

# Named Data Networking of Things: NDN-RIOT Progress Update

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**NAMED DATA  
NETWORKING**

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# NDN-RIOT Overall Goals

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- Enable flexible experimentation with NDN IoT apps on RIOT-OS
  - ▣ Capture the “edge” of edge-in effort
- Support for NDN packet format for limited MTU links
- Support of data-centric security, including ECDSA and HMAC signatures, AES encryption
- Support replaceable forwarding strategies
- Support of transmission (+fragmentation) over IEEE 802.15.4 and Ethernet
- Become the networking stack in RIOT-OS 😊

# Recent progress

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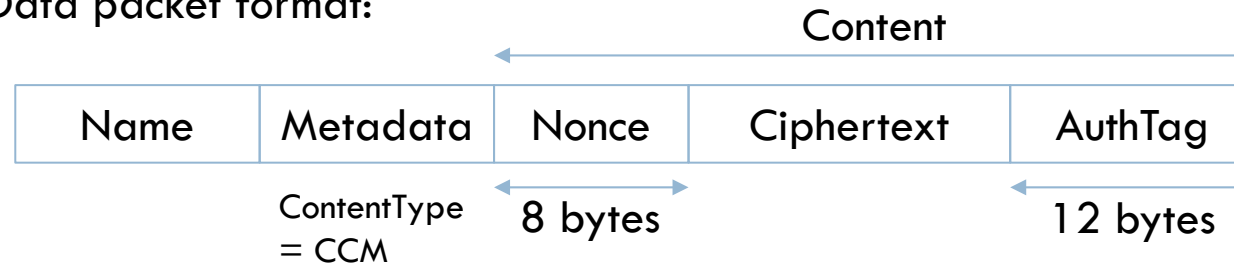
- Added basic forwarding strategy framework
  - ▣ Define callback functions (hooks) at three critical points in the forwarding pipeline
    - After Interest is received
    - Before Interest is satisfied by Data
    - Before Interest expires in PIT
  - ▣ Callback functions have full access to forwarder's internal data structures
    - FIB, PIT, CS, ...
  - ▣ Applications can set forwarding strategy choice through API

# Recent progress

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- AES-CCM signature type
  - AES-CCM is an authenticated encryption scheme:
    - (additional data, plaintext, nonce, key) → (additional data, ciphertext, auth\_tag)
    - Authentication tag covers both “additional data” and plaintext
  - Define a new content type for CCM-encrypted Data packet

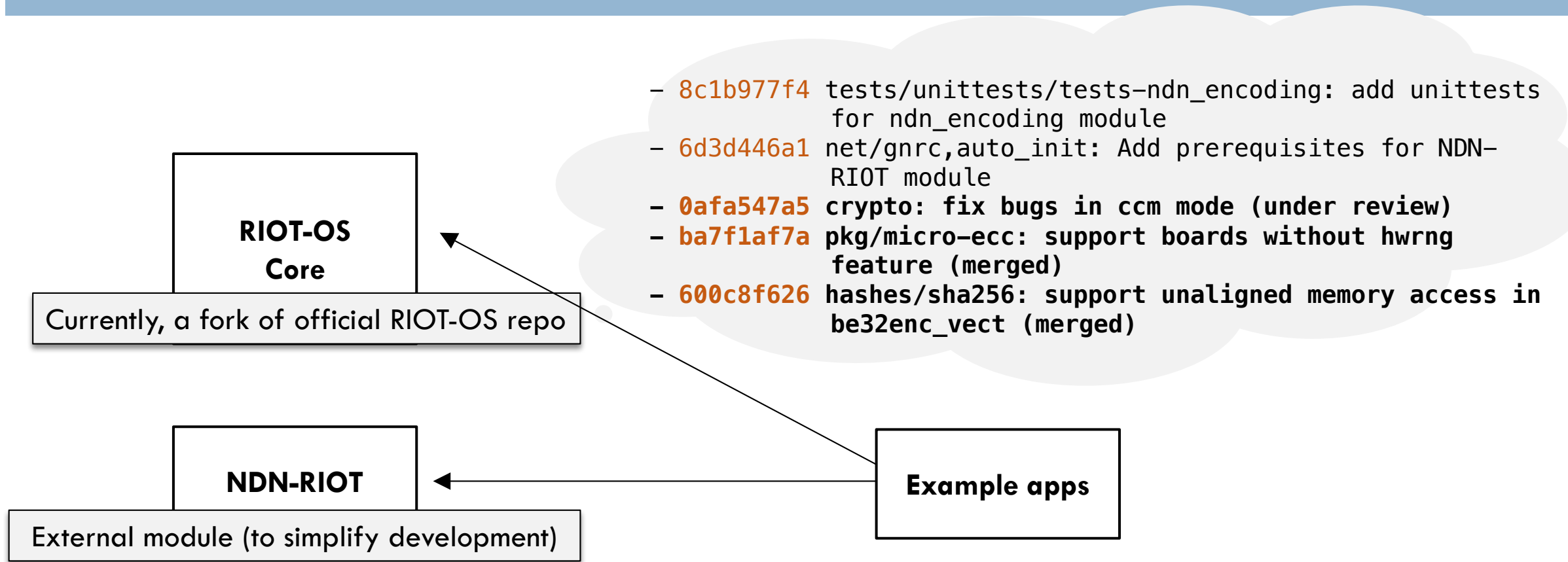
Data packet format:



- Additional data = {Name, Metadata, Nonce}
- CCM algorithm takes “additional data” in continuous block and outputs {ciphertext, auth\_tag} in continuous block

# NDN-RIOT and RIOT Integration

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# Getting Started

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- First, set up dev environment
  - <https://github.com/RIOT-OS/RIOT/wiki/Family:-native#dependencies>

Then type the following commands:

```
mkdir my_riot_dir
cd my_riot_dir
git clone https://github.com/named-data-iot/RIOT
git clone https://github.com/named-data-iot/ndn-riot
git clone https://github.com/named-data-iot/ndn-riot-examples
cd ndn-riot-examples/ndn-ping
make
```

Follow <https://github.com/RIOT-OS/RIOT/wiki/Virtual-riot-network> to set up virtual network with 2 tap devices, then launch a RIOT instance on each tap device

# Running Basic Examples (In Emulation Mode)

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On tap0 device:

```
ndnping server /prefix repo1
```

This will set tap0 device to listen on /prefix and generate data under /prefix/repo1

On tap1 device:

```
ndnping client /prefix 20
```

This will set tap1 device to ping /prefix for 20 times

# Running Basic Examples (For Real)

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- Flash devices
  - ▣ One with ping client
  - ▣ One with ping server
  
- Ping should be running after that