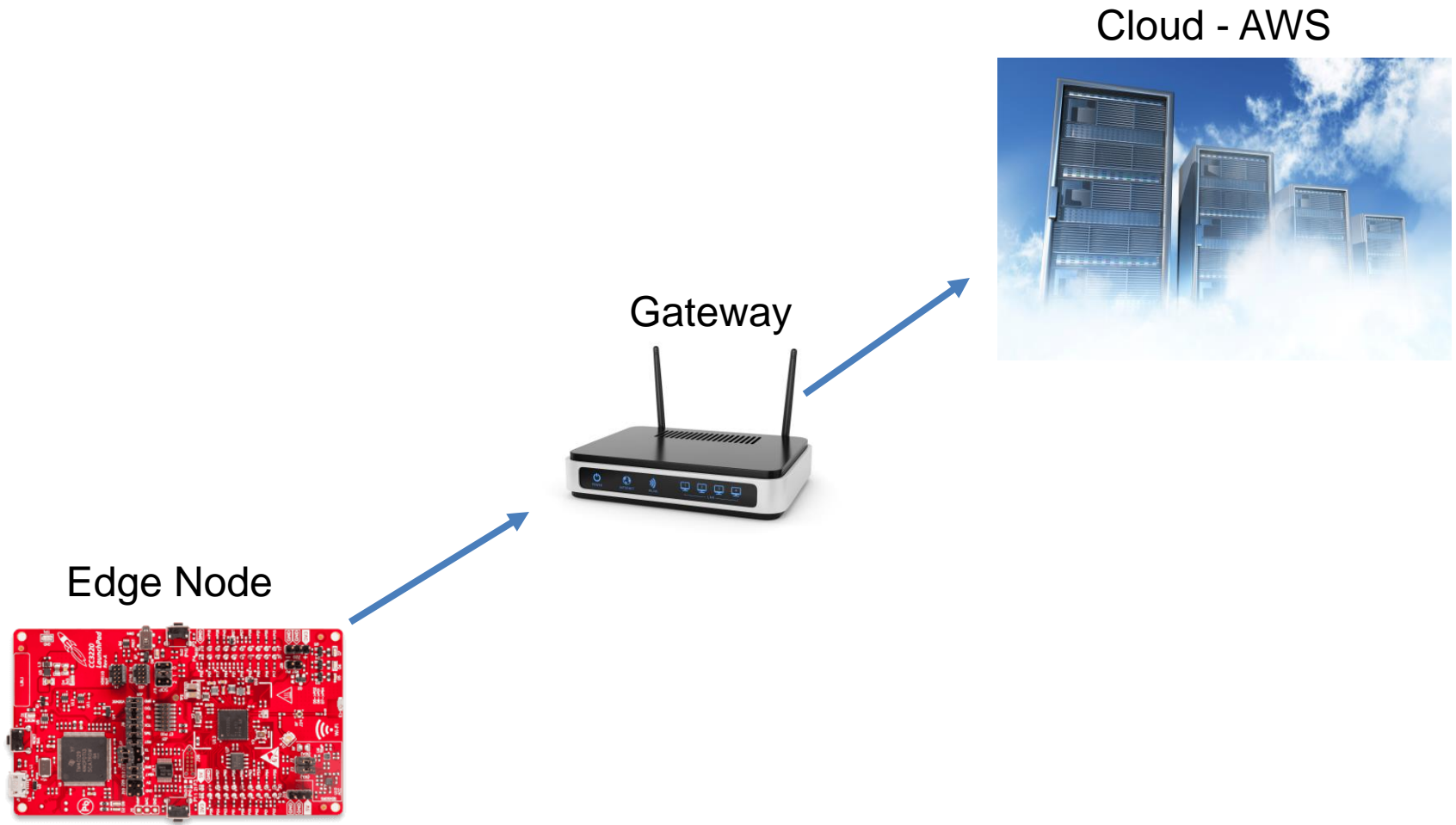


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