

GSM MS in Idle & Connected Mode Behavior and Pre Optimization

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- 1. Idle Mode**
2. Handover
3. Location Update
4. Paging Processing
5. Access Processing
6. Other parameters
7. GSM Pre Optimization

Idle Mode Operation

When?

- When the MS is switched ON
- When there is no dedicated connection

MS switched ON

Why?

- To camp on the best suitable cell

Search RF channels
to find BCCH carrier

Why to camp on a specific cell?

- For MS to receive system info from the NW on DL
- For MS to be able to initiate a call whenever needed
- For the NW to be able to locate the MS when there is a MT call/SMS

Check that the PLMN
& cell is allowed

MS camps on
the best
suitable cell

Idle Mode Tasks

- PLMN selection
- Cell selection & re-selection
- Location updates

ID's and ID Codes

Parameter

LAI (locationAreaId)

- | | |
|-----------------------------|--|
| • MCC (Mobile Country Code) | 0 ... 999 |
| • MNC (Mobile Network Code) | 0 ... 99,
0... 999 (optional 3-digit MNC) |
| • LAC (Location Area Code) | 1 ... 65533 |

BSIC (bsIdentityCode)

- | | |
|-----------------------------|---------|
| • NCC (Network Colour Code) | 0 ... 7 |
| • BCC (BTS Colour Code) | 0 ... 7 |

CI (cell-ID)

