IoTDI 2020

CHARACTERIZING SMART HOME IOT TRAFFIC IN THE WILD

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Smart Home IoT – A Target

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Hackers can hijack Wi-Fi Hello Barbie to spy on your children

Security researcher warns hackers could steal personal information and turn the microphone of the doll into a surveillance device

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  - Limited number of devices [PETS '17, PETS '19].

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  - Study smart home IoT behavior ***in the wild***.
- *Scale*
  - Study ***over 200*** homes.

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- Device identification using DHCP, SSDP and UPnP traffic.
- *Anonymized* data collection (no public IP addresses or device MAC addresses) with user consent.

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- 66 unique IoT device types (make and model) across 8 categories.
  - Smart TVs, Cameras, Speakers, Assistants, Game Consoles, Home Automation, Work Appliances and Health/Wearables.

Characterizing Smart Home IoT traffic

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Volumetric	Temporal	Destination

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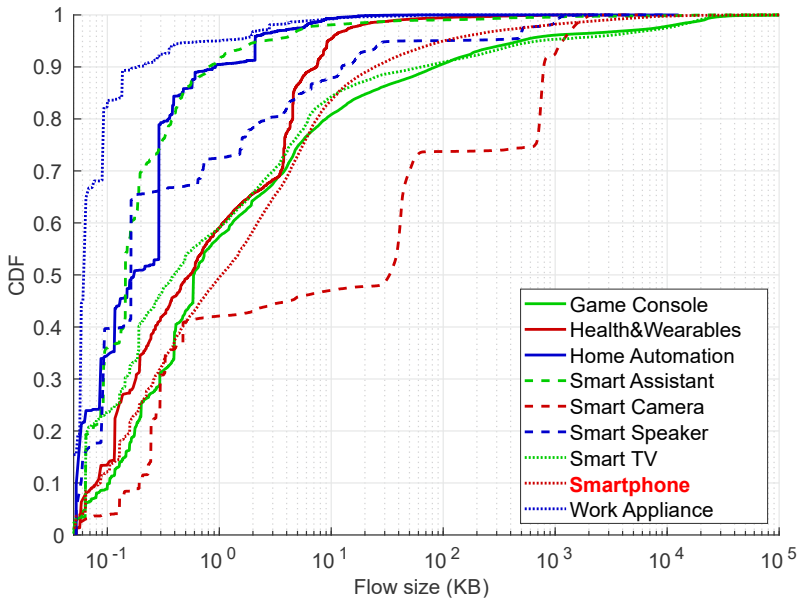

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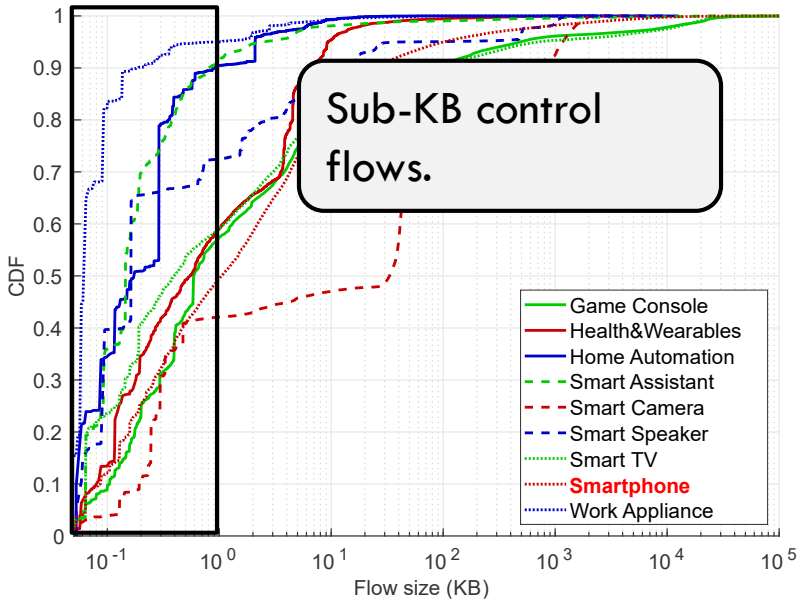

