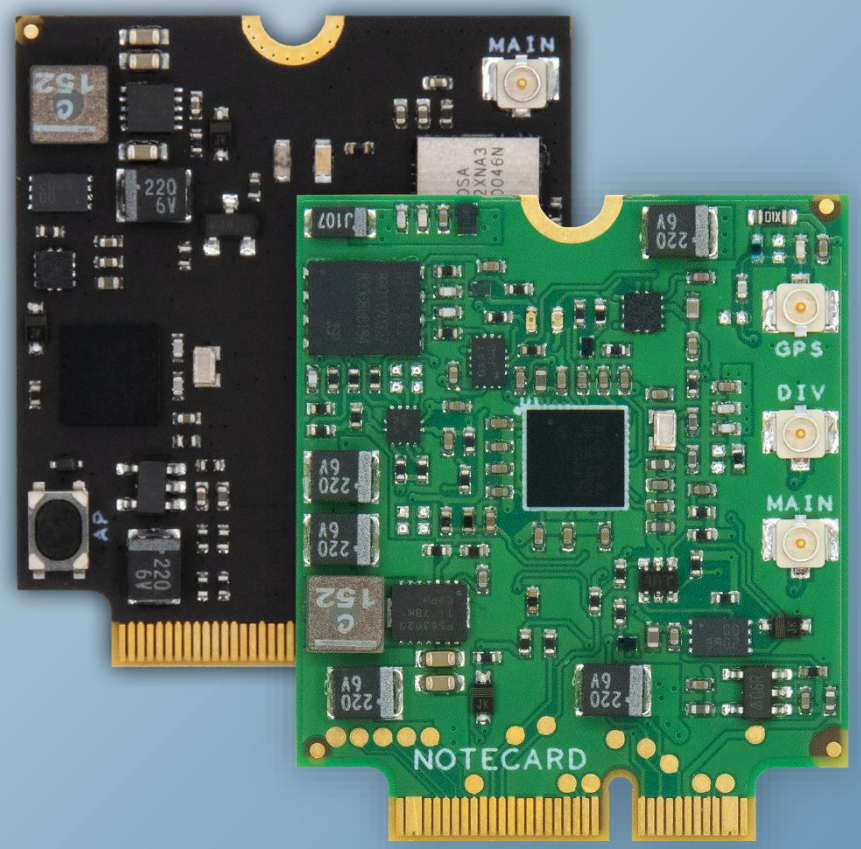
Introducing Simplified Cellular IoT with Blues Wireless and the Notecard



Adding IoT to your tinyML Project

SciTinyML 2023

blues wireless

Peter Ing

Blues Amplifier | Edge Impulse Expert | Arm Ambassador

tinyML Foundation

"Making wireless IoT easier for developers and more affordable for all"
NOTECARD
GPS

blues wireless

Easy for developers and **affordable** for all.

- Securing your data from device to cloud
- Building zero-config low-power hardware
- Providing an unmatched developer experience

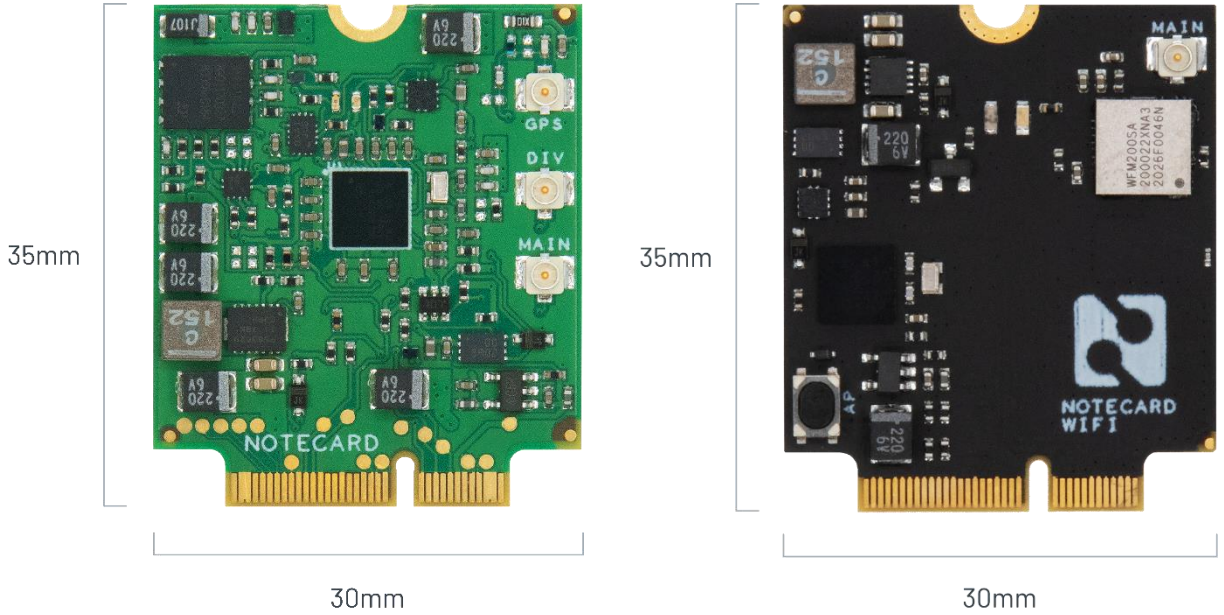
“

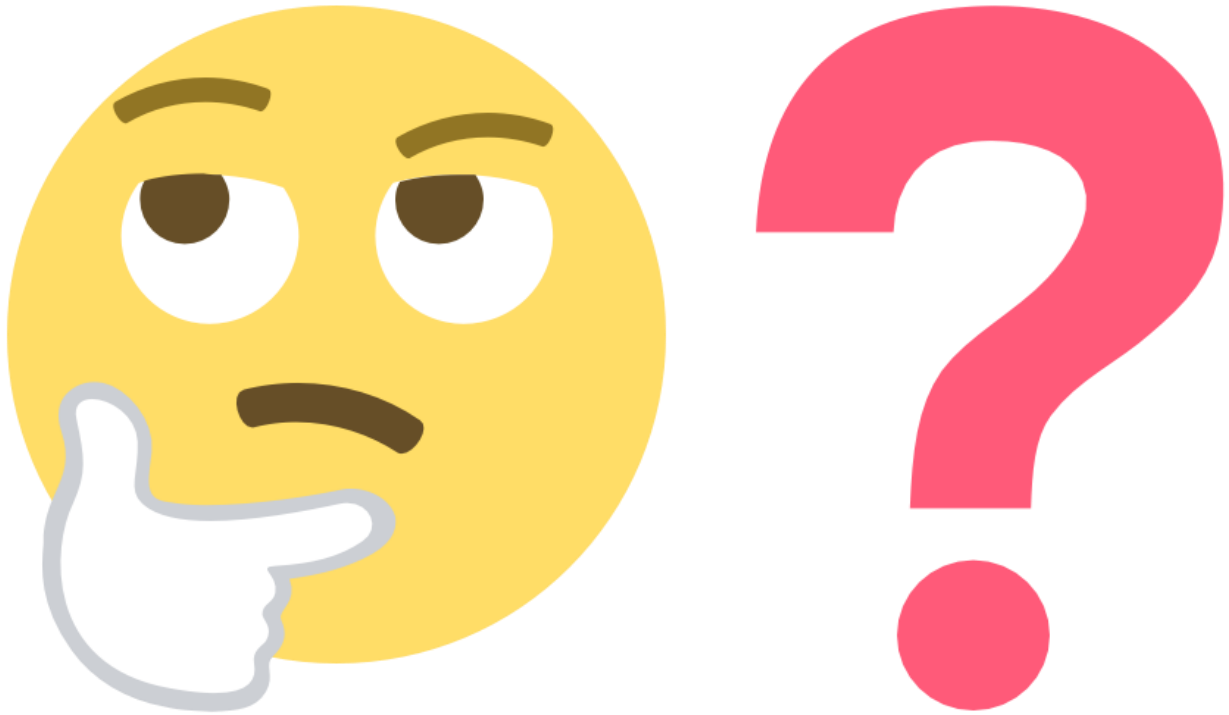
Complexity kills. It sucks the life out of developers, it makes products difficult to plan, build, and test.

Ray Ozzie – CEO of Blues Wireless

Today's Agenda

- Intro to the Notecard and Blues Wireless
- Hands-on Demonstration of Wireless IoT