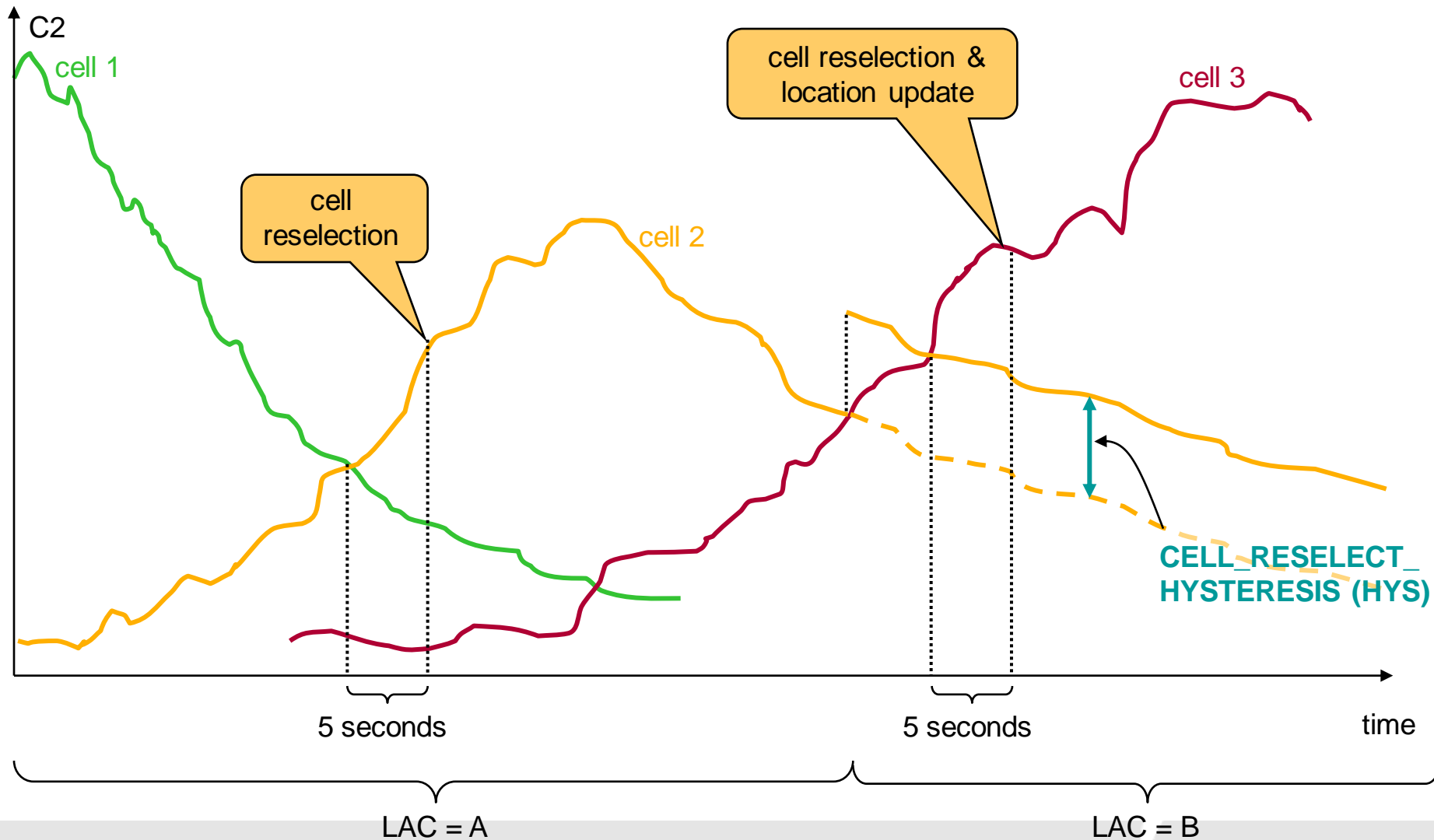
0 ... 65535

CGI (Cell Global Identity)

MCC + MNC + LAC + CI

Cell Reselection Based on Pathloss

Criterion C2



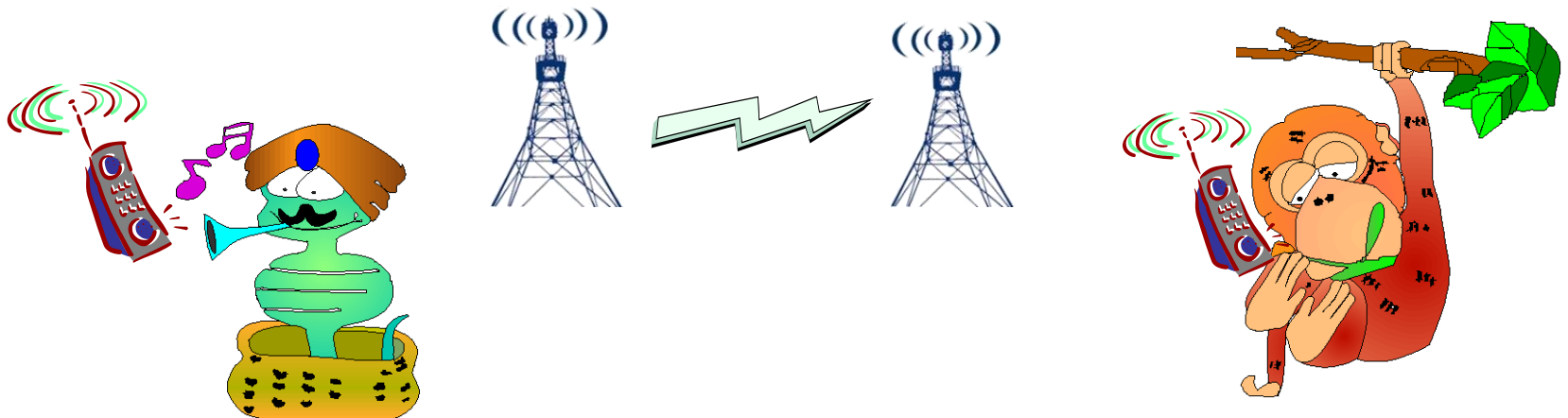


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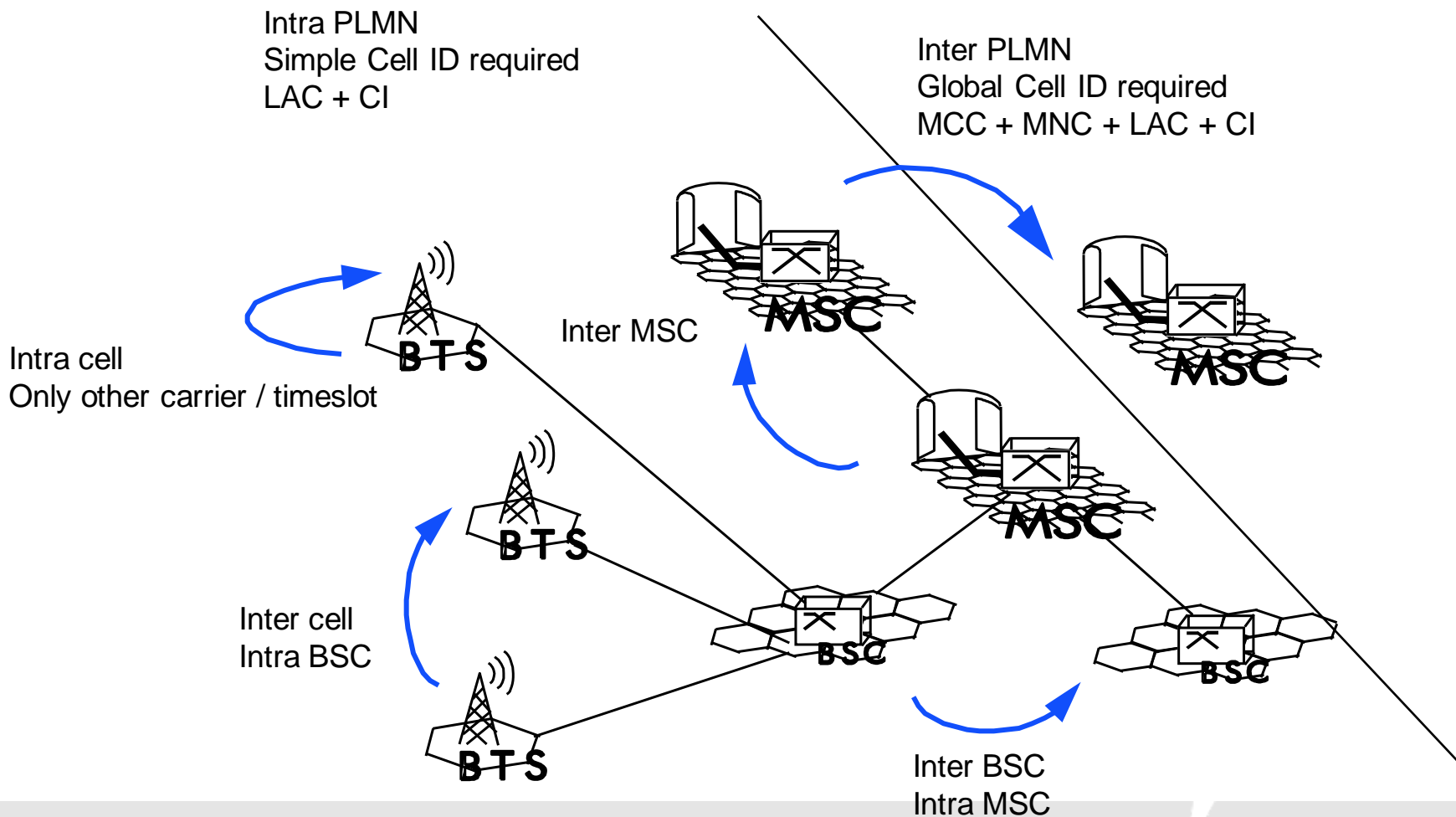
1. Idle Mode
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Purpose