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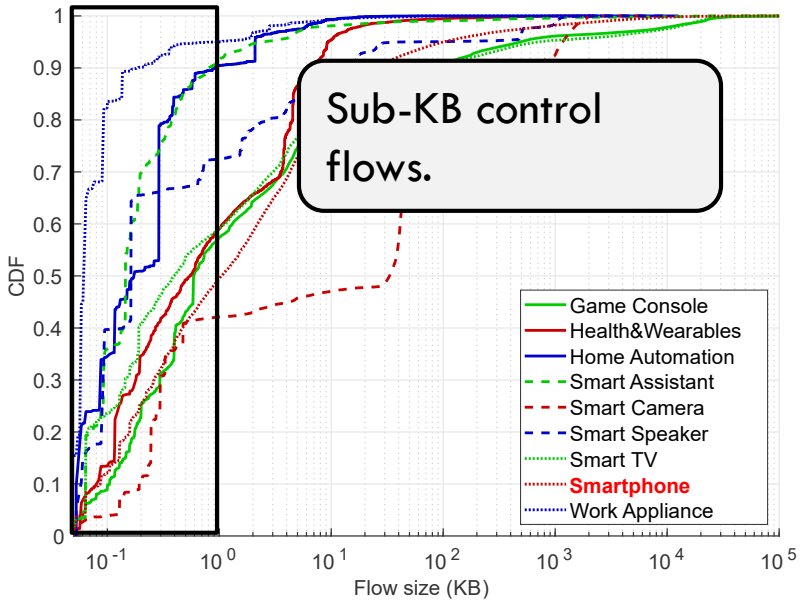

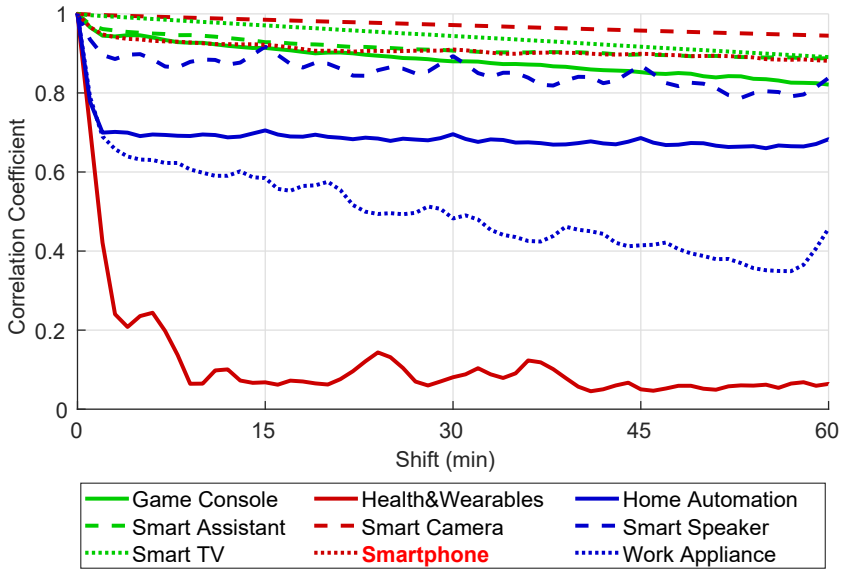

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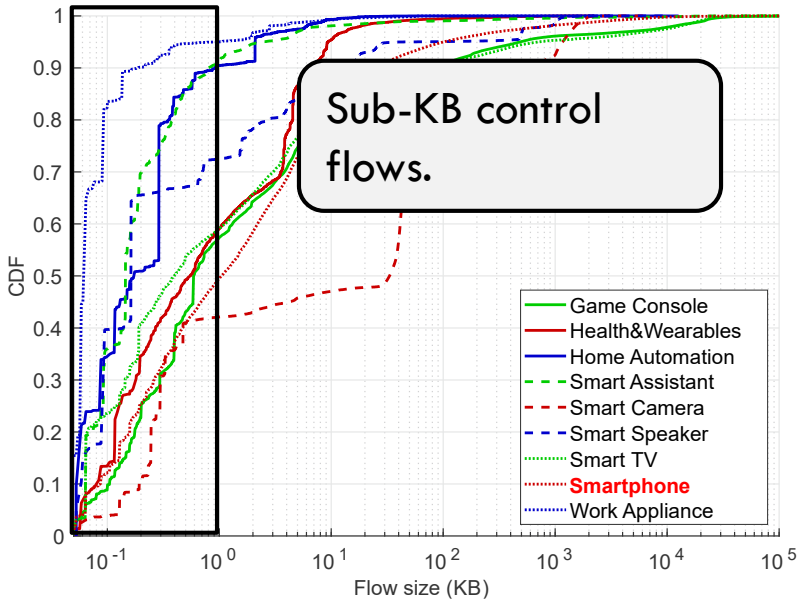

