

# CCN-lite & RIOT

## Updates from the Communities

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# CCN-lite

- ▶ CCN-lite is a lightweight ICN implementation
- ▶ permissive ISC license
- ▶ developed at University of Basel
- ▶ Multi Packet format forwarder: NDN, CCNx, etc.
- ▶ CCN-lite runs on multiple platforms
  - ▶ x86/64 on Linux, BSD and MacOS, Kernel Module for Linux
  - ▶ Android
  - ▶ Arduino
  - ▶ ARM Cortex A-series
  - ▶ RIOT (e.g. ARM Cortex M-series)
  - ▶ Contiki

## Properties / Features

- ▶ Single Binary, multiple packet formats
- ▶ enable/disable functionality/packet formats at compile time
- ▶ Little memory constraints. Runs on constraint devices
- ▶ few dependencies (libssl), easy to port for other platforms
- ▶ run multiple instances on a single machine

# Development

Active Developers / Regular Contributors:

University of Basel



Hamburg University  
of Applied Sciences



Free University of Berlin



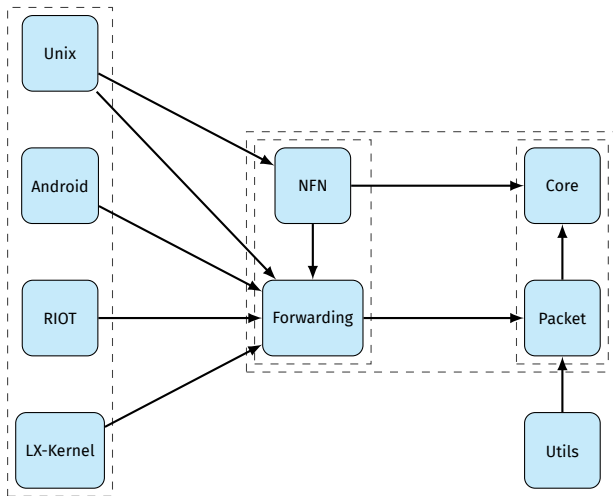
# CCN-lite v0.x

- ▶ started in 2011
- ▶ Goals:
  - ▶ Lightweight implementation of the CCNx 0.x forwarder
  - ▶ few lines of code, easy portability
  - ▶ basis for a NFN implementation (Named Function Networking)
- ▶ Grew with number of supported packet formats
- ▶ Stand alone implementation of various packet formats
- ▶ more than just a forwarder?

## CCN-lite v2

- ▶ 2017: Kickoff development of CCN-lite v2
- ▶ Restructuring of the code with the goals:
  - ▶ easy expandability for future application and packet formats
    - ▶ added: LOWPAN packet format
  - ▶ providing packet encoding library for applications
  - ▶ provide functionality for applications
  - ▶ fixing security issues  
(thanks to Eric Sesterhenn / X41 D-Sec)
- ▶ Modularization of the code
- ▶ Memory optimizations

# Structure of CCN-lite v2



## Current status of CCN-lite v2

- ▶ only few API changes to CCN-Lite v2
  - ▶ unified packet en/decoding for easier usage
  - ▶ wrapper functions simplify access to existing functions
- ▶ Libraries and API are mostly stable.
  - ▶ do not expect API changes before the release
  - ▶ maybe a few changes for compatibility with other platforms?
- ▶ Unix and RIOT implementations are complete
- ▶ Missing: Linux Kernel, Android, Arduino
- ▶ release is planned for this year



# CCN-lite in RIOT

## Current State

- ▶ CCN-lite v1 supported
- ▶ CCN-lite v2 GitHub Pull Request available
- ▶ Both use dynamic memory allocation (TLSF)

## Adaptations needed

- ▶ Static memory allocation
- ▶ Limit length of names
- ▶ Minimal data structure implementations (CS, FIB, PIT)
- ▶ Common API for users
  - ▶ CCN-lite vs NDN-RIOT vs ...
  - ▶ CCNx vs NDN vs ...

# LoWPAN Adaptations for CCN-lite and RIOT

## CCN-lite

- ▶ Extend CCN-lite Packet library for CCN-LoWPAN

## RIOT

- ▶ Generalize LoWPAN dispatch handling to reuse Fragmentation et al.