TerraSwarm

Contextual Callbacks for Resource Discovery and Trust Negotiation on the Internet of Things

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Problem: Bootstrapping

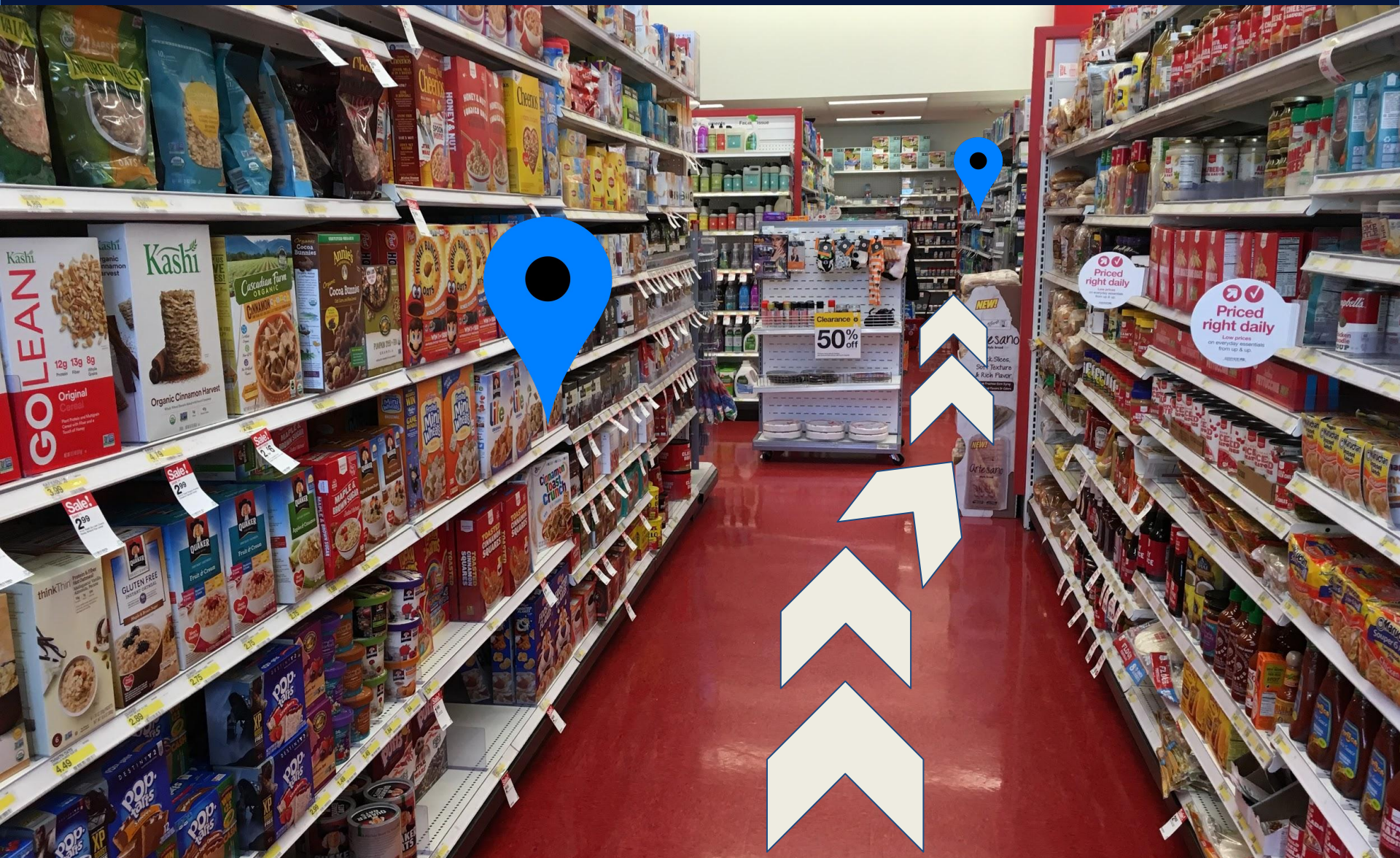
I) What Things are available?

- *How can I use them?*

II) What Things can I trust?