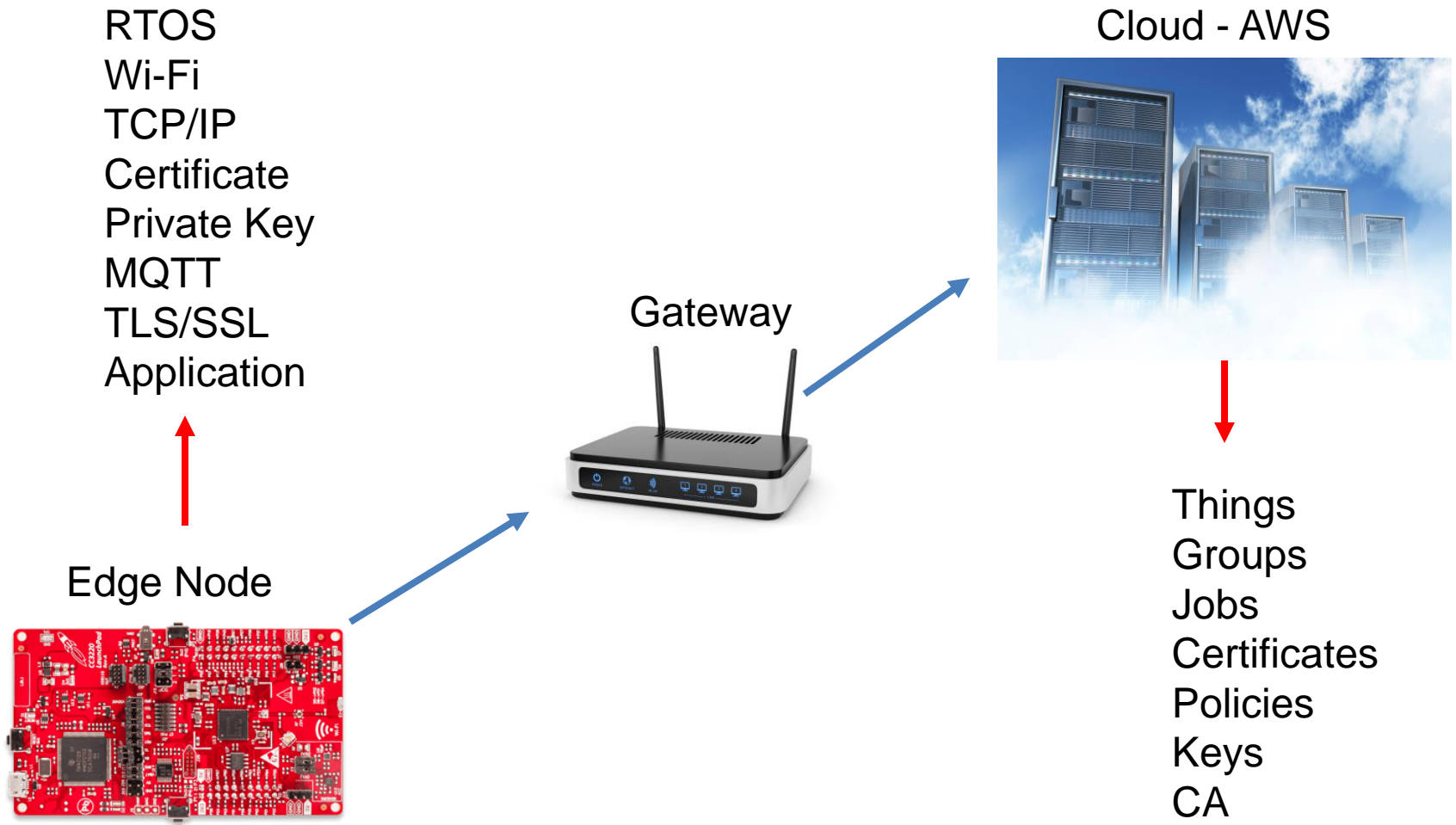
IoT Challenges



