Agenda

4G World Wednesday October 31st 1:30pm to 4:30pm

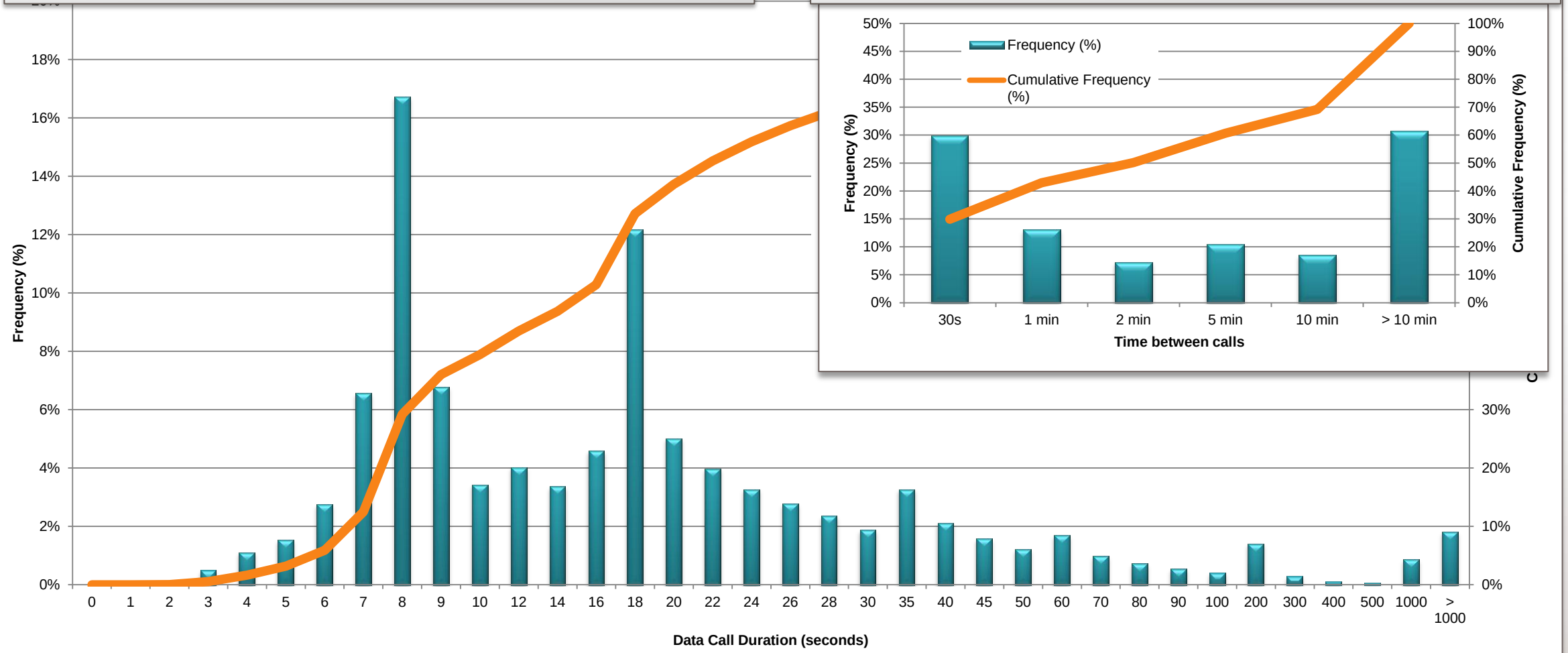
- **1:30 pm The 1000x mobile data challenge**
  - 1:30 How do we enable 1000x? — Rasmus Hellberg, Sr Director, Tech Marketing,
  - 1:45 How do we get access to new spectrum to reach 1000x? — Prakash Sangam Director, Tech Marketing
  - 2:00 Taking HetNets to the next level for 1000x — Rasmus Hellberg Sr Director, Tech Marketing
  - 2:15 The small cell products to power 1000x (3G/4G small cells, Wi-Fi) — Prakash Sangam Director, Tech Marketing
- **2:45pm The Chipset evolution and multimode challenges**
  - 2:45 Smartphone signaling and power enhancements — Sunil Patil, Director, Product Management
  - 3:05 Solving the global multimode and carrier aggregation challenges — Peter Carson ,Sr Director Marketing
  - 3:25 Circuit switched fallback, performance and interworking (LTE FDD/TDD GSM, UMTS, TD-SCDMA, 1X) — Sunil Patil, Director, Product Management
- **3:45pm The Voice and data Service evolution—together with Ericsson**
  - 3:45 The latest on VoLTE (RCS, SRVCC VoLTE, VoIP over other accesses), — Eric Parsons, Strategic Product Manager, LTE, Ericsson
  - 4:00 How do we achieve the Smart Pipe? (QoS and more) — Peter Carson, Sr Director Marketing
  - 4:10 LTE Broadcast services and opportunities — Mazen Chmaytelli, Sr Dir, Business Dev.

