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Idle Mode Mobility

LTE Radio Parameters 1 [FL18A]

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Module Objective

After completing this learning element, the participant should be able to describe discuss and analyze:

- The main measurements and measurements strategies in LTE
- Cell Selection criterion S
- Ranking criterion R
- Priority layer concept
- The main SIB parameters associated with intra-frequency and inter-frequency mobility

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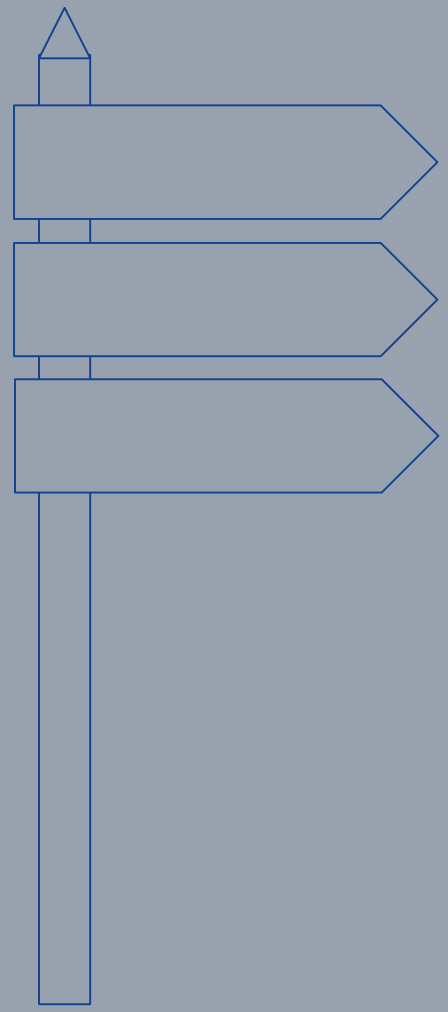


- **Measurements in LTE**
- Cell Selection
- Cell Reselection
- Mobility States
- SIB Parameters
    - Intra Frequency Mobility
    - Inter Frequency Mobility

LTE Measurements

Intra LTE measurement

- UE measurements
  - CQI measurements
  - Reference Signal Received Power (RSRP)
  - Reference Signal Received Quality (RSRQ)
- eNB measurements
  - Non standardized (vendor specific)
    - TA
    - Average RSSI
    - Average SINR
    - Detected PRACH preambles
    - Transport channel BLER
  - Standardized
    - DL RS Tx Power
    - Received Interference Power
    - Thermal Noise Power

Measurements from LTE to other systems

- UE measurements are mainly intended for handover
  - UTRA FDD
    - CPICH RSCP
    - CPICH Ec/No
    - Carrier RSSI
  - UTRA TDD
    - Carrier RSSI
    - RSCP
    - P-CCPCH
  - GSM: GSM carrier RSSI
  - CDMA2000
    - 1xRTT Pilot Strength
    - HRPD Pilot Strength

UE Measurements: RSRP & RSRQ

RSRP (Reference Signal Received Power)

- **Average** of **power levels** (in [W]) received across all **Reference Signal** symbols within the considered measurement frequency bandwidth.
- UE only takes measurements from the cell-specific Reference Signal elements of the serving cell, this makes RSRP results load and MIMO/diversity independent.

If receiver diversity is in use by the UE, the reported value shall not be lower than the corresponding RSRP of any of the individual diversity branches

RSSI (Received Signal Strength Indicator)

- RSSI comprises the linear average of the total received power (in [W]) observed only in OFDM symbols containing reference symbols for antenna port 0, in the measurement bandwidth, over N number of resource blocks by the UE from all sources, including co-channel serving and non-serving cells, adjacent channel interference, thermal noise etc.

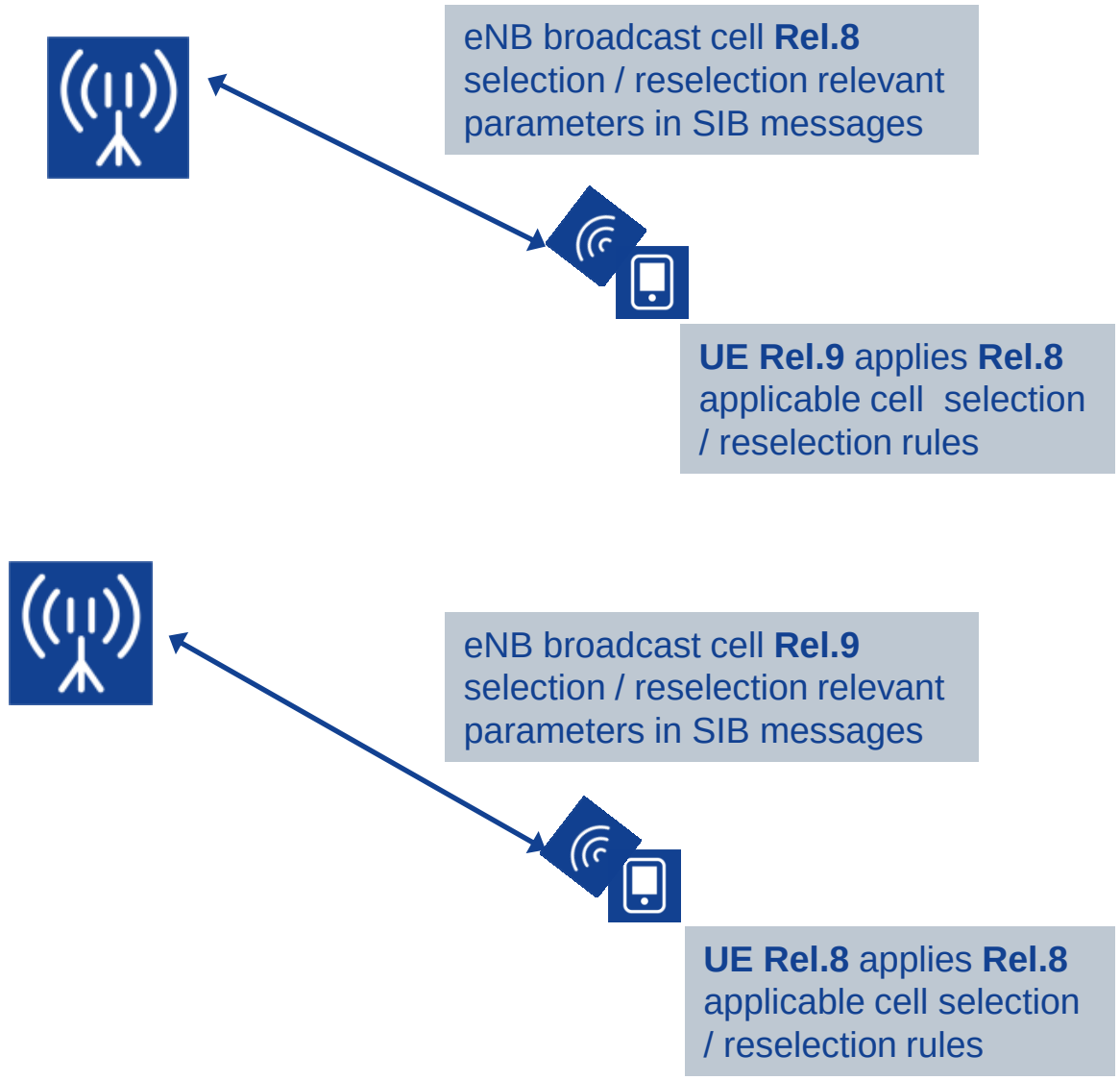
RSRQ (Reference Signal Received Quality)

- Defined as the ratio $N \times RSRP/RSSI$, where N is the number of RBs of the E-UTRA carrier RSSI measurement bandwidth. The measurements in the numerator and denominator shall be made over the same set of resource blocks

UE Measurements: RSRP & RSRQ

RSRP / RSRQ backwards compatibility

- If eNB is Rel.8 (provides parameters applicable only to Rel.8 cell selection and cell reselection mechanism) and UE is Rel.9 compliant terminal, then UE shall use Rel.8 mechanism.
- The same is for UEs Rel.8 which camp on eNB which supports Rel.9 (extended set of parameters broadcasted in a cell).