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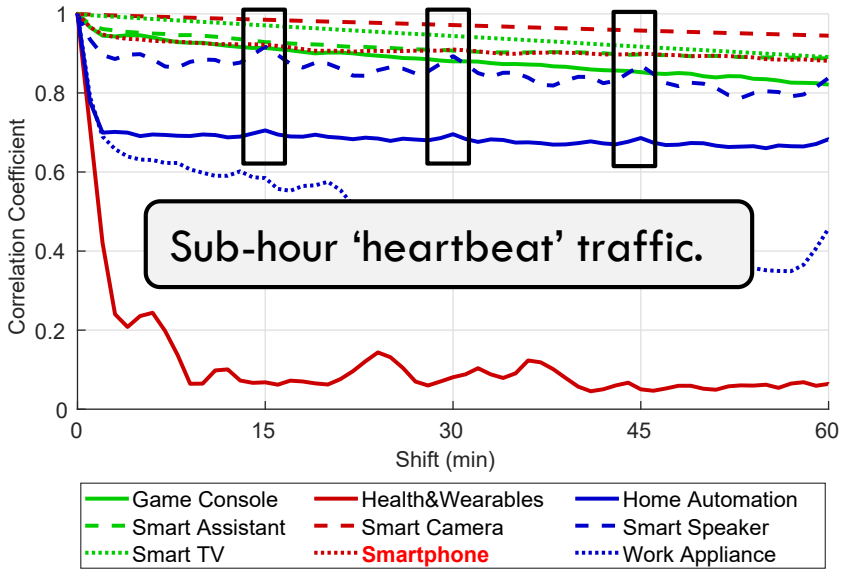

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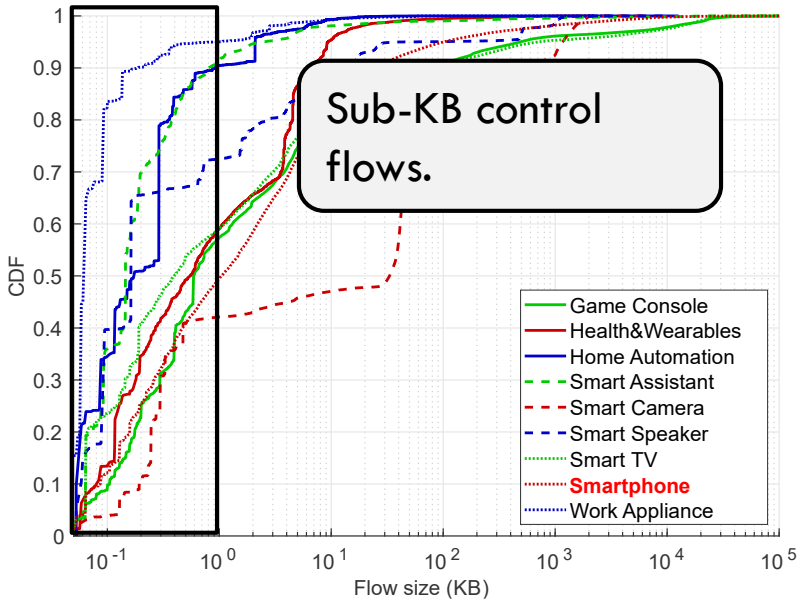

