IETF Hackathon

IETF 113

Adaptive Subscription

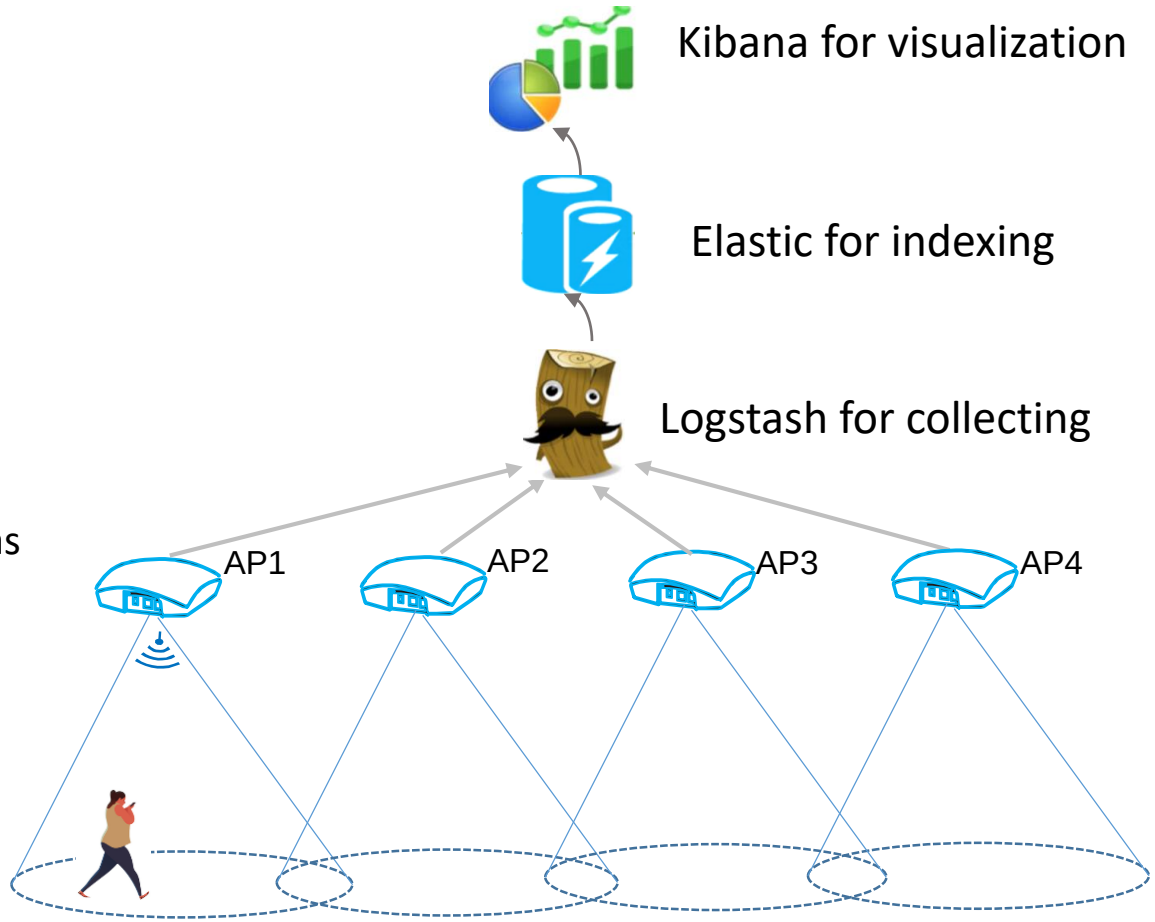
Hackathon Plan—Adaptive Subscription

- Background
  - Telemetry(e.g., YANG-PUSH defined in RFC 8639, 8641) has increased the frequency of data collection dramatically, but it also incurs more resources at the same time.
  - Hard to balance the need for low overhead and the desire for representative telemetry data:
    - A high-frequency data collection consumes high CPU usage and imposes pressure on network and collector;
    - A lower rate is insufficient to detect and diagnose problems and verify network behaviors.
  - Proposal:
    - Adaptive Subscription: To install subscription policy built on top of YANG-PUSH mechanism and allow the server to switch to different period intervals based on network condition changes.
- Test scenario
  - Wireless network performance monitoring
- Objectives
  - Monitor KPI changes at different frequencies of data collection (high frequency, low frequency, adaptive frequency)
  - Evaluate the performance of adaptive subscription (e.g., telemetry data volume)
- Specification
  - https://datatracker.ietf.org/doc/html/draft-wang-netconf-adaptive-subscription-09