A Simplified View

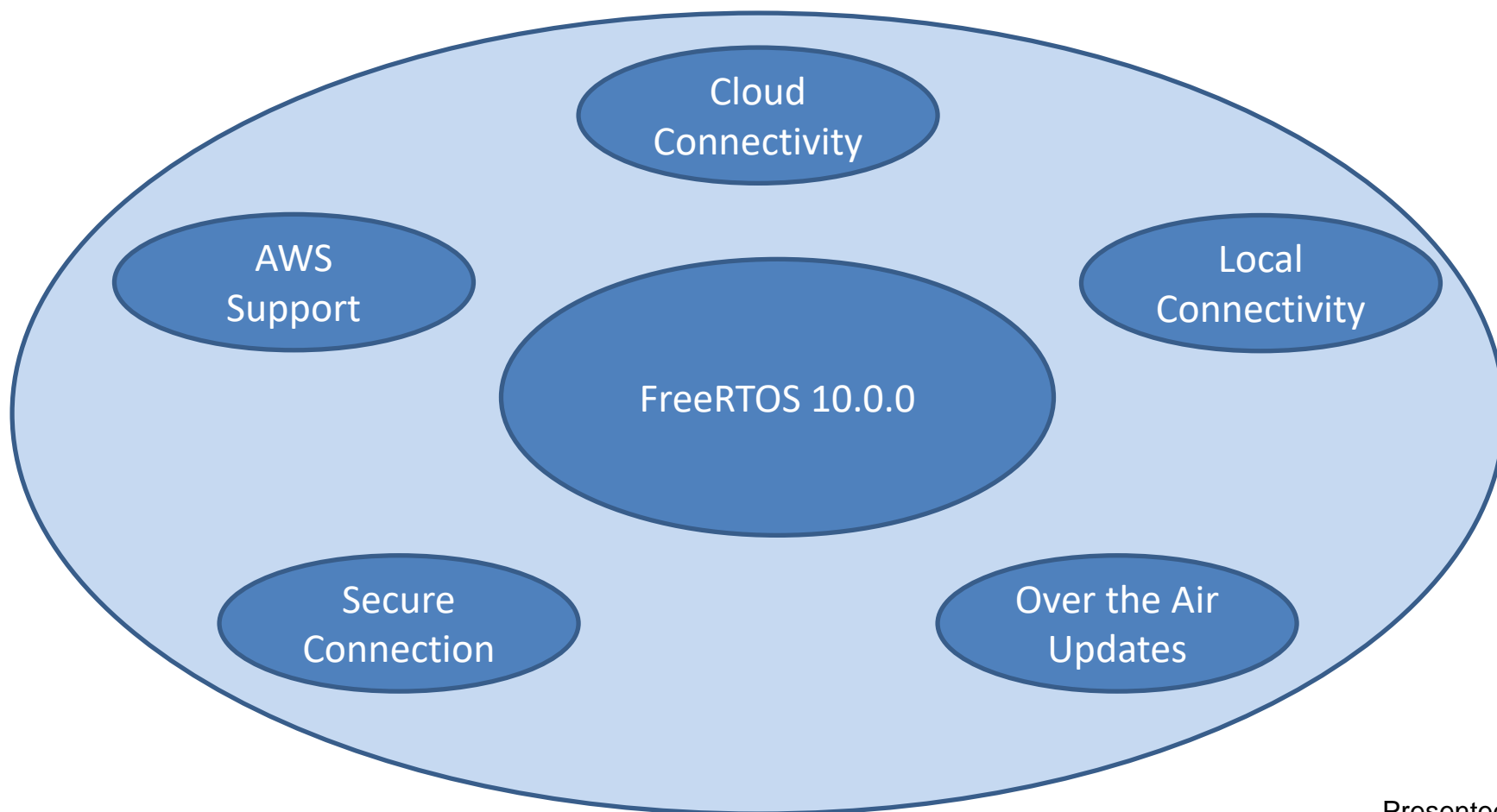


A Simplified View

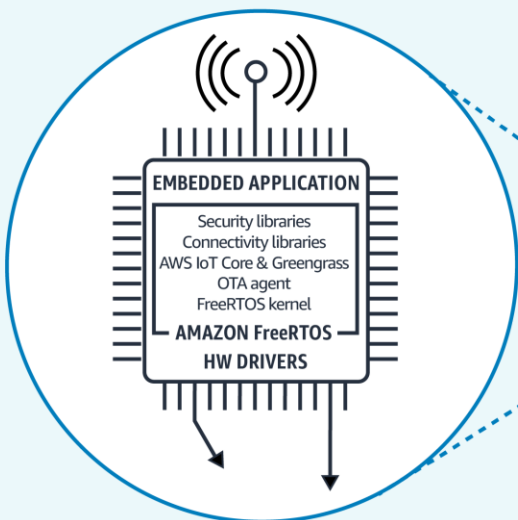


Amazon FreeRTOS Overview

Amazon FreeRTOS



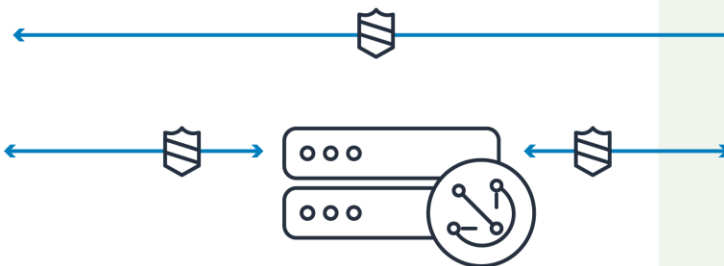
Amazon FreeRTOS Overview



Amazon FreeRTOS is an IoT operating system for microcontrollers that extends the FreeRTOS kernel with libraries for security, connectivity, and updateability



