µNDN: NDN for Constrained IoT Platform

NDN Retreat 2016

Level of “constrainedness”

- Raspberry Pi 3 Model B
  - 1.2GHz quad-core ARMv8 (64-bit), plus GPU
  - 1GB RAM, external SD card, 802.11n & Bluetooth
- Atmel SAM R21
  - ARM Cortex-M0+ (32-bit), up to 48MHz
  - 32KB SRAM, 256KB Flash, 802.15.4 radio
- Arduino Mega
  - ATmega2560 microcontroller (8-bit, 16MHz)
  - 8KB SRAM, 256KB Flash

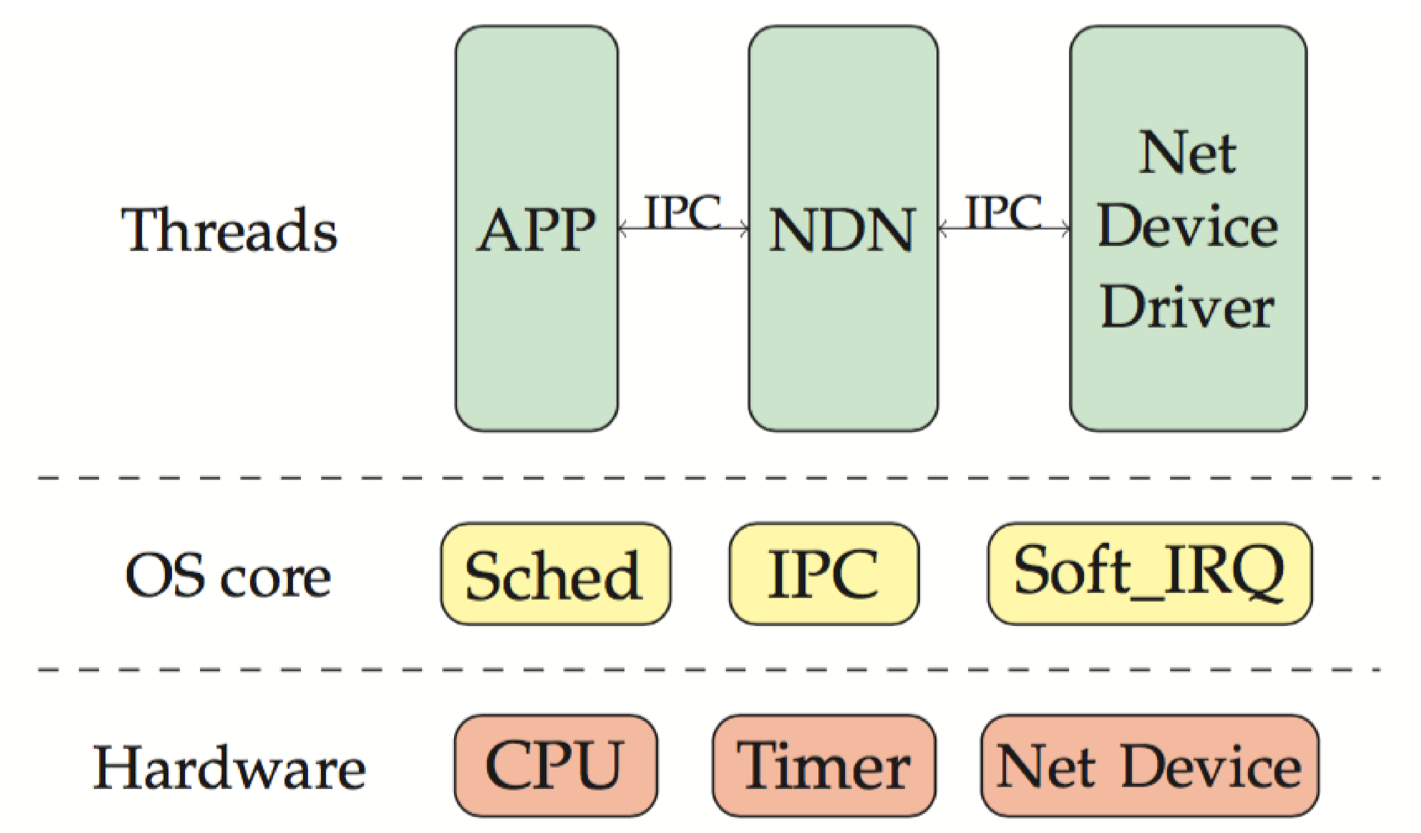
Progress by the NDN team

- Cross-compiled NFD for less-constrained platforms
  - Raspberry Pi
  - DD-WRT
- NDN for very constrained platforms
  - NDN APP over Arduino
  - NDN over RIOT-OS

µNDN concept

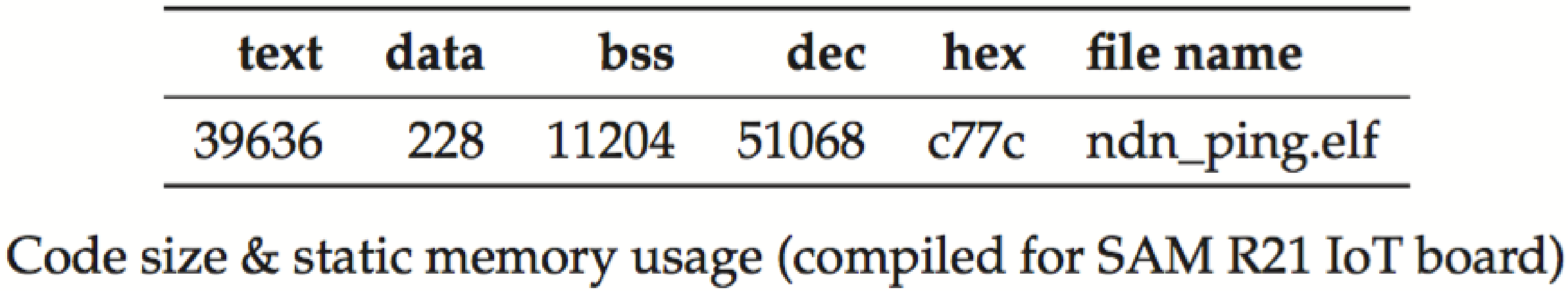
- Target the “middle-class” of devices
  - Enough resources to do something interesting
  - Capable of running a forwarder along the apps
- Small code size and memory usage
- Small packet and low data rate

Example: NDN for RIOT-OS



Software architecture of NDN on RIOT-OS

Example: NDN for RIOT-OS



text	data	bss	dec	hex	file name
39636	228	11204	51068	c77c	ndn_ping.elf

Code size & static memory usage (compiled for SAM R21 IoT board)

Discussion

- System design
  - What functionality to put in the micro-forwarder?
    - Routing protocols? Forwarding strategies? Caching policies?
- Link layer
  - Efficient forwarding over L2; energy efficiency;
- Security
  - Solutions using (mostly) symmetric crypto?
- Auto-configuration
  - How to bootstrap trust?
  - How to configure L3 & L2(?) connectivity?