Towards a Secure and Flexible Personal Data Platform on the Edge

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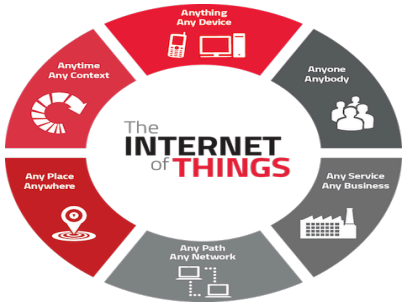
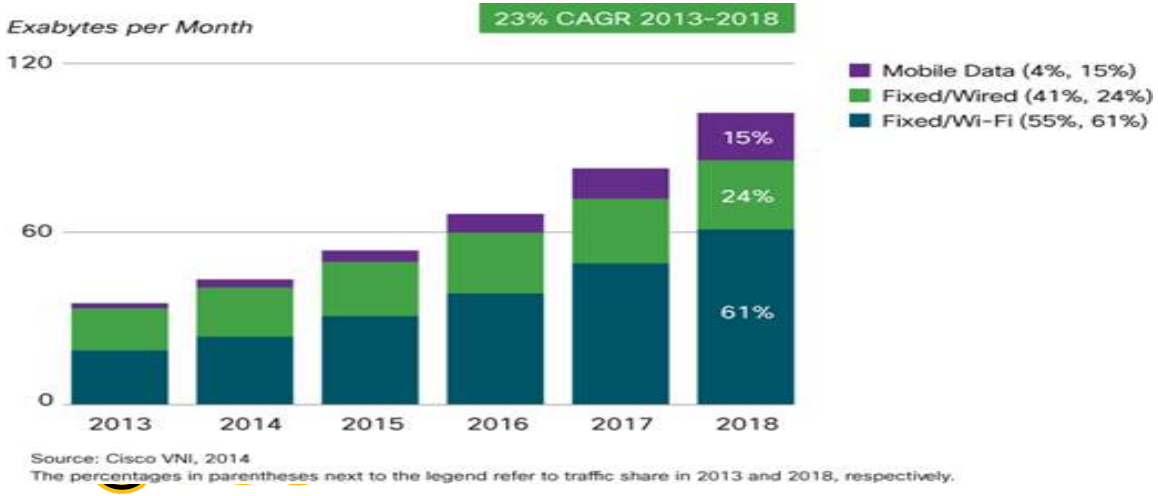
Rapid growth of mobile data traffic



- Number of smart device users expected to exceed 6 billion by 2020
- IoT connected objects are expected to reach 18 billion by 2022

Mobile devices runs numerous and wide variety of applications



High volume of wireless traffic

Wi-Fi networks are expected to carry almost 60% of smartphones and tablets data traffic by 2019

Growth of Sensitive Apps

- **Sensitive applications communicate sensitive data over internet**

Medical Information:
Blood Pressure Monitoring , Diabetes.

Activity Tracking:
Sleeping Patterns , Exercise Routines.