Smartphone Signaling & Power enhancements

October 2012

Smartphone Signaling Challenge

Duration of data calls are short



Frequency of attempts is high

Why are short & frequent calls a problem for operators?

- Excessive signaling
- Higher interference (both uplink and downlink)
- Signaling bandwidth reduces user bandwidth
- ***Overall, degraded usable network capacity & efficiency***

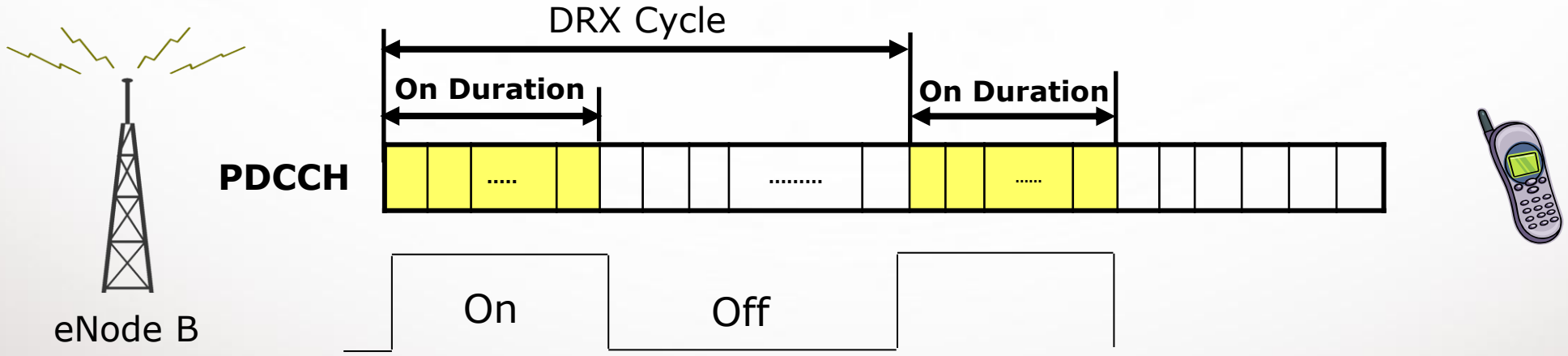
HSPA+ Features For Smartphones

	Power reduction	Signaling reduction	Interference Reduction
Rel-7 CPC (DTX/DRX)	✓		✓
HS-FACH		✓	
HS-RACH		✓	
Enhanced UE DRX	✓		
Rel 8 Fast Dormancy	✓	✓*	

* Signaling reduction with respect to pre Rel 8 fast dormancy mechanism

LTE Connected Mode DRX – Brief Overview

- Connected Mode Discontinuous Reception (CDRX) is a feature introduced in Release 8 of 3GPP
- CDRX mechanism allows UE to make signaling-free transitions between sleep and awake states
- eNodeB does not schedule transmissions during off period of the DRX cycle
  - Two DRX cycles: Short and Long
    - UE starts with (optional) Short DRX cycle and transitions to long DRX cycle after the expiration of a timer
    - eNodeB can direct UE into DRX mode



LTE Connected Mode DRX – Benefits

Traffic Scenario	Power Reduction
Web Browsing	15%
You Tube Streaming	20%

- Power reduction indicated above is reduction with respect no CDRX
- Power measured includes all components of smartphone device (modem, display, application processor, speakers etc)
- Benefits of CDRX depend on the application behavior and as a result CDRX parameters need to be adapted accordingly

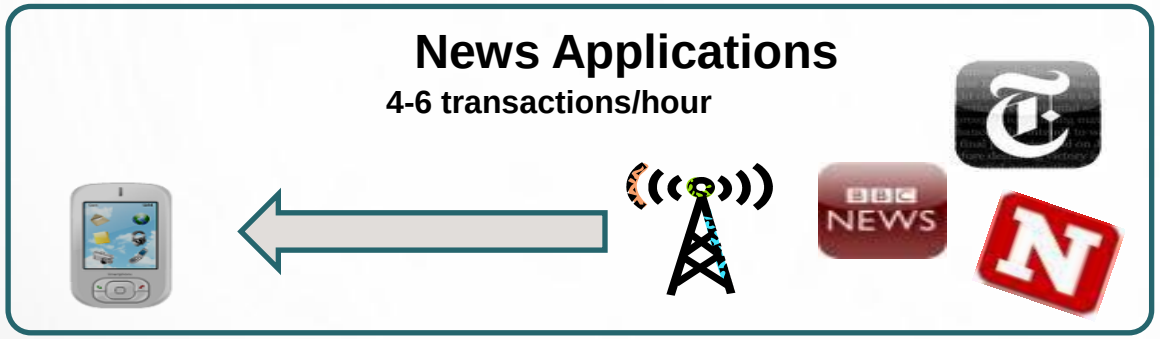
Smartphone Signaling Enhancement - Beyond Standards
Network Socket Request Management (NSRM)