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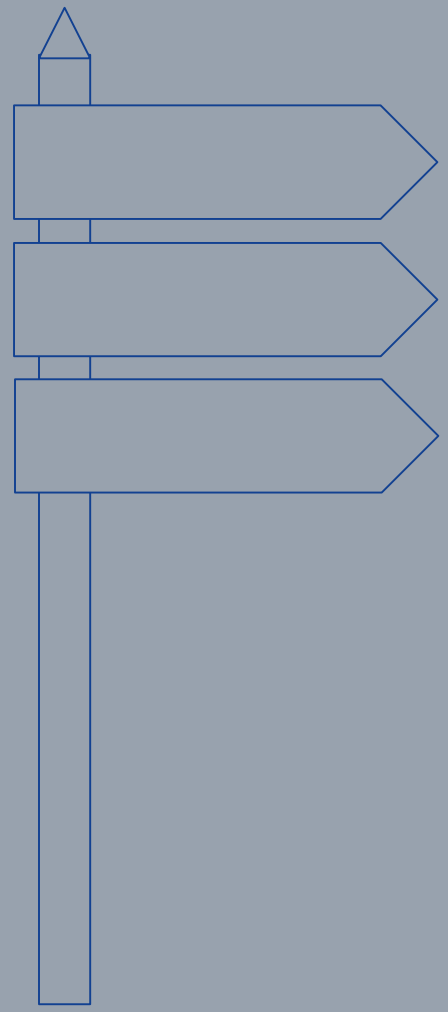

- Measurements in LTE
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Cell Selection Procedure

1) UE creates a candidate list of potential cells to camp on. Two possible search procedures:

- **Initial Cell Selection**

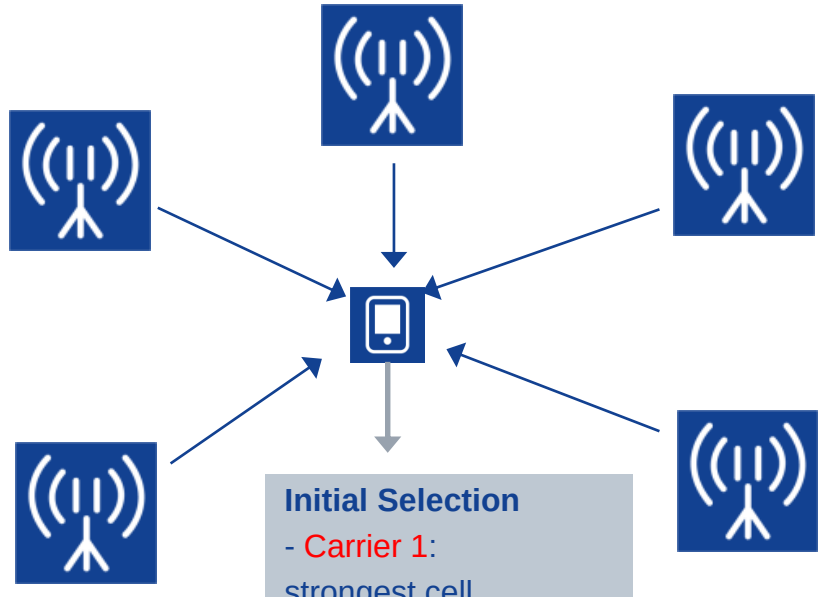
  UE scans all RF channels to find a **suitable cell**. On each carrier, the UE searches for the **strongest cell** and reads information. Once the UE has found the suitable cell for the selected PLMN, the UE creates a **candidate list** consisting of this cell and its neighboring cells as received in **measurement control** information.

- **Stored Information Cell Selection** (optionally)

  This procedure requires information stored from previously received measurement control information elements (cell parameters, carrier frequencies, etc.). After the UE has found a **suitable cell** for the selected PLMN, candidate list is created same as the initial cell selection process.

2) Each cell on the candidate list is evaluated according to the **selection criteria S**

3) After selecting a **suitable cell (S criterion fulfilled)** for camp on, UE reports this event to NAS for registration procedures. If the registration is successful, the UE enters into "**camped normally**" state.



S – Criterion Cell Selection R8

UE selects an eUTRA cell if the **S (selection) criteria** is fulfilled: **Srxlev > 0**

Srxlev = **Qrxlevmeas** – (**Qrxlevmin*** + Qrxlevminoffset**) - Pcompensation

UE measurement (RSRP) | SIB1 Parameter | SIB1 Parameter

Pcompensation = max (PEMAX*** – PUMAX, 0) (dB)

SIB1 Parameter

* Qrxlevmin = LNCEL: *qrxlevmin*

** Qrxlevminoffset = LNCEL: *qRxLevMinOffset* (used only when camped in VPLMN)

*** PEMAX = LNCEL: *pMaxOwnCell*

PUMAX is UE class specific max. UL Tx power (Class3 = 23dBm, Class1 = 31dBm)

LNCEL/SIB: qrxlevmin
Minimum required RSRP level
-140…-44dBm; 2dBm;
Default: -130

LNCEL/SIB: qRxLevMinOffset
Affects minimum required RSRP level
2..16 dB; 2dB;
Default: no value specified

LNCEL/SIB: pMaxOwnCell
Used to calculate Pcompensation for server
-30..33dBm; 1dBm;
Default: 23

S – Criterion Cell Selection R9

UE selects a eUTRA cell if the **S (selection) criteria** is fulfilled: **Srxlev > 0 and Squal > 0**

Srxlev = Qrxlevmeas – (Qrxlevmin + Qrxlevminoffset) - Pcompensation

Squal = Qqualmeas – (Qqualmin + Qqualminoffset)

Pcompensation = max (PEMAX – PUMAX, 0) (dB)

Squal = Cell selection quality value (dB)

Qqualmeas = Measured cell quality value (**RSRQ**)

Qqualmin = Minimum required quality level in the cell (dB)

Qqualminoffset = Offset to **Qqualmin** for a higher priority PLMN while camped normally in a VPLMN

LNCEL/SIB: qQualMinR9
Minimum required RSRQ level
LNCEL; -34... -3;
Default: no value specified

LNCEL/SIB: qQualMinOffsetR9
Affects minimum required RSRP level
LNCEL; 1... 8dB
Default: no value specified