- *Who controls them?*

Example: Smart Shopping List



Discovery & Establishing Trust

LAN Discovery

- Single network
- Wired power

IoT Discovery

- Many networks
- Battery-operated

LAN Trust

- Predetermined
- Static

IoT Trust

- Opportunistic
- Dynamic

Trust Between Things

ER-diagram

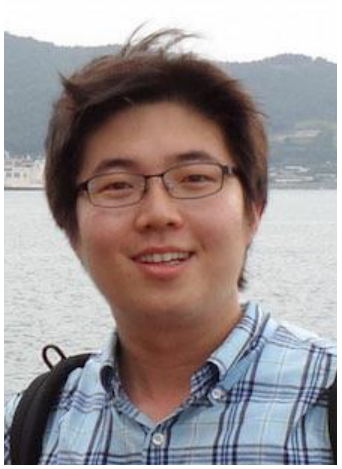
- Entities: Things
- Relations: Trust

Challenges

- Rapid Expansion
- Fluid Context (Mobility)
- Scale

Secure Swarm Toolkit

(Previous work by Hokeun Kim.)

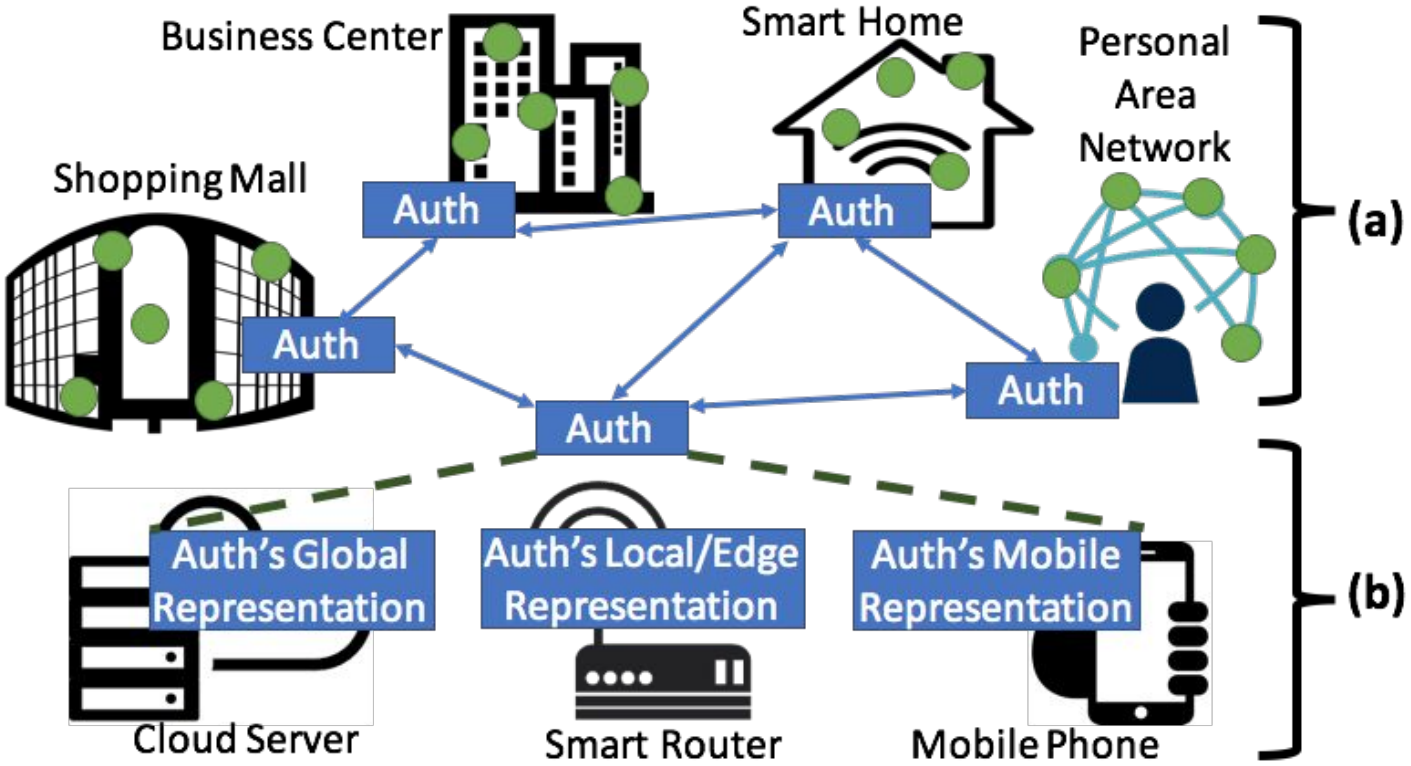


What has worked for the Web will not work for the IoT:

- A certificate for each and every Thing?
- Decentralization is a must for robustness.
- Some Things do not have the energy budget for public-key crypto, SSL in particular.