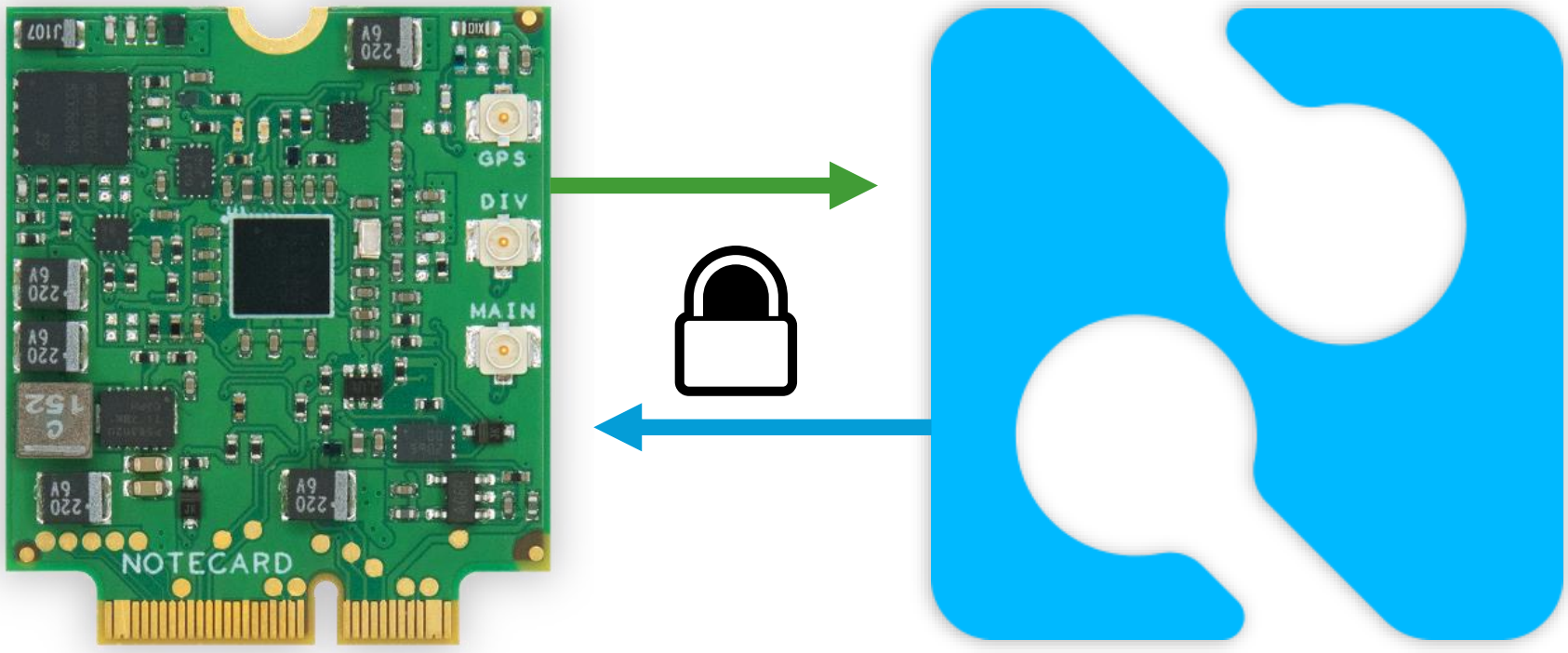




Why Blues Wireless

- Easy to use – no need to understand Modem SDK's , hardware interfacing or RF
- Free data plan– works globally just power up and go
- Simple hardware interfacing – I2C or Serial
- Simple Software interfacing - communicate JSON commands, no AT Commands
- Standalone mode or interfaced to a host device
- Wide variety of features and hardware to support many IoT applications – GPS, Temp/Humidity, Accelerometer included

“Device-to-Cloud Data Pump”



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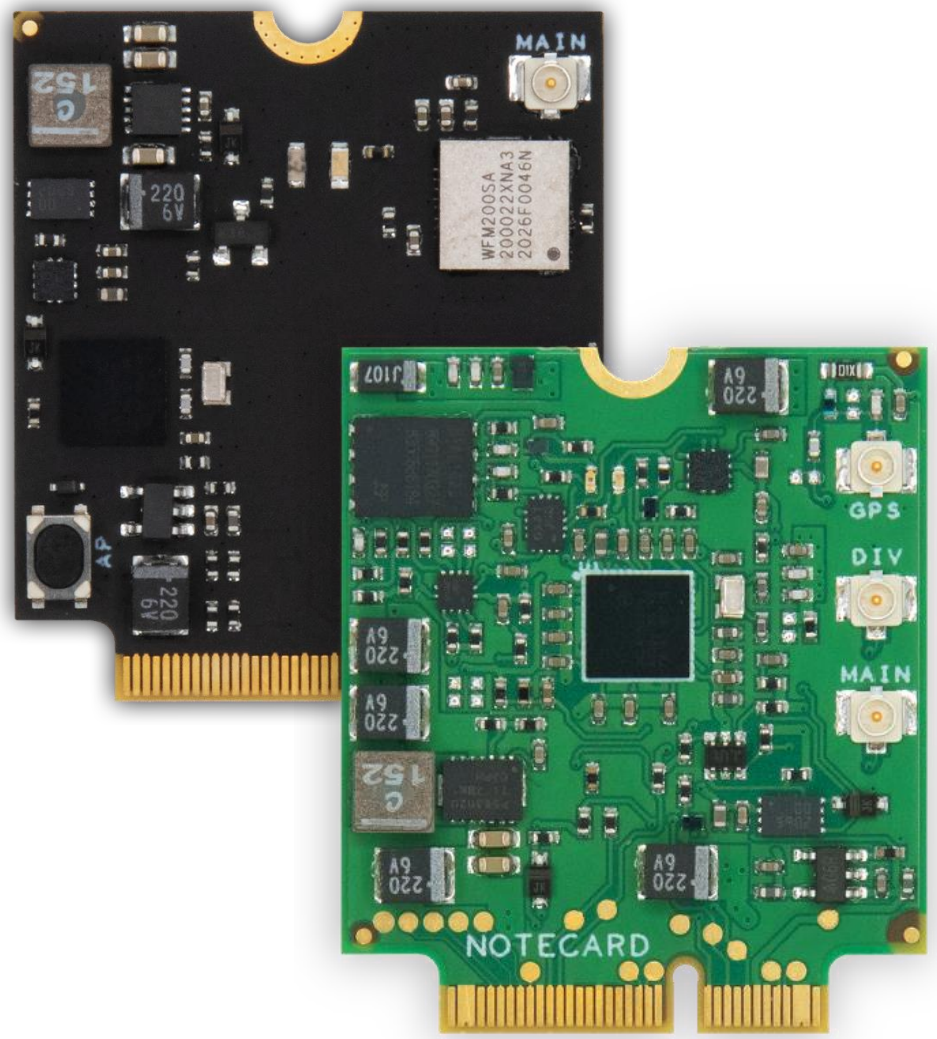
Notecard