Challenges

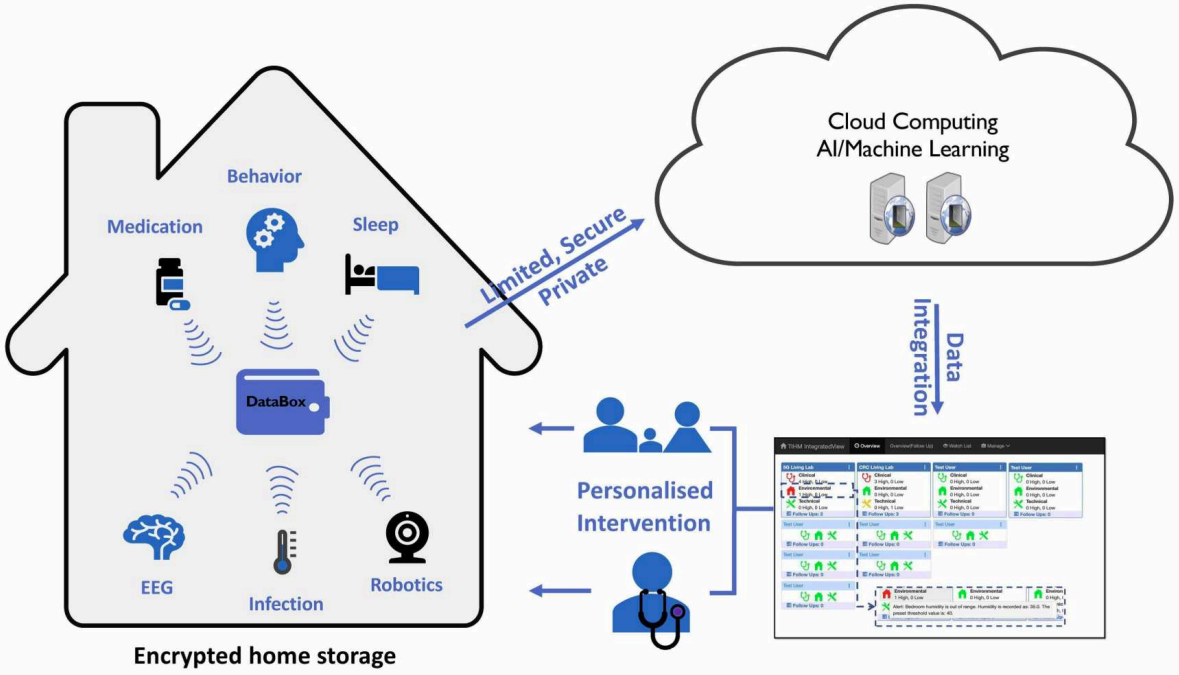
- Our ability to collect and process data has overwhelmed our ability to protect that information.

- Concerns over privacy, trust, and security are becoming increasingly important as different stakeholders attempt to take advantage of such rich data resources.

Challenge: how to provide technical means that enable and assist individuals in managing access to their data by others while retaining personal control over such uses and understanding the implications of any data release.

Solution: Databox

- A platform for managing secure access to data and enabling authorised third parties to provide the owner authenticated control and accountability.



- Databox is a multi-partner research project funded by a £1.2 million Engineering and Physical Sciences Research Council (EPSRC) grant.

Challeneges

- The various applications support various domains and services, generate and access different data patterns such as periodic, event-based, realtime and continuous data.
  - Sensor-based applications like motion detection generate and access data on periodic bases.
  - Event-based applications generate and access data only when the device state changes.
  - Video/audio monitoring applications continuously generate and access streams of data.

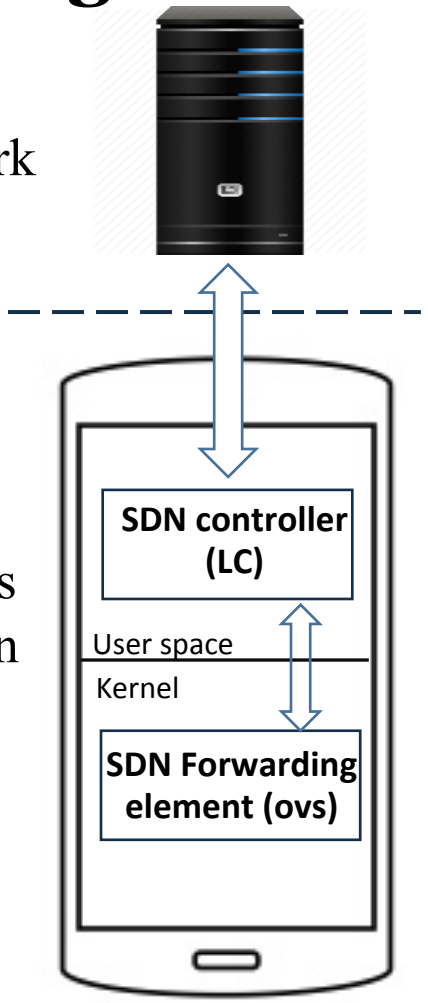
Challenge: have greater visibility and control over the traffic generated from smart and IoT devices in order to guarantee an optimized performance of smart and IoT applications as well as high quality of experience to users.

Soultion: SMILE - SMart and Intelligent wireLess Edge

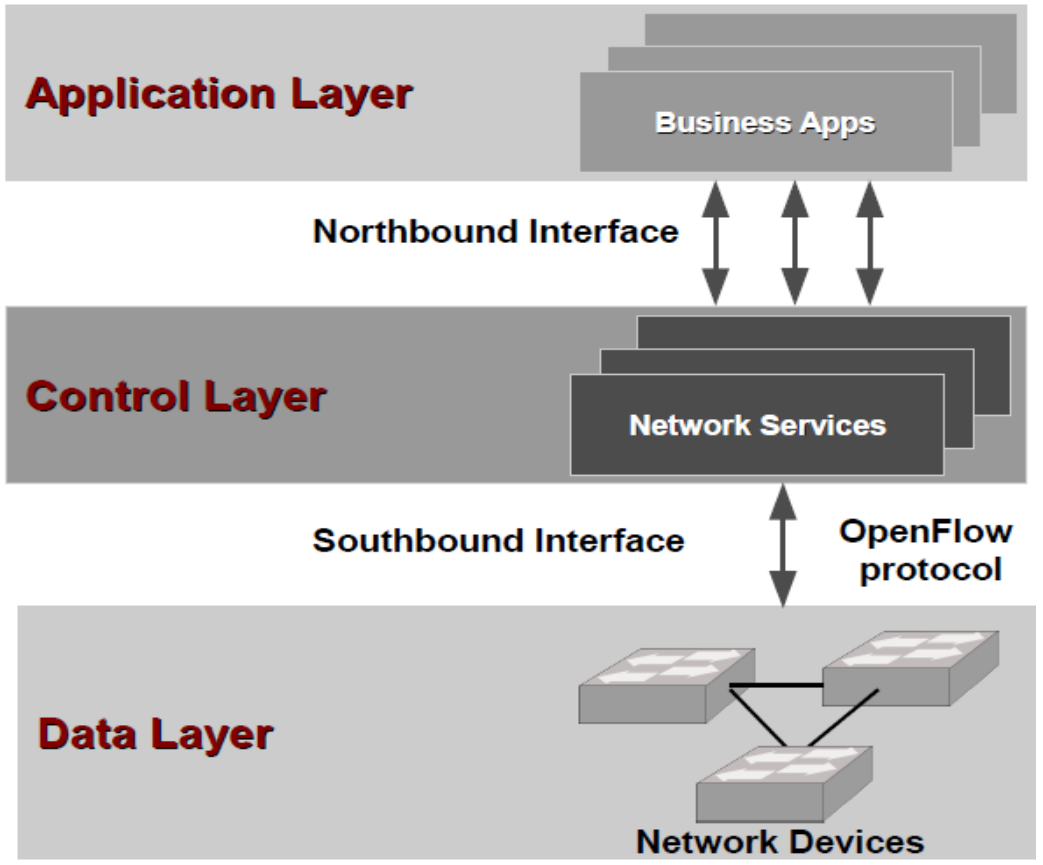
Utilizing SDN on End Device (*extreme SDN*)

Resource management (cloud or wireless network infrastructure)

Applying network policies using SDN components on an end device.



SDN Planes and Layers



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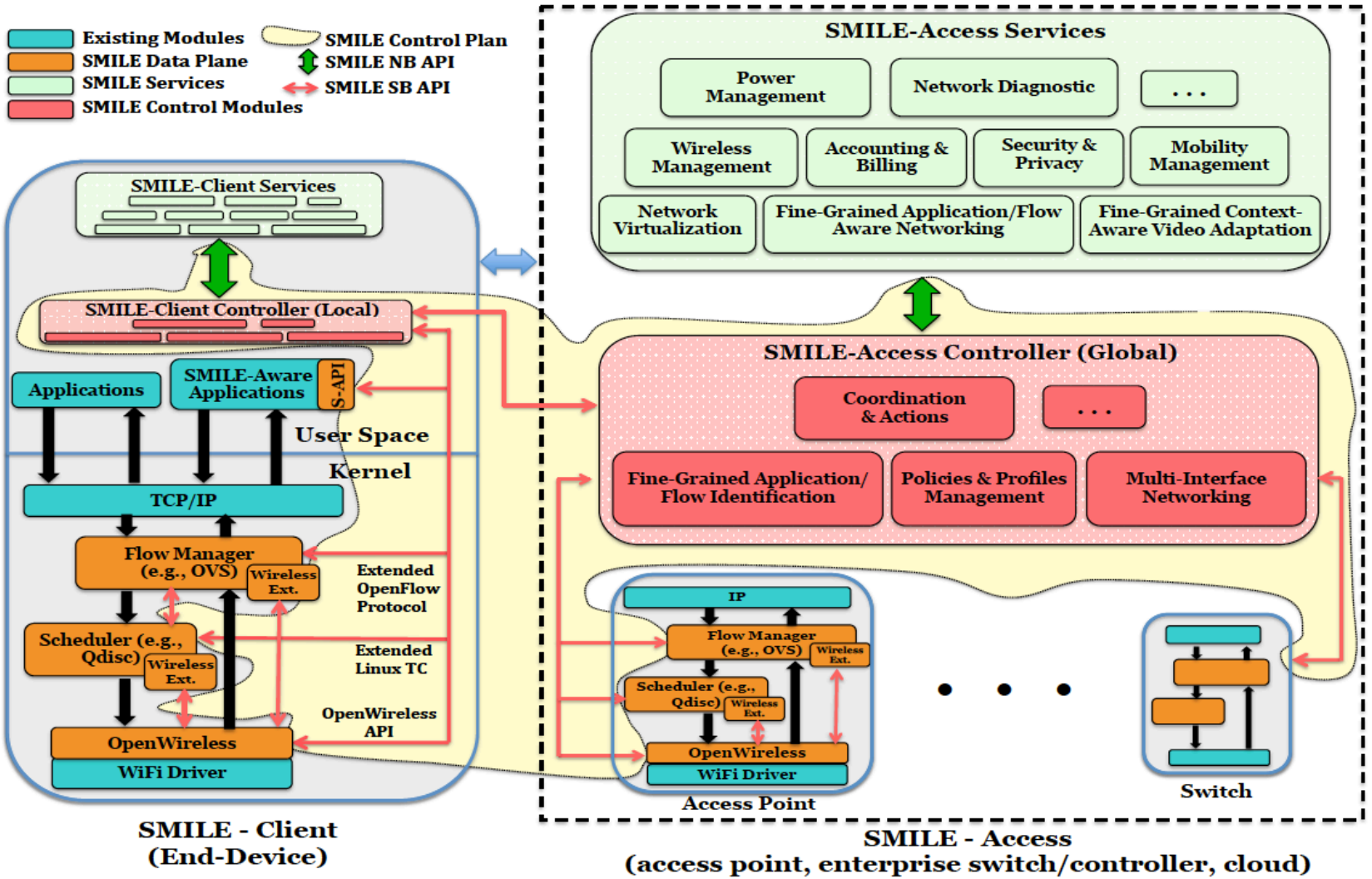
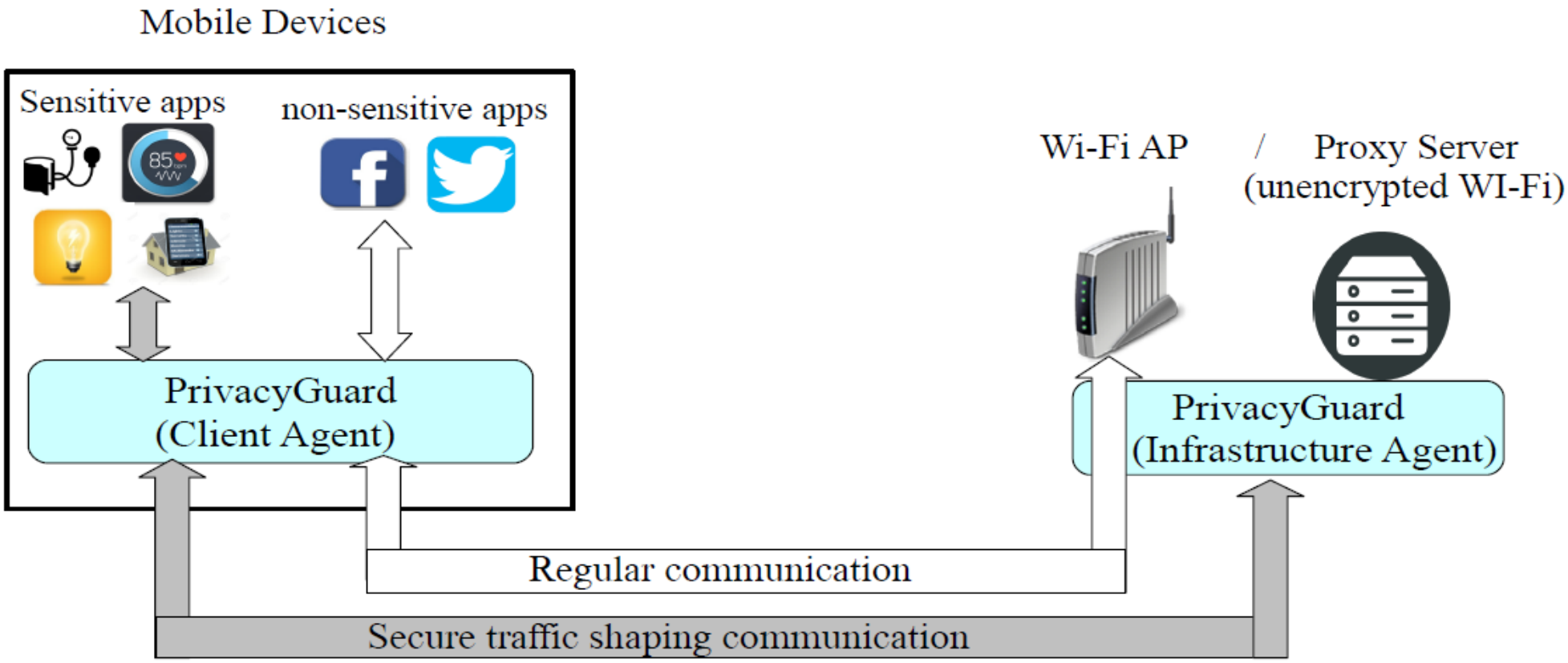
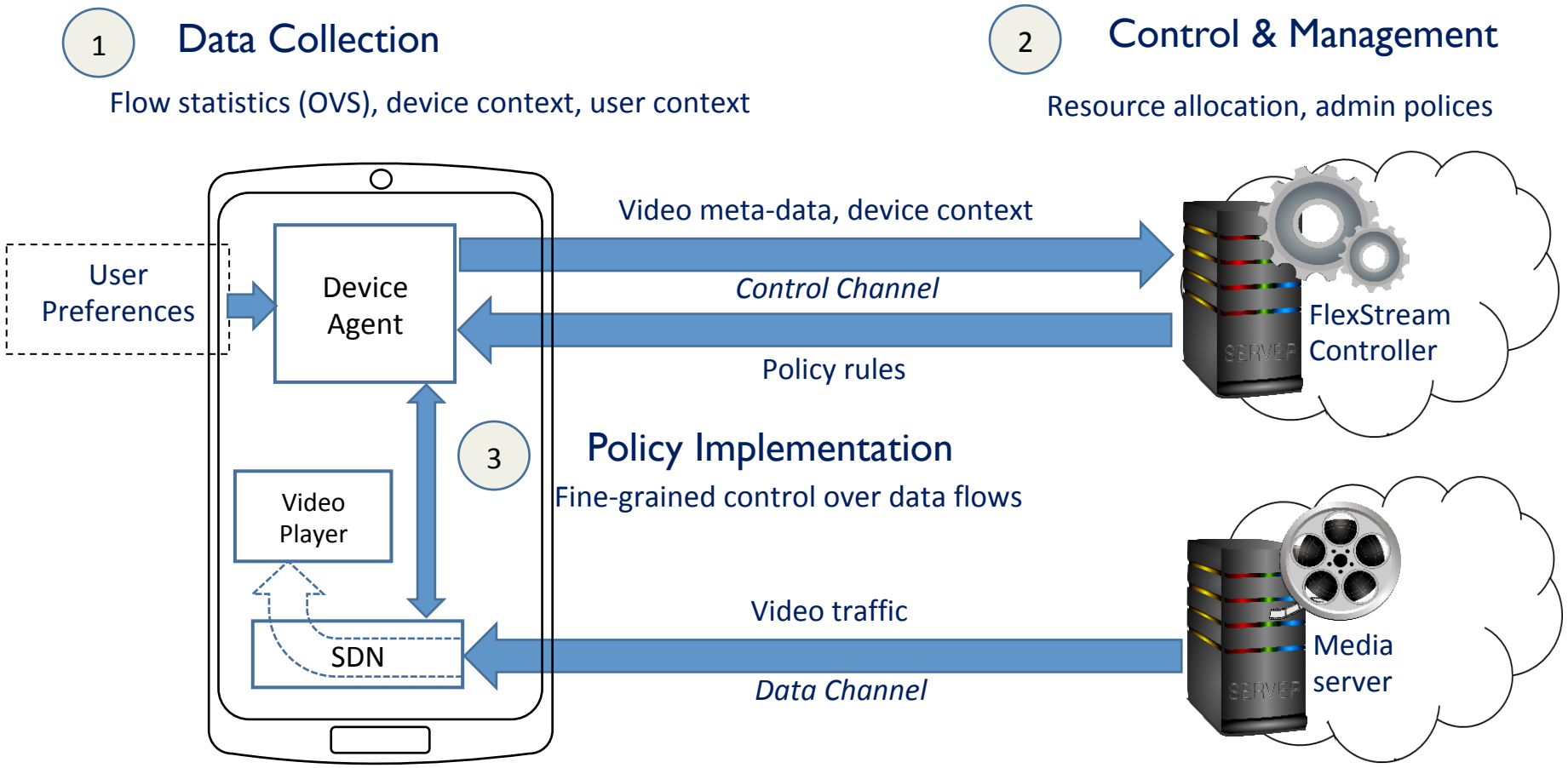