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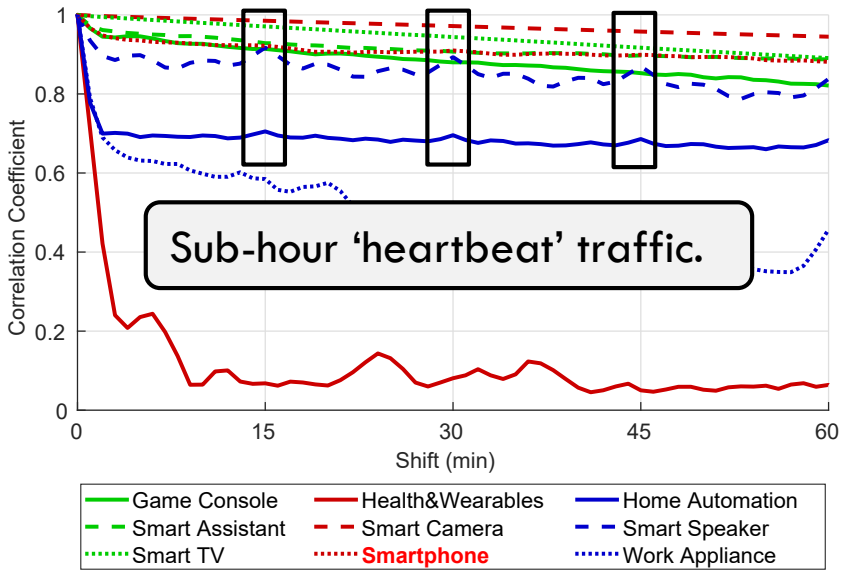

Destination

70-90% of traffic to Amazon, Google owned AS (higher backend centralization compared to 31% of overall Web).

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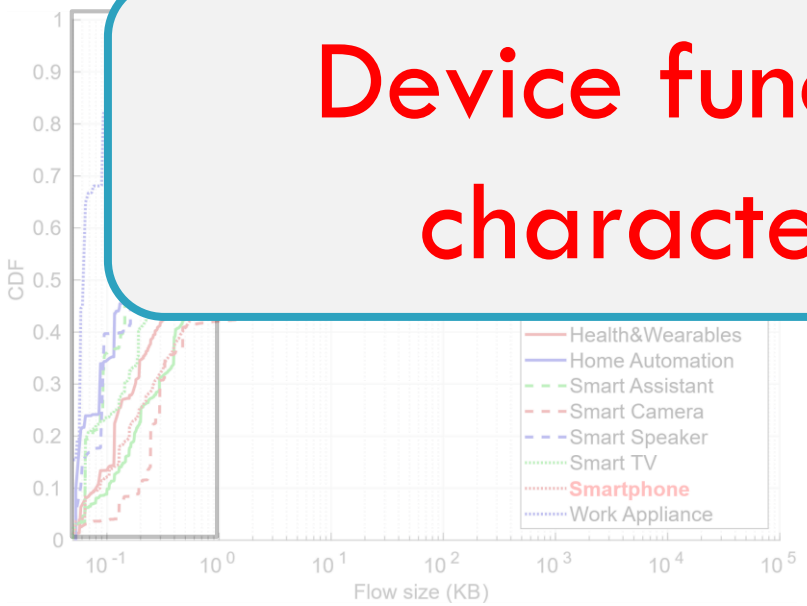
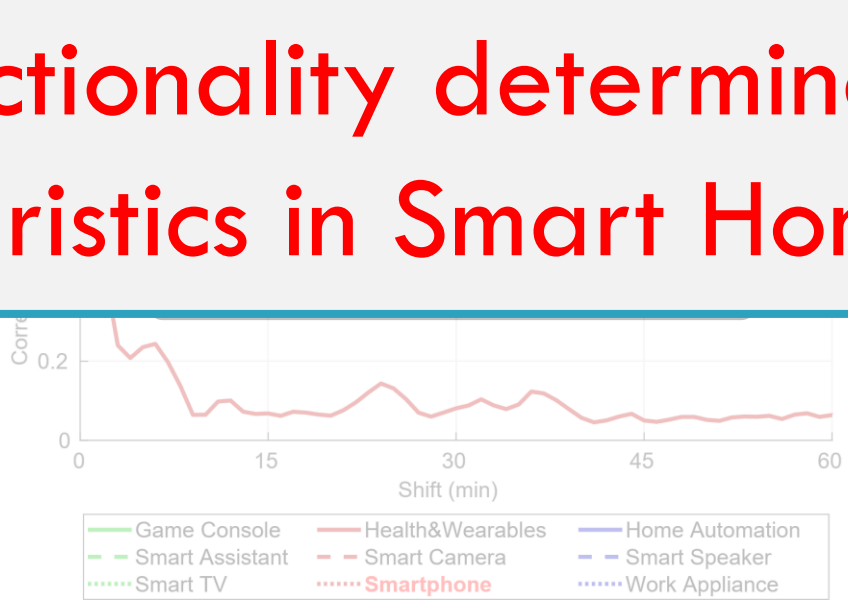
Volumetric | Temporal | Destination

