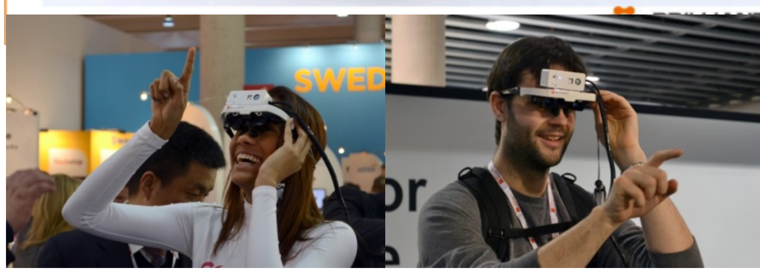
Power Saving on TIZEN

BRILLIANTSERVICE CO., LTD
Keiko Tsuda
2013/5/23

About Brilliant Service

Wearable phone



http://bit.ly/vikingb

Farm^3 (Farm cube)

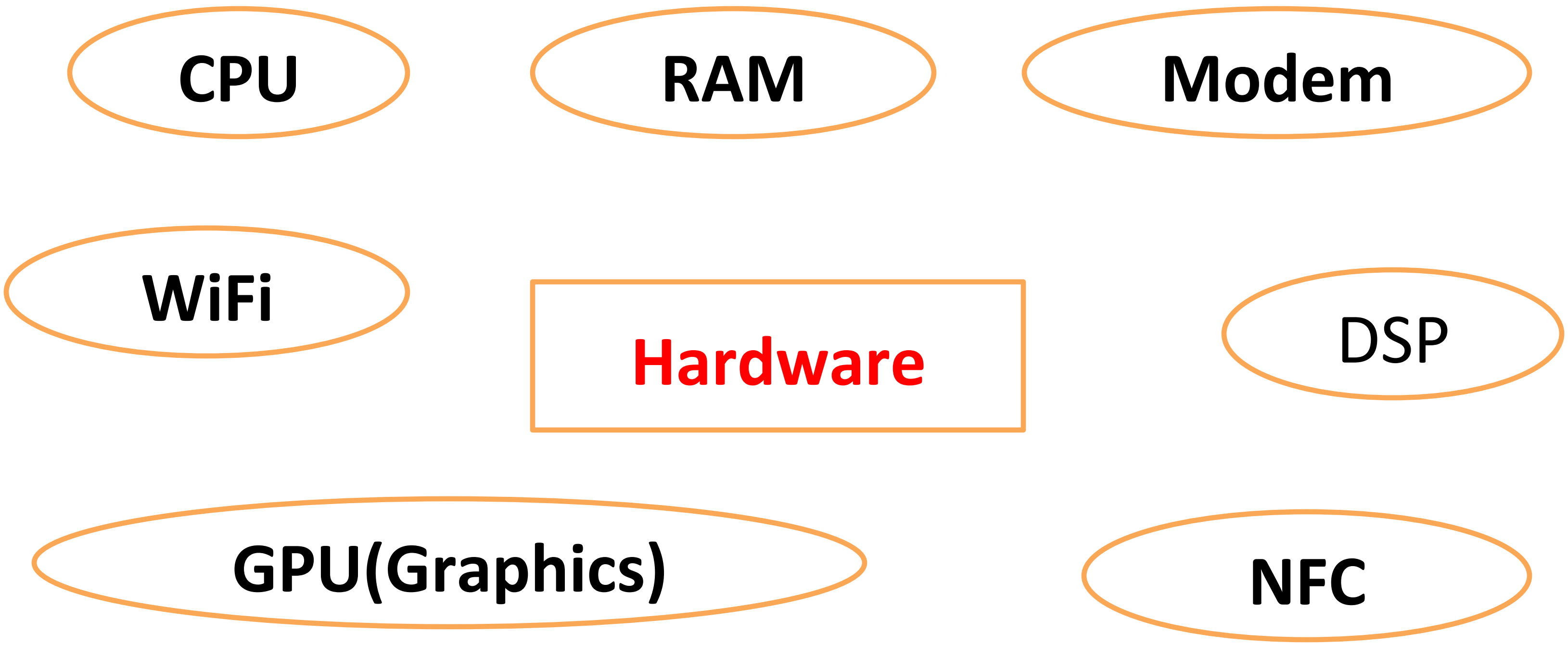
Why we are here today

- Introducing our brilliant Power saving idea
- Experiment of Power saving on TIZEN

