RTCWeb Considerations for Mobile Devices

draft-isomaki-rtcweb-mobile

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Scope

- RTCWeb in mobile endpoints such as smartphones or tablets
  - Cellular and Wi-Fi interfaces
- Introduce the specific challenges and suggest recommendations
- Topics
  - Connectivity to the Calling Site
  - Media and Data Channels
  - Recovery from interface switching (Cellular <-> Wi-Fi)
  - Congestion avoidance
- Some of the issues maybe addressed by IETF, some by W3C, some may have to be left for browser or application implementation

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Assumptions

- Battery-operated devices
- Cellular network characteristics mainly based on WCDMA/HSPA
  - CDMA or LTE not so different
  - Networks as they are deployed today (wrt. radio timers, NAT/FW timers, buffering, link mode, QoS)
- Interface/network selection and switching according to how it is done in today's smartphones

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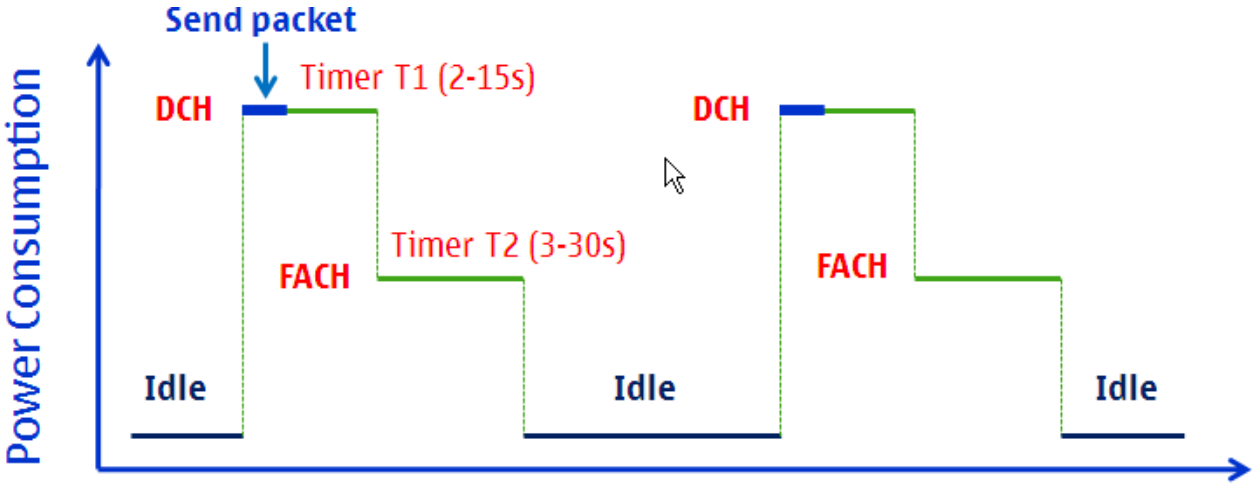
Cellular Networks



- Power consumption not based on traffic amount but pattern
  - Power-save (Idle) mode entered based on inactivity timers (~5-30 s.)
  - Getting active again takes a little while (~0.5-2s.) – seen on the "first" RTT!
- Firewalls and/or NATs in regular use
  - UDP timeouts often ~30s, TCP timeout anywhere between 1 and 60 min.
- Link layer operates in acknowledged (retransmission) mode
  - Single L2 loss delays also the subsequent packets
- Buffers are notoriously large

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Connectivity to the Calling Site

- WebSocket protocol or HTTP long polling over TCP
- Keepalives needed to keep the NAT/FW happy
  - Major source of power consumption

- Recommendations
  - Keep the keepalives as infrequent (and small) as possible
    - WebSocket PING-PONG better than HTTP with full headers
  - Synch keepalives from different sources to have just a single cycle

- Help from the standards
  - Common messaging/notification/push services for Web/Browser apps
  - Better app and/or browser visibility to NAT/FW timers

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Media and Data Channels

- Keeping **inactive** channels up is expensive
  - NAT/FW keepalive, liveliness, consent refresh
- Data Channels run on UDP
  - 30s NAT/FW timeout makes them infeasible to keep up for a long time

- Recommendations
  - Tear down inactive channels if possible

- Help from the standards
  - Channel suspend/resume?
  - TCP-binding for Data Channel?
  - Adaptive consent refresh timers
    - draft-muthu-behave-consent-refresh

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Interface Switching

- Most devices (OS's, Connection Managers) do hard handovers between cellular and Wi-Fi
  - The old interface and IP address are gone as soon (or before) the new one is up
- Recovering calling site connectivity
  - Re-initiate WebSocket or HTTP long polling state
- Recovering media
  - Update the media addresses to the peer

- Possibilities
  - ICE restart: takes time to setup signaling, send new Offer
  - draft-wing-mmusic-ice-mobility: a faster method
  - Recreate the whole PeerConnection
- Suggest to address this explicitly in RTCWeb "1.0" or "2.0"

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Congestion Avoidance

- Bufferbloat in cellular networks
- Separate users are segregated to some extent, but user's own TCP traffic will easily ruin real-time media

- Recommendations
  - Less-than-best effort congestion control for Data Channels for large transfers
  - Browser should be careful about its HTTP/TCP use while media is on
  - DSCP marking: draft-jennings-rtcweb-qos
  - RMCAT BOF

- Would be nice to get RTP/UDP on unacknowledged link mode

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