Device functionality determines traffic characteristics in Smart Home IoT.





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Security/Privacy Issues in Smart Home IoT

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  - **Security via Access Control.**
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- Manufacturer Usage Description (MUD – RFC 8520) by device manufacturers.
- Research tools to build MUDs based on device traffic – MUDgee (IoTS&P '18).

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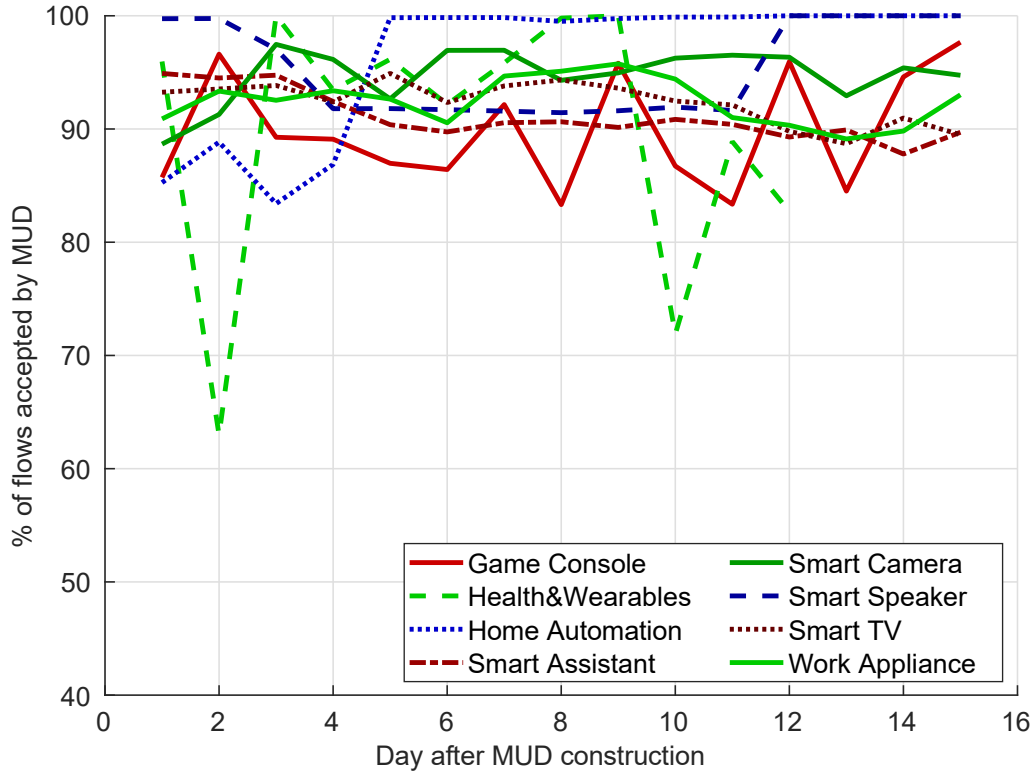