How to stop battery drain

- Stop unused hardware
- Stop unused processes running

The Biggest factor in battery consumption



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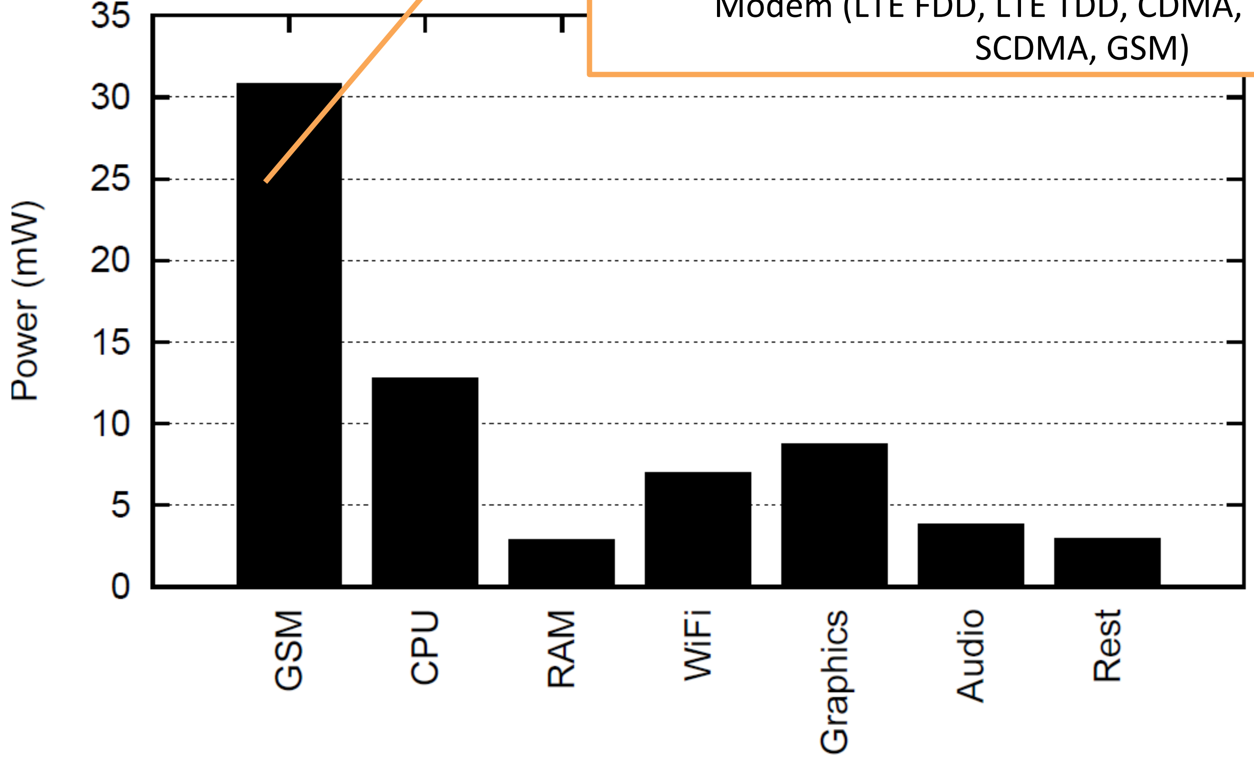
Power breakdown in the suspended state



Modem (LTE FDD, LTE TDD, CDMA, WCDMA, TD-SCDMA, GSM)

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*http://www.nicta.com.au/pub?doc=3587

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Modem????

This is it!

