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SimpleCore: an appeal for less complex core networks

5G PPP – 1st 5G Architecture Workshop
April 6th, 2016

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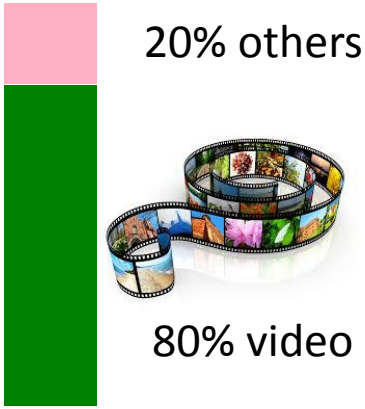
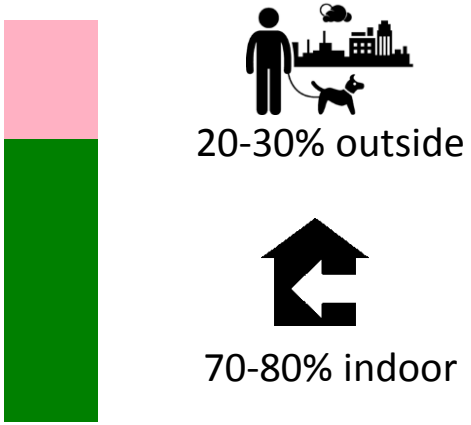
cisco : 2019 traffic prediction



→ Video works well with “best effort” and changing IPs (buffering, DASH, …)

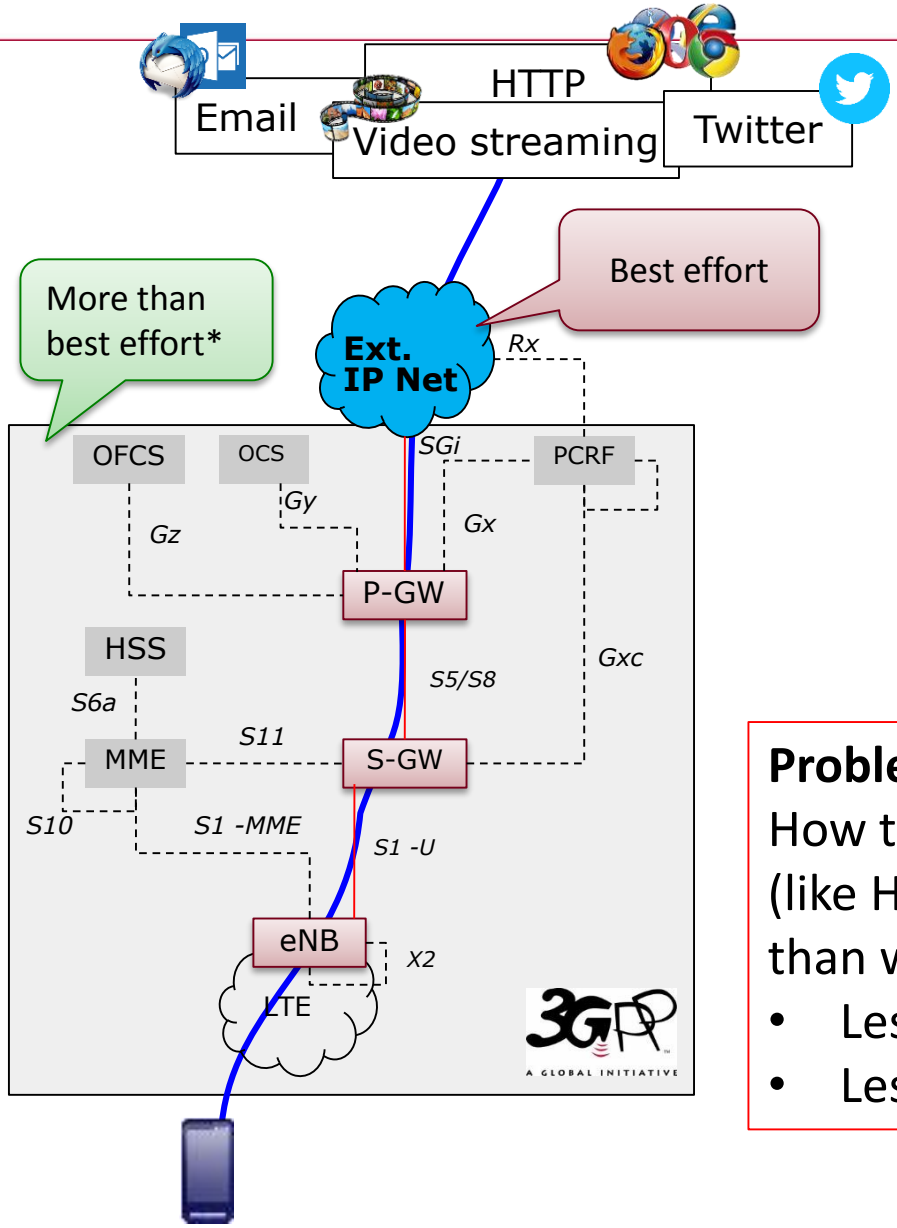
docomo : traffic consumption



→ Indoor traffic: low/no mobility (nomadic behavior)

Observation: **<u>for a large fraction of traffic</u>**

- Best effort is good enough
- Mobility support is not needed (no IP address preservation needed)



A lot of applications work well with a *best effort, no mobility support* model

However, the mobile network applies a "one size fits all" solution. Every packet stream gets mechanisms for

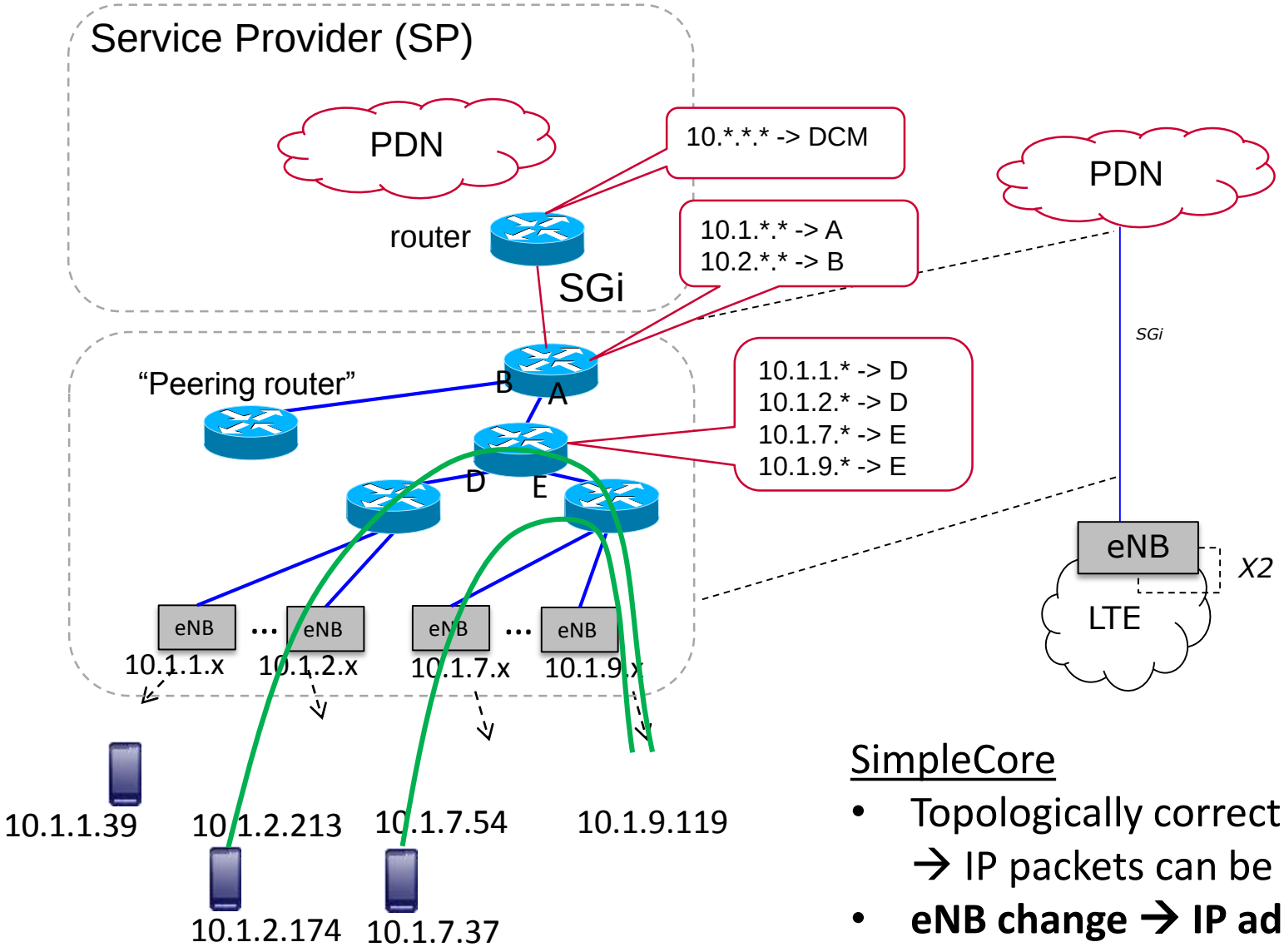
- Traffic differentiation (bearers)
- Mobility support (stable IP address)
- … even if not needed!

Problem statement

How to support "best effort, no mobility traffic" (like HTTP, DASH video, email) more efficiently than with current EPC:

- Less overhead in data plane processing
- Less signaling effort

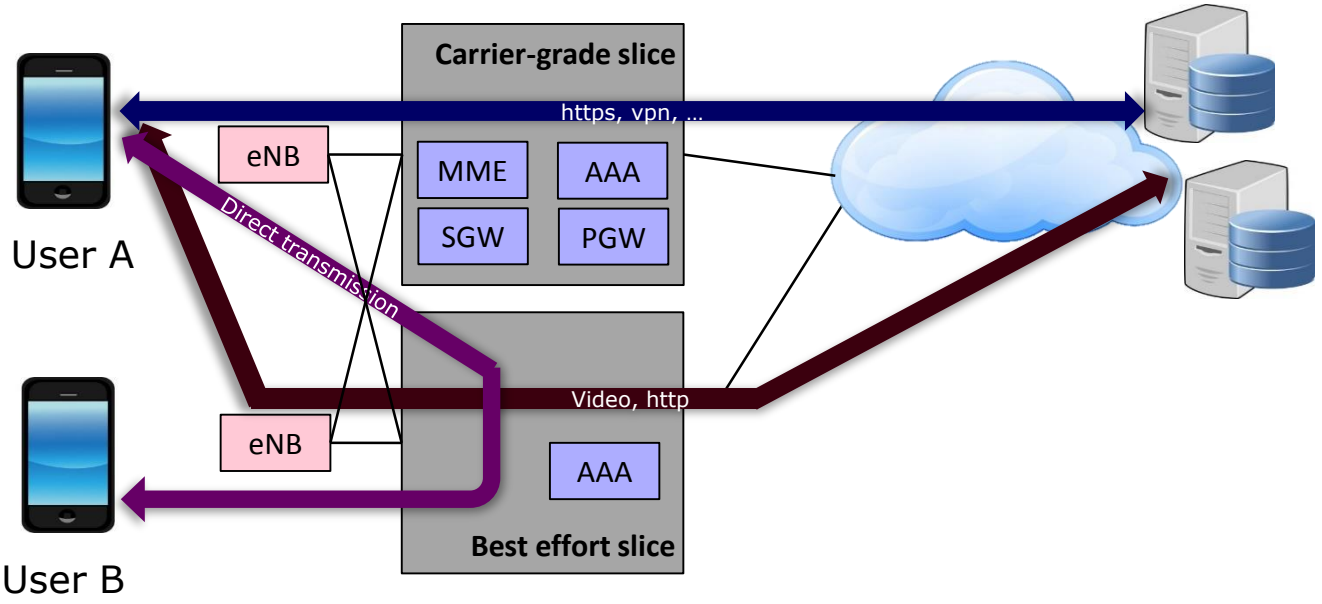
*IP level QoS, traffic differentiation, mobility support



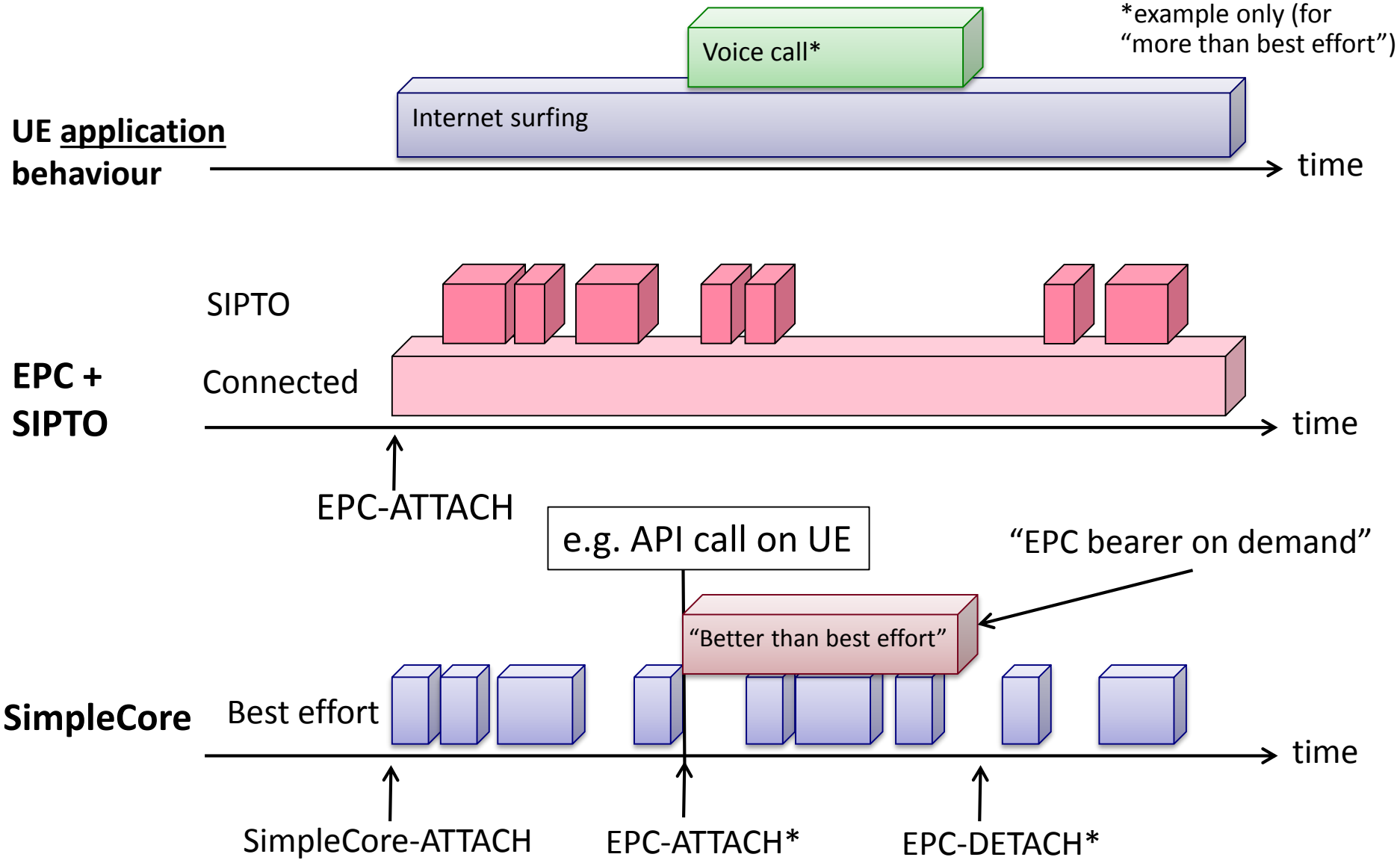
SimpleCore

- Topologically correct IP for UE
  → IP packets can be routed
- **eNB change → IP address changes**

- Related use cases are
  - “Broadband access in dense areas/everywhere”, “Massive IoT” (NGMN 5G White Paper)
  - “Mobility on demand”, “SMARTER Service Continuity” (3GPP SMARTER)
- Related technologies are
  - Network Functions Virtualization (as standardized in ETSI NFV)
  - Network slicing (3GPP SMARTER TR22.891; 3GPP FS_NextGen TR 23.799)
- Such technologies, e.g. allow for providing
  - a basic service that is connectionless, best effort and without support for node mobility
  - extended capabilities if explicitly requested by an application



Mobility-needed/mobility-less application in parallel



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GCM: Google™ cloud messaging

- Client App seems to hold connection to GCM connection server
- Client identification via unique ID assigned in registration with GCM
- Messages are sent to unique ID

APNs: ™ Push Notification service

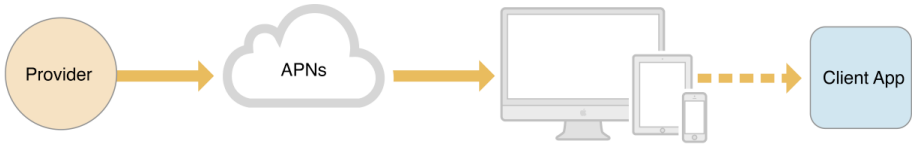
- Client App seems to hold a connection to APNs server
- Client identification via device token
- Messages are pushed via Apple's own servers to client
- Works via WiFi and cellular

HTTP POST Request

```
https://gcm-http.googleapis.com/gcm/send
Content-Type:application/json
Authorization:key=AIzaSyZ-1u...0GBYzPu7Udno5aA

{ "data": {
    "score": "5x1",
    "time": "15:10"
  },
  "to" : "bk3RNwTe3H0:CI2k_HHwgIpoDKCIZvvDMExUdFQ3P1..."
}
```