Microcontroller-based smart lighting



Local connection to IoT edge devices like AWS Greengrass Core devices

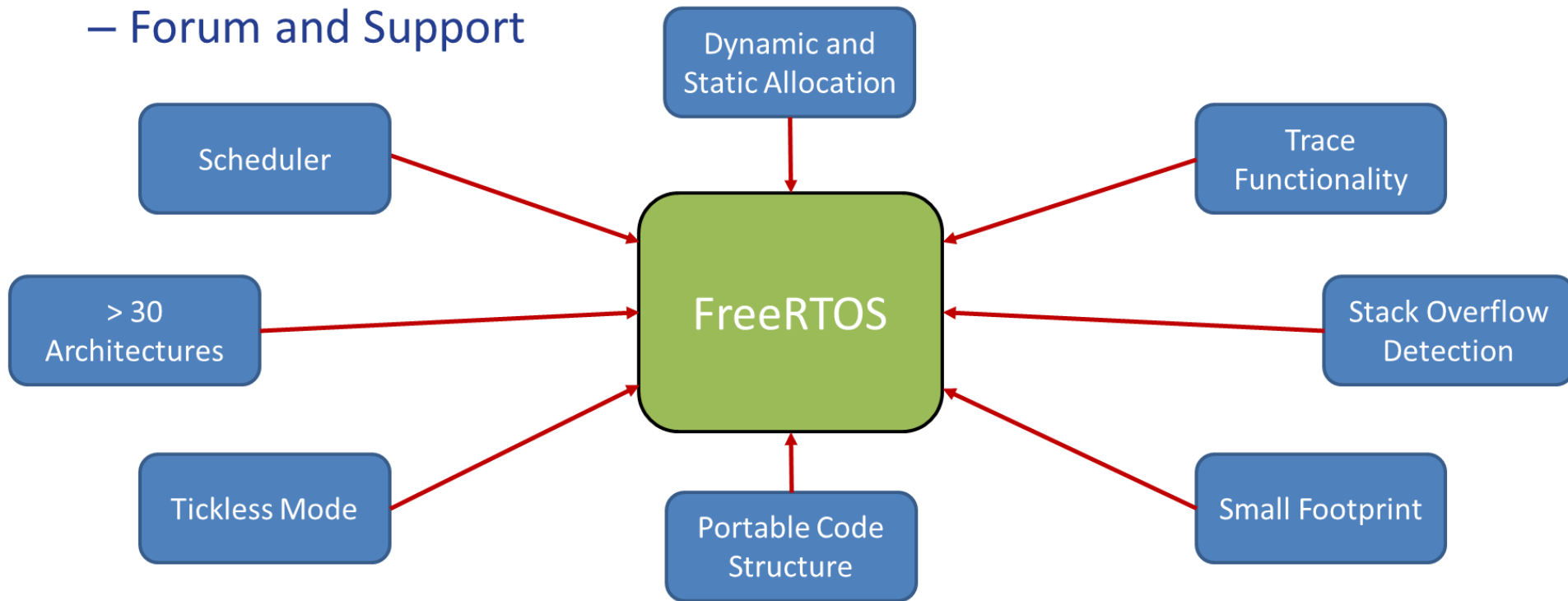


Direct connection to cloud services like AWS IoT Core

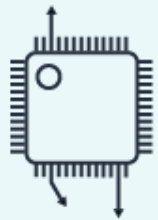
Source: aws.amazon.com/freertos

FreeRTOS

- FreeRTOS.org
 - Ports and source available
 - Forum and Support



Getting Started



Choose a supported microcontroller

Select a supported microcontroller from Amazon FreeRTOS Qualification Program



Amazon FreeRTOS

Download OS and libraries

Download the FreeRTOS kernel and libraries for security, cloud and local connectivity, and updateability through the Amazon FreeRTOS console



Develop app

Develop IoT applications for microcontroller-based devices with convenient APIs



Deploy connected device

Deploy and maintain connected microcontroller-based devices at scale. Easily connect to local gateways like AWS Greengrass Core devices or to AWS cloud services like AWS IoT Core