zoom

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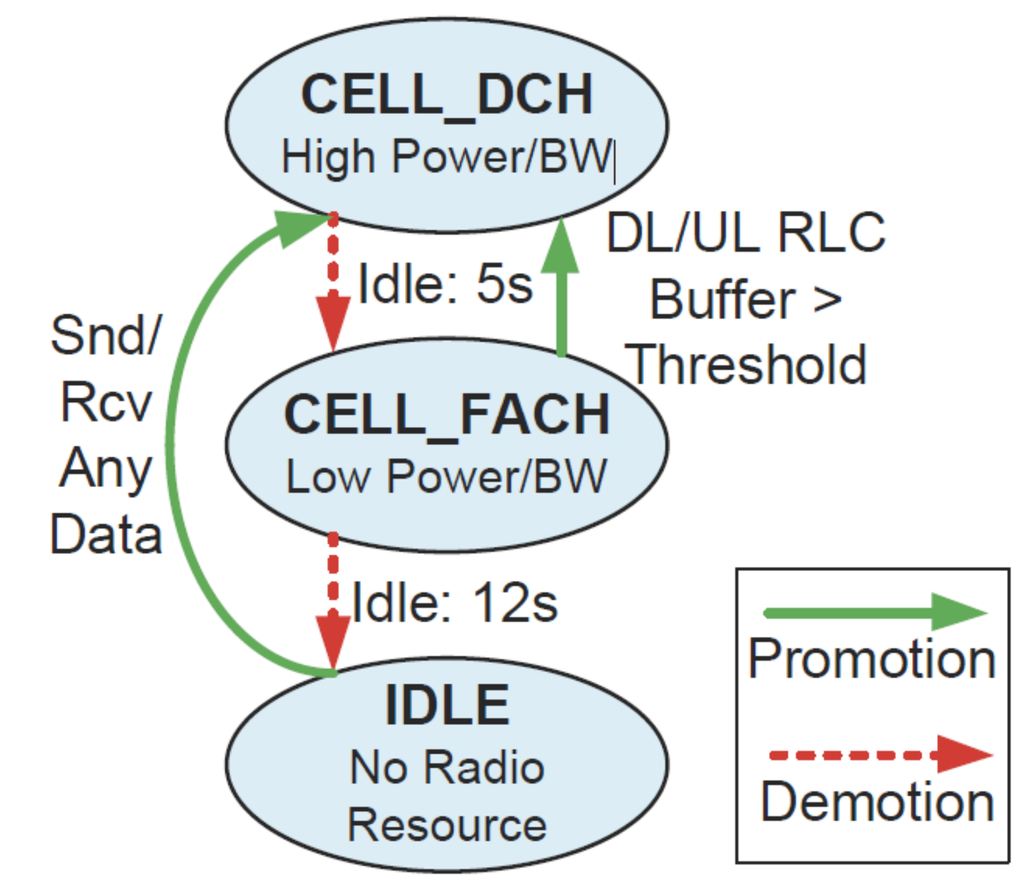
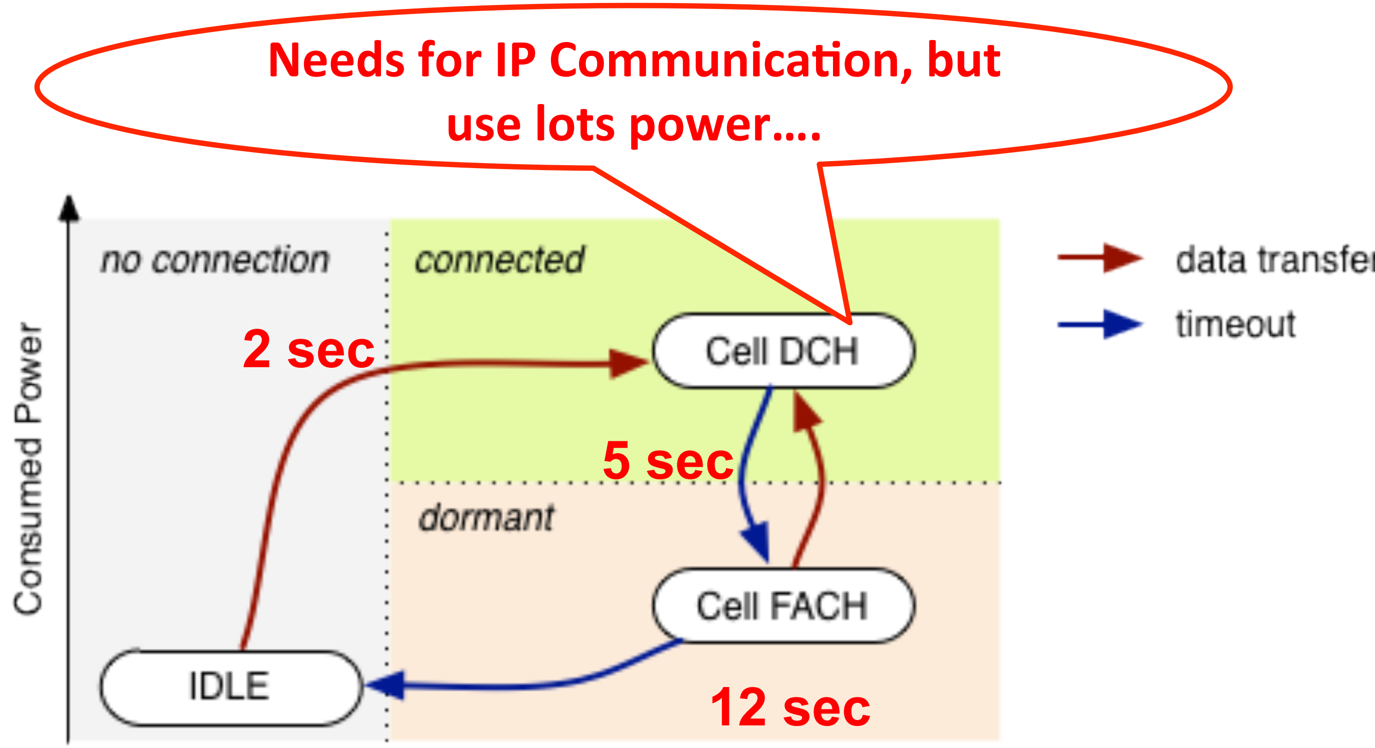
Radio Resource Controller

What is RRC?


CELL_DCH
High Power/BW
DL/UL RLC
Buffer >
Threshold
Idle: 5s
Snd/
Rcv
Any
Data
CELL_FACH
Low Power/BW
Idle: 12s
IDLE
No Radio
Resource
Promotion
Demotion

RRC State and Consumed Power



http://chimera.labs.oreilly.com/books/1230000000545/ch07.html#_hspa_and_hspa_umts_rrc_state_machine

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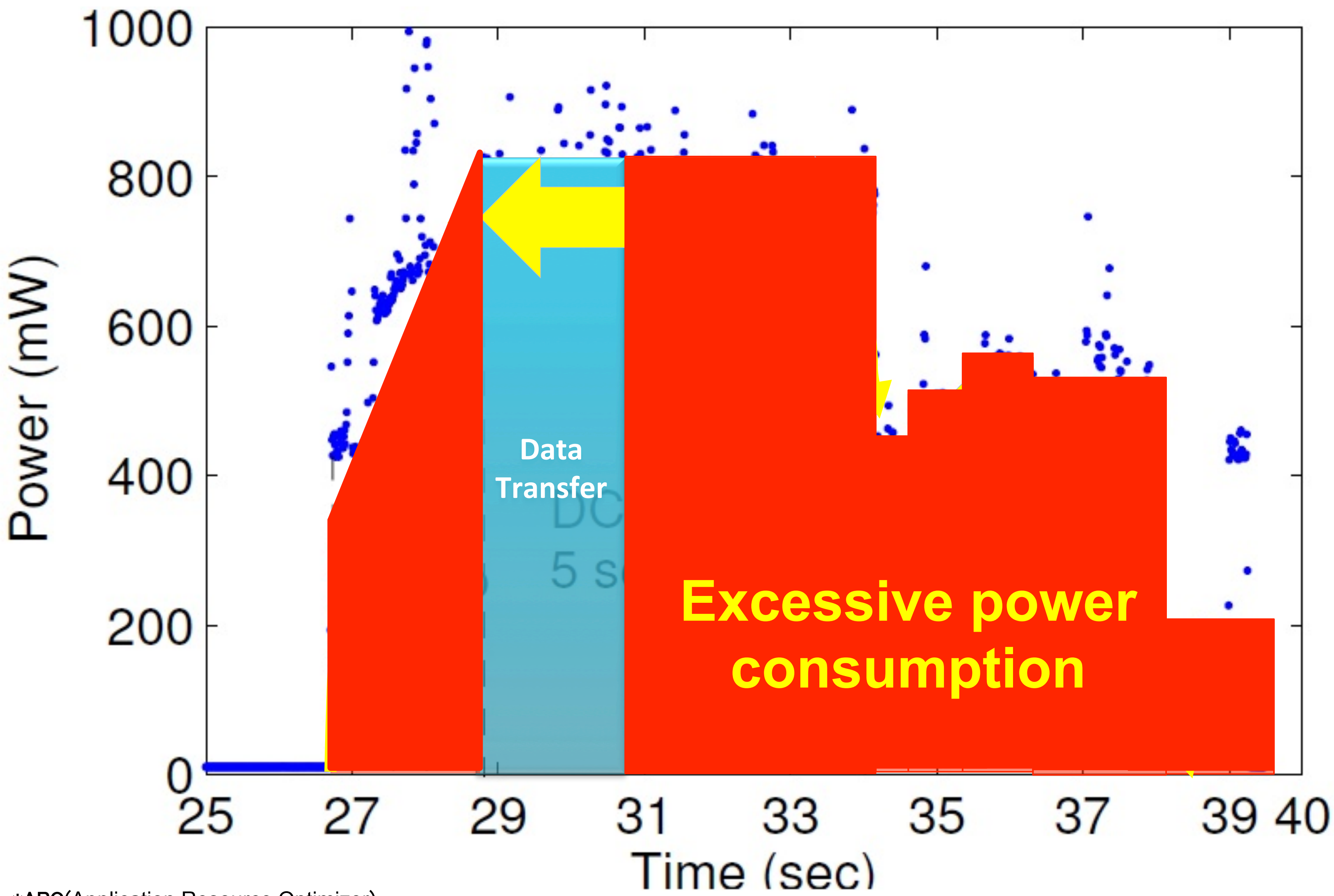
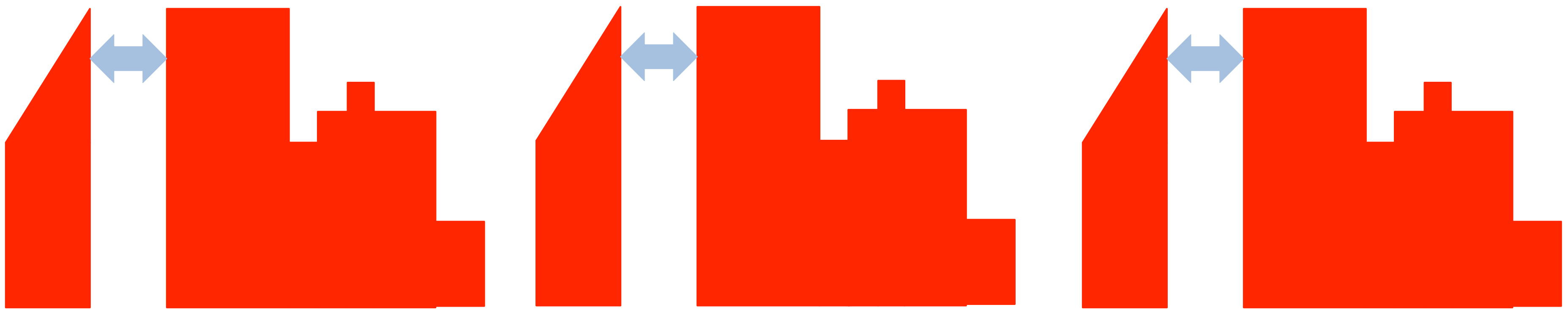
Power consumption in communication



*ARO(Application Resource Optimizer)

RRC state change x 3 communications



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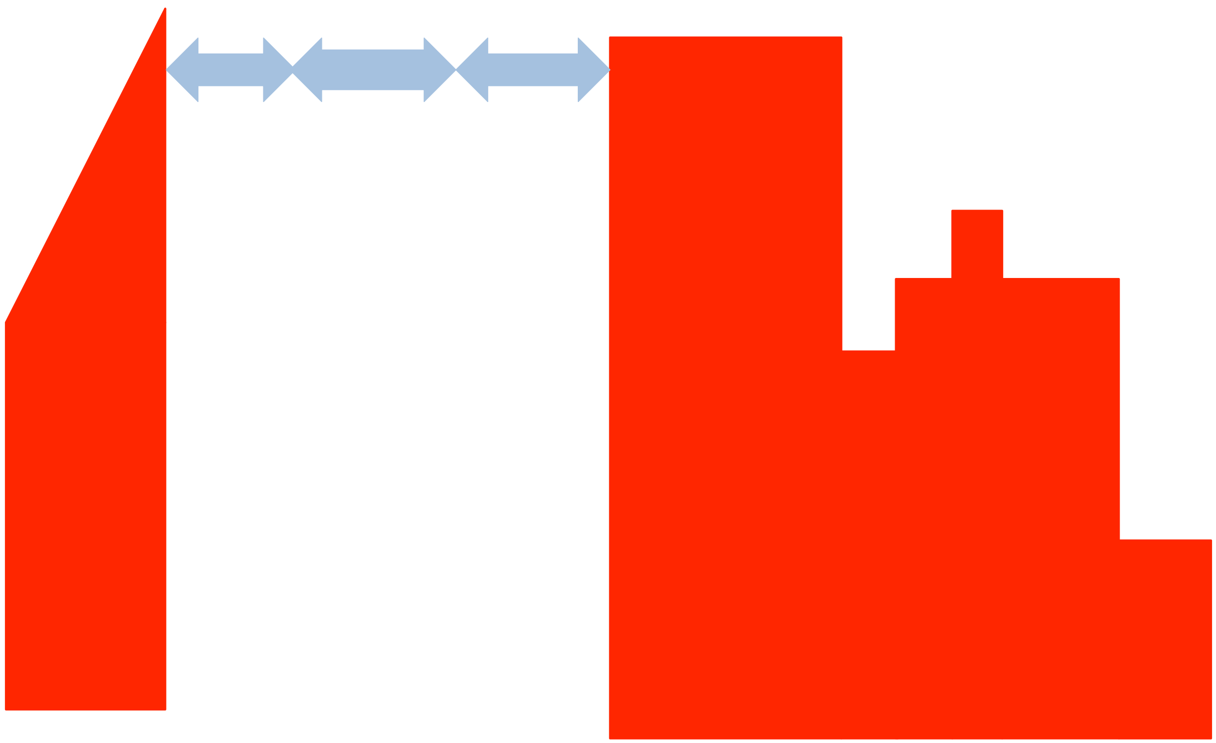
How can we improve?



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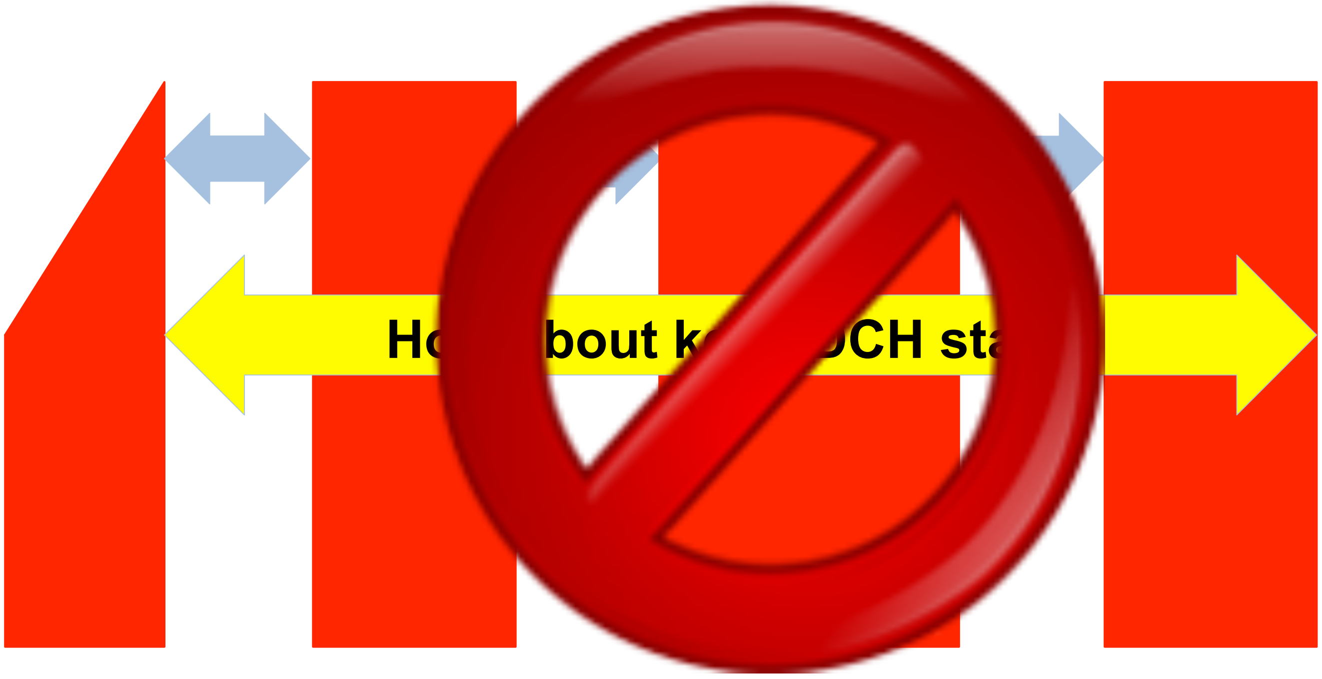
Bad example

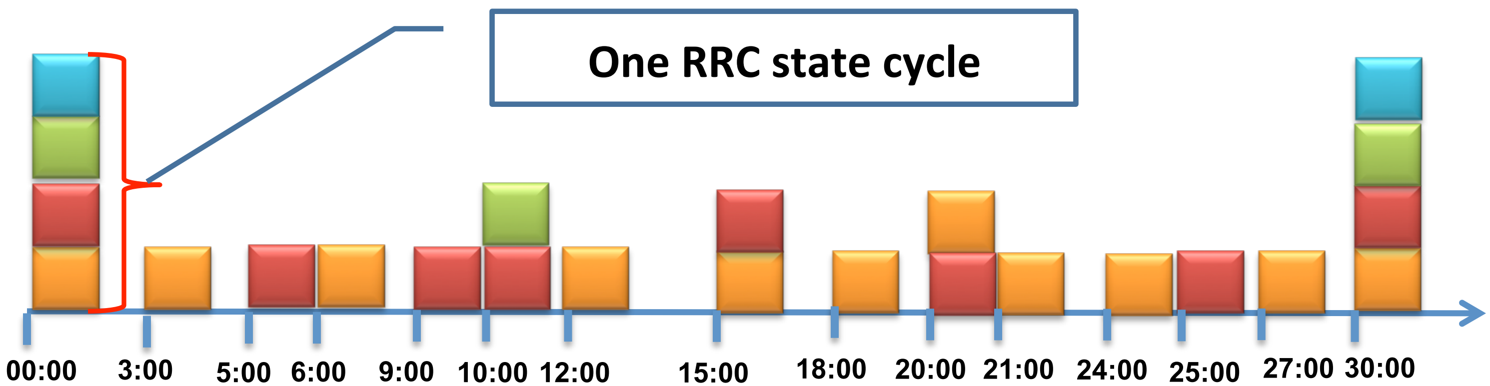


Reduce modem usage

- Keep the device in the idle status
- Avoid unnecessary communications.
- Use RRC state effectively

Our Experiment

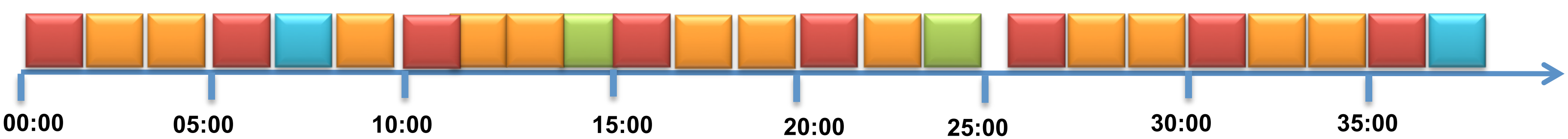
Background Application	Start interval	
A	Every 3 min	
B	Every 5 min	
C	Every 10 min	
D	Every 30 min	



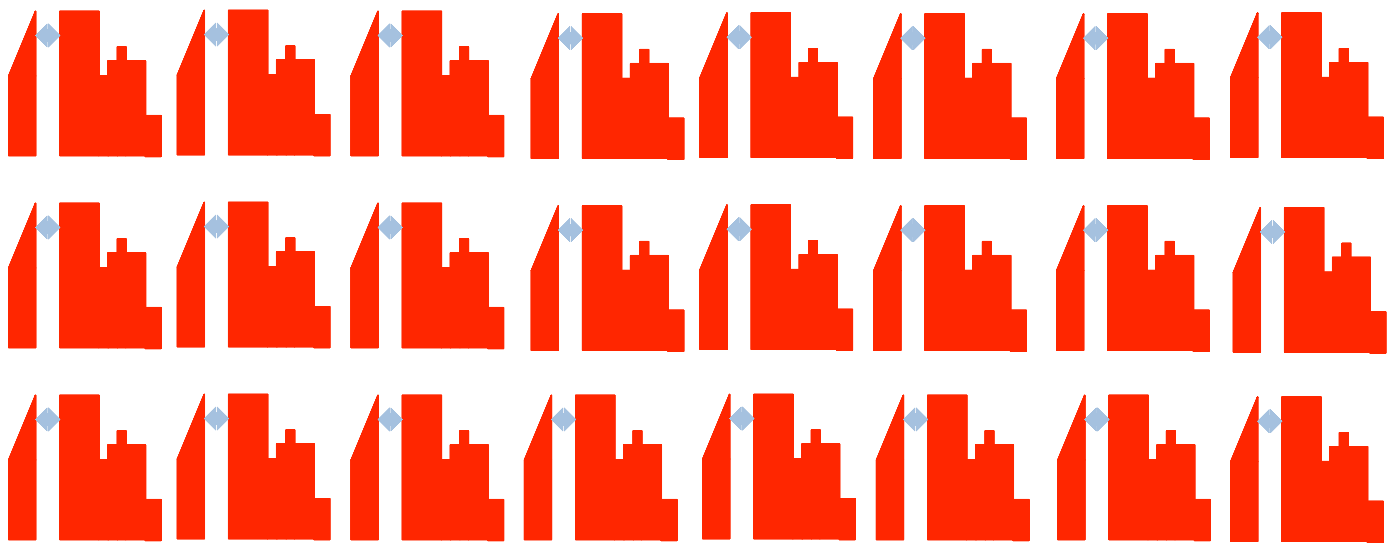
Worst case scenario

	Start	Start interval	
A	1min30sec	Every 3 min	
B	0min	Every 5 min	
C	14min10sec	Every 10 min	
D	7min	Every 30 min	

