

Optimal Transmission Window Configuration Option for ICMPv6 Router Advertisement

IETF 6man WG meeting
August 1, 2012



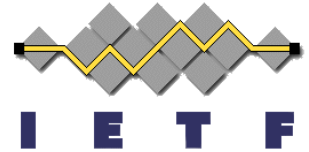
draft-savolainen-6man-optimal-transmission-window-00

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Johanna Nieminen

The problem

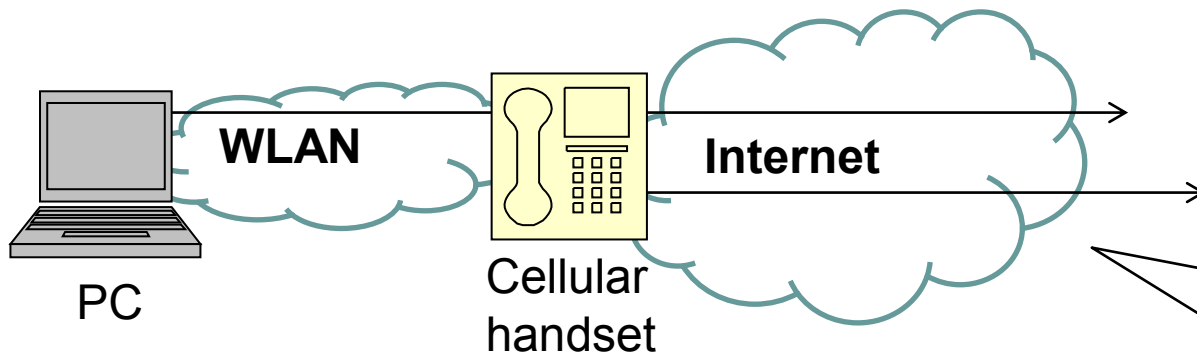
- A resource constrained gateway is providing Internet connectivity to nodes "below"
- Gateway's **uplink cellular network interface costs significantly whenever activated**: well-known power consumption issues related to 3GPP's T1/T2 timers
- Power consumption issues caused by **periodical messages** are commonly solved by **individual nodes** with help of various vendor specific centralized signaling or synchronization systems
- No synchronization solution available for cases where **multiple entities are sending periodical messages** through a resource constrained gateway

Two problem examples



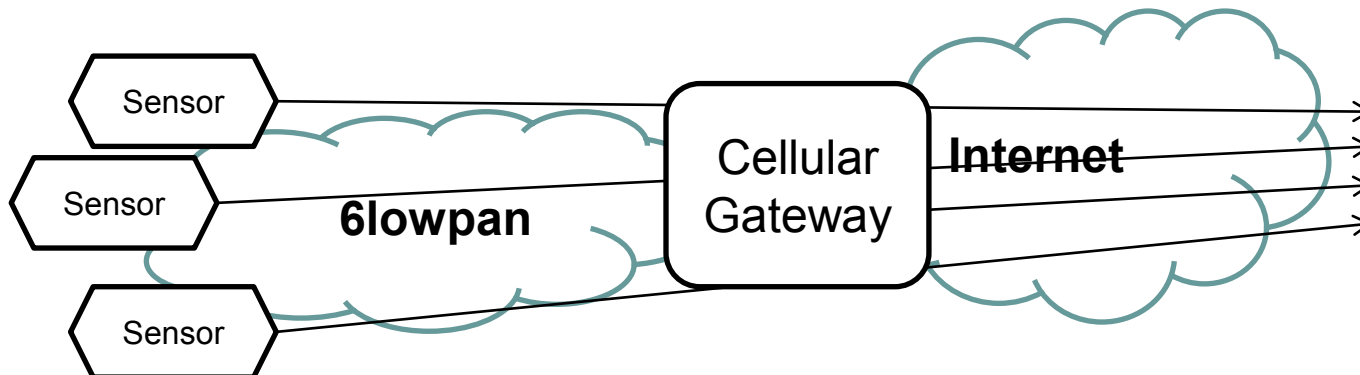
- All nodes are transmitting periodically through the gateway's cellular interface (including the gateway itself):

1)

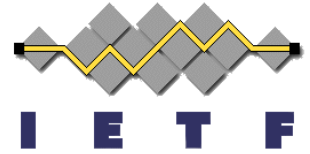


This is also the setup for measurements on the next pages

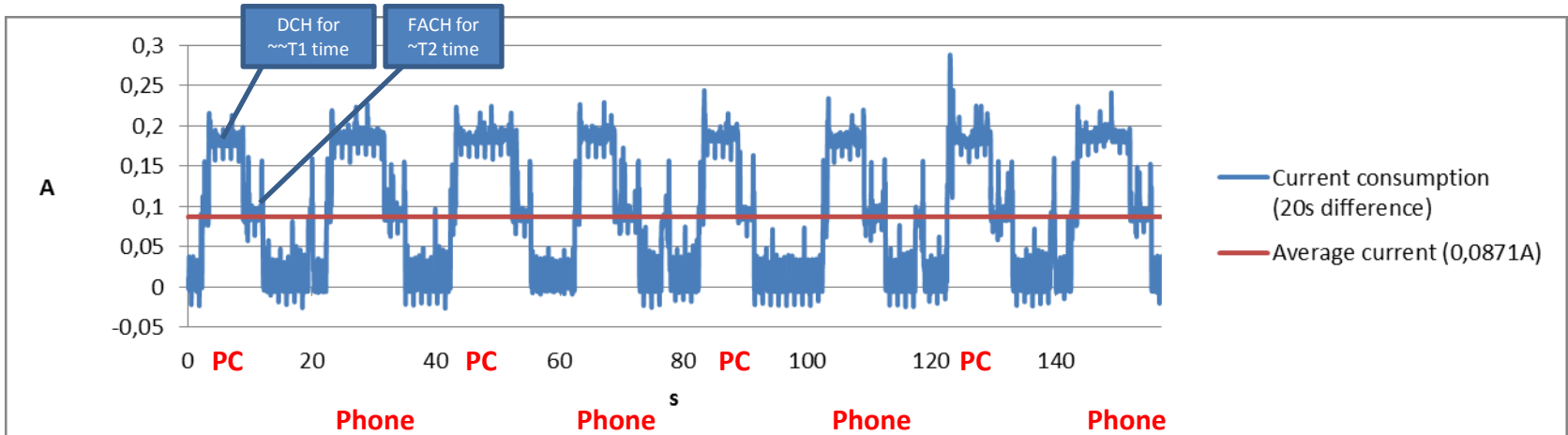
2)



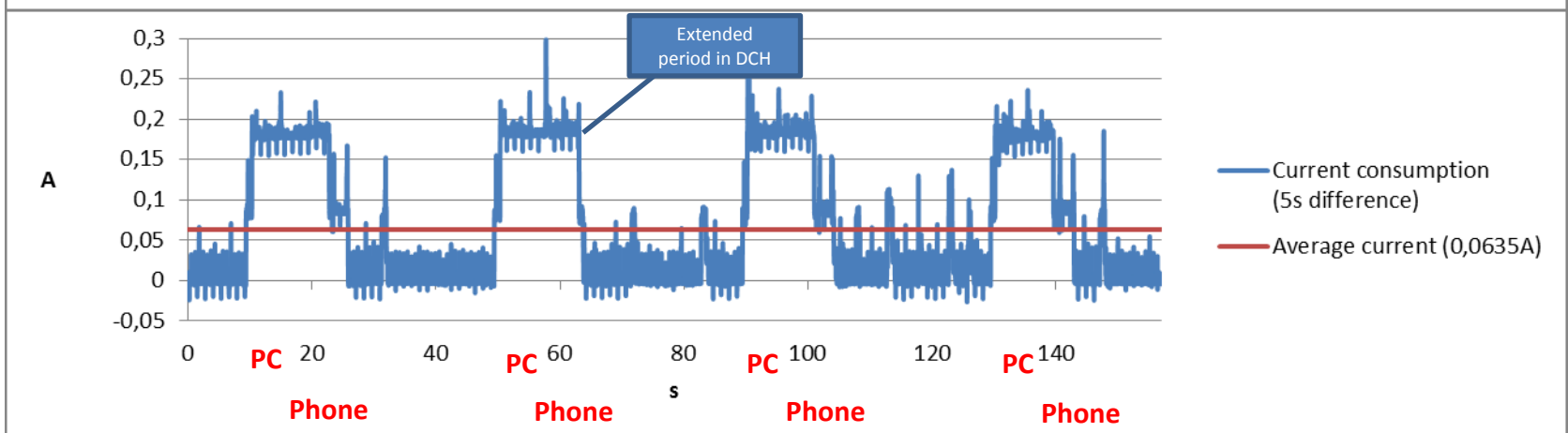
Report from basic and illustrative setup



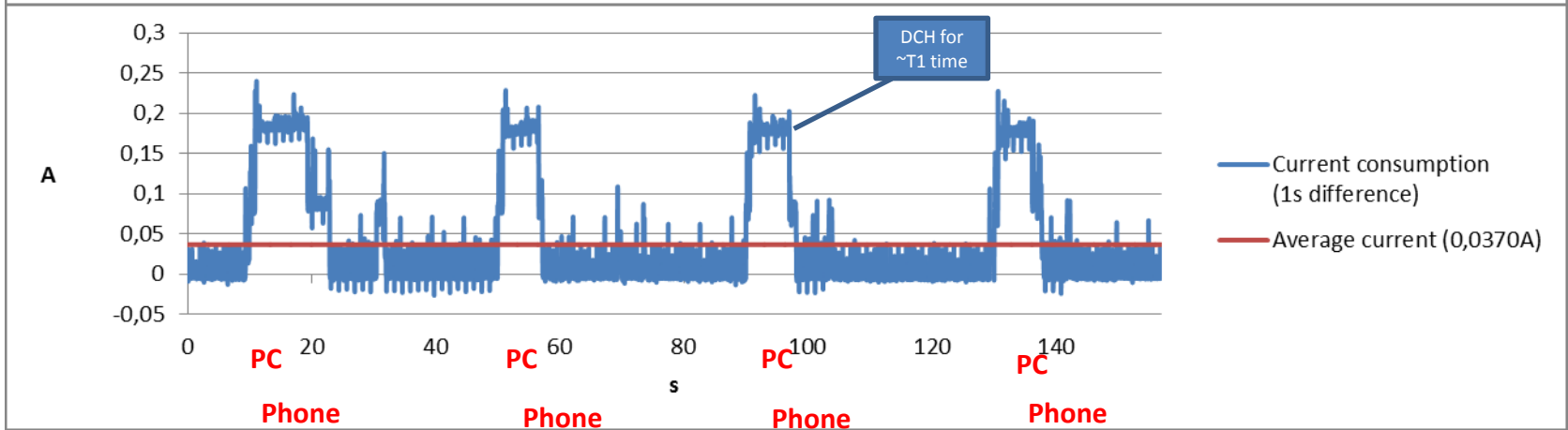
- A real phone tethering a real cellular connection to a real WiFi to which a real PC connects.
 - Used setup causes some background noise to current consumption
- The phone and the PC both are sending uplink UDP packet every 40 seconds
 - UDP sending implemented by artificial scripts
 - Artificially fast, of course, but good for illustration purposes
- In the first test PC and phone are as out of sync as possible
 - Both are sending one packet every 20s causing activation of cellular interface
- In the second test the PC and the phone are just five seconds out of sync
 - The packet send 5s after the first significantly extends the active time of the cellular interface
- In the third test the PC and the phone are only one seconds out of sync
 - The packet only 1s after the first does not significantly extend the active time
- In all of the tests the measurement period is exactly 157 seconds
 - In all cases covering four periodical messages from both the PC and the phone
- Used phone's average idle power consumption (with WiFi on) is subtracted from these measurements to scale figures to around zero power consumption level when no cellular transmission are taking place