Hardware Support

Espressif ESP32-DevKitC



Curiosity PIC32MZ EF



NXP LPC54018 Module

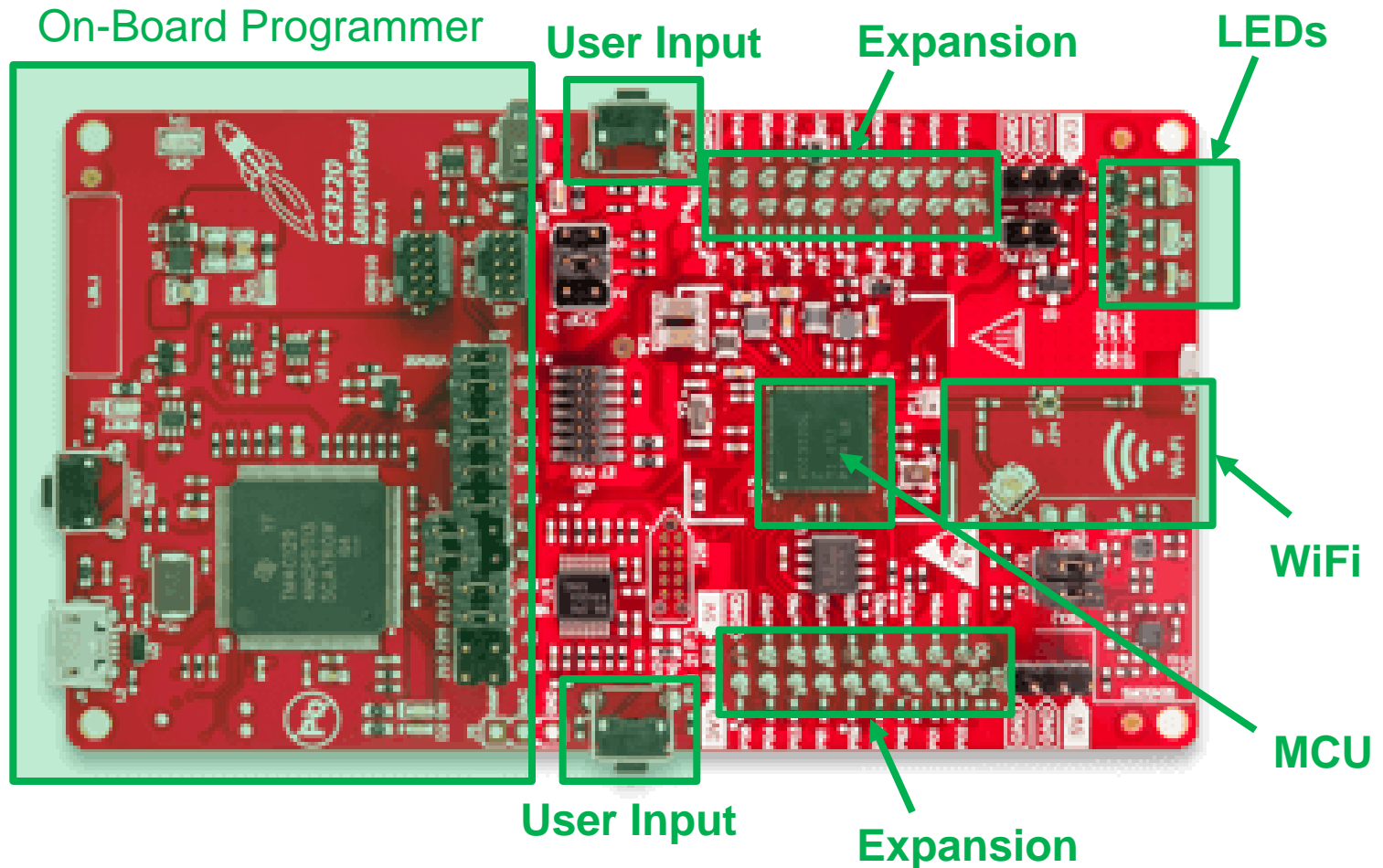


STM32L4 Discovery Kit

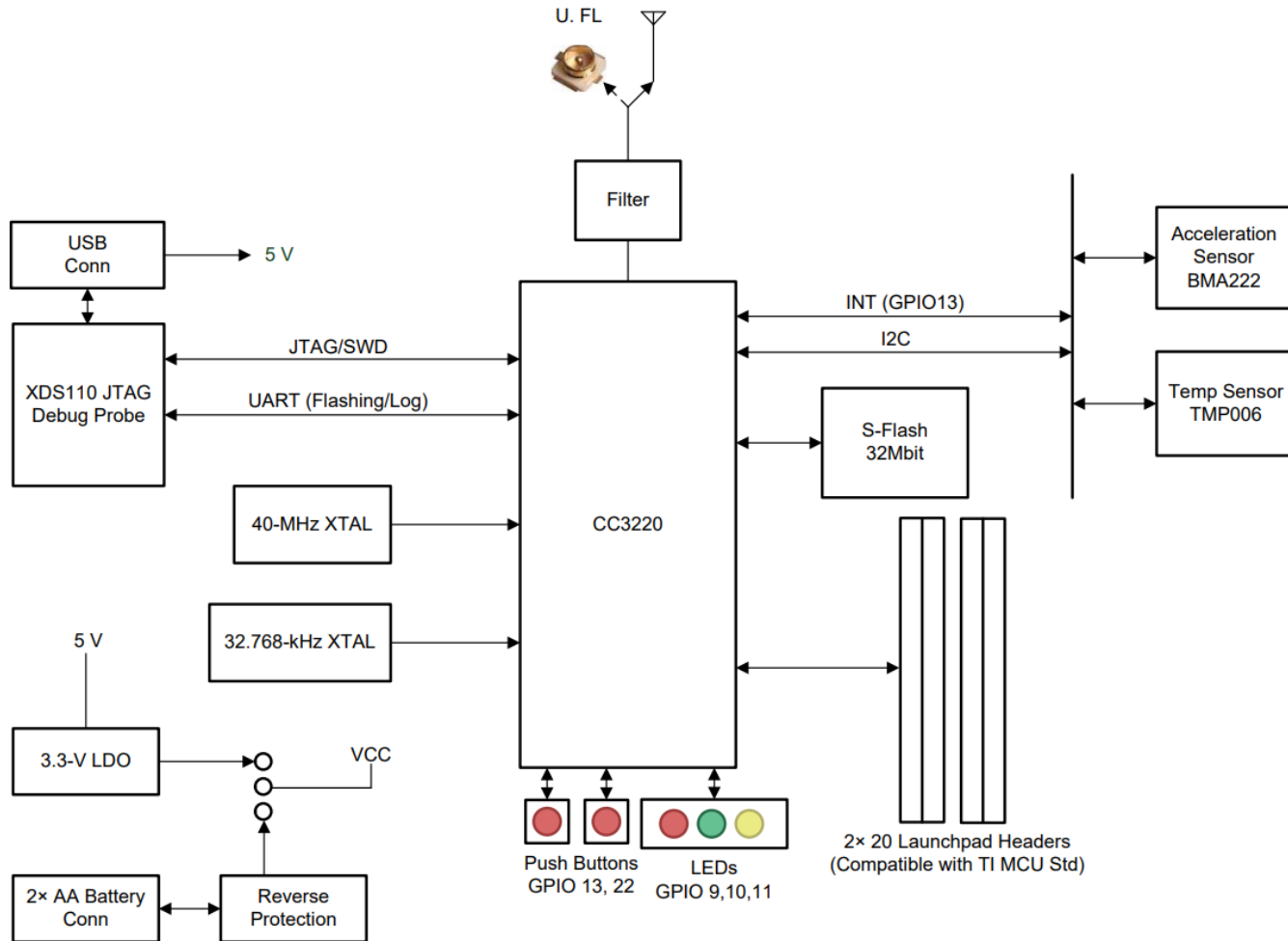


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CC3220 Simple Link Overview

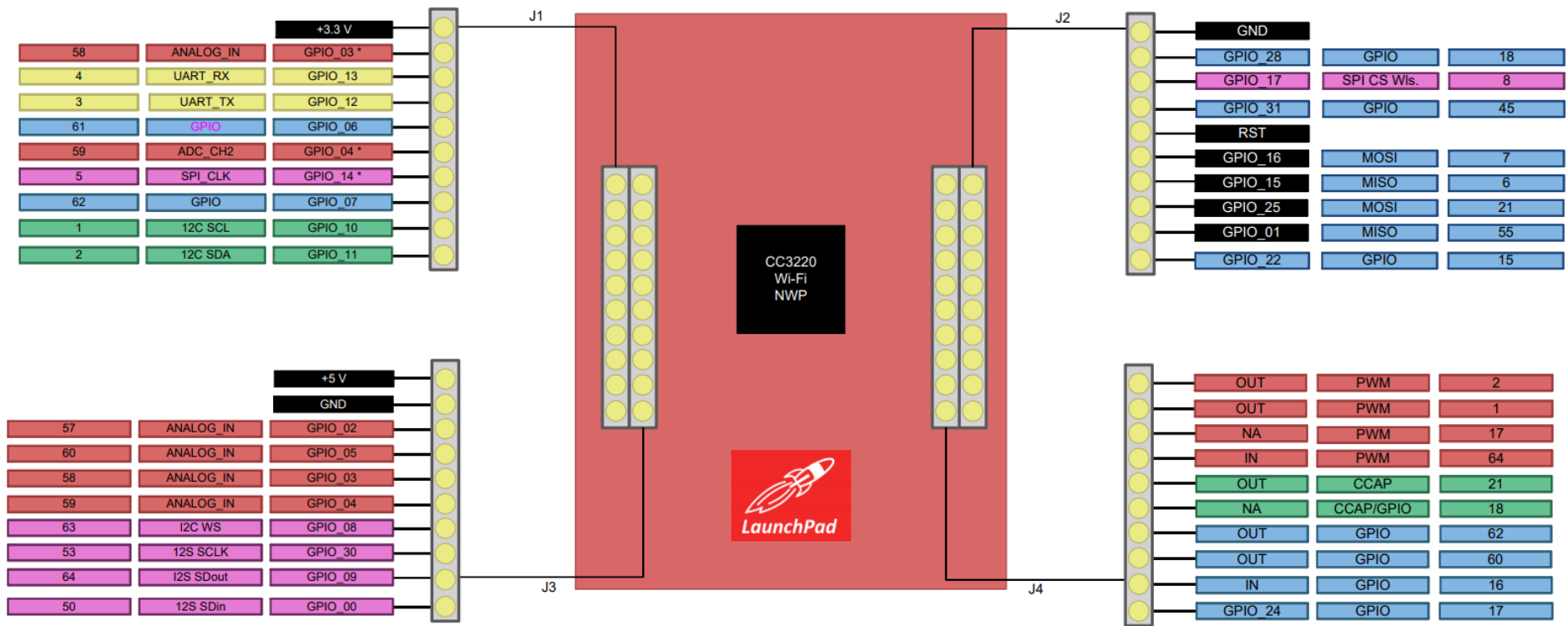


