Named Data Networking of Things

http://named-data.net/

http://named-data.net/publications/ndn-iotdi-2016/

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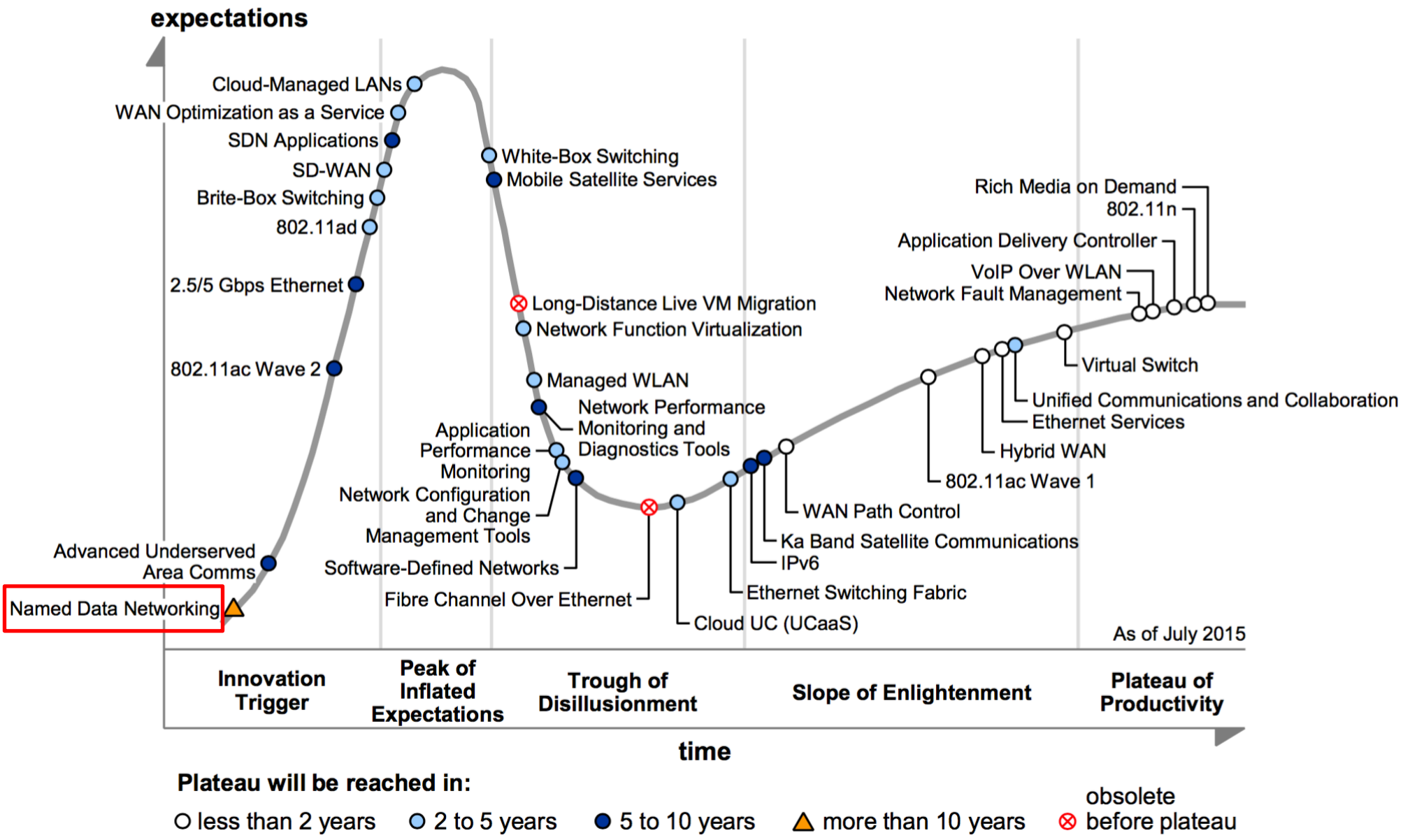
Figure 1. Hype Cycle for Networking and Communications, 2015



Today's IoT over TCP/IP

- Focusing on connections and devices
- Engineering effort to patch up TCP/IP for IoT
  - DNS to map application layer names to IP addresses
  - APP-layer protocols to bridge the semantic gap
    - CoAP(S)/HTTP(S) as the effective "narrow waist"
- Channel-based security or physical isolation
- Additional layers and gateways for different network environment
  - E.g., 6LoWPAN for 802.15.4 networks; IPv6-over-foo adaptation layers for different L2 technologies

IoT vs. Traditional IP Networks

- Too many devices to configure and connect
- Too small to support complex protocol stack
- Too critical to run without ***security*** protection

- Our approach to IoT:
  - Name “things”
    - e.g., temperature reading, light in a room
  - Connect apps and services
  - Build innate Security

IoT over NDN

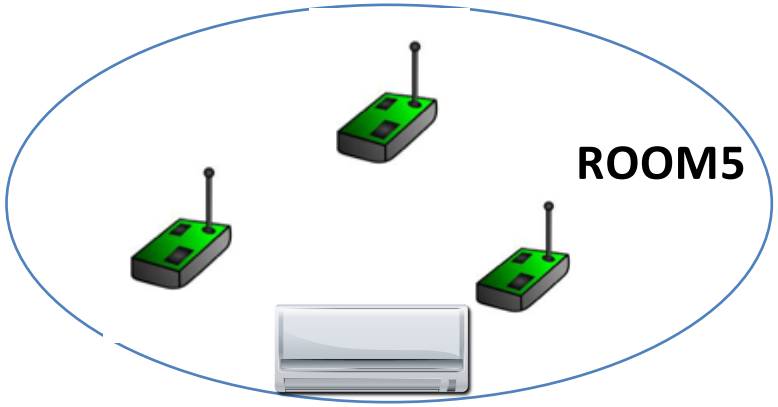
- Focusing on data & things, instead of devices
- Bringing APP-layer naming to L3
  - Network makes forwarding decision based on the names of “things”
- Securing data objects directly
- A single universal L3 protocol that works in all scenarios

One network protocol, serving all apps

"ROOM5 temperature?"

INTEREST(/ucla/bldg#/room5/temp)

DATA (name|data|signature)



"Turn on air conditioner"

INTEREST(/ucla/bldg#/room5/AC-on/sig)

DATA (name|ACK|signature)

INTEREST(/traffic/LA/HW405/location)

DATA (name|data|signature)

The same NDN protocol supports above apps and runs on the multi-continent NDN Testbed

Take-Away

- "Next Generation": Step up a level and take a fresh look of the overall picture
  - IP's way of networking doesn't fit IoT well
- We *can* do networking in fundamentally different ways
  - NDN shows a concrete example with running code