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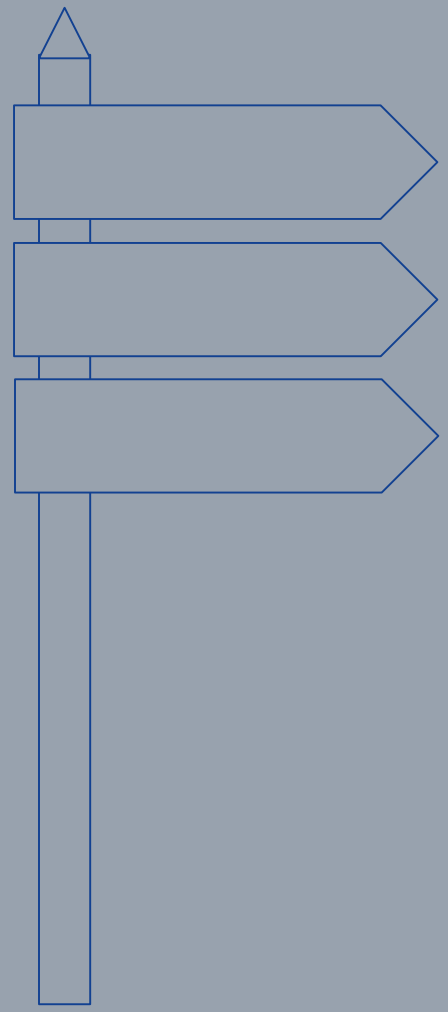

- Measurements in LTE
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- **Cell Reselection**
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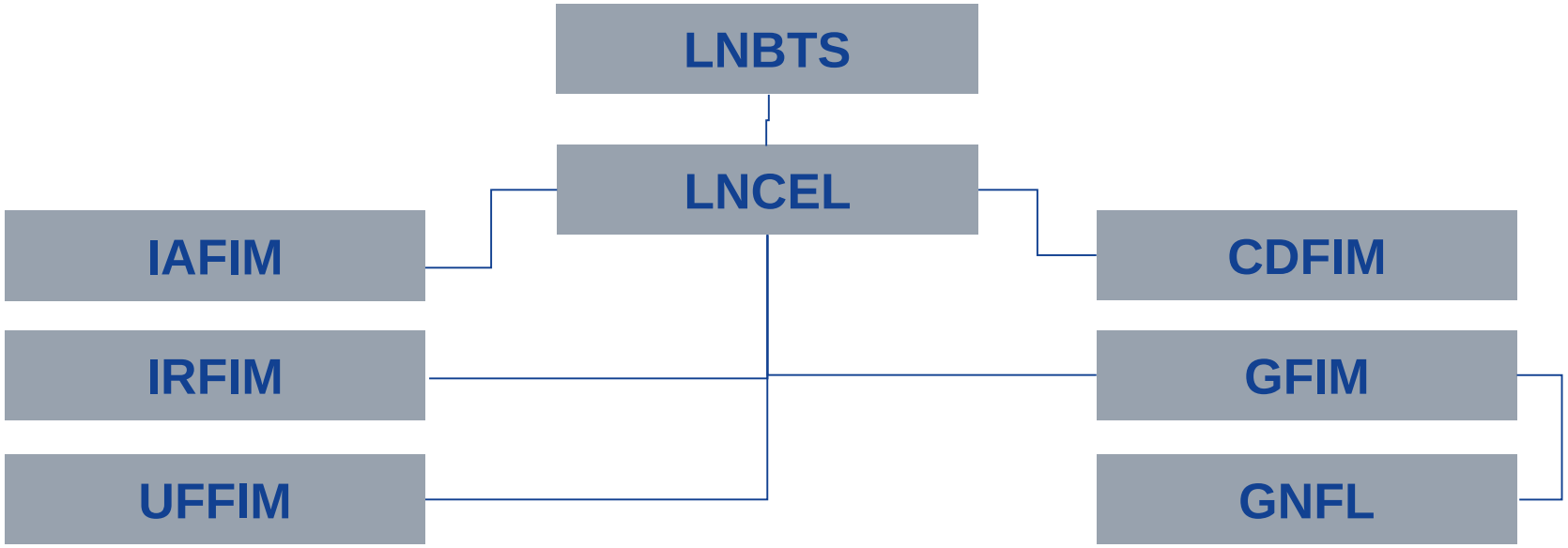
Parameter Objects Structure for Reselection



IAFIM = Intra Frequency Idle Mode

IRFIM = Inter Frequency Idle Mode

UFFIM = UTRAN FDD Idle Mode

GFIM = GERAN Frequency Idle Mode

GNFL = GERAN Neighbor Frequency List

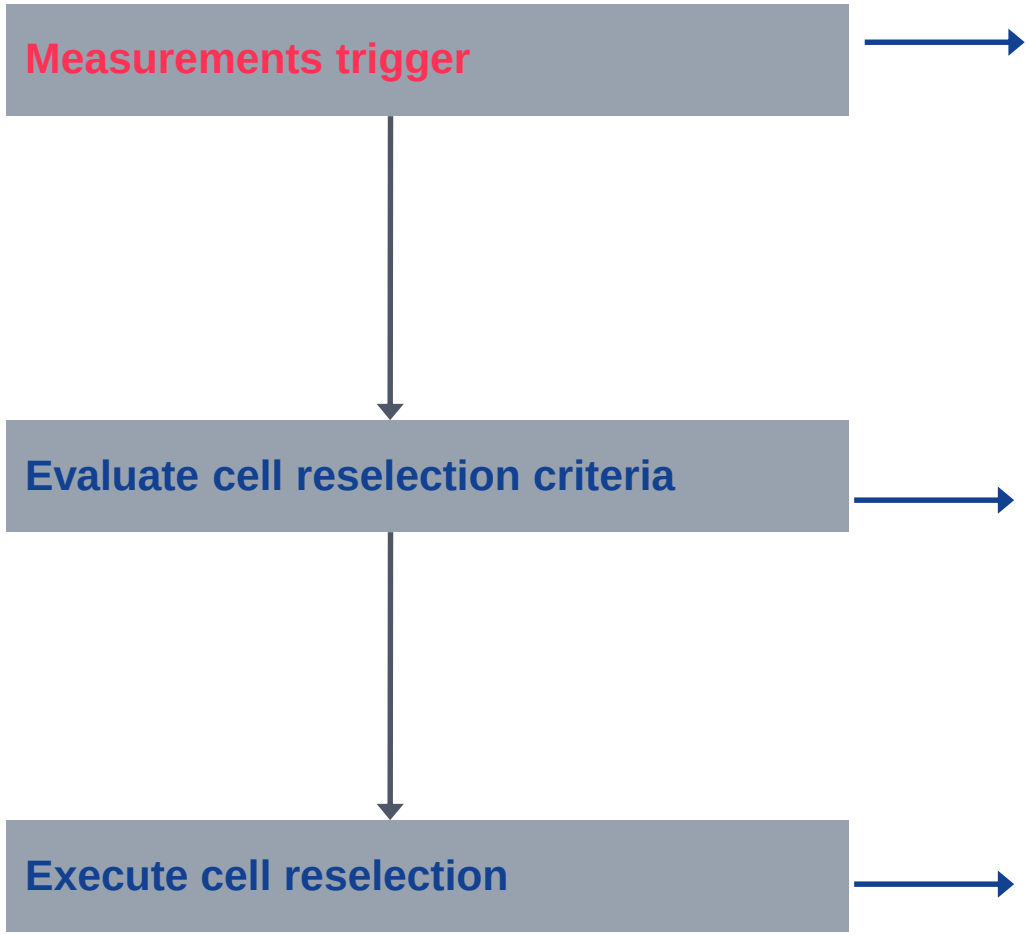
CDFIM = CDMA2000 Frequency Idle Mode

Priority Layer Concept in LTE

- Cell reselection between different LTE frequencies and different RATs is based on priorities
- Priorities could be configured for each LTE frequency (including serving cell) and for each frequency of each RAT
- Priorities are provided to UE via system information (SIB)
- Equal priorities are not applicable for inter-RAT cell reselection (see course RA4703)
- UE performs only cell reselection evaluation for inter-LTE frequency and inter-RAT carriers for which the UE has a priority
- UE camps on a cell which defines the priorities for the other network layers
- The range of absolute priorities is 0..7 (0 is the lowest priority)

