Motion-Triggered Surveillance Camera using MF-IoT

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Motivation

Rapid growth in IoT deployment posed unprecedented challenges to the underlying network

- Global reachability:
  - Allow devices to be identified and located from anywhere
- Mobility:
  - Support seamless connection when devices are mobile
- Resource heterogeneity:
  - Support IoT devices with different resource constraints
- Diverse communication patterns:
  - Provide efficient support for query/response, publish/subscribe (pub/sub), multicast, anycast, etc.
- Service-oriented naming & communication:
  - Allow users/applications to address “services” rather than the location of the devices
  - Example: Devices provide services that can be consumed by applications or other services

MobilityFirst-IoT

MF-IoT [2] extends MobilityFirst to low-end devices

- GUID-based communication in the application layer:
  - Every entity, including (services on) IoT devices, use GUID to address each other
  - Use Locally Unique Identifiers (LUIDs) to compress packet headers (10 bytes)
  - Transparent translation between LUIDs & GUIDs in the network layer
  - GUID-LUID mapping managed at gateways
  - Efficient support for diverse communication patterns (unicast, multicast, anycast)

- Highly efficient communication in IoT domains:
  - IoT devices form domains which connect to the core network via gateways
  - Applications/services “call” services via their GUIDs
  - Support device mobility & ID

Service-Oriented Communication

MF-IoT treats “services” as first-class citizens

- Services are seen as network entities:
  - Each service has a GUID
  - Many-to-many relationship between services and devices
- Services addressed by their GUIDs:
  - Applications/services “call” services via their GUIDs
  - Allow multiple instances of a service in the network
- Benefits:
  - No need to reconfigure other services when the device that provides a service changes (e.g., service migration)
  - Intrinsic multicast/anycast support
  - Service Chaining: data go through multiple services before consumed
  - Example: Alice does not have to reconfigure her smartphone when she forgets to wear her Fitbit and uses her smartphone as the step counter

MobilityFirst

MobilityFirst [1] is a future Internet architecture that supports device mobility & ID-based communication

- Globally Unique Identifier (GUID):
  - Public-key-based self-certifying flat names for every entity in the network (e.g., device, service, content, etc.)
- Global Name Resolution Service (GNRS):
  - Stores the mapping between GUIDs and network addresses (NAs)
  - Logically-centralized network layer function
- Mobility support:
  - Routers re-perform GNRS lookup on device move (late-binding)
  - Storage-aware delay tolerant routing based on NAs (GSTAR)

Service-Oriented Comm. in Motion-Triggered Surveillance Camera

References: