

FlexStream: Towards Flexible Adaptive Video Streaming on End Devices using Extreme SDN

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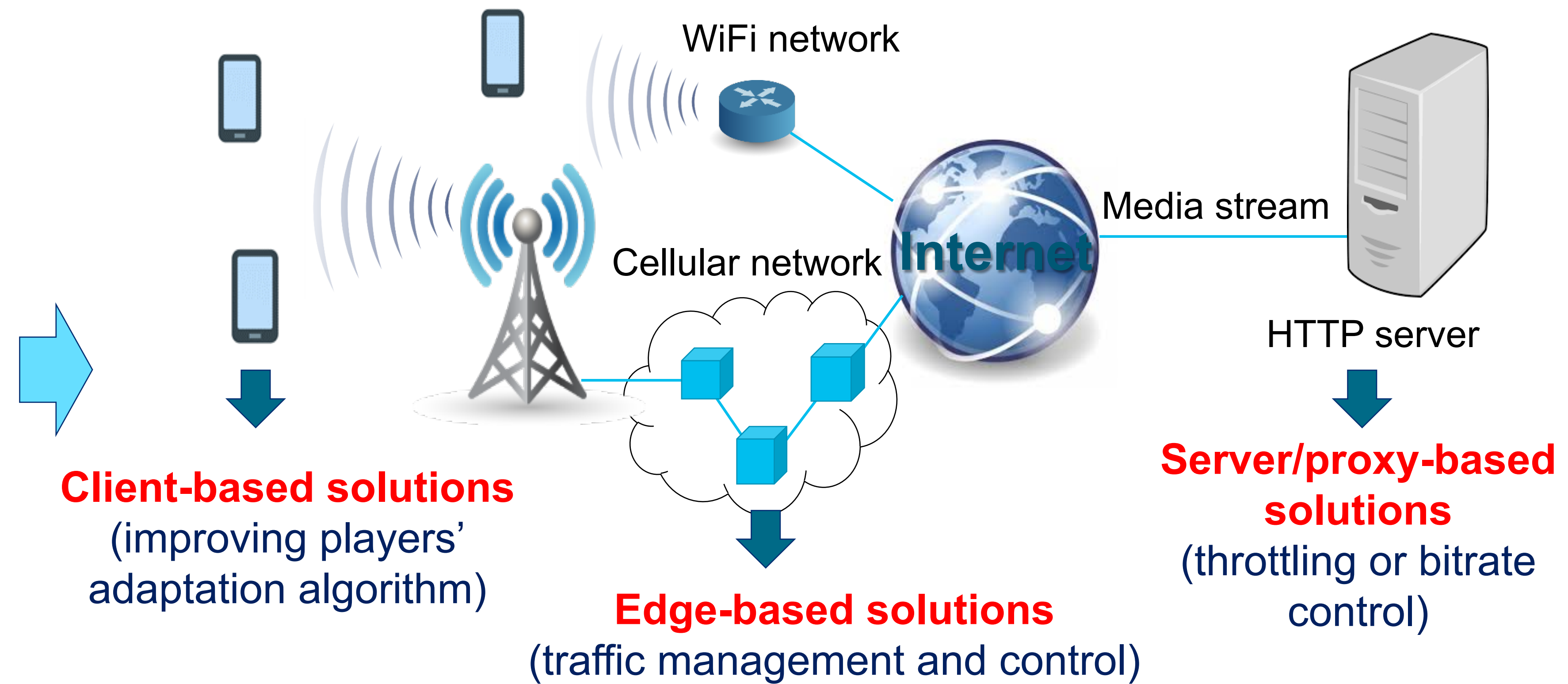
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Motivation

- When HTTP Adaptive Streaming (HAS) players compete over the bottleneck:
 - Instability in the quality
 - Playback Stalls
 - Unfairness
 - Long startup delay
- Root cause: ON/OFF traffic pattern