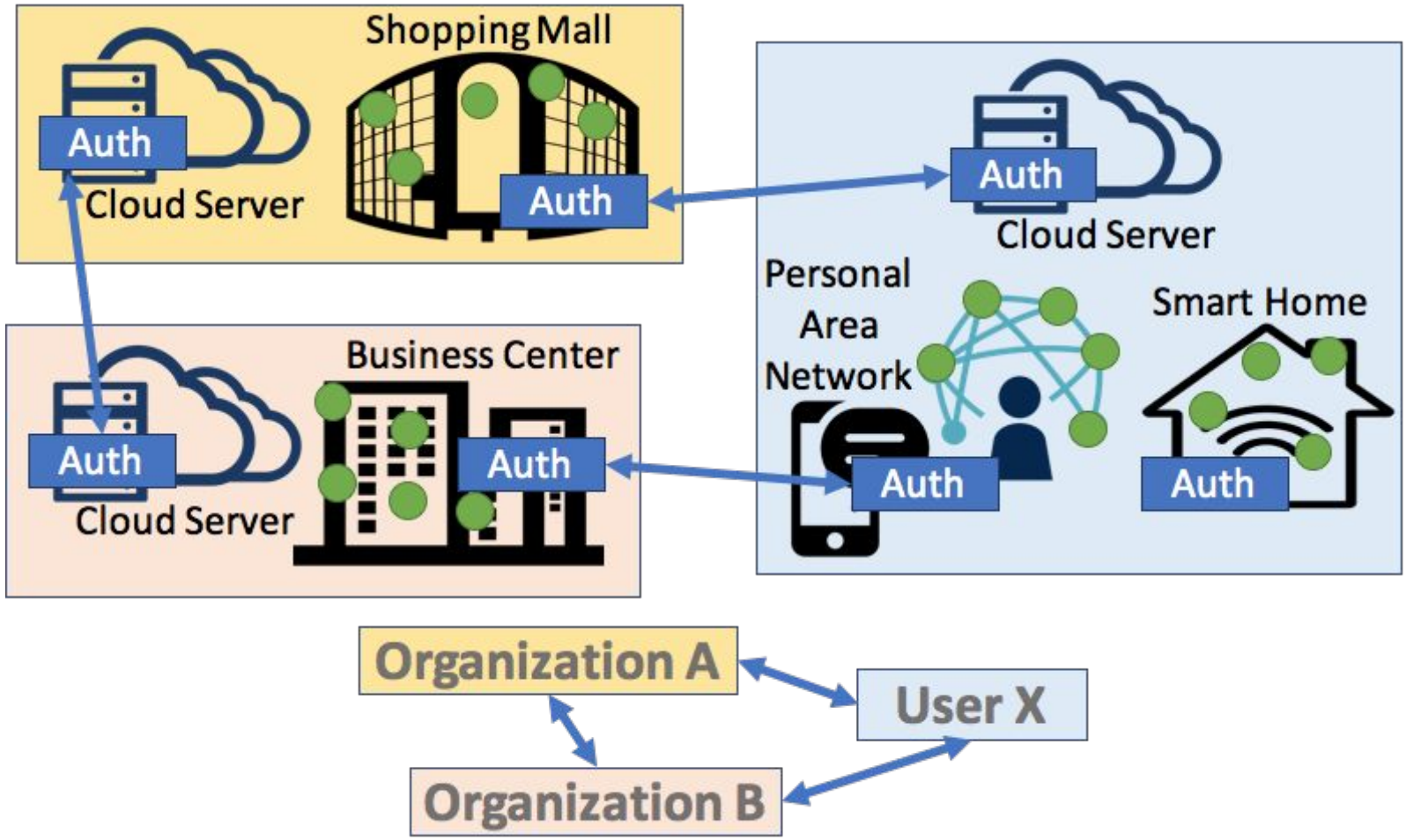
*Solution: A federated design of **local authentication and authorization** entities that broker secure connections between Things.*

