



# Dynamic capacity management in low traffic periods in the 3G NodeB.

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# 1. Introduction.

- Flexibility in traffic management .
- Energy efficiency of the 3G NodeB's.
- Aggregate traffic with fewer carriers during low traffic periods.

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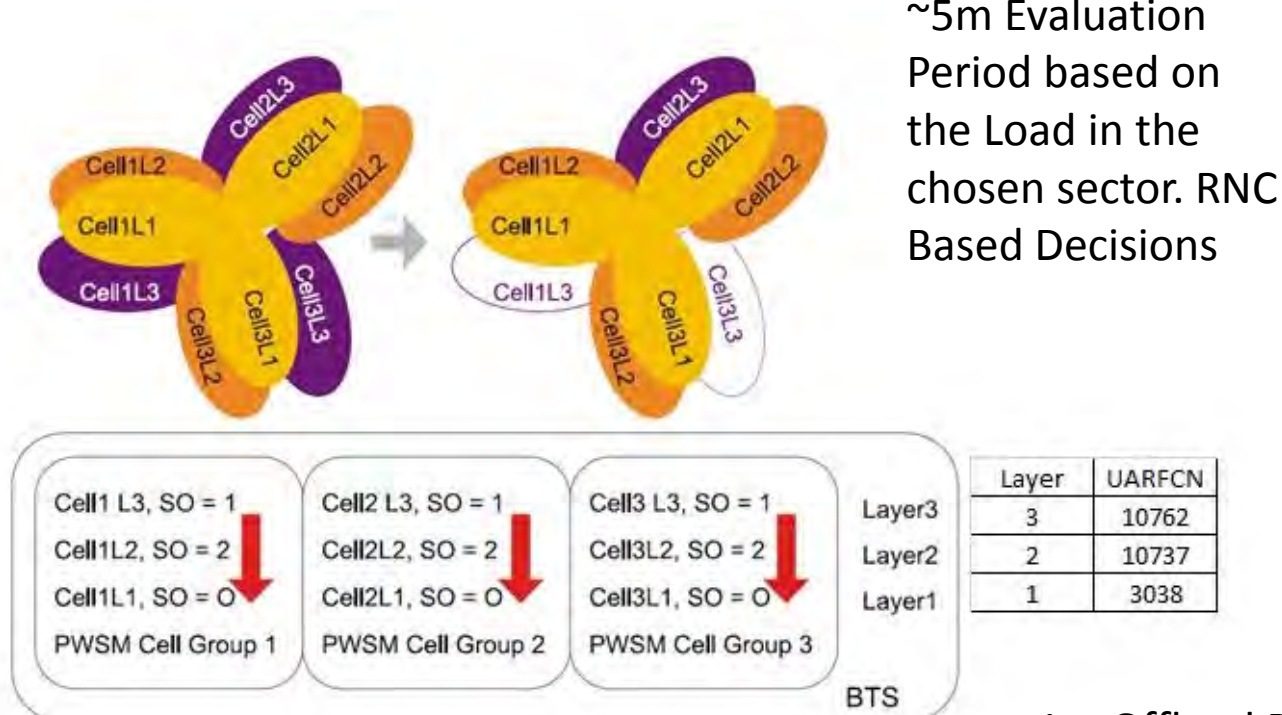
## Suitable Areas for activation of this functionality.

Most of the “Hot Spot” require additional capacity for certain time period . After this period expires its not efficient to maintain high capacity configurations .

- Trading Centers.
- Summer and Winter Resorts
- Indoor Offices
- Industrial Zones
- Suburban Areas.

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## 2. Radio frequency distribution per physical cell.



~1m Offload Period on cell level

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### 3.Triggers for activation and deactivation of carrier(s) in the physical cell.

Rules	Parameter	2100MHz		900Mhz
		CELL_UARFCN_10737	CELL_UARFCN_10737	CELL_UARFCN_3038
Activation Based Triggers	PWSMAVLIMITDCHSDPA	7	7	7
	PWSMAVLIMITNRTHSDPA	15	15	12
	PWSMAVLIMITRTDCH	40	40	37
	PWSMAVLIMITRTHSDPA	1	1	1
	PWSMAVPWRNRTHSDPA	40	40	31
	PWSMAVPWRRTHSDPA	37	37	37
	PWSMCELLGROUP	1	1	1
ShutDown Based Triggers	PWSMSDLIMITDCHSDPA	4	4	4
	PWSMSDLIMITNRDCH	15	15	15
	PWSMSDLIMITNRTHSDPA	15	15	15
	PWSMSDLIMITRTDCH	12	12	12
	PWSMSDLIMITRTHSDPA	10	10	10
	PWSMSDPWRNRTHSDPA	47	47	37
	PWSMSDPWRRDCH	45	45	37
	PWSMSDPWRRTHSDPA	34	34	34
Order	PWSMSHUTDOWNORDER	2	1	0
	PWSMSHUTDOWNREMCCELL	1	1	0

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RNC (Timers)	
PWSMDuration	5 [min]
PWSMExceededTrafficDur	20 [sec]



