Bringing Full Stack to Small Sats

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This presentation contains no US Export Controlled (ITAR) information.
Here's What We’ll Be Covering

- What are we building?
- Why build something new?
- How are we building it?
- Why should you care?
What Are We Building?

- Application
- KubOS
- Sat Hardware
Why Build Something New?

- Few full stack solutions
- Some vendor specific solutions
- Even fewer generic solutions
- Any full stack generic solutions?
Why Open Source?

- Small Sats and Open Source - A perfect match
- Too much independent reinvention
- “Given enough eyeballs, all bugs are shallow”
- Sharing enables innovation
Current Open Source

- CFE
- COSMOS
- UpSat/SatNOGS
- Many fragmented projects
Portability

Operating System

OS Abstraction Layer

Hardware Abstraction Layer
Portability - Operating System

FreeRTOS

Linux

OS Abstraction Layer

Hardware Abstraction Layer
Portability - OS Abstraction

Operating System → CSP, IPC, Threading, Timing → Hardware Abstraction Layer
Portability - Hardware Abstraction

- Operating System
- OS Abstraction Layer
- GPIO, I2C, SPI, UART
Portability - Supported Hardware

- STM32F407 Discovery Board
- MSP430F5529 LaunchPad
- NanoAvionics SatBus 3C1
- ISIS iOBC
Simplifying Middleware

- Sensors
- Subsystem
- System Values

Telemetry

- Beacon
- Storage
- Health Check
Development Environment

- SDK-in-a-box VM
- Yotta
- Toolchains
- Flashing
- Debugging
Why Should You Care?

- Simplicity
- Reusability
- Transparency
- Collaboration
Questions?

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