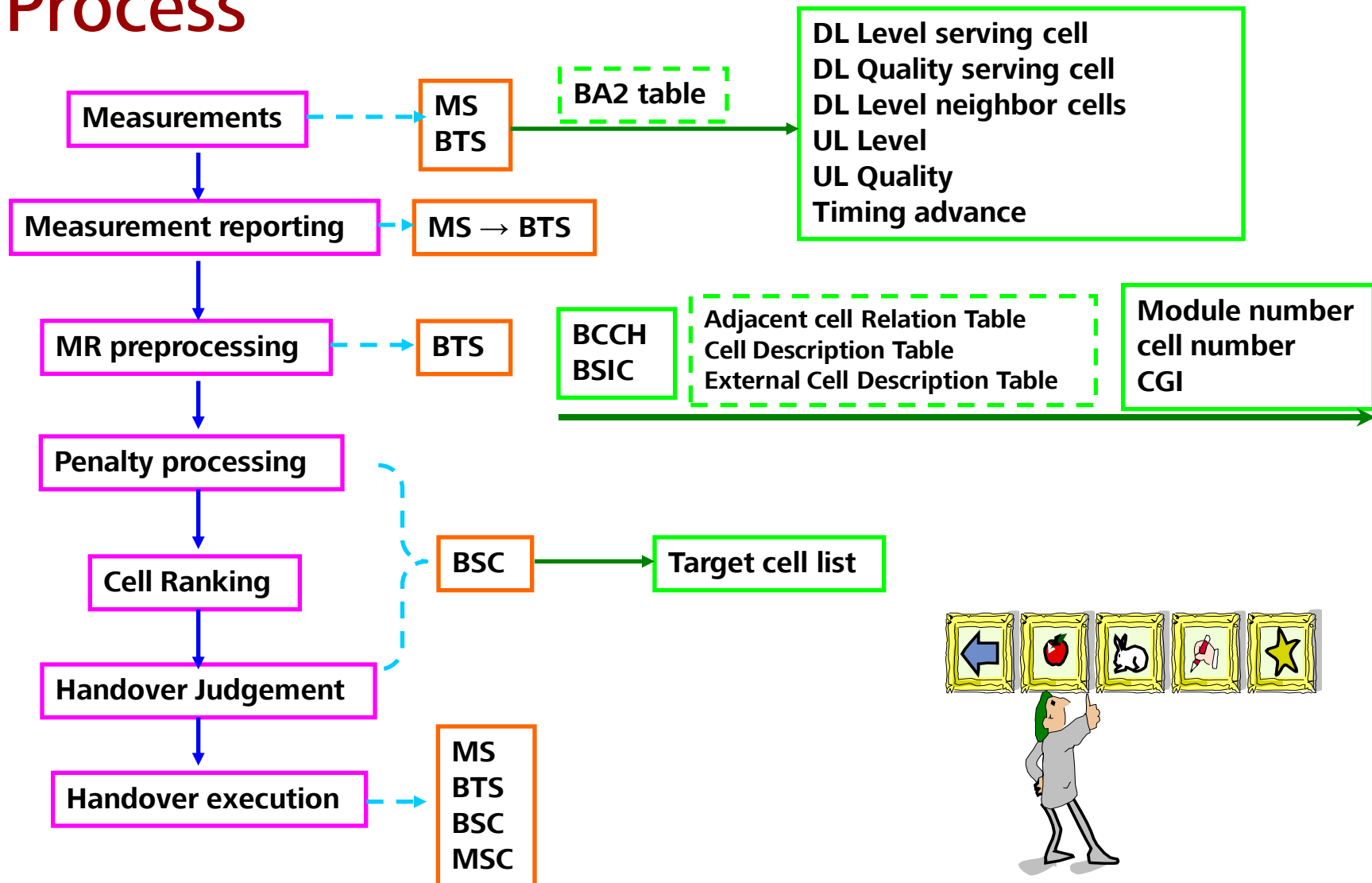
- ★ Movement → **Continuity** → Cell
- ★ Interference → **Quality** → Channel
- ★ Traffic → **Congestion** → Border / Layer