Locally Centralized, Globally Distributed

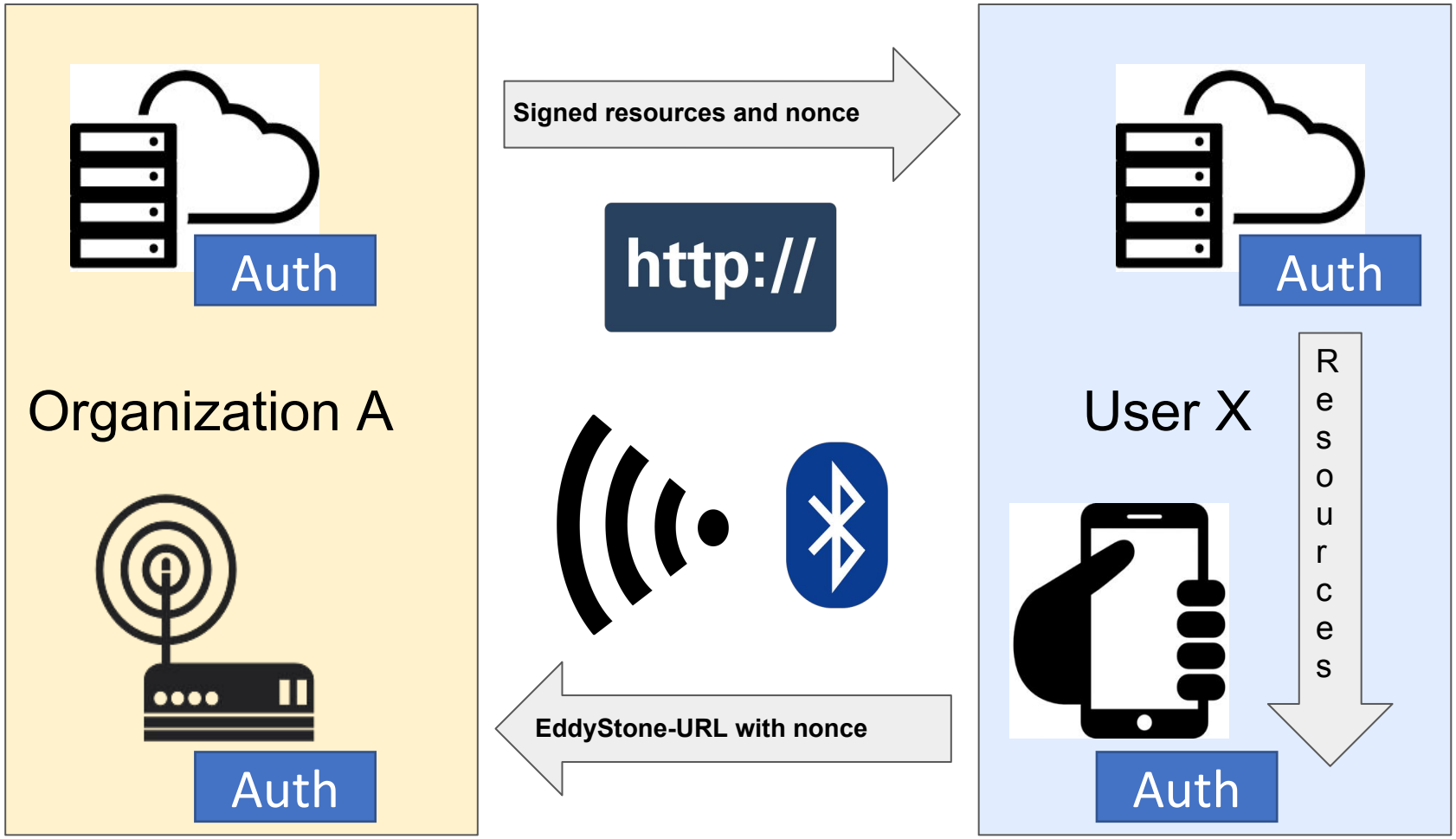


*Stake in the ground: Every physical space has an edge device with a **local authorization entity: Auth**.*

Logically Centralized, Physically Distributed



No Scanning: Local Auth Listens for Announcements



Summary

- Callbacks are tied to a physical context; provide resource information **exactly when/where needed**.
  - The limited range of radio ensures locality (unlike e.g., (W)LAN discovery).
- The user can **verify the origin** of a callback using a certificate tied to the owner.
- Advertisements are **cheaper** than scanning.
  - Traditional network/service discovery is outsourced to the edge.

Want to Learn More?

Please come talk to us during the poster session in the Crystal Foyer.

Thank you!