

ACM ICN 2020 Tutorial:

Practical NDN Application Development and Seamless Deployment

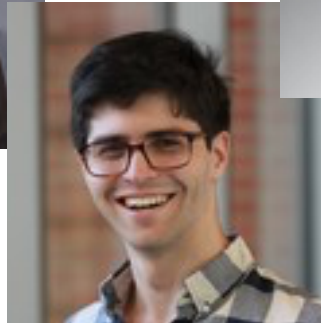
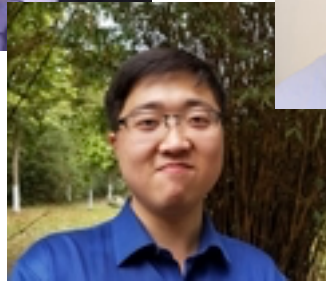
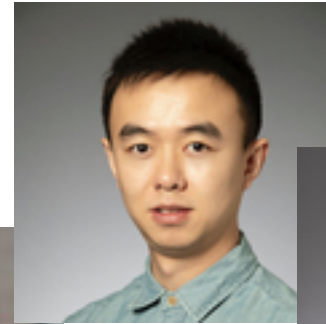
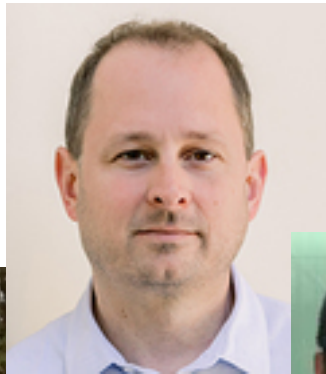
Tutorial Intro and App Development Overview

September 29, Zoom

Alex Afanasyev, Florida International University

Tutorial Goal

- Overview NDN and available libraries and tools
- Introduce high-level API models
- Showcase high-level APIs in apps



Named Data Networking in a Nutshell

- Clients **request Data** using a **name**
- Structured **name** can represent



- **Data** contains
 - requested content, command ack, or result of processing
 - meta information about the content
 - crypto signature to bind "content" and "name"

Interest packets

Name
Optional fields

Data packets

Name
Content
Signature



Three Pieces of NDN

- **Structured naming of data**

- → Fetching data by application-defined, semantically meaningful names
- → No need for protocol/port numbers; everything is in the name
- → In network data discovery (with and without routing assistance) using the name

- **Securing data directly**

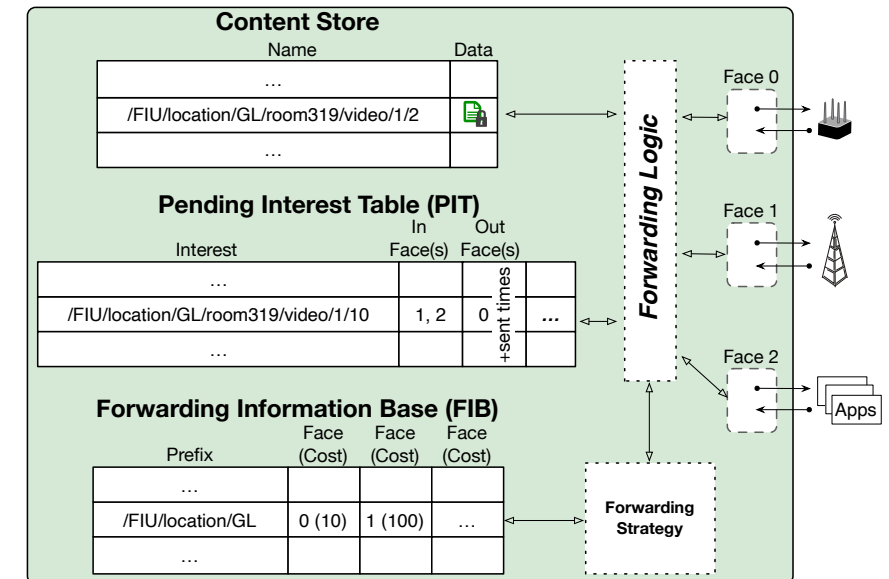
- → Removing dependency on transport security