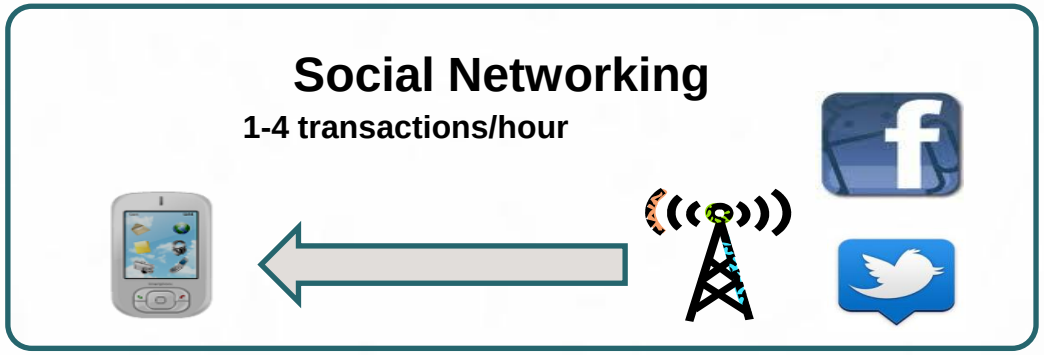
- Summary:
  - This feature helps reduce the number of network connections by background applications when the phone is idle. This significantly reduces network signaling load.

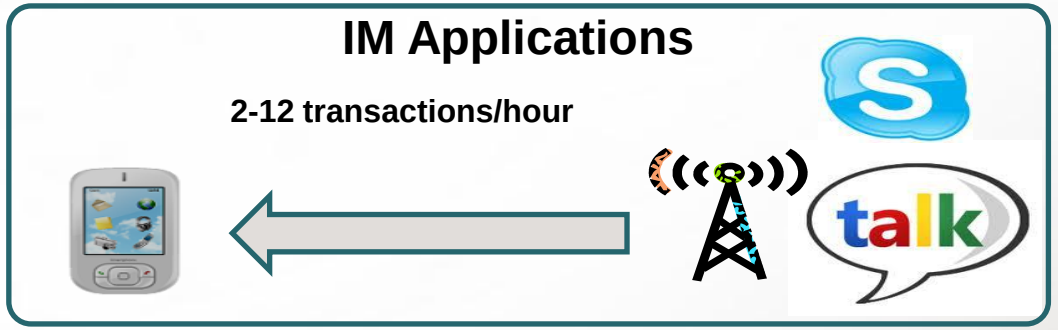
- Examples:
  - If your phone is idle sitting on the desk at work all requests for network connections from background apps will be held until an event trigger or pre-configured timer is set
    - An event trigger could be the display goes active and user is interacting with the mobile
    - A priority application or app from the exclusion list requests a socket

- Value Proposition:
  - This feature reduces network signaling load by effectively managing applications that connect to the network in the background in an uncoordinated fashion
  - Some gains in standby time

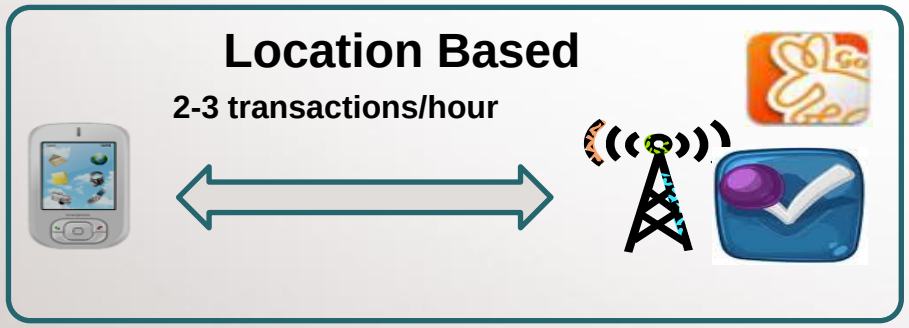
Applications Generating Traffic in Background Mode are Delay Tolerant