0:00 B	7:00 D	13:30 A	19:30 A	25:00 B	31:30 A
1:30 A	7:30 A	14:10 C	20:00 B	25:30 A	34:30 A
4:30 A	10:00 B	15:00 B	22:30 A	28:30 A	35:00 B
5:00 B	10:30 A	16:30 A	24:10 C	30:00 B	37:00 D



Worst Case Communication



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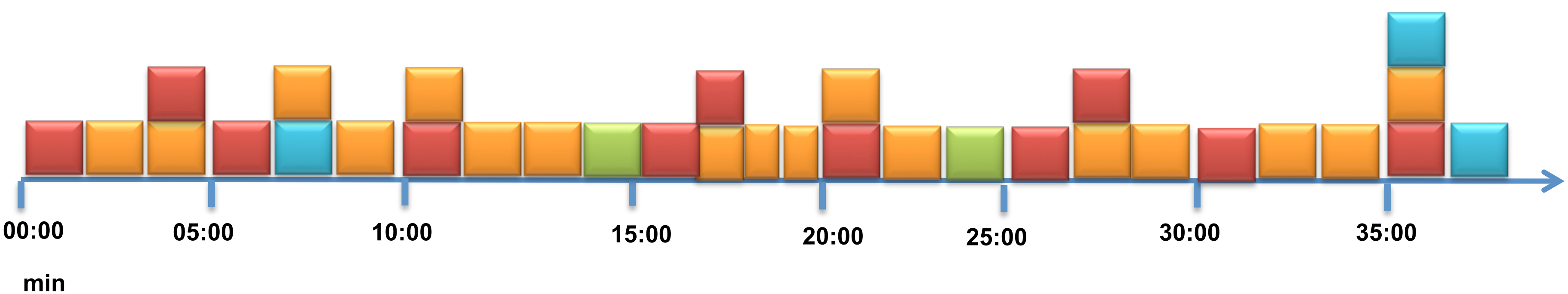
How to improveve?

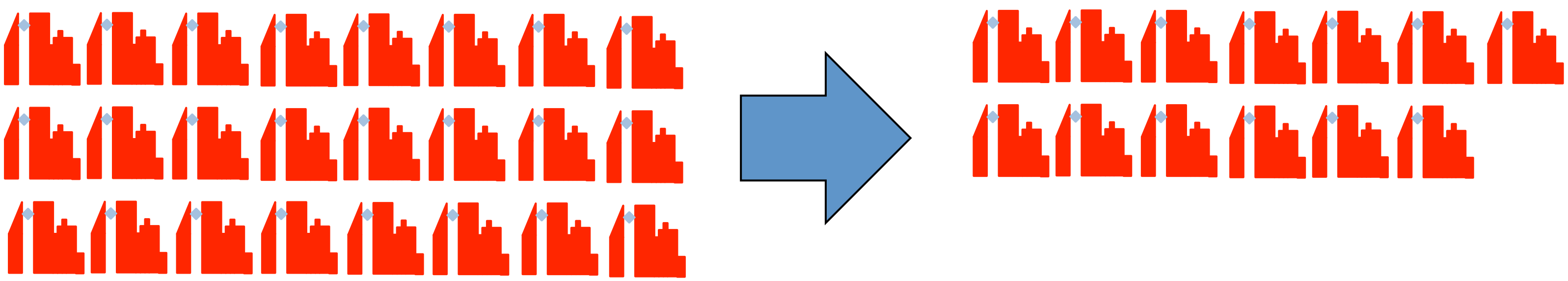
	Start	Start interval	Redundancy
A	1min 30sec	Every 3 min	±30sec
B	0 min	Every 5 min	±60sec
C	14 min 10 sec	Every 10 min	±90sec
D	7:00 min	Every 30 min	±300sec

Result

0:00 B	7:00 D	13:30 AC	16:30 A	24:10 C	30:00 B	37:00 D
1:30 A	7:30 A	14:10 C	19:30 A	25:00 B	31:30 A	
4:30 AB	10:00A B	15:00 B	20:00 AB	25:30 AB	34:30 A	
5:00 B	10:30 A	15:30 AB	22:30 A	28:30 A	35:00 ABD	



Wow



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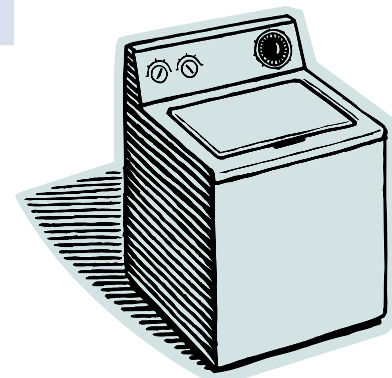
Real life experience