- **Stateful Forwarding Plane**

- → Creating closed feedback loop
 - Measure performance, detect failures
- → Enabling multi-path forwarding
 - Add a strategy module to assist the forwarding decisions
- → Buffering both data (CS) and interests (PIT)
 - Designed in support for lossy/challenging network conditions

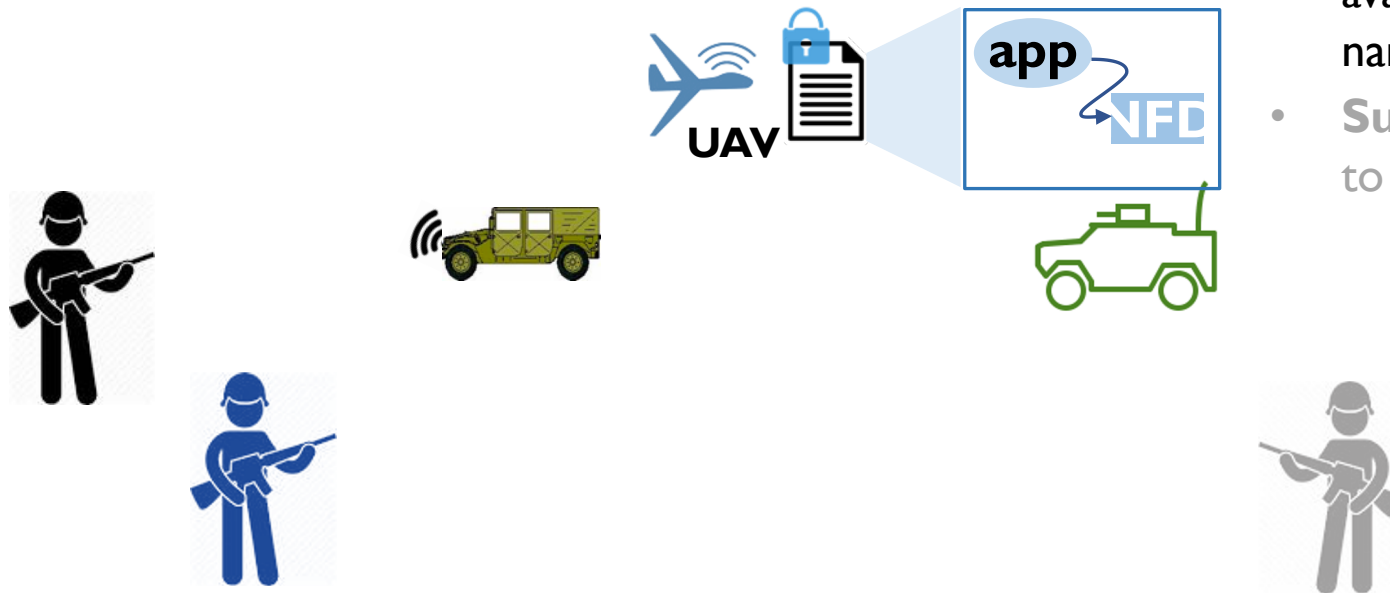
Data packets

Name
Content
Signature



NDN is a Natural Fit to ... Pub/Sub

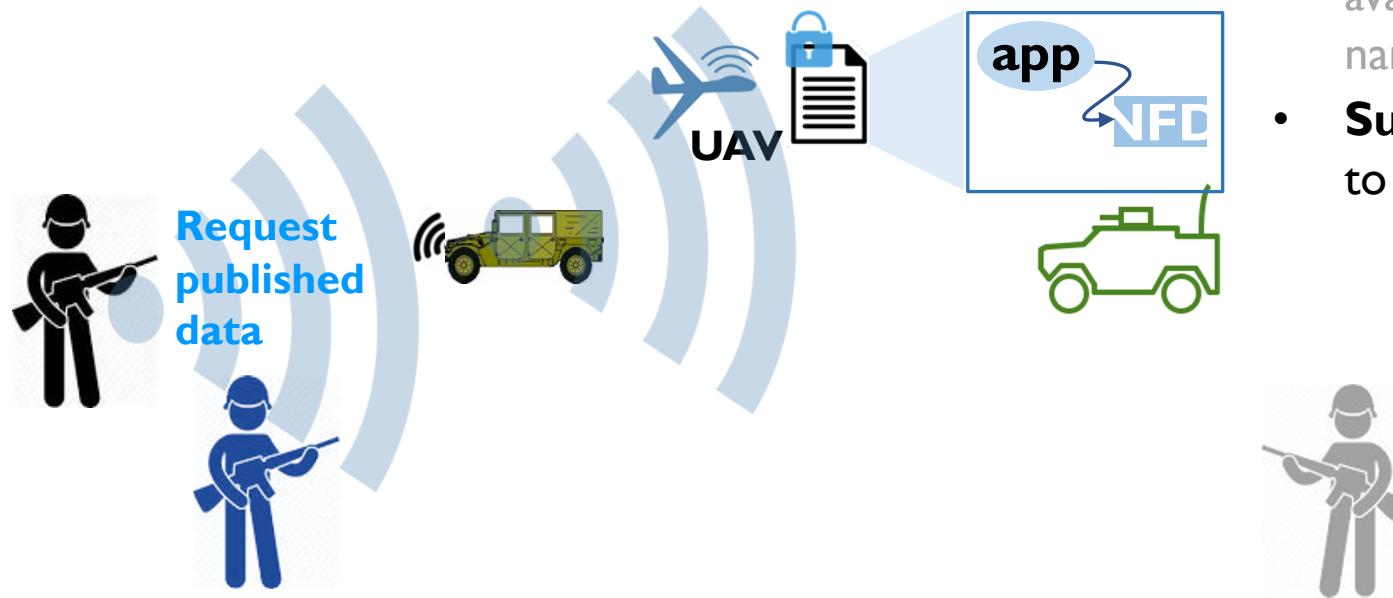
- Consumers and producers don't need to be online at the same time
- Even with large losses and intermittent connectivity NDN can provide efficient communication



- **Pub:** a file creator making the file available at the local node as a set of named, secured *data packets*