# Timers.



Level WBTS		
Parameter	Value	Description
PWSMInUse	1	Enabling the Power Saving feature on underlying Cells
PWSMEnableWakeUpTime	1	Enables the cells to wake up after Timers Expires
PWSMShutdownEndHour	6	Hour for wake up the cells in Shutdown mode
PWSMShutdownBeginHour	22	Hour to start monitoring cells for PWSM shutdown procedure
PWSMShutdownEndMin	0	Minutes to wake up the cells which are shutdown mode.
PWSMShutdownBeginMin	0	Minutes to start monitoring cells for PWSM shutdown procedure
PWSMRemCellSDBeginHour	-	Additional Timers.
PWSMRemCellSDBeginMin	-	
PWSMRemCellSDEndHour	-	
PWSMRemCellSDEndMin	-	
PWSMAVTrafficVERLogic	0	
PWSMWeekday	-	This parameters are not used in this scope of the tests.

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# Triggers for activation and deactivation of carrier(s) in the physical cell.

- Transmitted HS DL Power – [dBm].
- Number of Real Time Channels (Voice).
- Number of Users ( Circuit Switched/ Packet Switched/Dual Carrier HSDPA user etc.)
- Number of Non Real Time Channels (Legacy R99 Packet Switch Channels and HSDPA High Speed Transport Channels).
- Time Periods in days and weekends. (Based on predefined Traffic Models).
- Predefined priorities based on used Frequency Bands used by the NodeB.

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# Distribution mechanisms for traffic management in the radio network.

- SHO ( Soft Handover) (Handovers between cells using the same frequency (UARFCN)).
- ISHO ( Inter System Handovers). ( Handovers between technologies 3G-> 2G).
- IFHO ( Inter Frequency Handovers). ( Handovers between cells using different frequency band WCDMA 2100 MHz -> WCDMA 900MHz.)
  
- All of the procedures are using power ramp down. During 2s the Cells intentionally decreases its transmitted power causing the rules for triggering (SHO,ISHO or IFHO) to be met.

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# Results.

## Energy Efficiency.

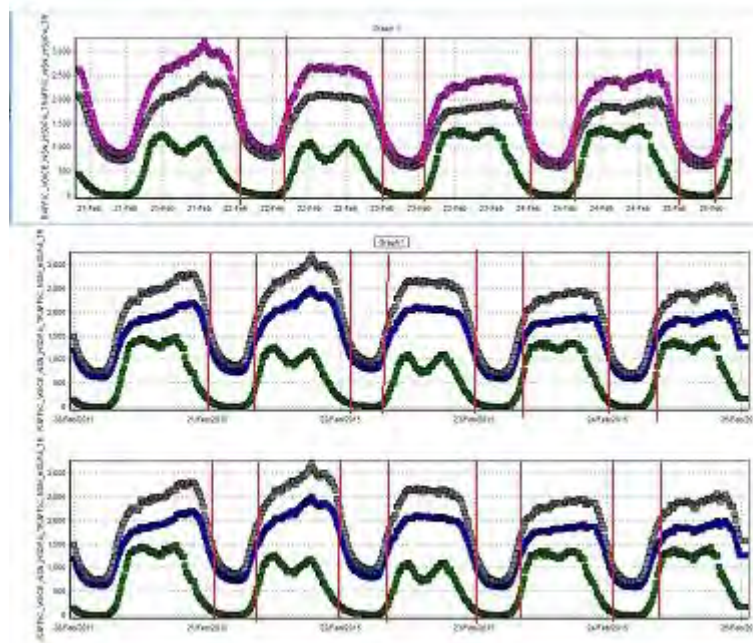
Results are made on base of measurements of the period (27.10 - 10.11)

	NodeB	Time	NodeB_1	NodeB_2	NodeB_3	NodeB_4	NodeB_5	NodeB_6	NodeB_7	NodeB_8
	Type		Highway/Urban	Urban	City/Urban	City	City	City	City	City/Urban
Saving per NodeB (for the period)	T1	Night	11	3	58	4	2	0	1	130
Saving per NodeB (for the period)	T2	Day	0	0	0	0	0	0	0	0
Total Saving per NodeB per Day	Power		0.78571429	0.21429	4.142857	0.28571	0.1428571	0	0.0714	9.285714
Total Saving per year NodeB	Power	[kWh]	286.785714	78.2143	1512.143	104.286	52.142857	0	26.071	3389.286
Total Saving Per Year Per Sector Year	Power	[kWh]	95.5952381	26.0714	168.0159	11.5873	5.7936508	0	2.1726	376.5873
Number of Carriers			3	3	9	9	9	9	12	9

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# Aggregated Traffic per Carrier on Cluster basis. (Voice and Data traffic).



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## Conclusion.

- Low Energy consumption in low traffic periods in the network and maintaining low Blocking Rate  $\sim 0.2\%$ .
- Increased Capacity efficiency.
- Increased lifespan of the Radio Modules in the network.

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Thank you.