

NDN-IoT Framework and Example Application “Flow”

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Introduction – NDN-IoT & Flow

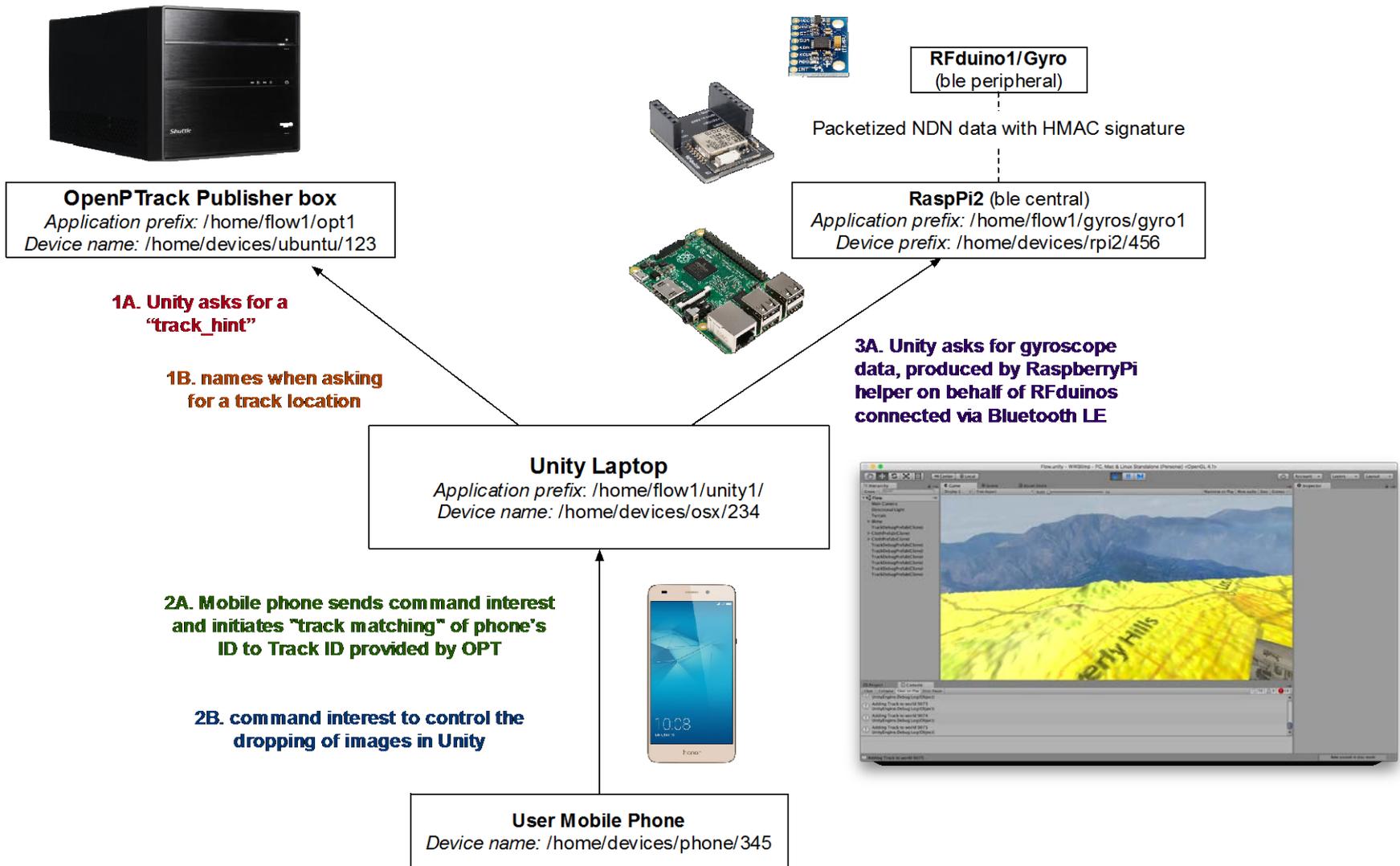
- **NDN-IoT framework**
 - Libraries in JavaScript, Python, C# and C++
 - Implement naming, trust and bootstrap, discovery and application-level pub/sub functionalities NDN team's IoTDI '16 invited paper [1]
- **"Flow" application:**
 - Home IoT game application built using the framework
 - Cloud-independent, secure (authentication and authorization)
 - Its design and implementation discussed in NDN teams' IoTDI '17 invited paper (to appear)

[1] W. Shang, A. Bannis, T. Liang, Z. Wang, Y. Yu, A. Afanasyev, J. Thompson, J. Burke, B. Zhang, L. Zhang. *Named Data Networking of Things (Invited Paper)*. In *IoTDI, 2016*

Flow: components

Component	Device	Role
OpenPTrack (opt)	Linux workstation machine	Produces time-series data (location of multiple tracked persons) at 30Hz
Mobile website	Mobile phone	Sends environment control commands and consumes environment status
Virtual camera control	RFduino	Produces NDN data from gyroscope reading. Packetize, and send to helper (RaspberryPi) via bluetooth
Controller/Gateway	RaspberryPi2	Serves as the trust anchor (runs NDN-pi controller)
Unity3D game engine	OSX machine	Consumes opt, phones, and Arduino data; and renders the virtual environment

Flow: app message exchanges



Flow: app message exchange keys

Diagram Key for NDN Interest-Data Exchange

1A.

Interest: /home/flow1/opt1/<run_id>/hints/, exclude: <last_received_timestamp>

Data: Interest name + <timestamp>, content: {"id": 45, "seq#": 312}

1B.

Interest: /home/flow1/opt1/<run_id>/tracks/<track_id>/<seq#>

Data: Interest name, content: {"x": 1.0, "y": 0.9, "z": -0.3}

2A.

Command interest: /home/flow1/unity1/<action:match, id:alice_phone>

Data: Interest name, content: {"status": "200", "data": "<html>track 45, show links</html>"}

2B.

Command Interest: /home/flow1/unity1/<action:link_click, id:alice_phone, link:img_3>

Data: interest name, content: {"status": "200"}

3A.

Interest: /home/flow1/gyros/gyro1/, exclude: <last_received_timestamp>

Data: Interest name, content: {"p": 0.3, "y": 0.5, "r": 0.1}

Links and documentation

- [Code repository](#)
 - [NDN-IoT framework](#)
 - [Functionality overview](#)
 - [Interface description](#)
 - [Flow application](#)
- [Technical guide](#) (installation and troubleshooting)
- [Demo poster](#)
- [Application screen recording](#)