- **Sub:** *interested parties* sending request to fetch the new file

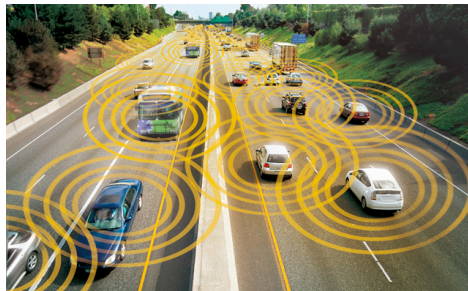
NDN is a Natural Fit to ... Pub/Sub

- Consumers and producers don't need to be online at the same time
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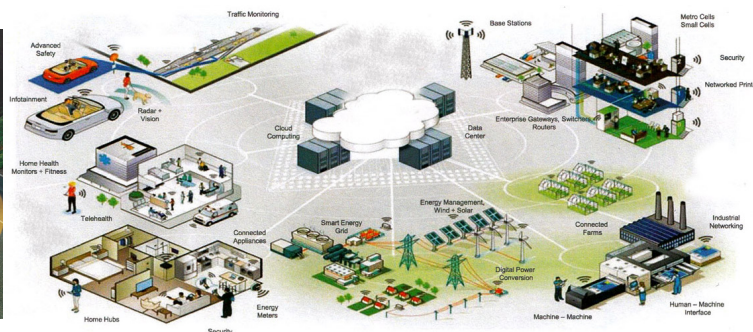
- **Pub:** a file creator making the file available at the local node as a set of named, secured *data packets*
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NDN is a Natural Fit to ... Ad Hoc Communication



Vehicular Net

[/V2V/Highway/I-405/Exit-22/NB/...](#)



Smart home/city, IoT

[/Home/LivingRoom/Thermostat/T/Set/75/...](#)