Periodic Transactions with Low Data/Transaction



Background traffic need not be sent immediately

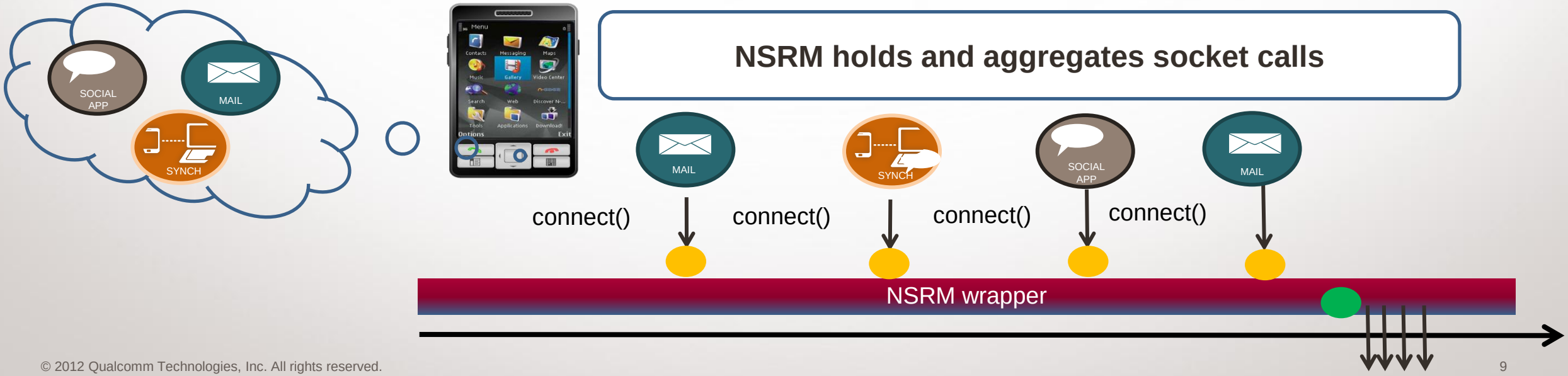
* Based on Qualcomm's study of smartphone traffic on commercial networks

Network Socket Request Manager (NSRM)

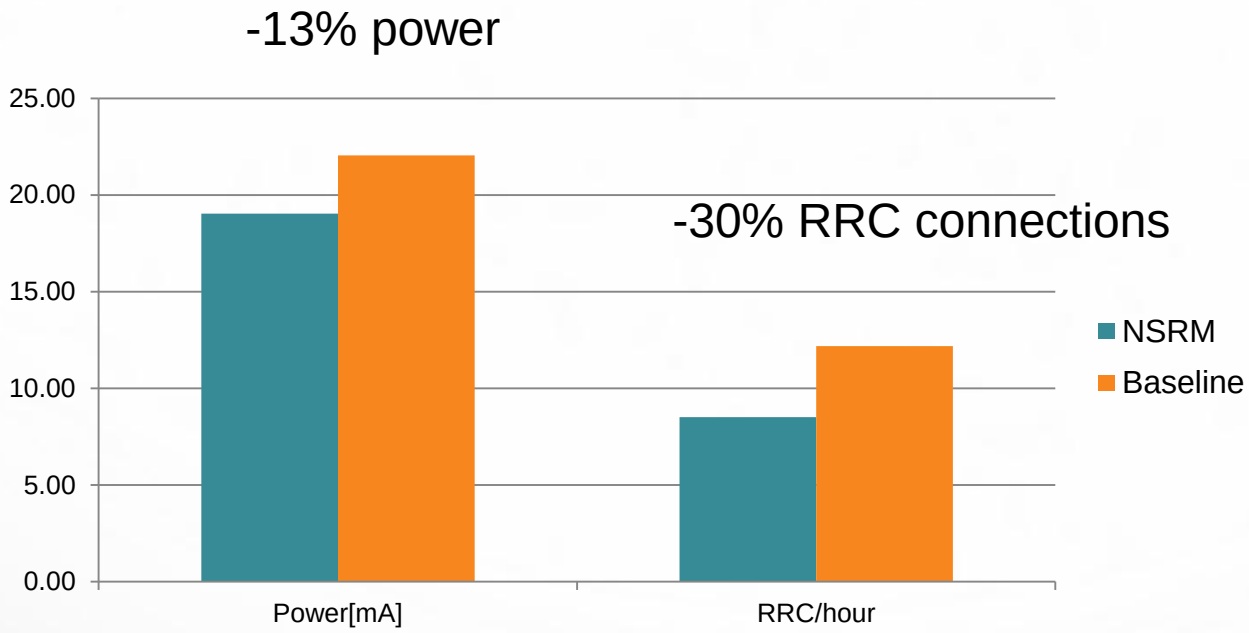
Reducing app signaling

Synchronized background application requests, resulting in more efficient network use without any user experience impact.

- NSRM aggregates and holds socket calls for background apps
- Differentiates delay tolerant apps
- NSRM does not manage push or long live TCP connection
- Synchronizes updates using smart heuristics; no user experience impact



Power and RRC signaling reduction



- Application mix: BBC, Facebook, CNN, Google reader, Twitter, Weather bug, basic Google apps
- Power/RRC reduction is measured only while phone is in background mode

Thank You

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