SMILE Ex: PrivacyGuard

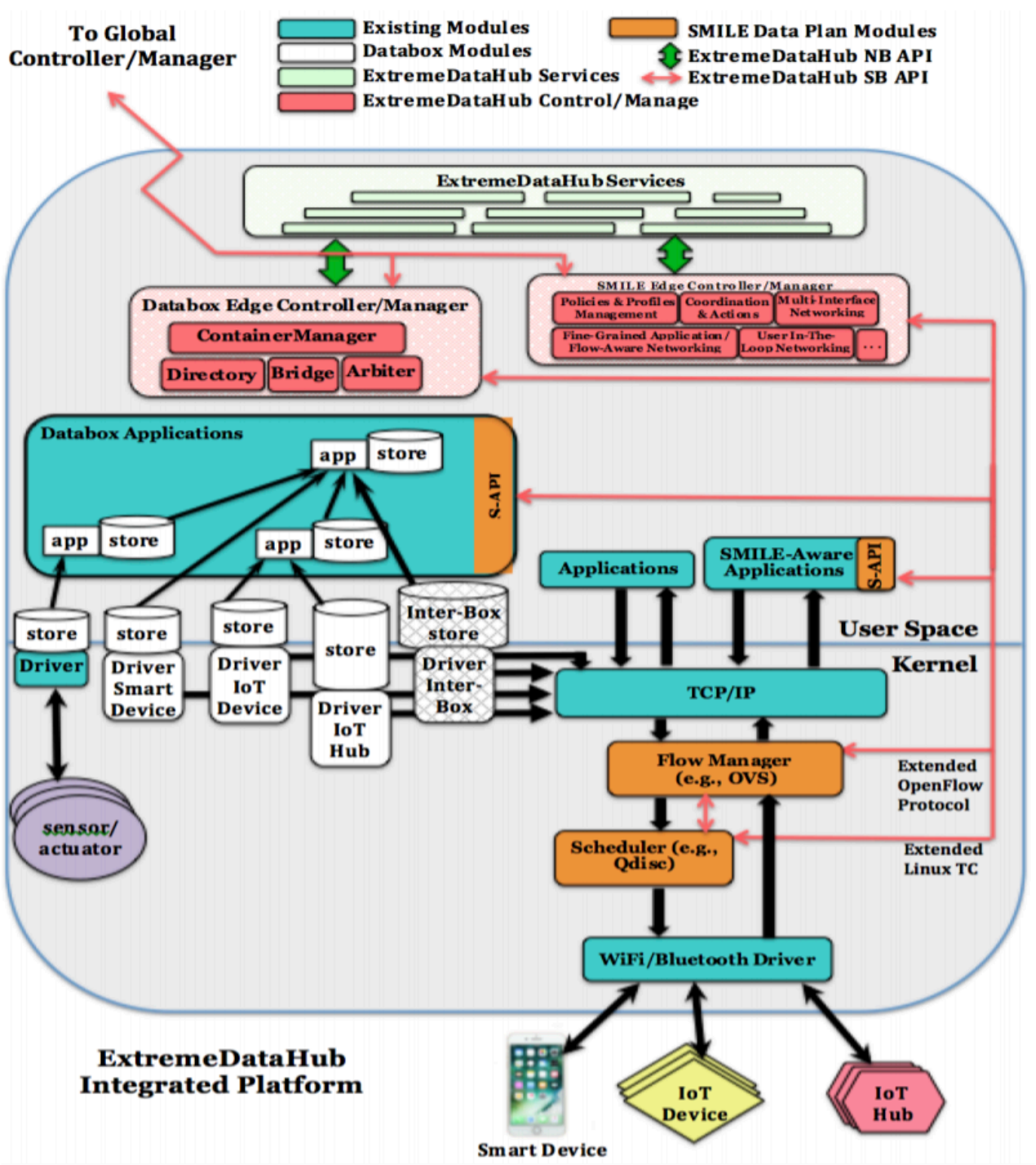


SMILE Ex: FlexStream



ExtemeDataHub

Need for programmable networked edge device that mediates access to sensitive and personal data



VCU

Future Work

Explore other high-reach sensitive data applications

- Smart homes
- Smart healthcare/hospitals system
- Smart cities (e.g., transportation traffic management)

Large-Scale Distributed ExtremeDataHub Network

- Networked system of multiple devices that are either geographically located within the same network or distributed across multiple network environments.
- Application trying to access data should not be aware about the physical location of the data and multiple ExtremeDataHub devices should seamlessly inter-connect together to enable accessing to the required data regardless of the physical location of these data.

ExtremeDataHub API

- To be utilized by application developers.
- During low battery level, application developer could configure the app to drop less useful functional flows (advertising data).

Connection to GEFI

- Programmable multi-tenants real-time edge/cloud testbed?
- In addition to communication challenges, data (accessing, managing, indexing, storing) need to be taken into challenges

→ Data access is shaping communication needs

Thank You!

QUESTIONS

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https://music.lab.vcu.edu/