Unique ID of client App



➔ IP address changes are no problem

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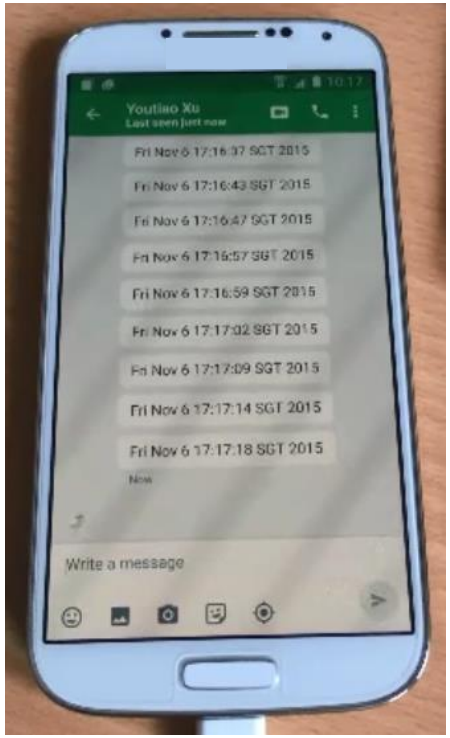
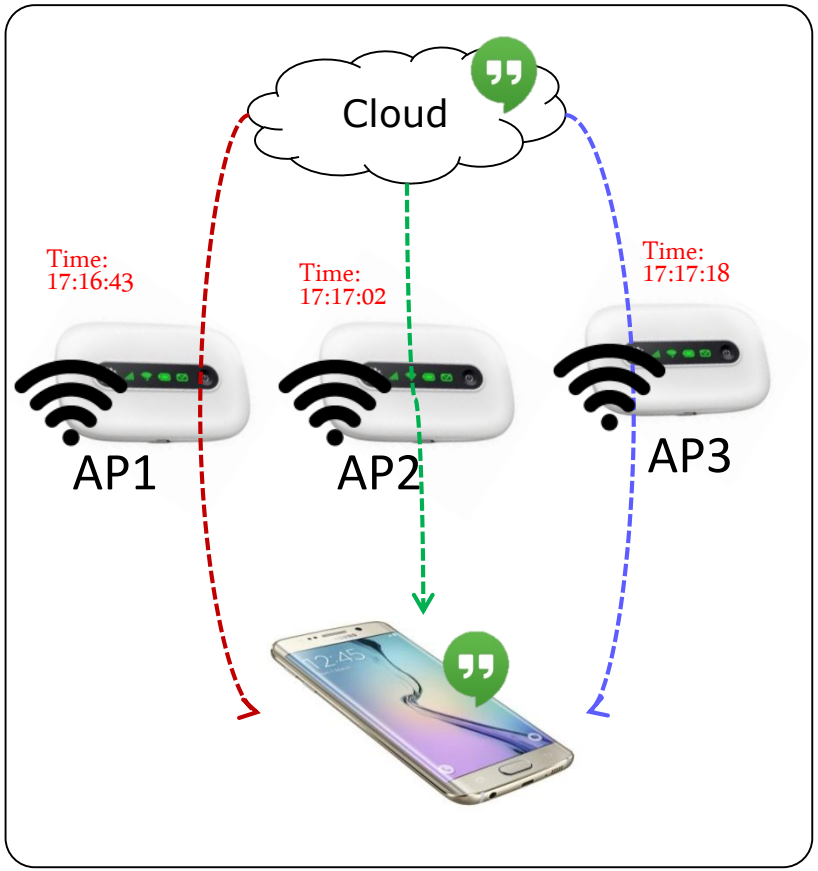
Demo setup

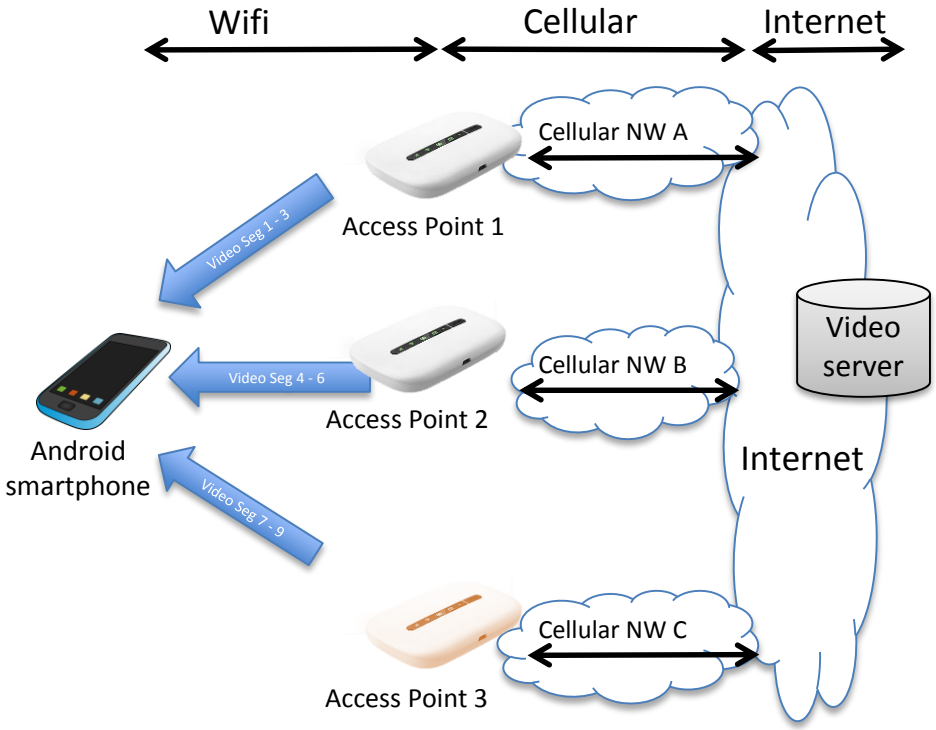
- Smartphone, 3 WIFI APs
- Chat-bot regularly sends messages to smartphone via Google Hangouts™

