



# MOBILE CLOUD COMMUNICATION

Connecting pervasive and mobile devices to cloud

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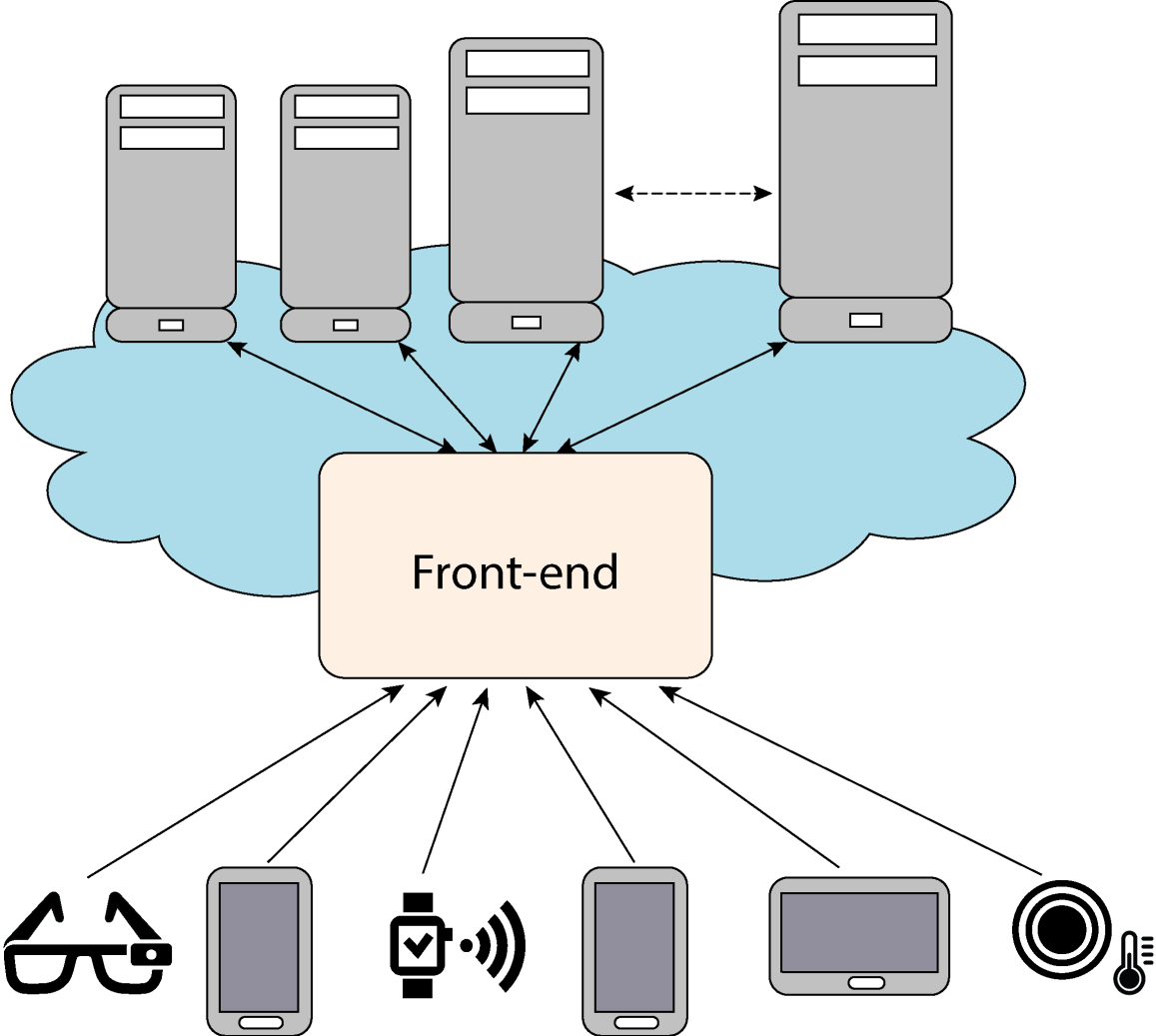
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# Agenda

- Mobile cloud communication
  - Device to cloud
  - Cloud to device
- Synchronization services
- Low-power devices protocols
  - CoAP, XMPP, etc.
- Notification services
  - MQTT, GCM, APNS, etc.

# Mobile cloud communication



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# Mobile cloud communication

- Synchronous
- Asynchronous

# Synchronization services

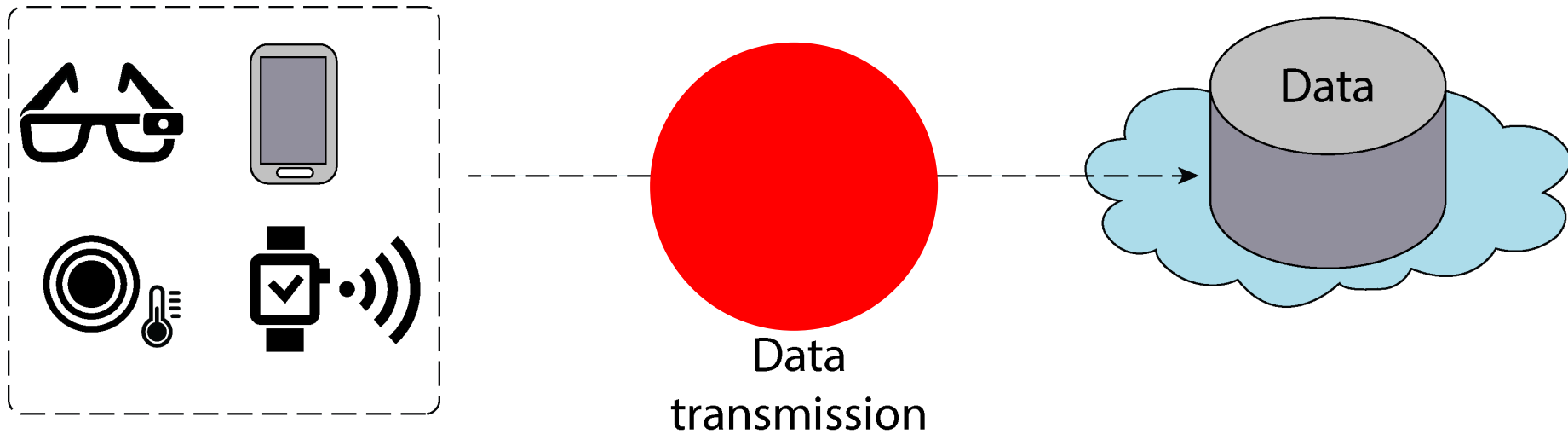
- Open protocol based upon standardized XML communication over HTTP POST
  - Streaming
- Replication of data
  - E-mail, facebook, google services, etc.

# Low-power devices protocols

- CoAP
  - Constrained Application Protocol
- AMQP
  - Advanced Message Queuing Protocol
- Node
- WebSocket

# Low-power devices protocols

- Data transmission (duty cycling)



# Notification services

- GCM
  - Google Cloud Messaging
- APNS
  - Apple Push Notification Service
- MPNS
  - Microsoft Push Notification Service



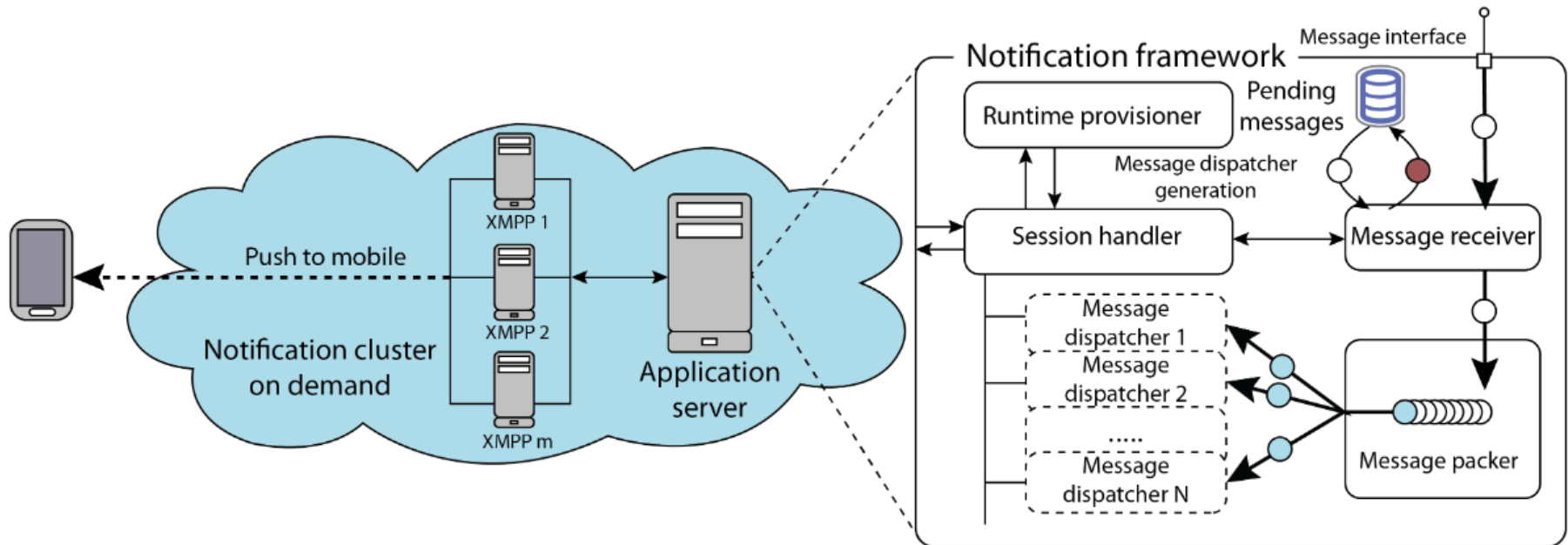
# Notification services

- XMPP
  - Extensible Messaging and Presence Protocol
- MQTT
  - Message Queue Telemetry Transport

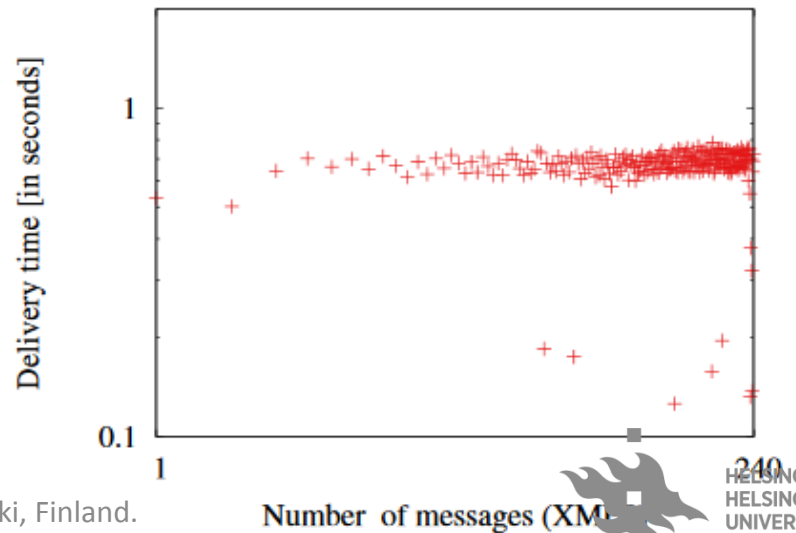
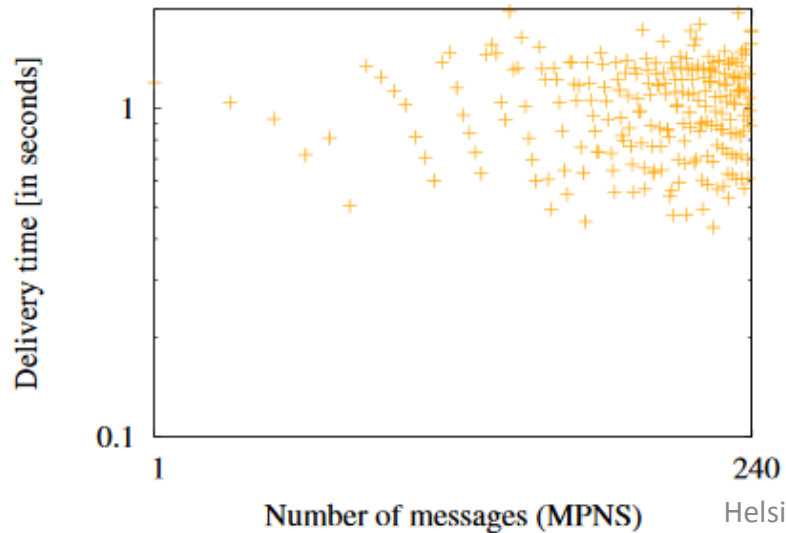
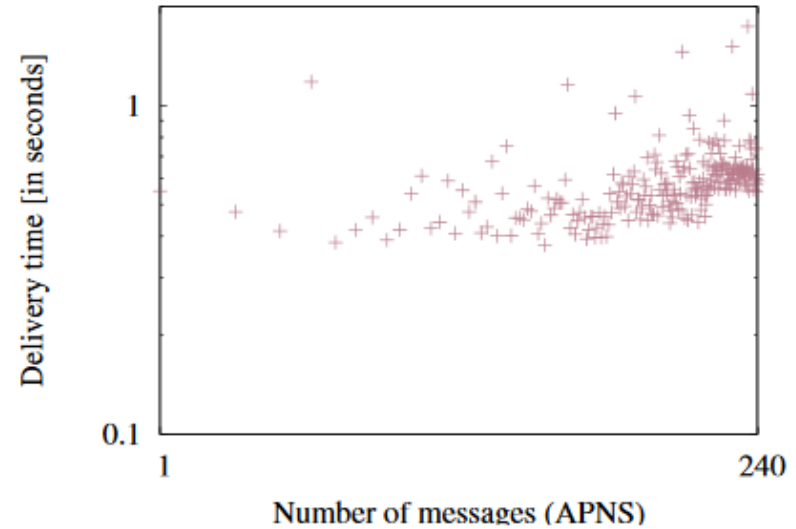
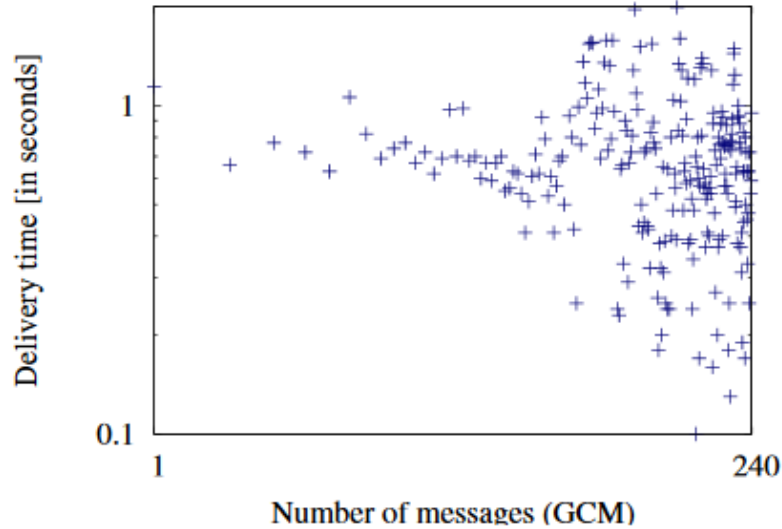
# Notification services

Mechanism	Payload (bytes)	Mobile platform	Average delivery time (seconds)
APNS	256	iOS	0.4
MPNS	4096	Windows Phone	1.2
GCM (aka AC2DM)	1024	Android	1.0
MQTT	1024	Any	0.3
XMPP	1024	Any	0.3

# Notification services

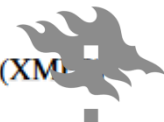


# Delivery performance



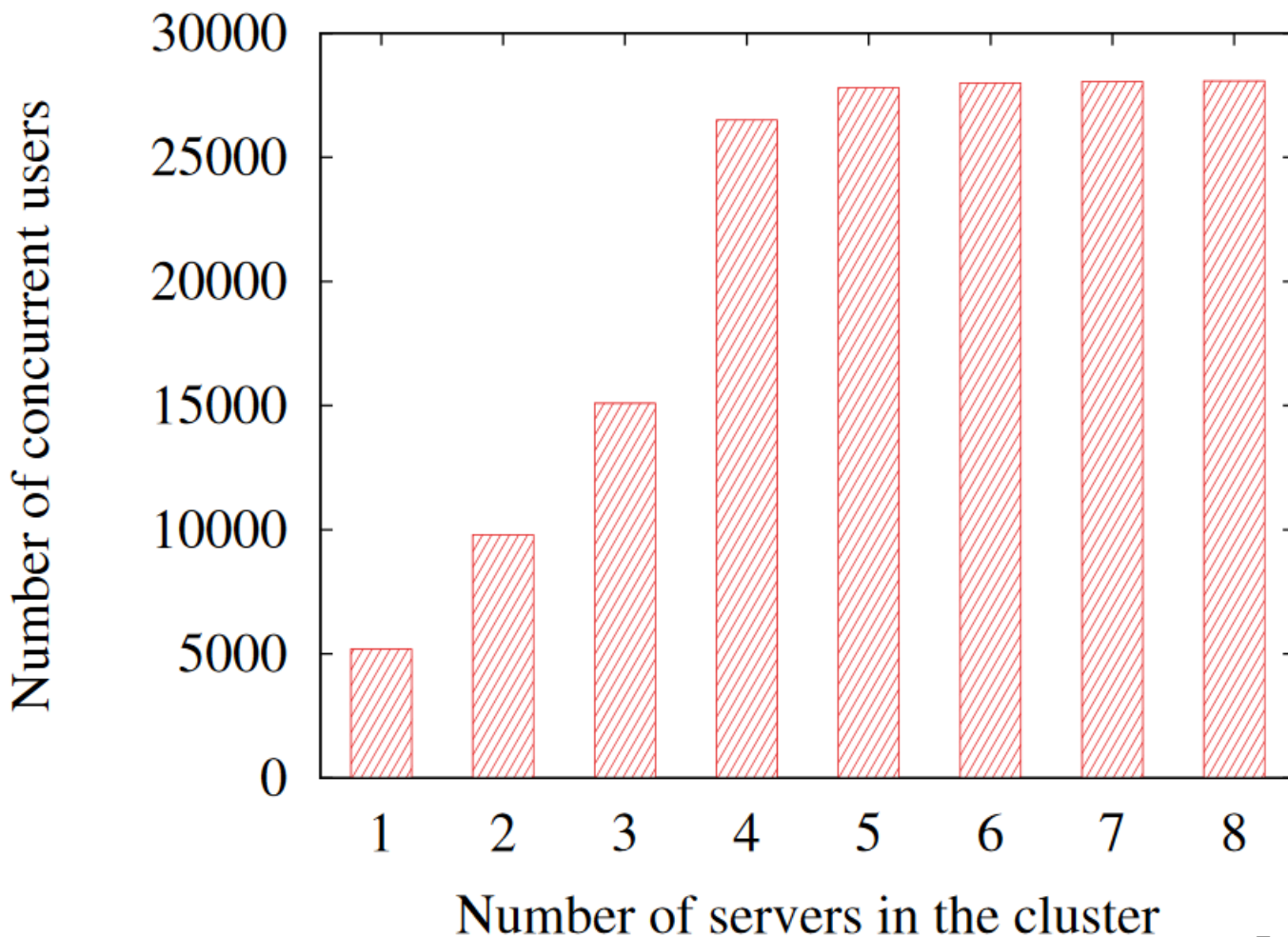
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Number of messages (XMPP)



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# Delivery scalability



# Assignment

- 6to reading
  - Al-Fuqaha, Ala, et al. ["Internet of things: A survey on enabling technologies, protocols, and applications."](#) *IEEE Communications Surveys & Tutorials* 17.4 (2015): 2347-2376.



# QUESTIONS

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**24.10.2017 – NO SESSION  
(DUE TO EXAM)**



# PROGRESS REPORT SESSION

Helsinki, Finland.

# Practical assignment for 31.10.2017

- Prepare a few slides answering the questions of the *Data-analysis-insights-p1* slides, which are located in the material section of the course web page.