LNCEL/SIB: cellReSelPrio	Absolute priority of the serving cell
IRFIM: eutCelResPrio	Absolute priority of EUTRA carrier frequency
UFFIM: uCelResPrio	Absolute priority of the UTRA carrier frequency
GNFL: gCelResPrio	Absolute priority of the GERAN carrier frequency
CDFIM: hrpdCResPrio	Absolute priority of the CDMA2000 HRPD carrier frequency
CDFIM: rttCResPrio	Absolute priority of the CDMA2000 1xRTT carrier frequency

Reselection Process Overview



- Neighbor cells of same or lower priority
  - Measured only when the server's RSRP signal level is below some threshold
- Neighbor cells of higher priority
  - Measured periodically

A neighbor is candidate for reselection only if measurements are good (exact algo depends on priority)

Reselection to the best candidate neighbour

Cell Reselection Summary

	Phase1: Neighbor Measurement Trigger		Phase2: Reselection Criteria (> T_{resel}) (implicit: S_{nei} > 0, both S_{rxlev} & S_{qual})
to Higher	Always		$S_{nei} > Threshold_{high}$
to Equal	Intra-Freq	$S_{serv} < S_{intraSearch}$	Rn > Rs ($Rn = RSRP_{nei}$ - qOffset) ($Rs = RSRP_{serv}$ + qHyst)
	Inter-Freq	$S_{serv} < S_{Non\text{-}intraSearch}$	
to Lower	$S_{serv} < S_{Non\text{-}intraSearch}$		1. $S_{nei} > Threshold_{low}$ 2. $S_{serv} < Threshold_{serv,low}$
Notes:	1. For Rel.8 UEs, S means Srxlev; 2. For Rel.9+ UEs, S means Srxlev or Squal.		1. For Rel.8 UEs, S means Srxlev; 2. For Rel.9+ UEs, S means Squal.

Measurements Trigger – Intra Frequency R8

- When to trigger the measurements of neighbor cells?
- UE is not continuously measuring neighbor cells in search of a better cell to camp on
- UE only performs intra frequency measurements when:

Intra Frequency

Srxlev <= Sintrasearch

Srxlev = Qrxlevmeas – (Qrxlevmin + Qrxlevminoffset) - Pcompensation

SIB3

→ **Qrxlevmeas ≤ *Qrxlevmin* + *Sintrasearch***

(assuming that Qrxlevminoffset and Pcompensation both = 0)

LNCEL/SIB: sIntrasearch
0..62dB; 2dB;
Default: 62

LNCEL/SIB: qrxlevmin
Minimum required RSRP level
-140…-44dBm; 2dBm;
Default: **-130**

	Srxlev > Sintrasearch	Srxlev <= Sintrasearch
sIntrasearch broadcast	Measurements not mandatory	Measurements mandatory
sIntrasearch not broadcast	Measurements mandatory	

Measurements Trigger – Intra Frequency R8

Intra frequency neighbors measured when

Srxlev <= Sintrasearch

Srxlev = Qrxlevmeas – (Qrxlevmin + Qrxlevminoffset) - Pcompensation

Assuming Pcompensation = 0, Qrexlevminoffset = 0

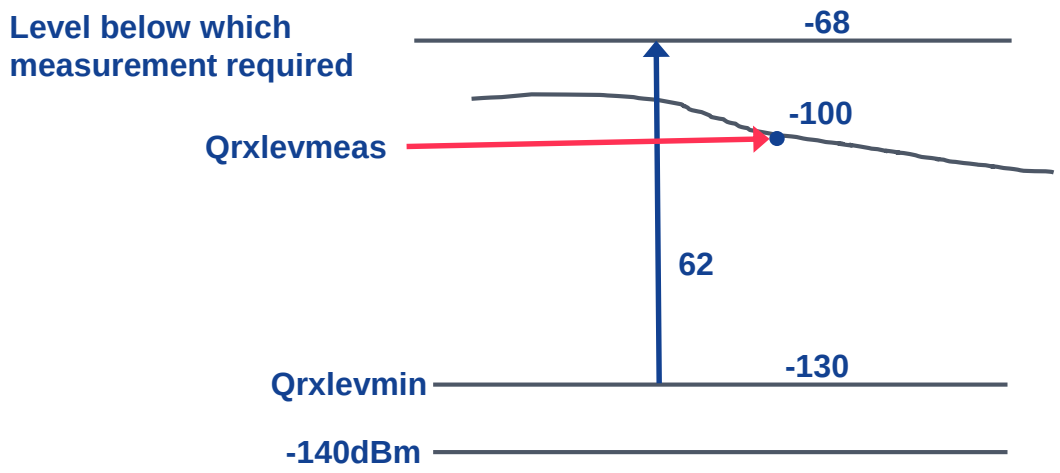
→ Srxlev = Qrxlevmeas – Qrxlevmin

Substituting Srxlev

→ Qrxlevmeas - *Qrxlevmin* ≤ *Sintrasearch*

Rearranging

→ Qrxlevmeas ≤ *Qrxlevmin* + *Sintrasearch*



Example;

Qrxlevmeasured = -100

Qrxlevmin = -130

Sintrasearch = 62

Qrxlevmeas ≤ *Qrxlevmin* + *Sintrasearch*

-100 ≤ -130 + 62

-100 ≤ - 68 = true → measure neighbor cells

Measurements Trigger – Intra Frequency R9

According 3GPP Rel.9 UE starts monitoring of neighbor intra-frequency cells if:

Intra - Frequency:

Srxlev <= SintrasearchP

Or

Squal <= SIntraSearchQ

Srxlev <= **sIntraSearchPR9**

Srxlev = RSRP - **qrxlevmin**

RSRP <= **qrxlevmin** + **sIntraSearchPR9**

Squal <= **sIntraSearchQR9**

Squal = RSRQ – **qQualMinR9**

RSRQ <= **qQualMinR9** + **sIntraSearchQR9**

SIB3

LNCEL/SIB: sIntrasearchPR9

0..62 dB; step 2 dB

Default**: no value specified**

LNCEL/SIB: sIntrasearchQR9

0..31 dB; step 1 dB

Default: no value specified

LNCEL/SIB: qQualMinR9

-34 ..-3 dB; step 1 dB

Default: no value specified

LNCEL/SIB: qrxlevmin

Minimum required RSRP level

-140…-44dBm; 2dBm;

Default: **-130 dBm**

Measurements Trigger – Inter-frequency and Inter-RAT R8

Monitoring of inter-frequency LTE and inter-RAT layers

- According 3GPP Rel.8 UE starts monitoring of neighbor inter-frequency LTE/inter-RAT cells (equal or lower priority) if:

Srxlev <= SnonIntraSearchP

SIB3

Srxlev <= **sNonIntrsearch**

Srxlev = RSRP – **qrxlevmin**

RSRP <= **qrxlevmin** + **sNonIntrsearch**

LNCEL/SIB: sNonIntrsearch
0..62 dB; step 2 dB
Default: 16 dB

Measurements Trigger – Inter-frequency and Inter-RAT R9

Monitoring of inter-frequency LTE and inter-RAT layers

- According 3GPP Rel.9 UE starts monitoring of neighbor inter-frequency LTE/inter-RAT cells (equal or lower priority) if:

Srxlev <= SnonIntraSearchP or Squal <= SnonIntraSearchQ

SIB3

Srxlev <= **sNonIntraSearchPR9**

Srxlev = RSRP – **qrxlevmin**

RSRP <= **qrxlevmin** + **sNonIntraSearchPR9**

Squal <= **sNonIntraSearchQR9**

Squal = RSRQ – **qQualMinR9**

RSRQ <= **qQualMinR9** + **sNonIntraSearchQR9**

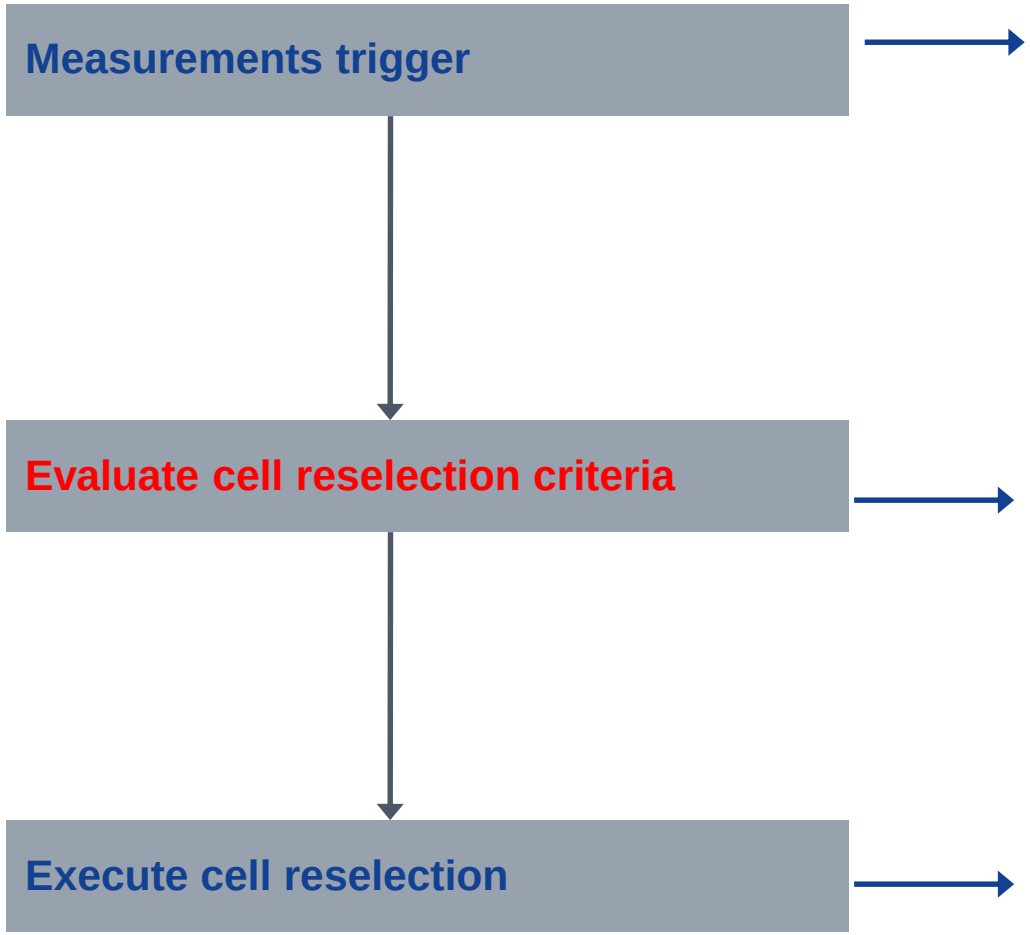
LNCEL/SIB: sNonIntrsearchPR9
0..62 dB; step 2 dB
Default: no value specified

LNCEL/SIB: qQualMinR9
-34..-3 dB; step 1 dB
Default: no value specified

LNCEL/SIB: sNonIntrsearchQR9
0..31 dB; step 1 dB
Default: no value specified

In Rel.9 the measurements of neighbor cells of inter-frequency LTE/ inter-RAT layer of equal and lower reselection priorities then serving cell can be triggered either based on RSRP level of serving cell or based on quality of the serving cell – RSRQ based measurements

Reselection Process Overview



- Neighbor cells of same or lower priority
  - Measured only when the server's RSRP signal level is below some threshold
- Neighbor cells of higher priority
  - Measured periodically

A neighbor is candidate for reselection only if measurements are good (exact algo depends on priority)

Reselection to the best candidate neighbour

R Criterion – Cell Reselection Intra Frequency (Equal Priority)

Ranking criteria for serving and neighboring cells

Serving cell

- $R_S = RSRP_{serving}$ + qHyst

Neighboring cell

- $R_N = RSRP_{neighbor}$ - qOffsetCell

R8: all cells following Srxlev > 0 ranked according R value

R9: all cells following Srxlev > 0 AND Squal > 0 ranked according R value

Cell on top of ranking list selected if

- $R_N > R_S$ during tReselEutr

To calculate Srxlev for intra frequency neighbors, the maximum UE power has to be taken into account like for the server

LNCEL/SIB qHyst
0dB (0) … 24dB(15)
Default: 2 dB

LNCEL/IAFIM qOffsetCell
-24dB (0)...24dB(30)
Default: 0 dB

LNCEL/SIB qrxlevminintraF
-140...-44 dBm, step 2 dBm
Default: no value specified

LNCEL/SIB: qQualMinR9
-34..-3 dB; step 1 dB
Default: no value specified

LNCEL/SIB tReselEutr
0...7 s, step 1 s
Default: 1 s

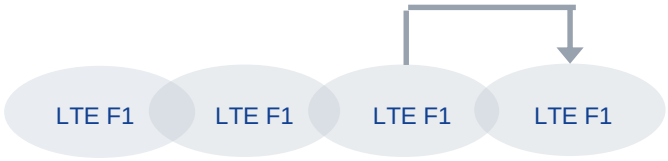
LNCEL/SIB: pMaxIntraF
Used to calculate Pcompensation for intra-frequency neighbors
-30..33dBm; 1dBm;
Default: no value specified

R Criterion – Cell Reselection Intra Frequency (Equal Priority)

Example

Intra-frequency LTE reselection
(always to **equal** priority layer)

LTE F1
priority = 7



Cell selection

LTE (serving cell) RSRP > **qrxlevmin** = **-130dBm**

and

LTE (serving cell) RSRQ **> qQualMinR9** = **-19dB**

Measurements of equal priority intra-frequency LTE layer started:

LTE(Scell) RSRP <= qrxlevmin + **sIntraSearchPR9** = -130dBm **+ 62dB** = -78dBm

or

LTE(Scell) RSRQ <= qQualMinR9 + **sIntraSearchQR9** = -19dB **+ 31dB** = 12dB

(condition met always as the highest possible RSRQ is -3dB)

Reselection triggered:

LTE (Ncell) RSRP > **qrxlevminintraF** = **-130dBm**

and

LTE (Ncell) RSRQ > **qQualMinR9** = **-19dB**

and

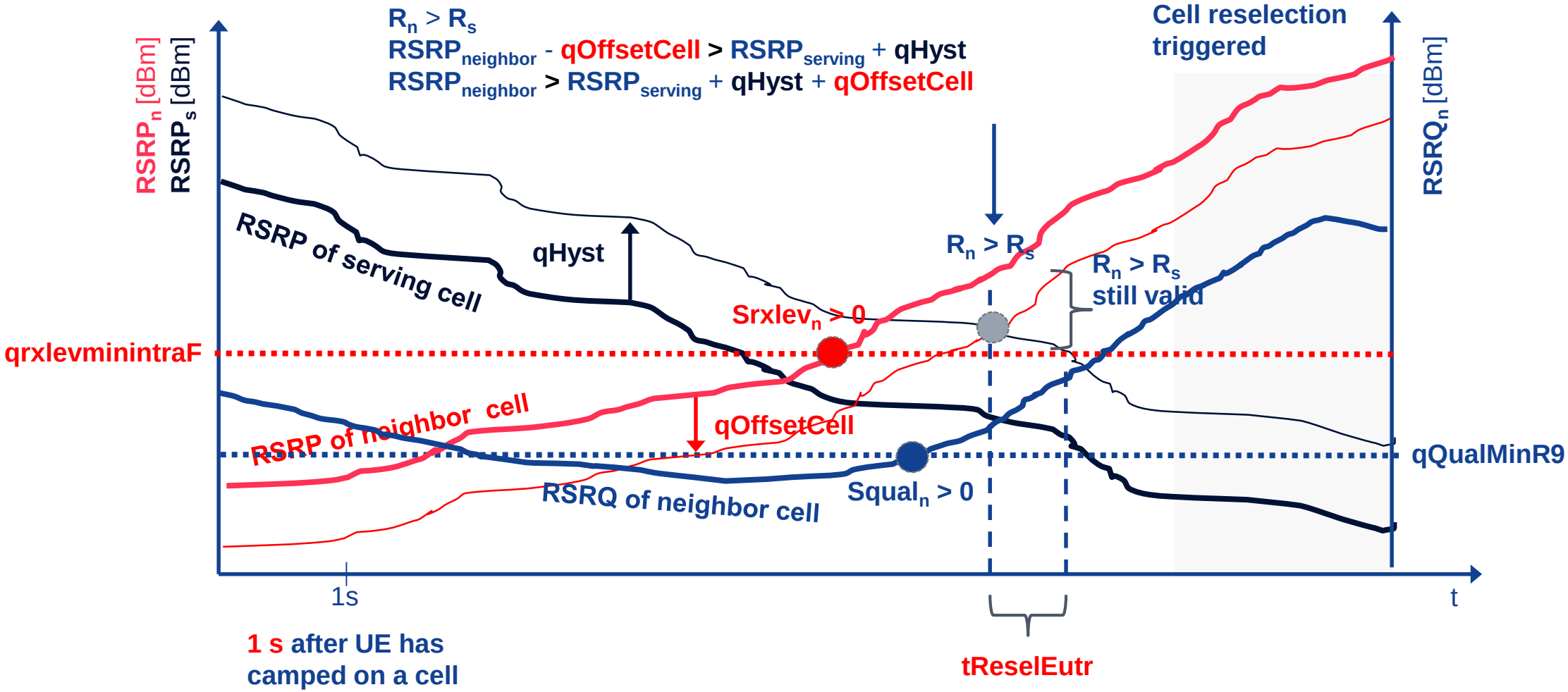
$RSRP_n$ - **qOffsetCell** > $RSRP_s$ + **qHyst** =>

$RSRP_n$ – **0dB** > $RSRP_s$ + **3dB** =>

$RSRP_n$ > $RSRP_s$ + **3dB**

R Criterion – Cell Reselection Intra Frequency (Equal Priority)

Example



R Criterion – Cell Reselection Inter Frequency with Equal Priority

Very similar to intra frequency case

But additional frequency offset configurable for neighboring carrier

Serving cell

- $R_S = RSRP_{serving} + qHyst$

Neighboring cell

- $R_N = RSRP_{neighbor} - qOffsetCell - qOffsetFrequency$

R8: all cells following Srxlev > 0 ranked according R value

R9: all cells following Srxlev > 0 AND Squal > 0 ranked according R value

Cell on top of ranking list selected if

- $R_N > R_S$ during interTResEut

To calculate Srxlev for inter frequency neighbors, the maximum UE power has to be taken into account like for intra frequency ones

LNCEL/SIB qHyst
0dB (0) … 24dB(15)
Default: 2 dB

LNCEL/IRFIM qOffsetCell
-24dB (0)...24dB(30)
Default: no value specified

LNCEL/IRFIM qOffFrq
-24dB (0)...24dB(30)
Default: 0 dB

LNCEL/IRFIM qrxlevmininterF
-140...-44 dBm, step 2 dBm
Default: -130 dBm

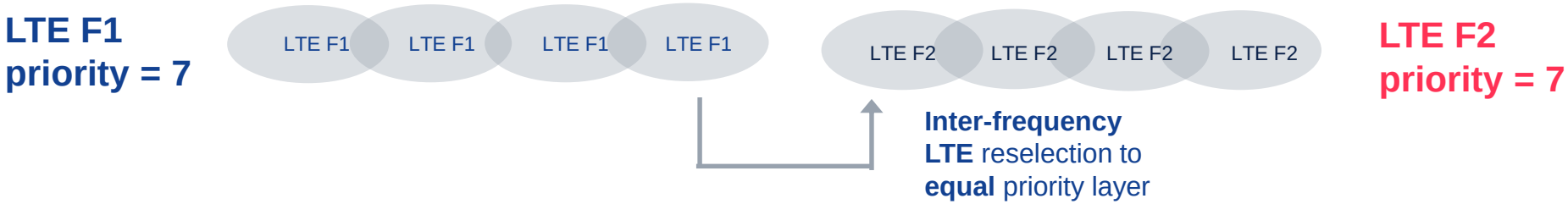
LNCEL/IRFIM: qQualMinR9
-34..-3 dB; step 1 dB
Default: no value specified

LNCEL/IRFIM: interTResEut
0 – 7s; step 1s
Default: 1 s

LNCEL/IRFIM: pMaxInterF
Used to calculate Pcompensation for inter-frequency neighbors
-30..33dBm; 1dBm;
Default: no value specified

R Criterion – Cell Reselection Inter Frequency with Equal Priority

Example



Measurements of equal priority inter-frequency LTE layer started:

LTE(serving cell) RSRP <= qrxlevmin + **sNonIntraSearchPR9** = -130dBm **+ 14dB** = -116dBm

or

LTE(serving cell) RSRQ <= qQualMinR9 + **sNonIntraSearchQR9** = -19dB **+ 6dB** = -13dB

Reselection triggered:

LTE (neighbor cell) RSRP > **qRxLevMinInterF** = **-130dBm**

and

LTE (neighbor cell) RSRQ > **qQualMinR9** = **-19dB**

And

$RSRP_{neighbor}$ – (**qOffCell** + **qOffFrq**) > $RSRP_{serving}$ + **qHyst** =>

$RSRP_n$ – (**0dB** + **0dB**) > $RSRP_s$ + **3dB** =>

$RSRP_n$ > $RSRP_s$ + **3dB**

LNCEL/SIB qHyst
0dB (0) … 24dB(15)
Default: 2 dB

LNCEL/IRFIM qOffsetCell
-24dB (0)...24dB(30)
Default: no value specified

LNCEL/IRFIM qOffFrq
-24dB (0)...24dB(30)
Default: 0 dB

R Criterion – Cell Reselection Inter Frequency to Higher Priority

Condition 1 on neighbouring :

- **R8: all cells following Srxlev > 0**
- **R9: all cells following Srxlev > 0 AND Squal > 0**

Condition 2 on neighbouring :

- **R8: SrxlevNeighbor >ThreshX,high during interTResEut**
- **R9: SqualNeighbor >ThreshX,highQ during interTResEut**
- **R9 &** threshServingLowQ not broadcast in SIB3 **: SrxlevNeighbor >ThreshX,high during interTResEut**

LNCEL/IRFIM: interFrqThrH
Threshx,high
0..62 dB; step 2 dB;
Default: 10 dB

LNCEL/IRFIM: interFrqQThrHighR9
Threshx,highQ
0..31 dB, step 1 dB
Default: no value specified