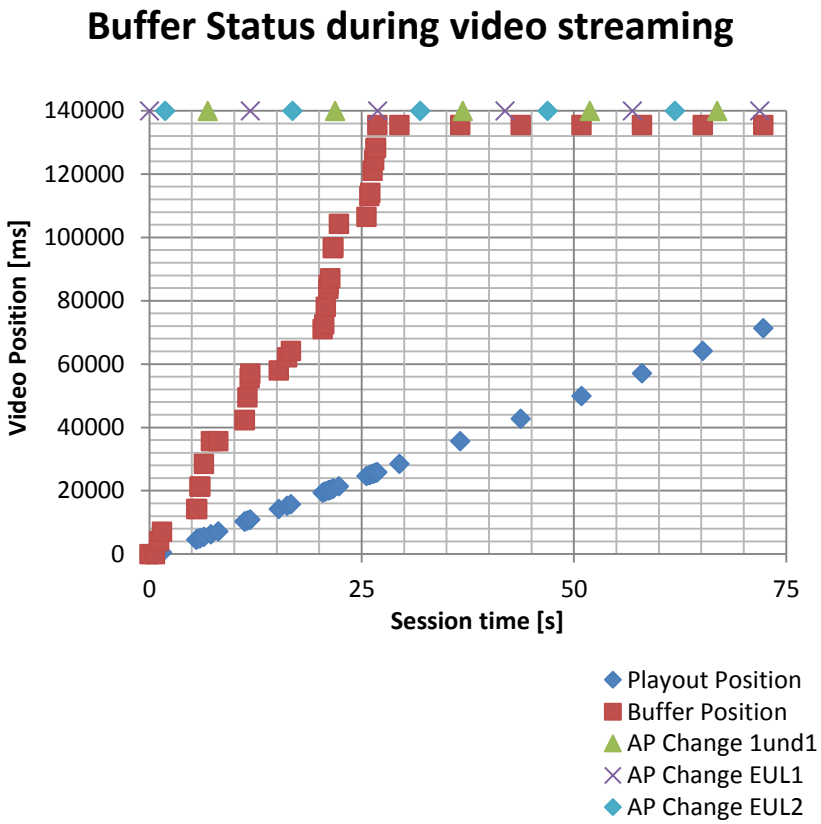




➔ **IP address changes are no problem and messages are received in a timely manner**

- Demo setup: Smartphone, 3 WIFI APs
  - Smartphone changes access point every 5 seconds





➔ **IP address changes are no problem and no stalling was observed**

Conclusion

Today's mobile core networks are highly complex due to backwards compatibility and the requirement to always deliver the best possible service

4G core network provides mobility support and QoS to all traffic

Traffic intensive applications (>80% of traffic) like video / web surfing can handle node mobility at application layer and anyway traverse the best effort Internet

Such applications (70% of traffic) are mainly consumed indoors, by quasi-static users

Technologies like network slicing and virtualization allow to adapt to such properties

- Slice with extended capabilities like mobility support
- Default basic slice is connectionless, best-effort, no mobility network

"SimpleCore" provides a solution for such basic slice using a hierarchical IP address assignment, where a UE's IP address will change when doing handover between eNBs

Experiments with push notifications and video streaming provided promising results

Harmonize Social contribution beyond borders, across generations

Evolve Evolution of service and network

Advance Advance industries through convergence of service

Relate Creating joy through connections

Trust Support for safe, secure and comfortable living

HEART

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