- Low-power system-on-module
- Global cellular/GPS or Wi-Fi
- 500MB cell data + 10 years service
- Simple JSON-based API
- Python, Go, Arduino, C/C++
- Cellular: NB-IoT, LTE-M, Cat-1



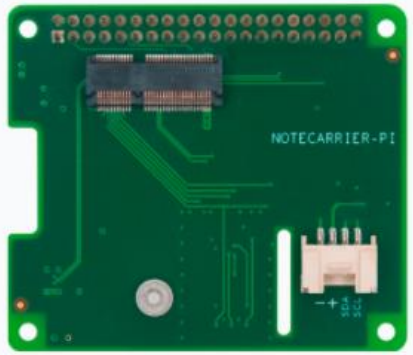
When Does the Notecard Make Sense?

- Low-bandwidth cellular
- Edge computing scenarios
- Secure communications
- Turnkey cloud integrations

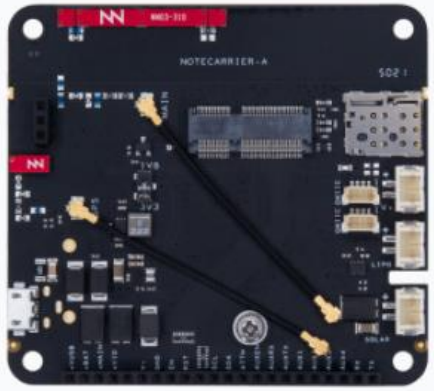
- Wi-Fi replacement
- Sub-millisecond latency
- Video streaming

Notecarriers

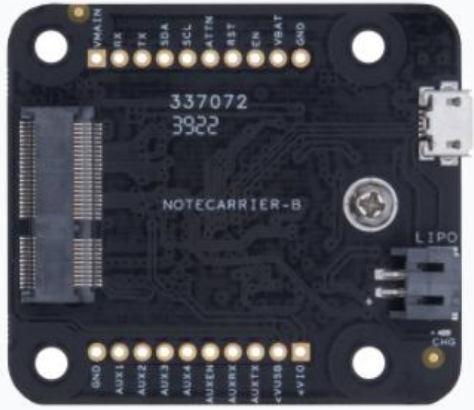
Notecarrier F



Notecarrier Pi



Notecarrier A



Notecarrier B

Example: *card.location* API

Request

```
{ "req": "card.location" }
```

Response

```
{
  "status": "GPS updated (58 sec, 41dB SNR, 9 sats),
  "mode":   "periodic",
  "lat":    42.577600,
  "lon":    -70.871340,
  "time":   1598554399
}
```

What don't you need with the Notecard?

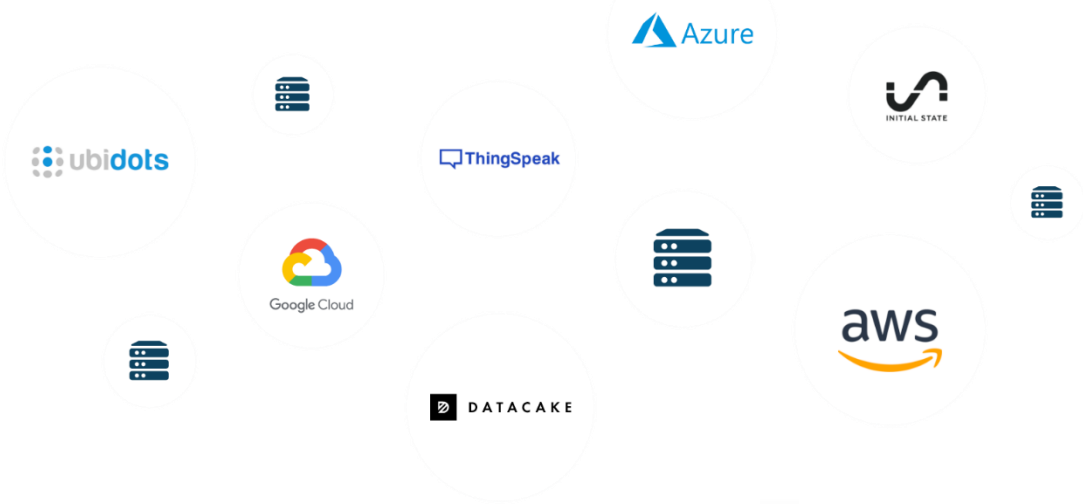
- SIM or Separate Mobile Plan
- AT Commands or Cellular Connection Management
- Custom Security Implementation
- OTA DFU
- Power Management
- Cloud Integration