CC3220 Simple Link Overview



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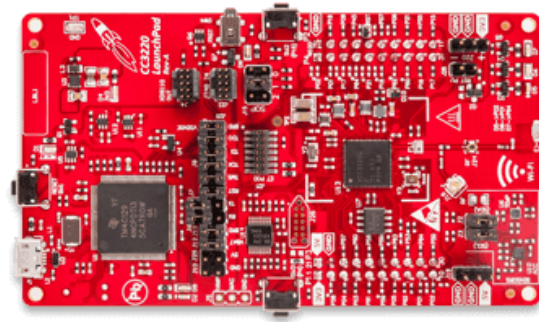
CC3220 Simple Link Overview



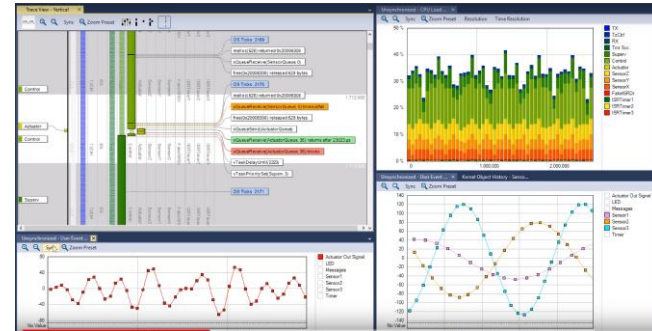
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What You will need ...

CC3220 LaunchPad



Percepio Tracealyzer 4



Code Composer



A light snack ...



Additional Resources

- Download Course Material for
 - C/C++ Doxygen Templates
 - Example source code
 - Blog
 - YouTube Videos
- Embedded Bytes Newsletter
 - <http://bit.ly/1BAHYXm>



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- Blog > CEC – Connecting Edge Devices to the IoT using Amazon FreeRTOS