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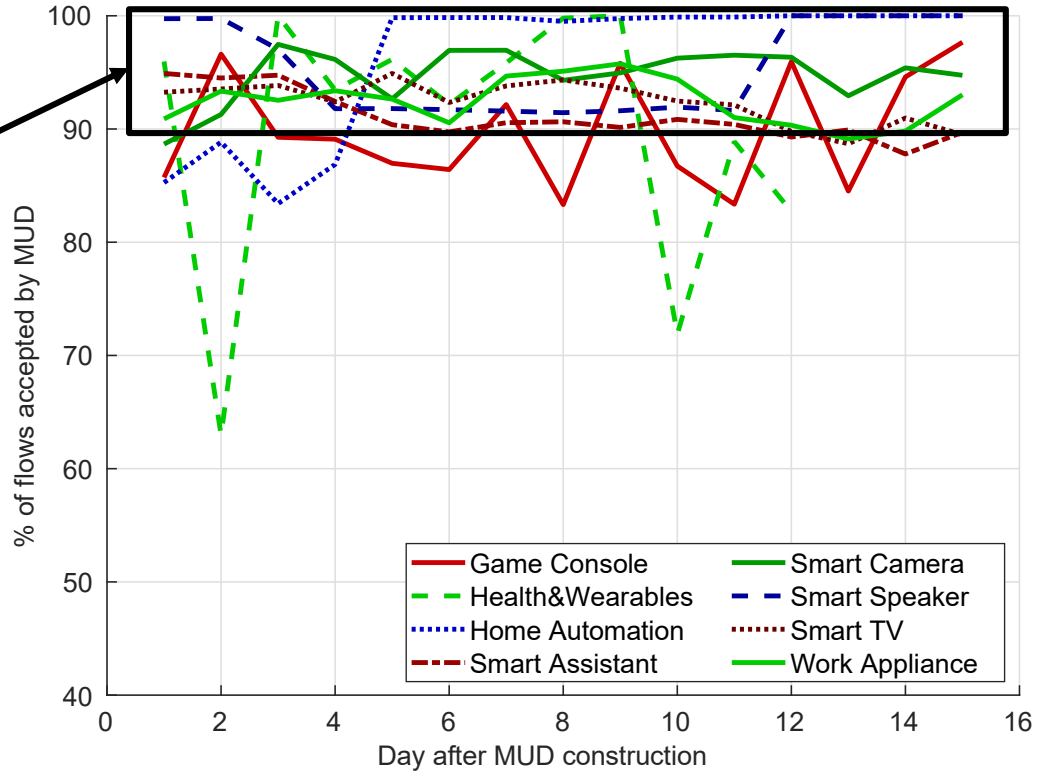

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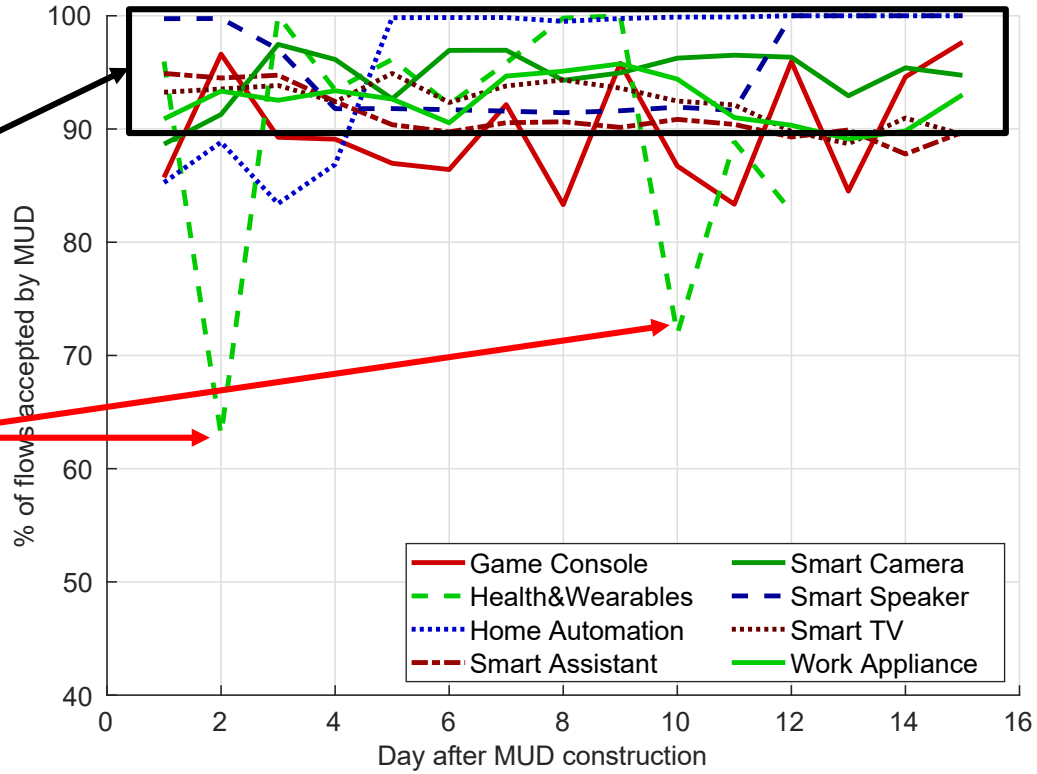
Drops due to unseen traffic