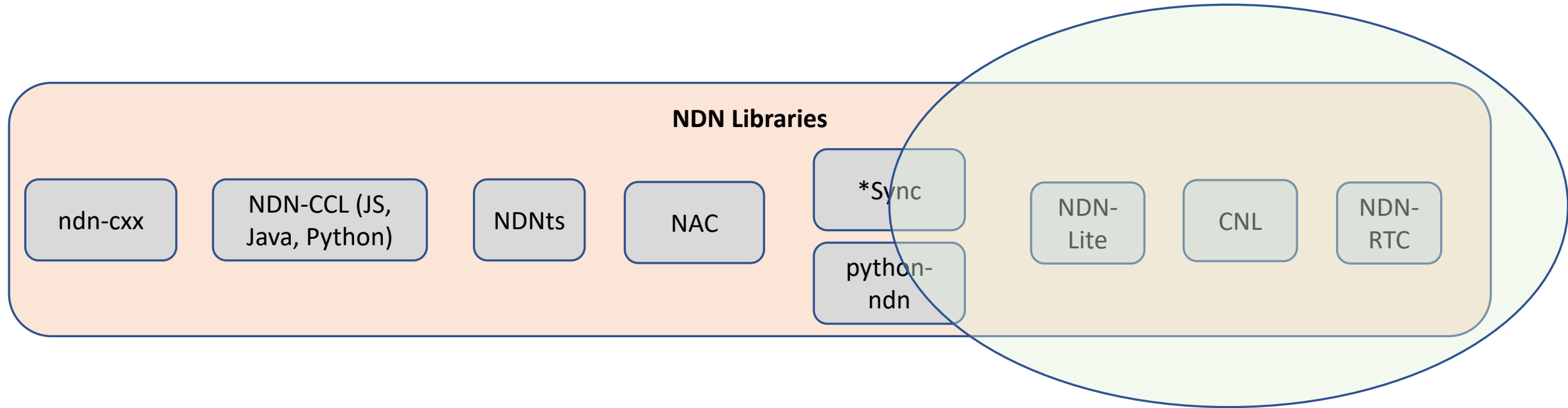


Disaster Recovery

[/Response/FL/Miami/FloodReports/...](#)
[/AliceDoe/npChat/alicedoe123/file/mycat/...](#)

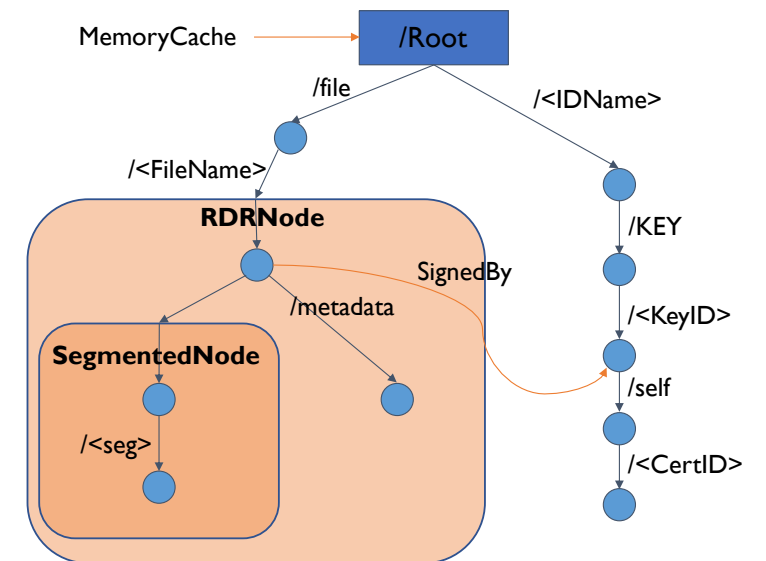
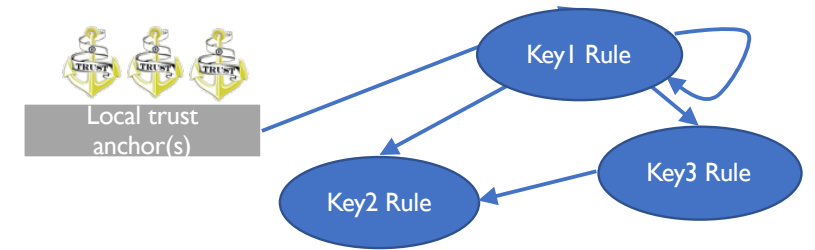
- Users want data, but network tries to maintain point-to-point connections, which is very challenging in these environments, and often unnecessary.

NDN Library APIs



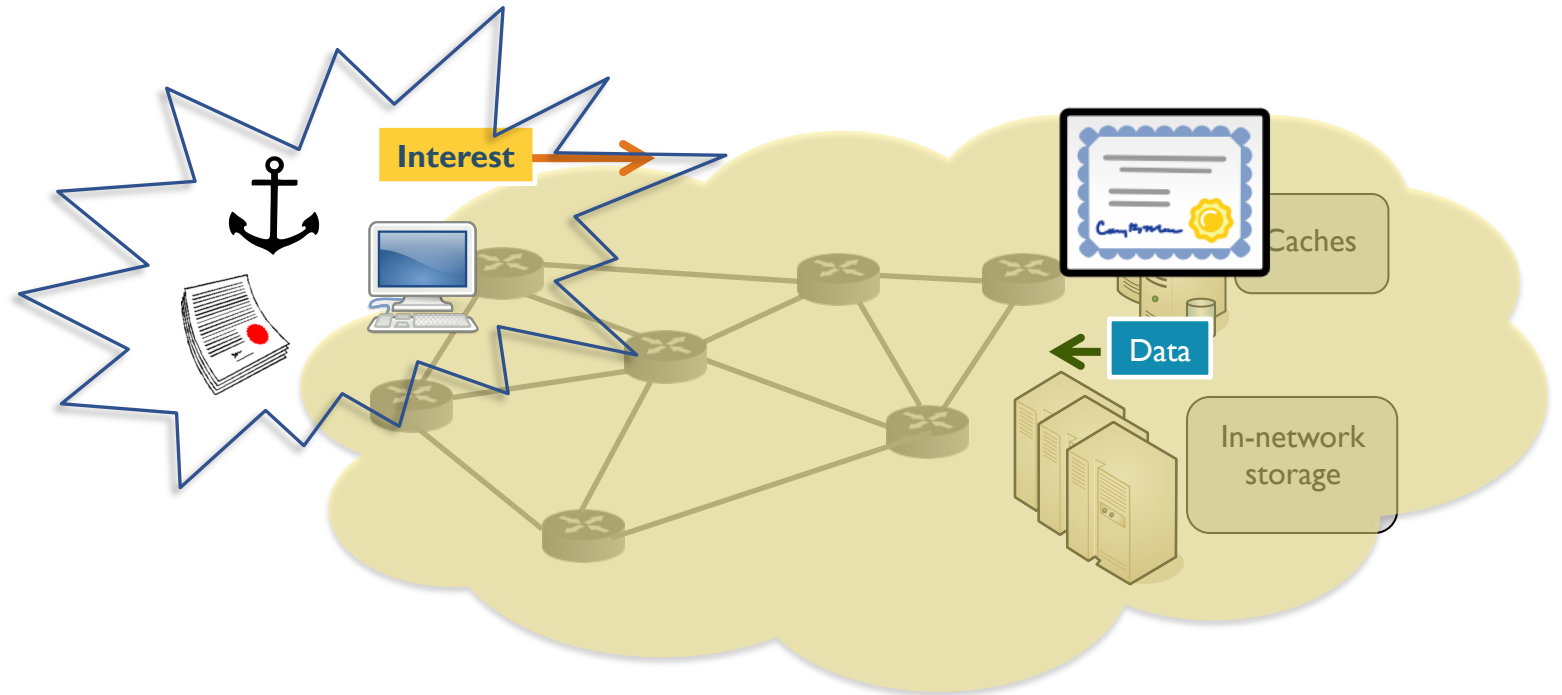
High Level APIs

- Define high-level goals for app communication
- Bootstrap trust and set up security policies
- Automatically manage namespace
- Fetching/publishing application objects (not individual data)
 - Publish/subscribe
 - Automatically deal with local storage (in memory/disk), managing remote storage (repos)



Deployment Automation

- Principles of deploying NDN application
- What is NDN “config”?



Leaning More

The screenshot shows the NDN website homepage with a navigation menu (Project, Architecture, Codebase, Testbed, Publications, Outreach) and four featured articles: NDN Hackathon, Tutorial Videos, The NDN Testbed is Growing, and NDN Video FAQ. A search bar and a list of upcoming events are also visible.