Test Environment Setup

- gRPC-based telemetry to collect data from Access Points in our campus;
  - The following data collection methods are evaluated：
    - A high-frequency periodic telemetry
    - A low-frequency periodic telemetry
    - An adaptive-frequency telemetry
  - For each data collection method, two cases are evaluated:
    - One is to report the rssi values so as to detect real-time WIFI roaming across different APs.
    - The other is to stream the bytes sent from the AP uplink so as to detect the possible uplink congestion.
- ELK is used to collect, analyze, and visualize data.
  - The acronym for three open source tools: Elasticsearch, Logstash, and Kibana
  - The Huawei plugin for ELK to collect and process information from Huawei devices has been developed and open sourced

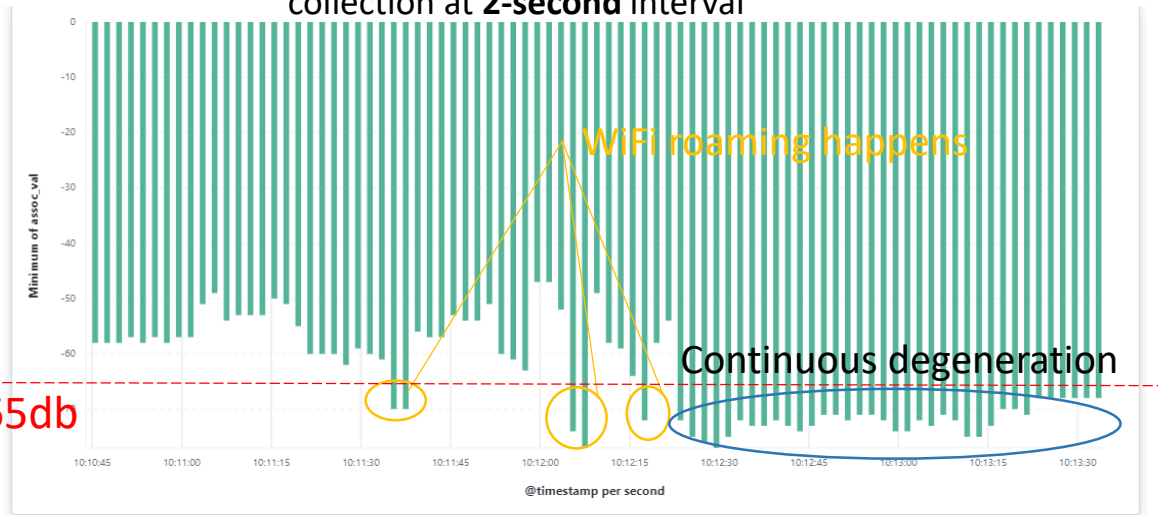
  Code: https://github.com/HuaweiDatacomm/elk-huawei-plugin



Network Scenario

What got done—RSSI signal data streaming

Continuous high-frequency data collection at **2-second** interval



Continuous low-frequency data collection at **30-second** interval

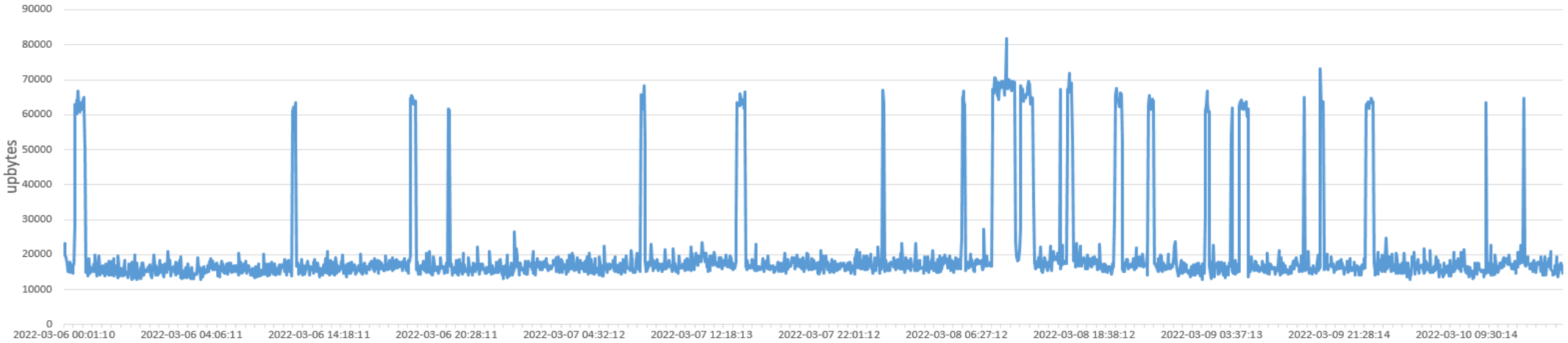
Streaming data at a fixed period.