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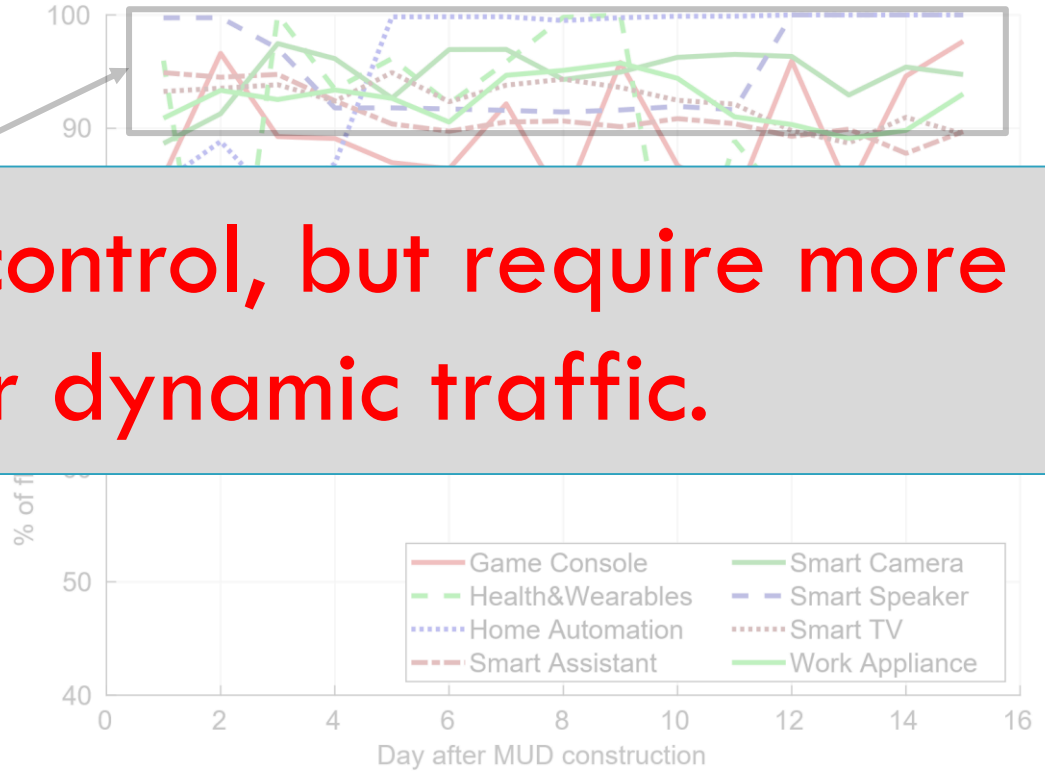

MUDs can help in access control, but require more work to account for dynamic traffic.

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Online Tracking has reached smart home IoT and requires more study into its effects.

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  - **Advertising/Tracking** – Present in certain devices, major players.
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- Smart Home IoT backend centralization.
  - Market monopolization, surveillance, single point of failure.
- Advertising and Tracking in Smart Home IoT.
  - Requires more study, solutions catered to smart home IoT.

Questions

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