Mon	Tus	Wed	Thu	Fri	Sat	Sun
Erika	Sally	Erika	Keiko	Erika	Sally	



Erika and Sally has 1 day frexsible

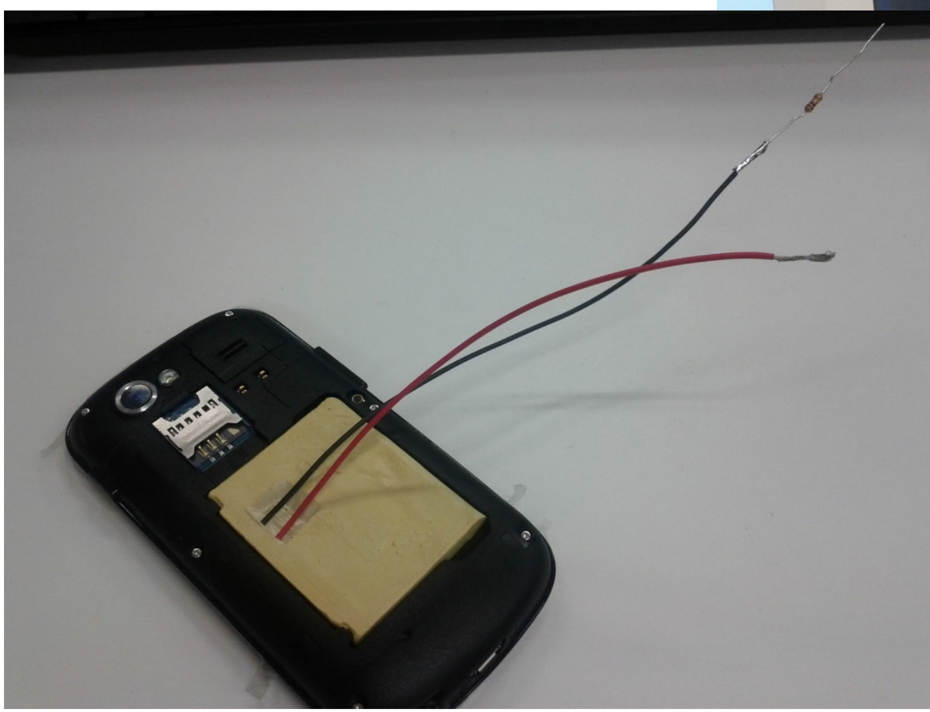
Mon	Tus	Wed	Thu	Fri	Sat	Sun
Erika	Sally Erika	Erika	Keiko Erika	Erika Sally	Sally	

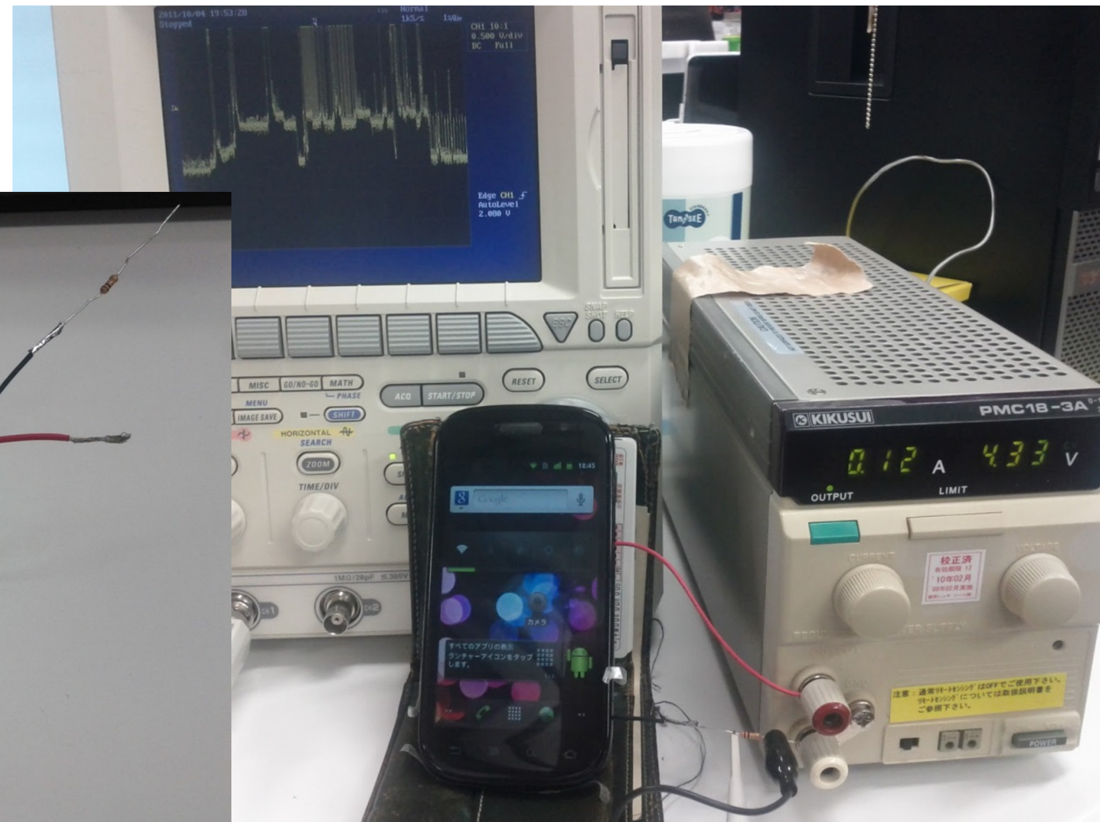
How to do it.

Schedule the background applications' timing to communicate using our **ECO-TIZEN library**.

Please come to our booth.

Power performance with our solutions





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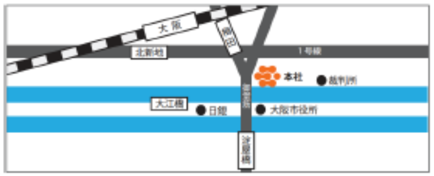
Questions?

Location

Osaka



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