Adaptive-frequency; **condition evaluated by the subscriber**

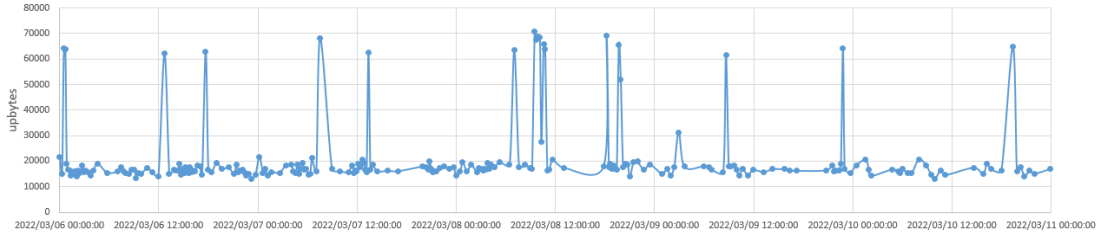
Adaptive-frequency; **condition evaluated by the server**

Period set to be every 2 seconds if the rssi value < -65dB;
If the rssi value >= -65dB, switch to 30 seconds period value.

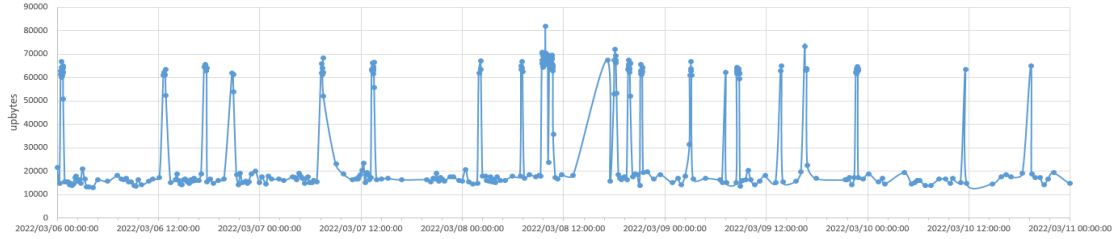
What got done—upbytes statistics streaming



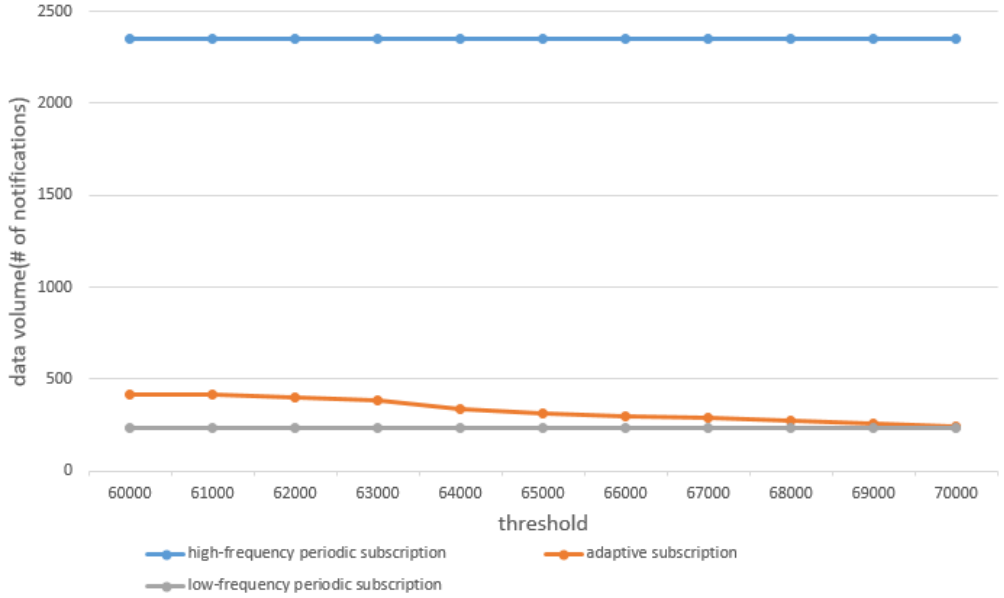
High-frequency periodic subscription at 1-min interval within about 5 days



Low-frequency periodic subscription at 10-min interval



If the upbytes < 60000 bytes, stream data at 10-min interval;
if the upbytes >= 60000 bytes, stream data at 1-min interval



Received number of notifications for different collection methods

What we learned

- Adaptive subscription can greatly reduce the data volume(by ~86% on average but depends on the selected threshold) during massive data collection and processing
- Adaptive can serves as a compromise between data management resource cost and data fidelity for network diagnosis
- The selection of threshold for specific monitored data object is important for adaptive subscription, and should be based on the operation experience.
  - A too high or low threshold may make adaptive subscription degenerated to periodic subscription;
  - A frequent fluctuation around the threshold is not recommended.

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