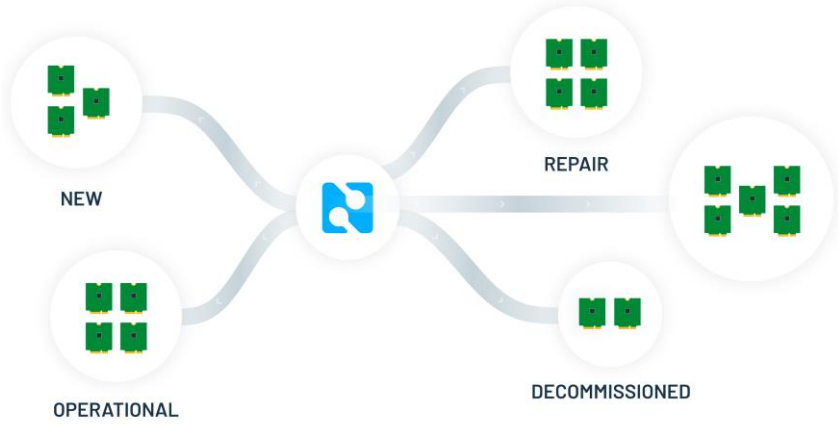
Notecarrier

- Carrier boards for easy prototyping
- Notecarrier for every scenario:
  - **F** – Feather-compatible socket
  - **A** – Any MCU, onboard antennas
  - **B** – Small form factor
  - **Pi** – Raspberry Pi SBC
  - SparkFun MicroMod Cellular Function

Notehub

- Route data to **any cloud** app
- Manage **fleets** of devices
- OTA MCU/Notecard **firmware updates**
- **Secure** communications





Notehub “Consumption Credits”

- Only Pay for What You Use!
- Billing Account “Topped Up” to 5,000 CCs Monthly
- Notecard Purchase → 5,000 CCs

Notehub “Consumption Credits”

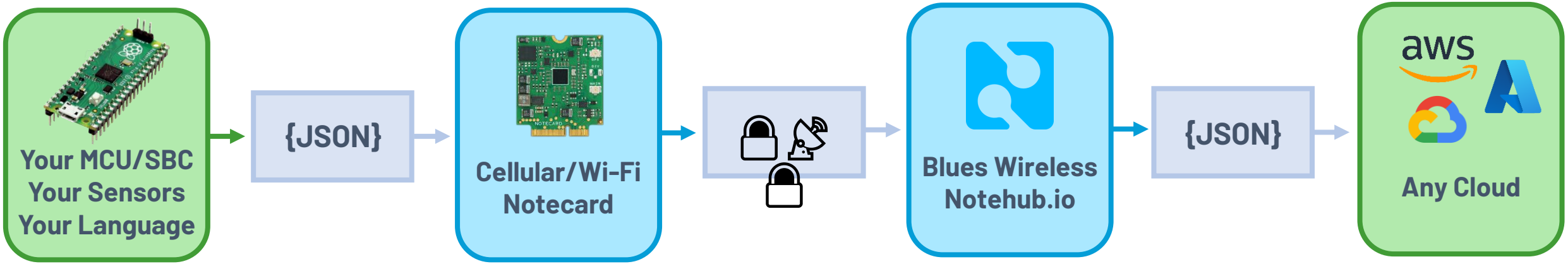
- **Send an Event to Notehub?** FREE
- **Route an Event from Notehub to Cloud?** 1 CC
- **Pull an Event via API?** 1 CC
- **All other API requests?** 0.001 CC

Scenarios

Outbound - Device to Cloud

Inbound - Cloud to Device

Outbound Communication (from MCU to Cloud)