R Criterion – Cell Reselection Inter Frequency to Lower Priority

Condition 1 on neighbouring :

- **R8: all cells following Srxlev > 0**
- **R9: all cells following Srxlev > 0 AND Squal > 0**

But for server additionally required

- **R8: SrxlevServer < threshServingLow during interTResEut**
- **R9: SqualServer < threshServingLowQ during interTResEut**

But for neighbor additionally required

- **R8: SrxlevNeighbor >ThreshX,low during interTResEut**
- **R9: SqualNeighbor >ThreshX,lowQ during interTResEut**
- **R9** threshServingLowQ not broadcast in SIB3 **: SrxlevNeighbor >ThreshX,low during interTResEut**

LNCEL/SIB: threshSrvLow
ThreshServingLowQ
0..62 dB; step 2 dB;
Default: 4 dB

LNCEL/SIB: threshServingLowQR9
ThreshServingLowQ
0..31 dB, step 1 dB
Default: no value specified

LNCEL/IRFIM: interFrqThrL
Threshx,low
0..62 dB; step 2 dB;
Default: 6 dB

LNCEL/IRFIM: interFrqQThrLowR9
Threshx,lowQ
0..31 dB, step 1 dB
Default: no value specified

R Criterion – Cell Reselection Inter Frequency to Higher/Lower Priority

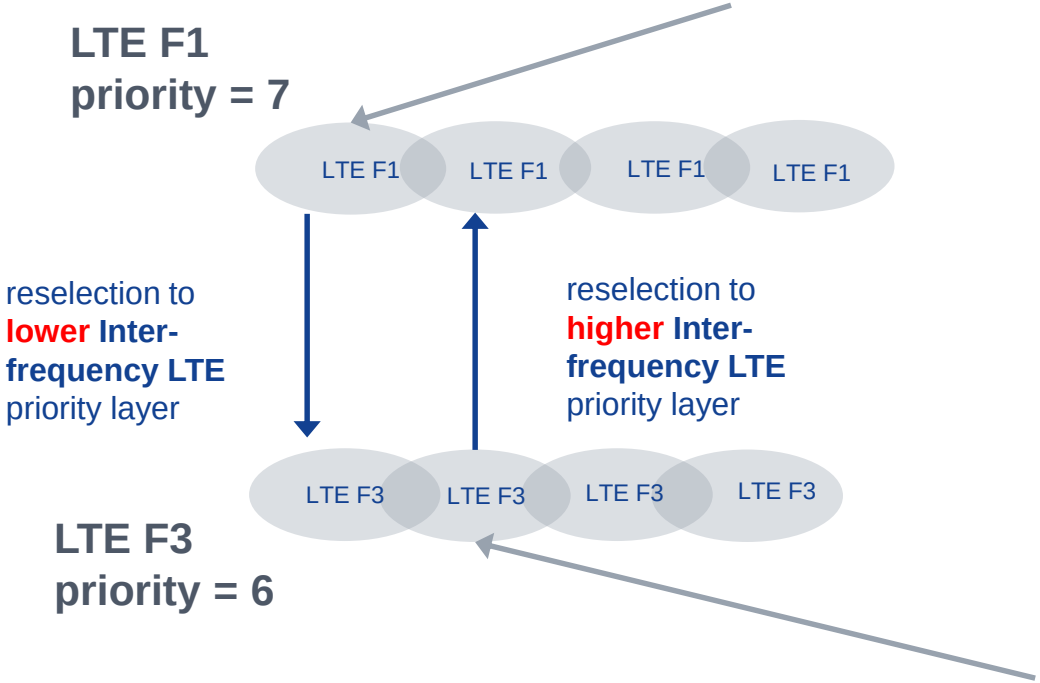
Example

Reselection towards **lower** priority frequency layer triggered:

LTE (serving cell) RSRQ < **qQualMinR9** + **threshServingLowQR9 = -19dB** + **2dB =** -17dB

and

LTE (neighbor cell) RSRQ > **qQualMinR9** + **interFrqQThrLowR9 = -19dB** + **4dB =** -15dB



LNCEL/IRFIM: qQualMinR9
-34..-3 dB; step 1 dB
Default: no value specified

LNCEL/SIB: threshServingLowQR9
ThreshServingLowQ
0..31 dB, step 1 dB
Default: no value specified

LNCEL/IRFIM: interFrqQThrLowR9
Threshx,lowQ
0..31 dB, step 1 dB
Default: no value specified

LNCEL/IRFIM: interFrqQThrHighR9
Threshx,highQ
0..31 dB, step 1 dB
Default: no value specified

Reselection towards **higher** priority frequency layer triggered:

LTE (neighbor cell) RSRQ > **qQualMinR9**+ **interFrqQThrHighR9 = -19dB** + **4dB =** -15dB

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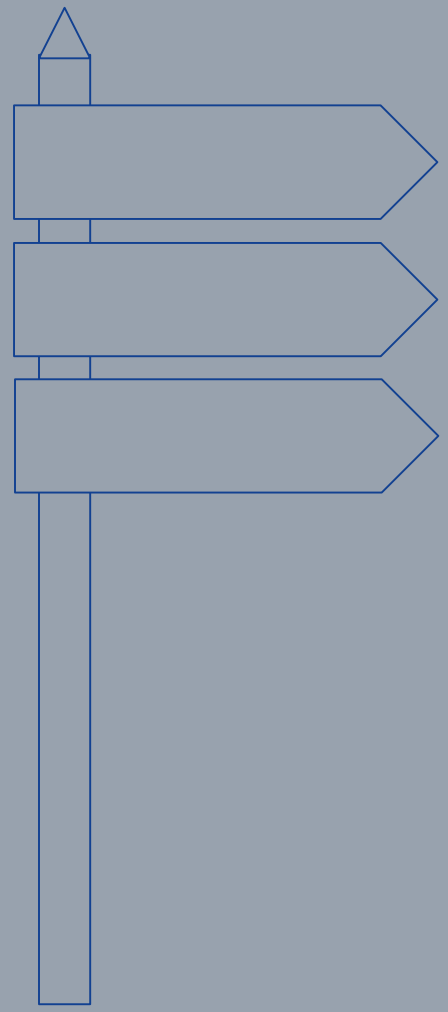

- Measurements in LTE
- Cell Selection
- Cell Reselection
- **Mobility States**
- SIB Parameters
    - Intra Frequency Mobility
    - Inter Frequency Mobility

Mobility States

- Possible mobility states are: high, medium & normal mobility speed UE's.
- Mobility state depends on number of (different cells) cell reselections.
- It is detected by a UE:
  - Parameters broadcast in SIB3:

LNCEL/SIB: tEvaluation	LNCEL/SIB: nCellChgHigh	LNCEL/SIB: nCellChgMed
30s (0), 60s (1), 120s (2), 180s (3), 240s (4) Default: 30s	1..16 Default: 10	1..16; 1; Default:5

  - If the number of (different cells) cell reselections during the past time period *tEvalulation* exceeds *nCellChgHigh*, **high mobility** has been detected.
  - If the number exceeds *nCellChgMed*, and not *nCellChgHigh*, **medium mobility** has been detected.
  - Else **Normal Mobility** is considered
  - REMARK: Mobility could be further applied separately for intra, inter frequency, inter-RAT scenarios

Mobility States

For High & medium mobility states, cell ranking criteria will be modified to consider a scaling factor:

High mobility:

Multiply **Qhyst** by "Speed dependent ScalingFactor for Qhyst for high mobility state“ **(qHystSfHigh)**