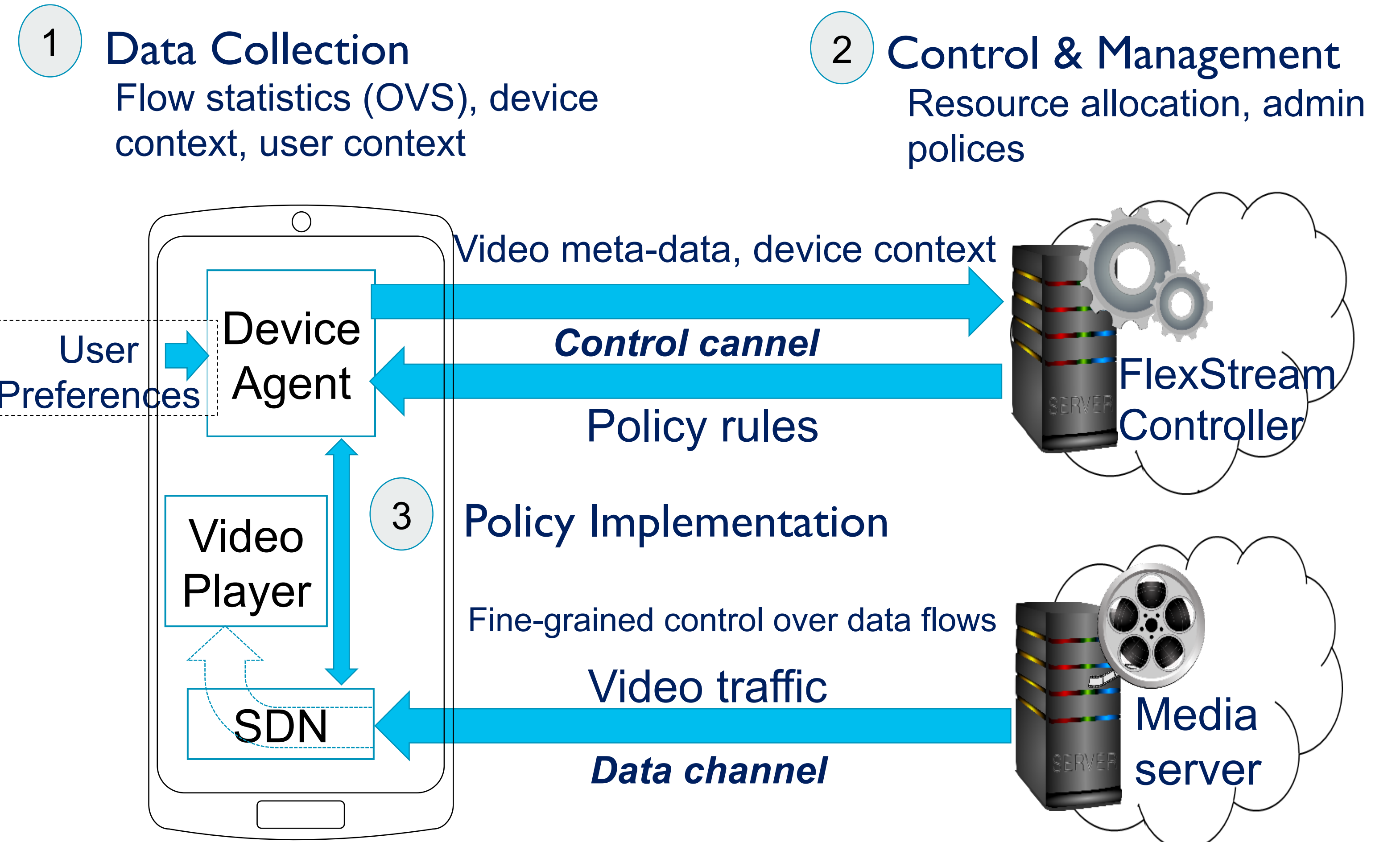
Existing Solutions



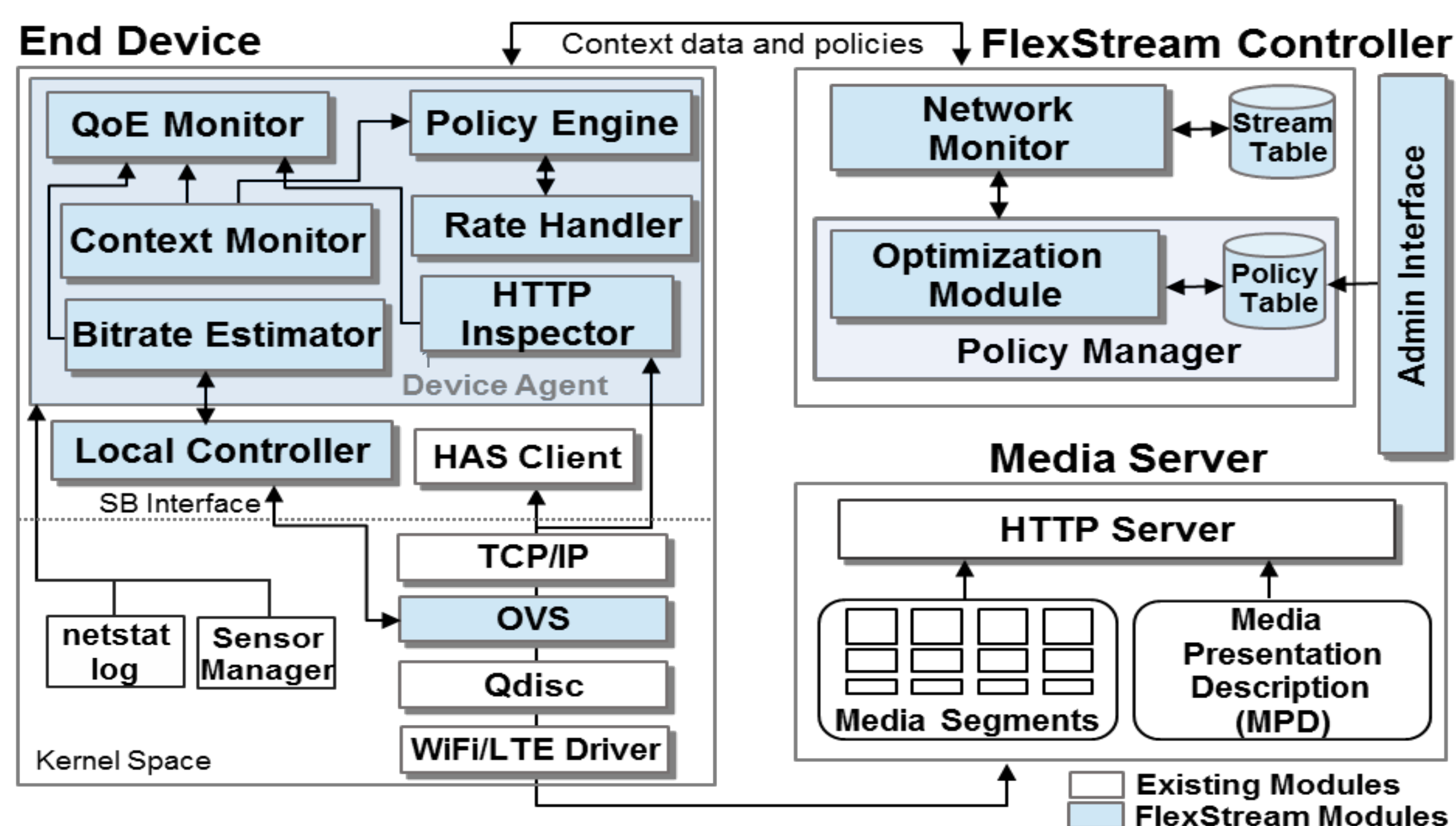
Issues with Existing Solutions

- Not effective:** they can not address the main performance issues, and can not comply with network policies.
- Invasive:** Players have to follow specific adaptation logic.
- Not generic:** Specific for HAS.
- Costly:** Require large and special-purpose network infrastructure.
- Infeasible (in practice):** they requires CDN edge server changes, or require player feedback and interactions.

