Introducing Simplified Cellular IoT with Blues Wireless and the Notecard

Adding IoT to your tinyML Project
SciTinyML 2023
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tinyML Foundation
“Making wireless IoT easier for developers and more affordable for all”
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”
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**

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

**Response**

```json
{
  "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)

Your MCU/SBC
Your Sensors
Your Language

{JSON}

Cellular/Wi-Fi Notecard

Blues Wireless Notehub.io

{JSON}

Any 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)

{ 
  "file": "data.qo",
  "temp": 27.3,
  "when": 1644268443,
  "lat": 42.11,
  "lon": -88.32
  "device": "dev:89347"
}
Inbound Communication (from Cloud to MCU)

Your MCU/SBC
Your Sensors
Your Language

{JSON} → Cellular/Wi-Fi Notecard → Blues Wireless Notehub.io → {JSON} → Any Cloud

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
Revolutionizing IoT Software Development

arm Virtual Hardware

- **Reduces Barriers to Entry**
  - Enabling more global developers to access silicon and development boards

- **Faster Time to Market**
  - Accelerates application development for the IoT market

- **Scalable Performance**
  - Supports enterprise-class DevOps and MLOps integration testing
Embedded microcontroller developers

No scalability with physical hardware

Cloud-native developers

Hard to run on end devices

ML
Trained in the Cloud

Edge Device

Binary Image
Deployment
Devices fleet
Use Case: Machine Learning Operations

ML Ops

Design

Deploy

Train

Test

arm Virtual Hardware