Handover Types

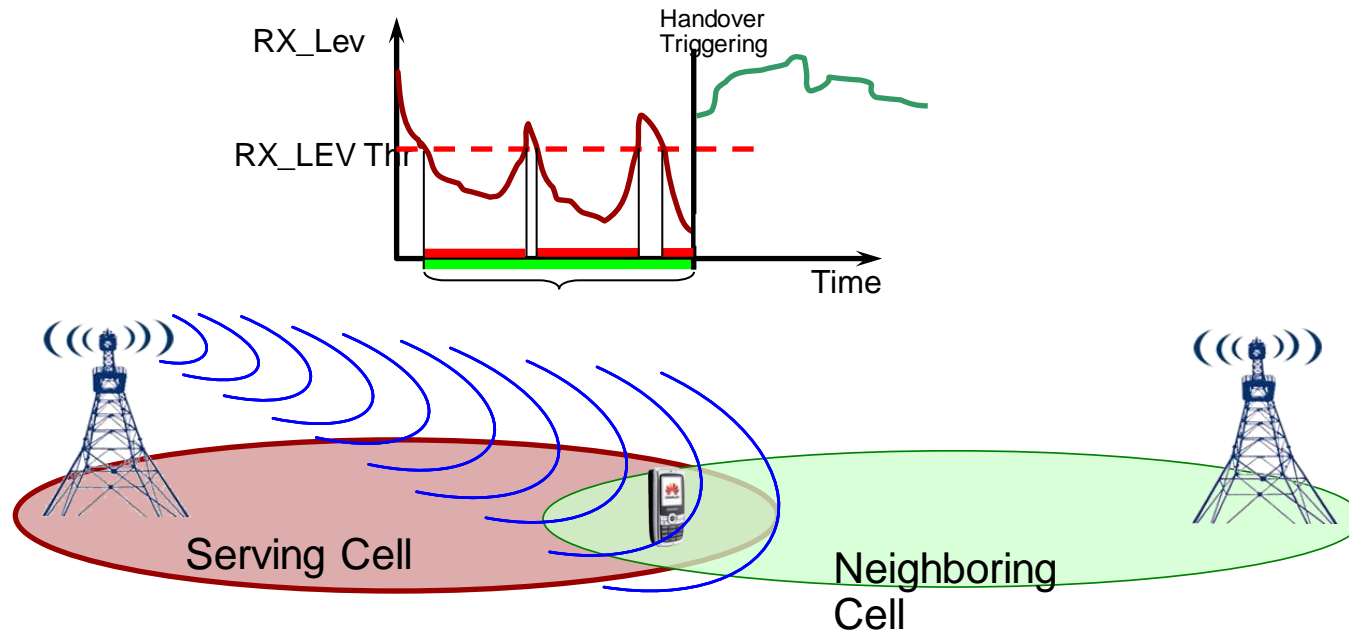


Process



Handover

- Edge Handover





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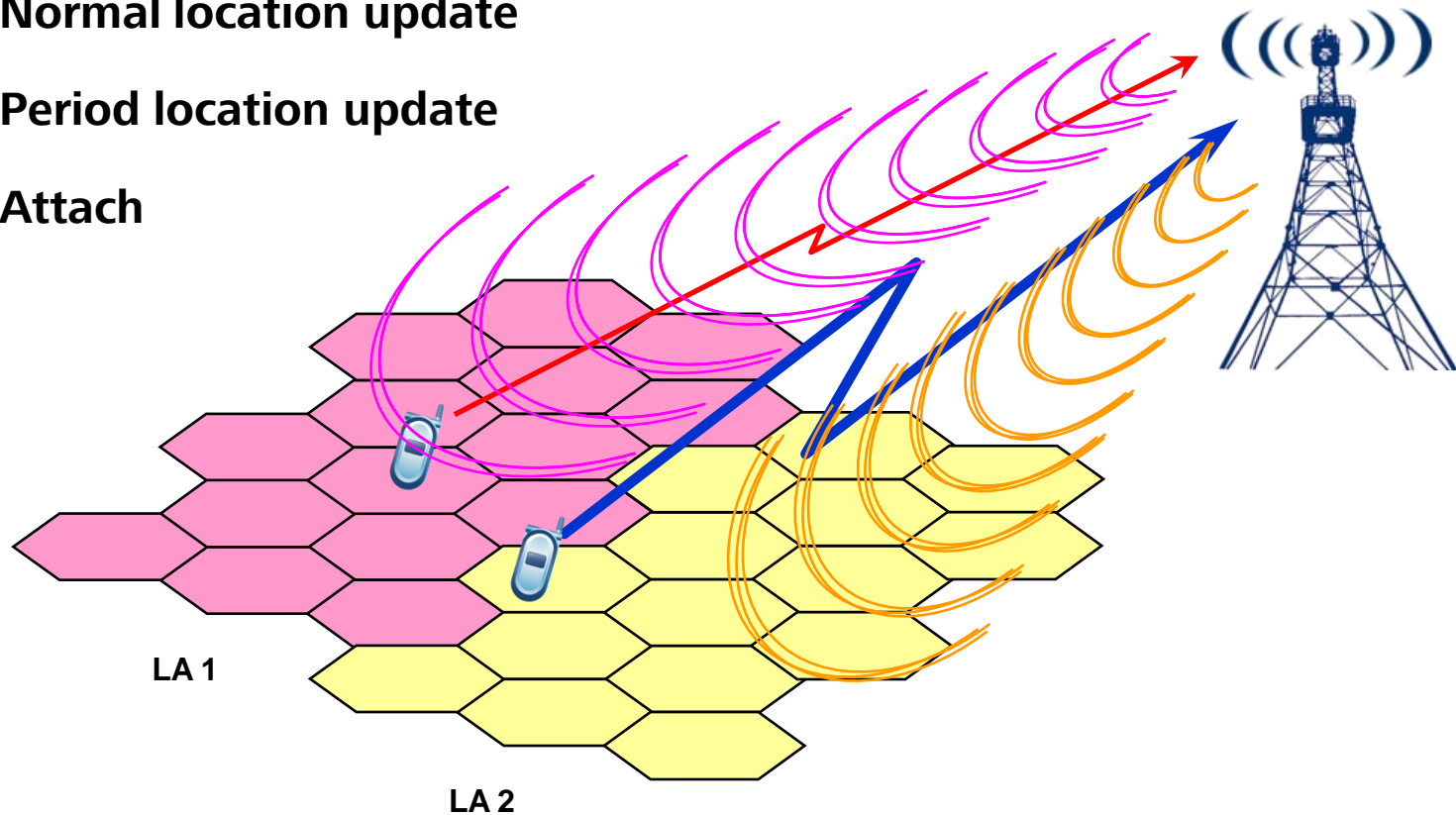
Definition of Location Update