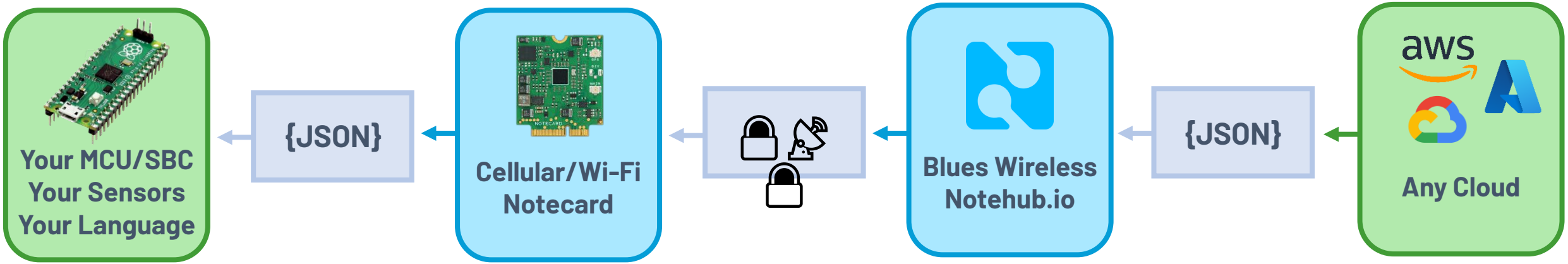
Arduino | C/C++ | **Python**

```
req = {"req": "note.add"}
req["file"] = "sensors.qo"
req["body"] = {"temp": 72.22 }
req["sync"] = True
rsp = card.Transaction(req)
```

JSON

```
{
 "file": "data.qo",
 "temp": 27.3,
 "when": 1644268443,
 "lat": 42.11,
 "lon": -88.32
 "device": "dev:89347"
}
```

Inbound Communication (from Cloud to MCU)



Arduino | C/C++ | **Python**

```
req = {"req": "note.get"}
req["file"] = "data.qi"
req["delete"] = True
rsp = card.Transaction(req)
```

JSON

```
{
 "file": "data.qi",
 "sample_freq": 5,
 "notify": true
}
```

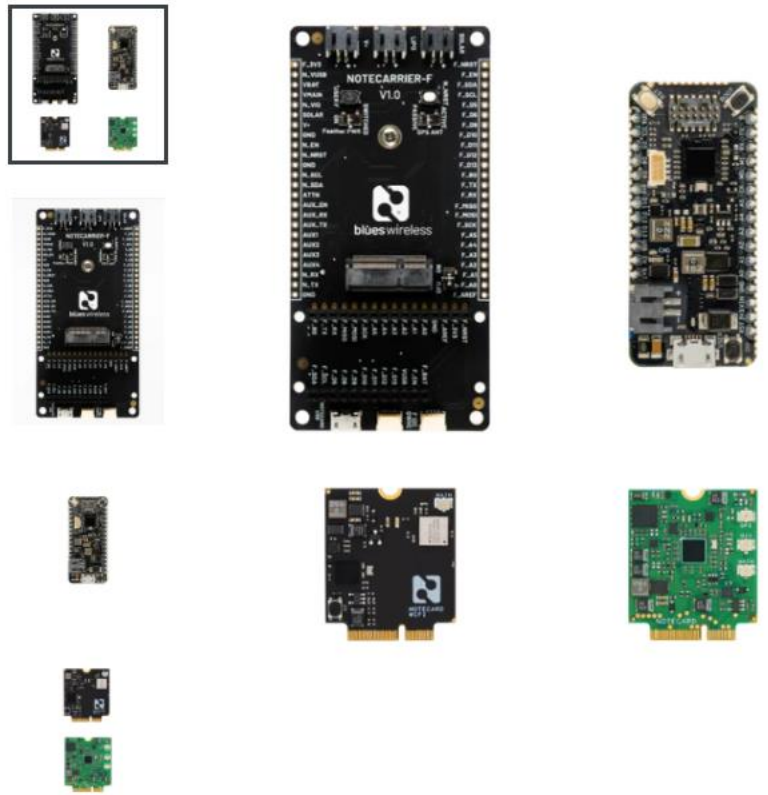
Demo

Bonus Features

- Blues Swann
- App Accelerators
- Outbound DFU

Blues Starter Kit

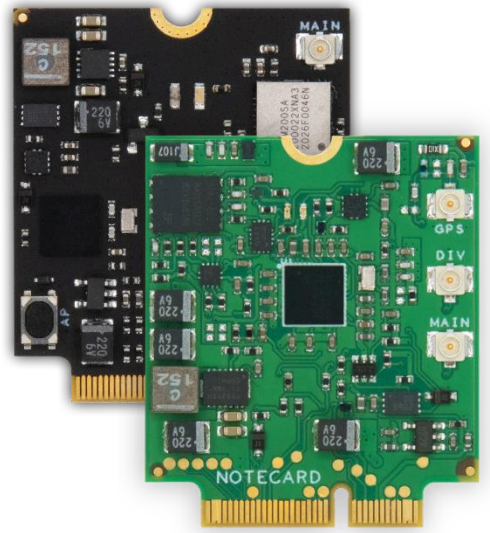
- Notecarrier F
- Swan
- WiFi Notecard
- Notecarrier Pi



Thanks!