NDN HACKATHON
See the results of the recently concluded NDN Hackathons and the upcoming Hackathons.
[Read More](#)

TUTORIAL VIDEOS
Watch tutorial videos about the NDN project and NDN technologies.
[Read More](#)

THE NDN TESTBED IS GROWING
The NDN research testbed is a shared resource created for research purposes, that now includes nodes in Asia and Europe.
[Read More](#)

NDN VIDEO FAQ
Questions about NDN answered on video by faculty, students, staff researchers, and colleagues.
[Read More](#)

Named Data Networking (NDN) Project Newsletter for October 2019 – July 2020
August 14, 2020 by FIU in Updates | Comments Off on Named Data Networking (NDN) Project Newsletter for October 2019 – July 2020

The NDN project team compiles and publishes this newsletter periodically to inform the community about recent activities, technical news, meetings, publications, presentations, code releases, and upcoming events. You can find these newsletters posted on the NDN website.

Upcoming Events

- September 10-11, 2020, Virtual Meeting: NDN Community Meeting 2020, [Call for Contributions \(Presentations, Posters, Demos\)](#)
- September 29, 2020 – October 1, 2020: 7th ACM Conference on Information-Centric Networking (ICN 2020), [Call for Posters and Demos](#)
- December 12-14, 2020, 3rd IEEE HotICN 2020, [Call for Papers](#)

search this site

Events

- September 10-11, 2020
[NDN Community Meeting 2020](#)
Virtual Meeting
- June 7, 2020
[ICC ICN-SRA 2020](#)
Virtual Meeting
- March 14-15, 2020
[10th NDN Hackathon](#)
Arizona
- March 12-13, 2020

<https://named-data.net>

Codebase

Libraries

[NDN Platform Documentation](#)
[NDN Forwarding Daemon \(NFD\)](#)

NFD

[NFD on Android](#)
[NDN-RIOT](#)

NLSR

[NLSR](#) – The Named Data Link State Routing Protocol

Mini-NDN

[NDN Tools](#) – The collection of essential tools for NDN
[ndn-cxx](#), [NDN-TS](#), [pytnon-ndn](#), [NDN-CNL](#), [NAC](#), [Psync](#), ...

ndnSIM

Github

Publications

Papers

79+ papers

Technical Reports

68+ technical reports

Presentations

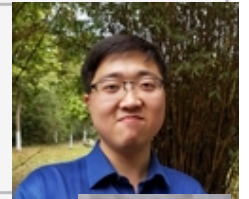
100+ presentations

NDN Tutorials

[@ MILCOM 2019](#): Towards Data-Centric Battlefields: Named Data Networking Services for Tactical Networks
[@ ACM ICN 2019](#): NDN IoT: Taking NDN to Real Experimentation
[@ MILCOM 2018](#): Towards a Data-Centric Battlefield: Applications of Named Data Networking in Tactical Networks
[@ ACM ICN 2018](#): “Second Generation” NDN Applications + NDN Security Concepts and Tools
[@ MILCOM 2017](#): A Data-Centric Battlefield: Leveraging Named Data Networks in Tactical Networks
[@ ACM ICN \(2017\)](#): Running IoT Apps over ICN
[@ ACM SIGCOMM \(2017\)](#): NDN - Why Bother?
[@ ACM ICN \(2016\)](#): Exploring NDN Research through Real World Problem Solving
[@ ACM ICN \(2015\)](#): Sync and Security in ICN
[@ ACM ICN \(2014\)](#): Introduction to NDN

What's Next

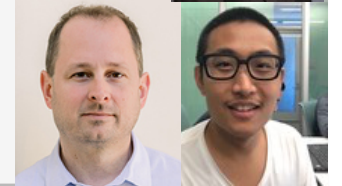
(25 minutes)
Pub-Sub in NDN-Lite
Tianyuan Yu



(25 minutes)
npChat as an Illustrative App Examples
Lan Wang



(40 minutes)
Intro to NDN CNL API
Jeff Burke, Xinyu Ma

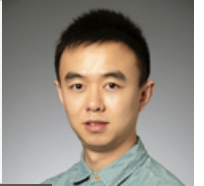


10 minutes: Coffee Break

(25 minutes)
Plug-n-Play of NDN Applications
John (Hunter) Dellaverson



(15 minutes)
Self-learning in NDN: Enabling an Auto-configured NFD
Teng Liang



(40 minutes)
Q & A