FlexStream Overview



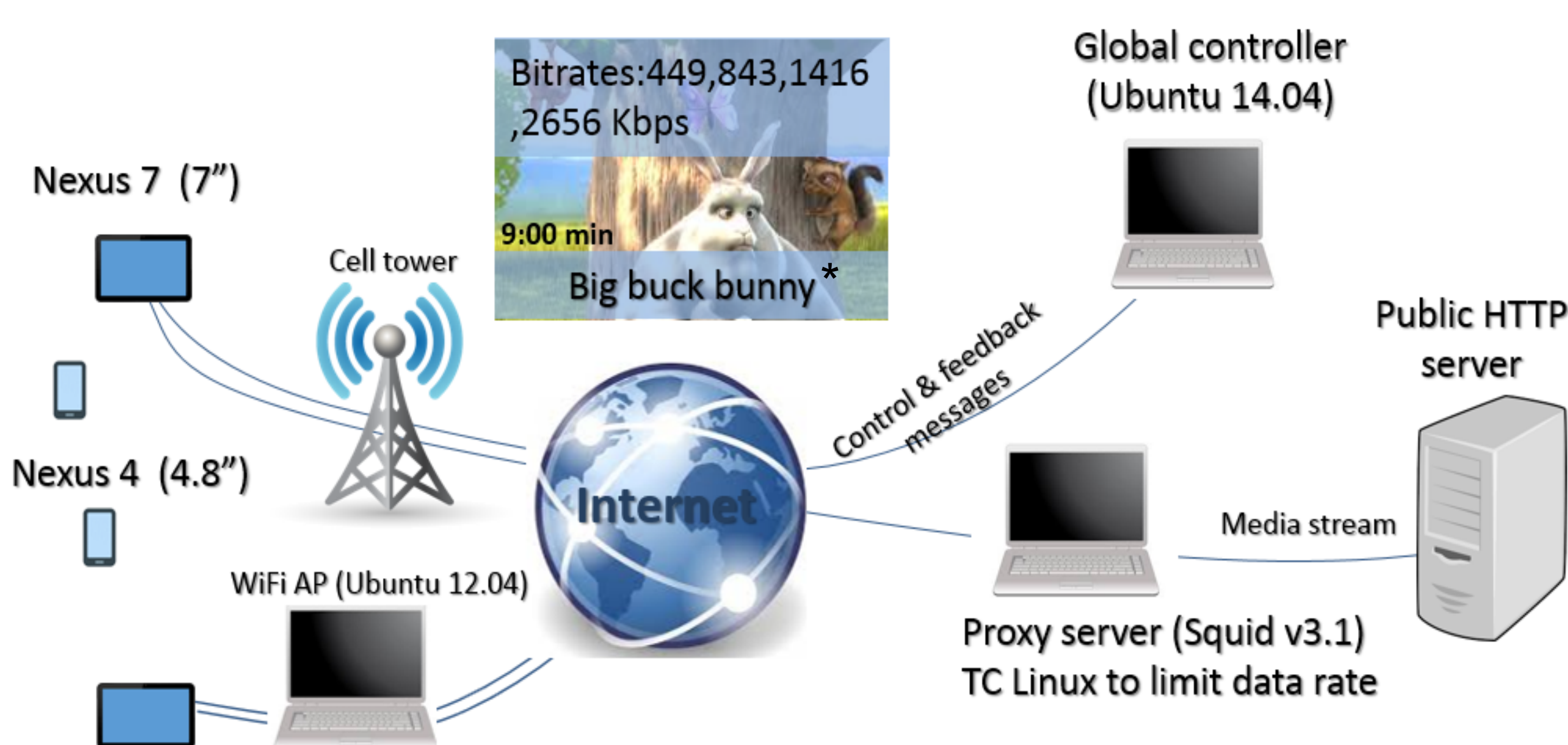
FlexStream Architecture



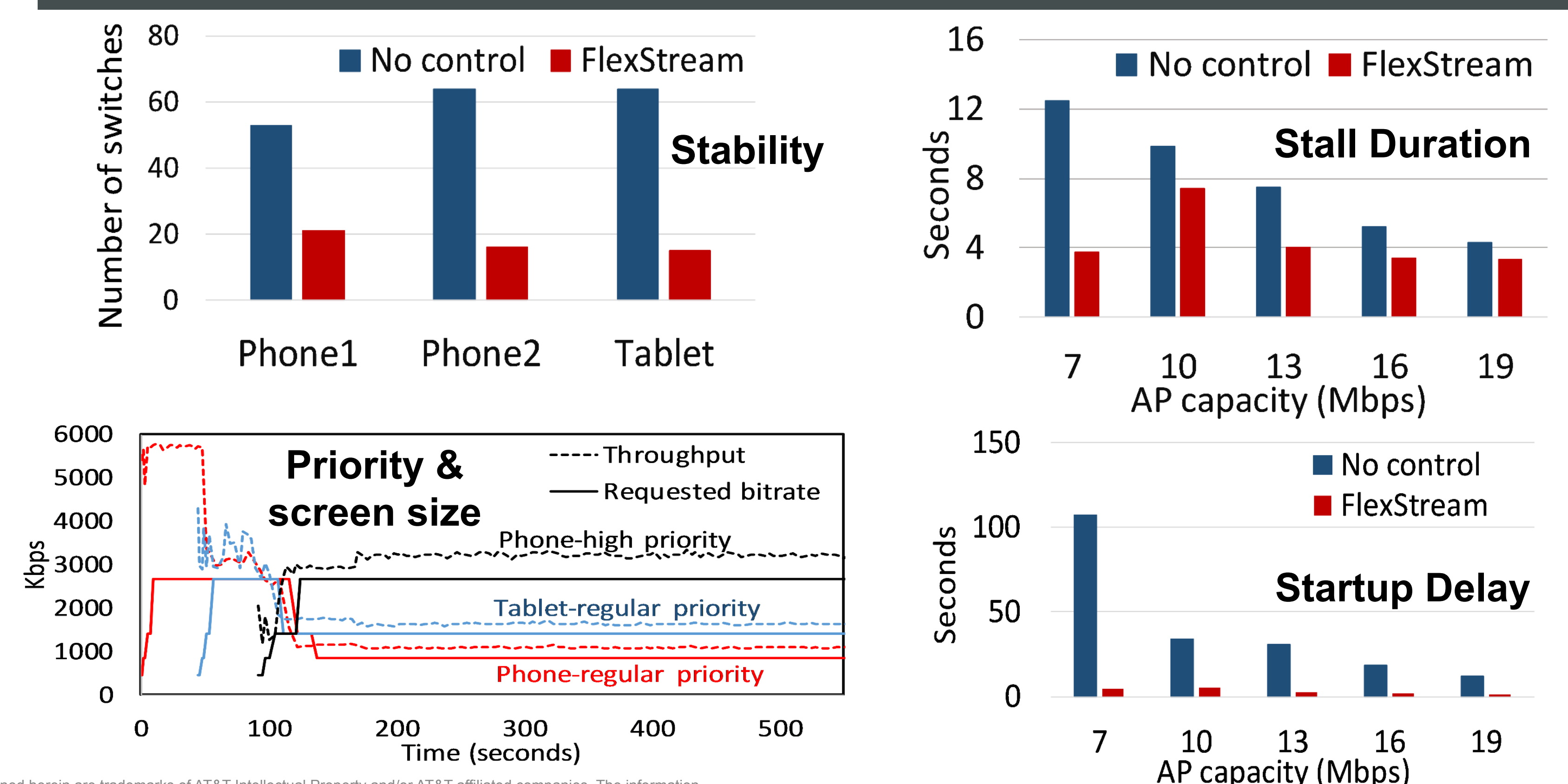
Implementation Challenges

- Rate control on an end device:** extending SDN planes and open flow control to enable controlling the data rate on the end device through TCP flow control mechanism (modifying TCP receiving window).
- Binding OVS to the cellular interface:** Installing a number of rules to the OVS flow table to rewrite the source/destination IP and MAC addresses with OVS addresses to force all traffic to pass through OVS.

Network Topology



Sample Results



(*) Big Buck Bunny. <https://peach.blender.org>