- **dev.blues.io** for Blues Wireless resources
- 15% off Starter Kits @ **bit.ly/blues-get-started**
- **Win a Free kit to the 2 best ideas - blues.tinyML@gmail.com**

Peter Ing
Blues Amplifier



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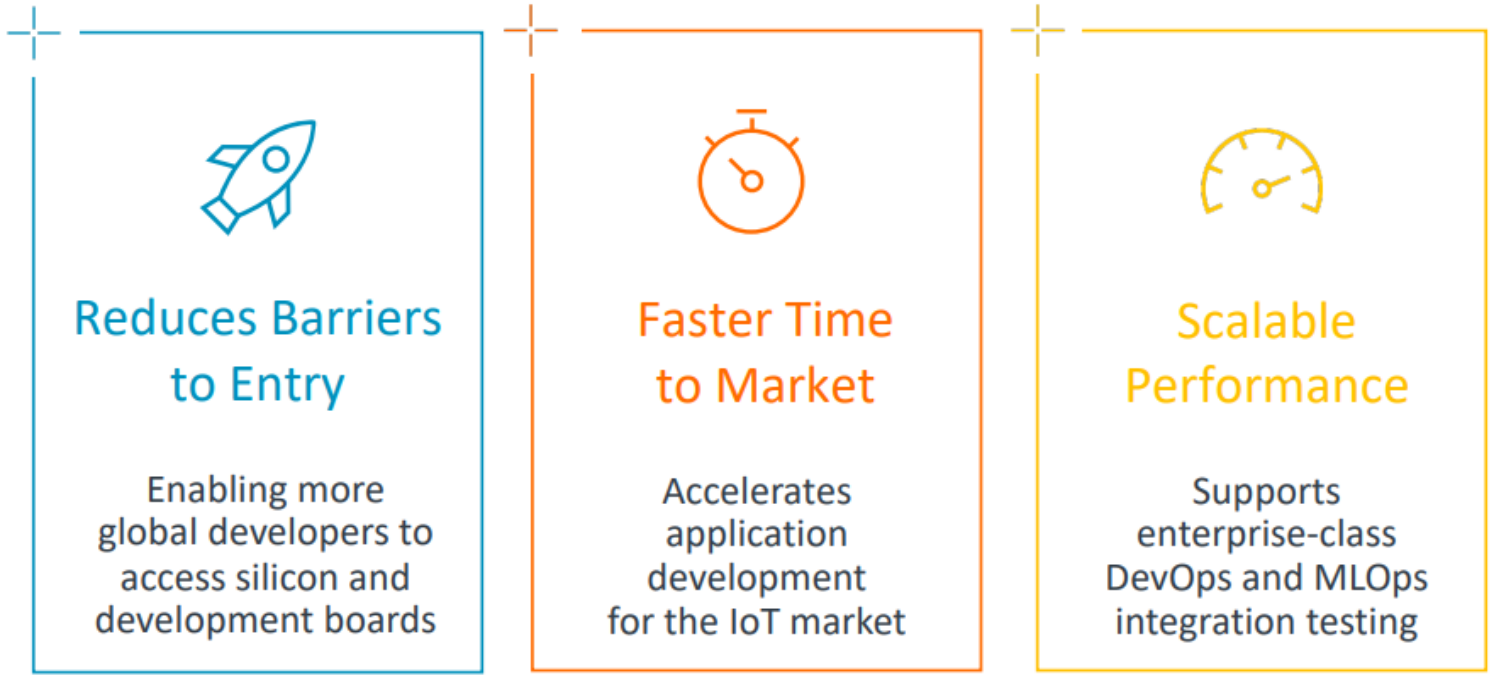
Revolutionizing IoT Software Development