LNCEL/SIB: qHystSfHigh
-6 dB (0), -4 dB (1), -2 dB (2), 0 dB (3);
Default: -4

Multiply **tReselection** by "Speed dependent ScalingFactor for TreselectionRAT” for high mobility state for RAT cells. (RAT = EUTRAN, UTRAN, GERAN). **(celResTiFHM)**

LNCEL/SIB: celResTiFHM
0.25 (0), 0.5 (1), 0.75 (2), 1 (3);
Default: 0.5

Medium mobility:

Multiply **Qhyst** by "Speed dependent ScalingFactor for Qhyst for medium mobility state“ **(qHystSfMed)**

LNCEL/SIB: qHystSfMed
-6 dB (0), -4 dB (1), -2 dB (2), 0 dB (3); -
Default : -4dB

Multiply **tReselection** by "Speed dependent ScalingFactor for TreselectionRAT for medium mobility state for RAT cells. (RAT = EUTRAN, UTRAN, GERAN). **(celResTiFMM)**

LNCEL/SIB: celResTiFMM
0.25 (0), 0.5 (1), 0.75 (2), 1 (3);
Default: 0.5

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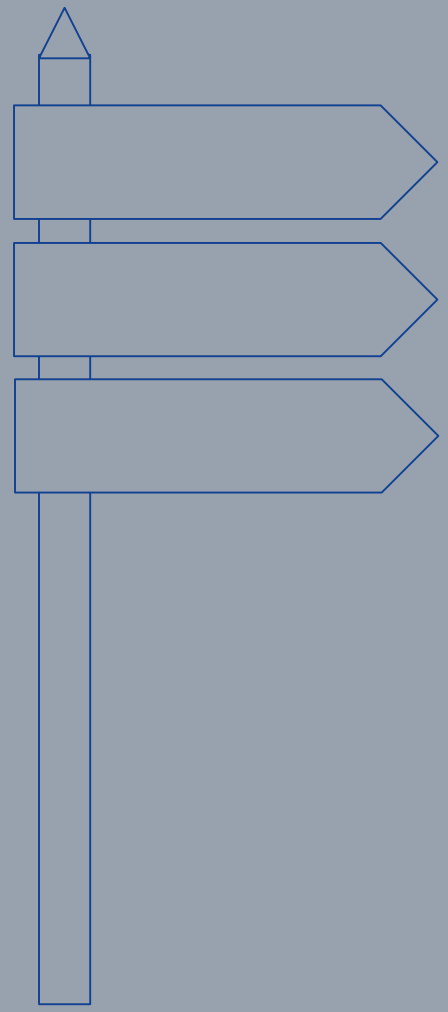


- Measurements in LTE
- Cell Selection
- Cell Reselection
- Mobility States
- **SIB Parameters**
  - **Intra Frequency Mobility**
  - **Inter Frequency Mobility**

Idle Mode Mobility Intra-Frequency (SIB4)

Broadcast of SIB 4 is optional – no need to broadcast any intra-frequency neighbor cells

- UE is able to complete cell re-selection with SIB3 information

eUTRAN SIB4 informs about LTE idle mode neighbors

- Physical Cell Identifier (PCI) of neighbor cell can be broadcast
- cell (neighbor) individual re-select offset can be broadcast

SIB4 also informs about *blacklisted* cells (BC)

- A UE is not allowed to re-select a *blacklisted* cell
- Up to 16 groups of cells (PCIs) can be *blacklisted*
- UE will not measure BC cells in connected mode
  - » UE will never be instructed from eNB to handover to a blacklisted cell

LNCEL/IAFIM: physCellIdNcl

PCI is a unique cell identification in a neighboring cell list

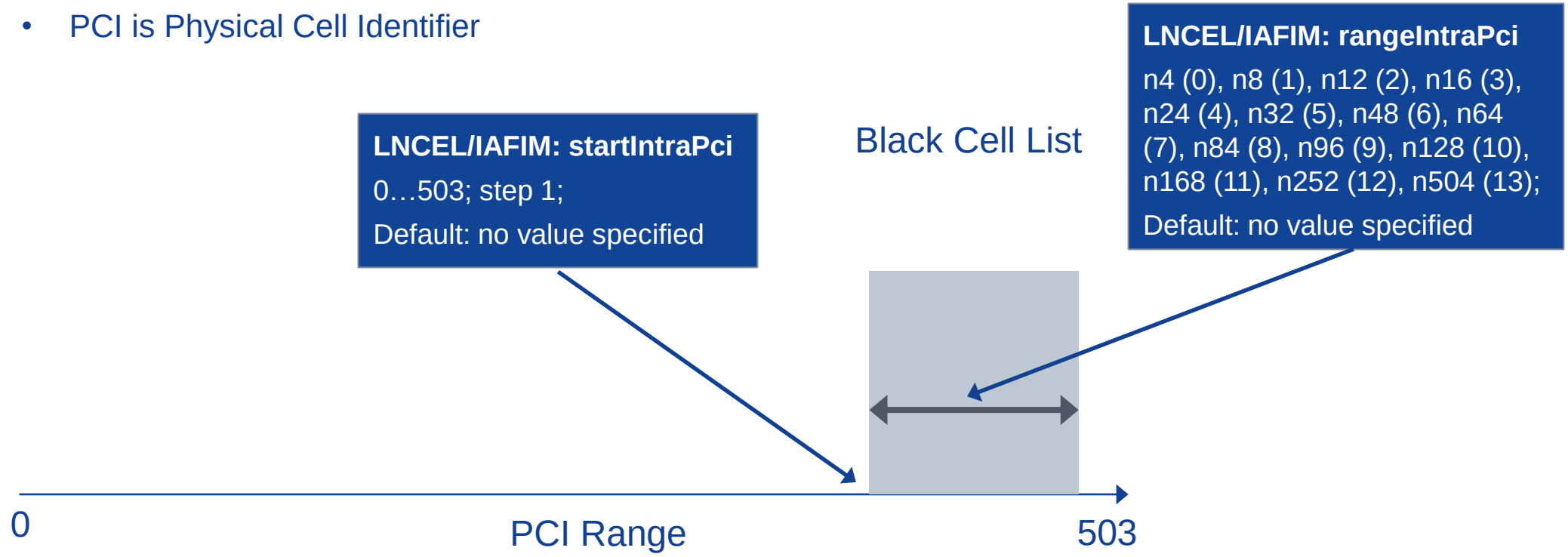
0…503, step 1;

Default: no value specified

Idle Mode Mobility Intra-Frequency (SIB4)

BlacklListed Cells –> the feature prohibits UE to camp on group of cells

- UE shall not consider Black Listed Cells to camp on
- Operator can control Black Cell List
- Range of blacklisted cells must be consecutive
- Range can be defined with parameter *rangeIntraPci*
- Start of range can be defined with parameter *startIntraPci*
- PCI is Physical Cell Identifier



Idle Mode Mobility Inter-Frequency (SIB5)

IRFIM Object Parameters

- irfimId 8 frequency layers could be defined
- dlCarFrqEut f2 Frequency number
- eutCelResPrio relative cell prio for ranking
- intFrBCList (structure: 2 parameters per neighbor)
  - rangeInterPci
  - startInterPci
- intFrNCList (structure: 2 parameters per neighbor)
  - physCellIdNcl
  - qOffCell
- interFrqThrH
- interFrqThrL
- interPresAntP Antenna port 1 used
- interTResEut
- measBdw f2 Bandwidth
- pMaxInterF
- qOffFrq Frequency specific offset
- qRxLevMinInterF minimum coverage criteria
- tResEutSF (structure: 2 parameters)
  - eutResTiFHM
  - eutResTiFMM

NOKIA