100%



73%



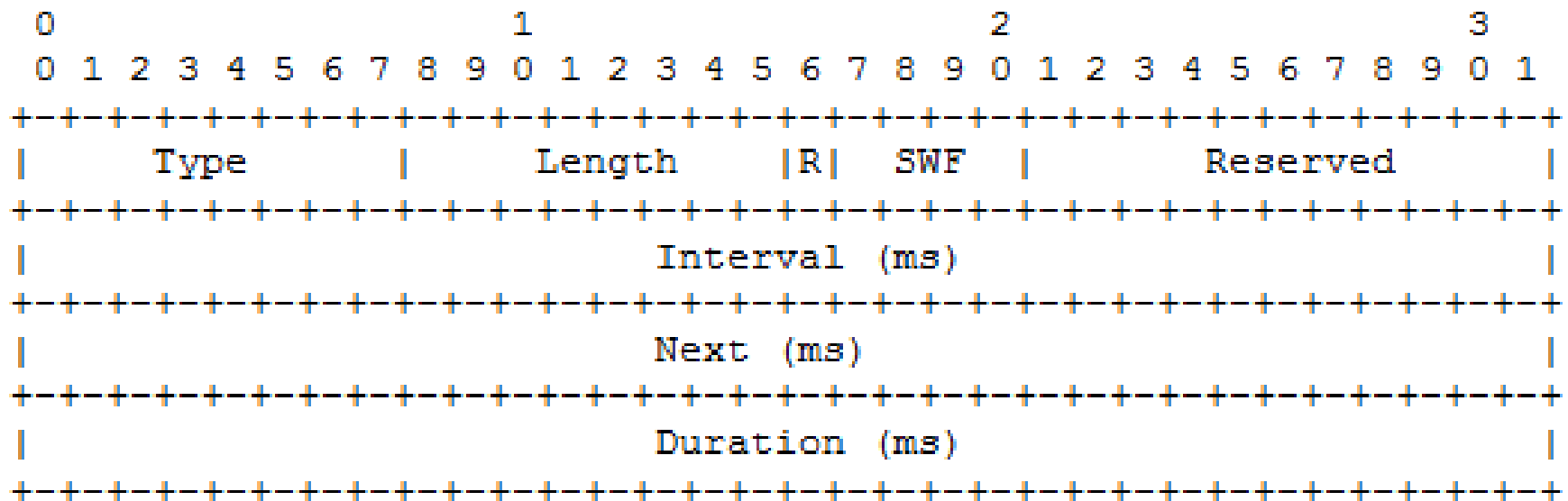
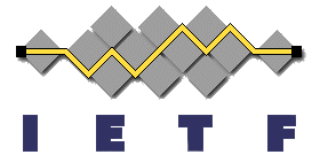
42%

Solution proposal

- Gateway to advertise in RAs what is the Optimal Transmission Window for the local network it is serving
- Nodes accessing Internet through the gateway should attempt to send their periodical messages during the window, whenever possible
 - Essentially RA would be extended with "WHEN" information
- This helps to decrease number of activations for gateway's cellular interface: battery savings
- Information received via RA is made available to applications, node internal synchronization system, etc, via implementation specific APIs

Proposed RA option

(details in I-D itself, as usually)



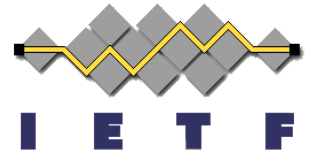
Interval: Time between optimal transmission windows (*default: 800 seconds*)

Next: Time until the start of the next optimal transmission window

Duration: Duration of each optimal transmission window (*default: 1000 milliseconds*)

SWF: Secondary transmission window schedules (in cases where interval is too long)

R: TRUE if transmission window is open at the moment of RA sending



Next steps

- Is there interest in 6man WG to adopt this?