arm Virtual Hardware



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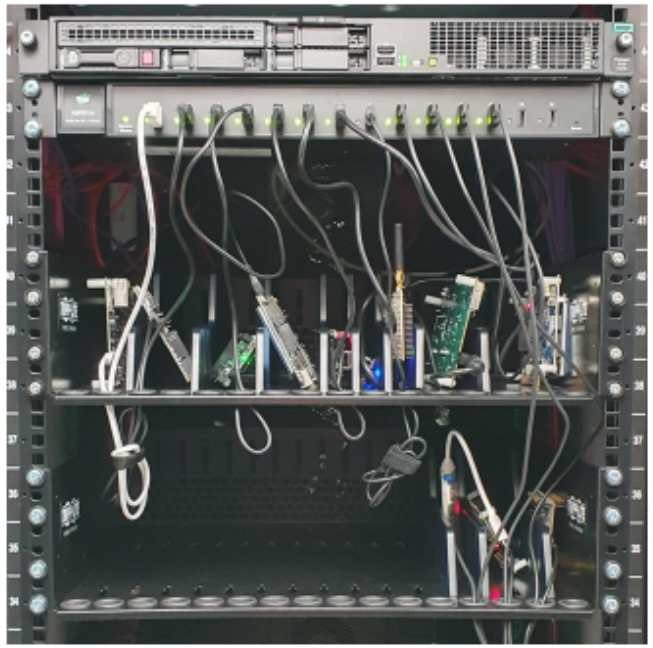
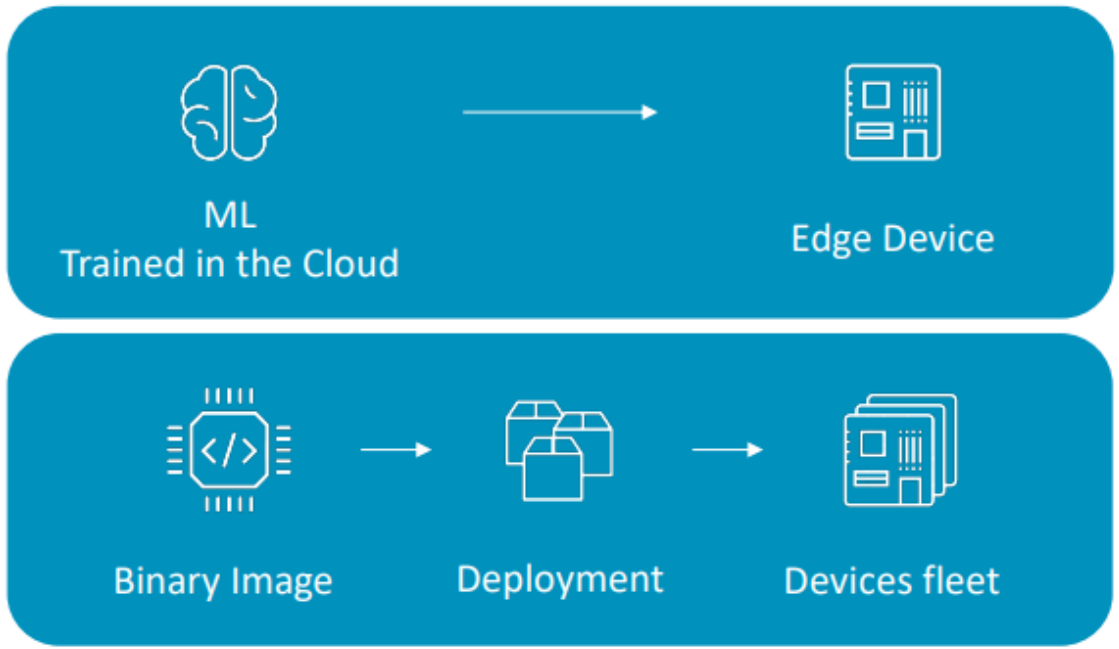
Embedded microcontroller developers

No scalability with physical hardware



Cloud-native developers

Hard to run on end devices



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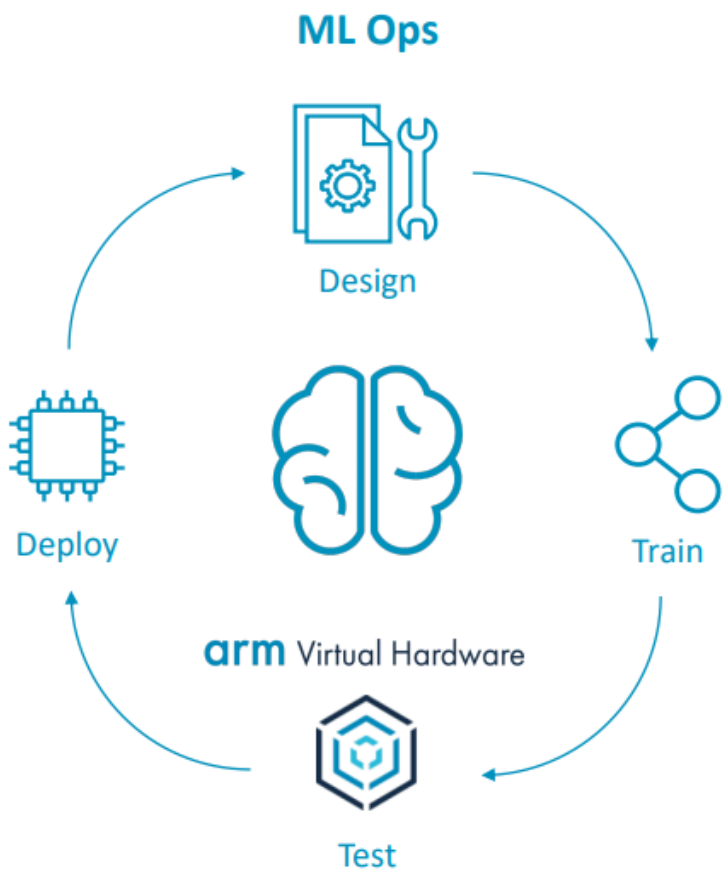
Use Case: Machine Learning Operations



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