- Inform the system the LA (Location Area) where the MS is located.

Normal location update

Period location update

Attach



Location Area

- A location area is a set of base stations that are grouped together to optimize signaling
- Location Area is a group of cells and the subscriber is paged in this area.
- One or more base station controllers are used to serve each Location Area but by a single MSC.
- Each Location Area has a unique Location Area Identity number.



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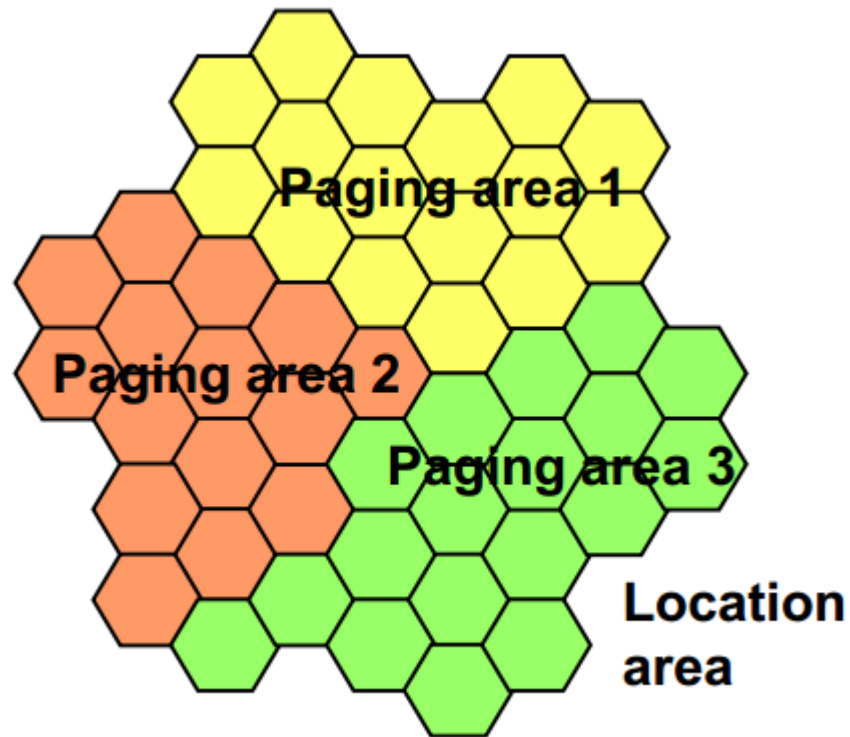
Paging

- Paging is the one-to-one communication between the mobile and the base station
- Paging is a procedure the network uses to find out a subscriber's location before actual call establishment.
- Paging is used to alert the mobile station of an incoming call.

Paging Strategies

- Location Area Splitting in Paging Areas
 - Mobile registers only when entering the Location Area; it doesn't register when moving between Paging Areas of one Location Area.
 - For an incoming call, paging messages are broadcasted in the Paging Areas according to a sequence determined by different strategies.

Location Area Splitting in Paging Areas





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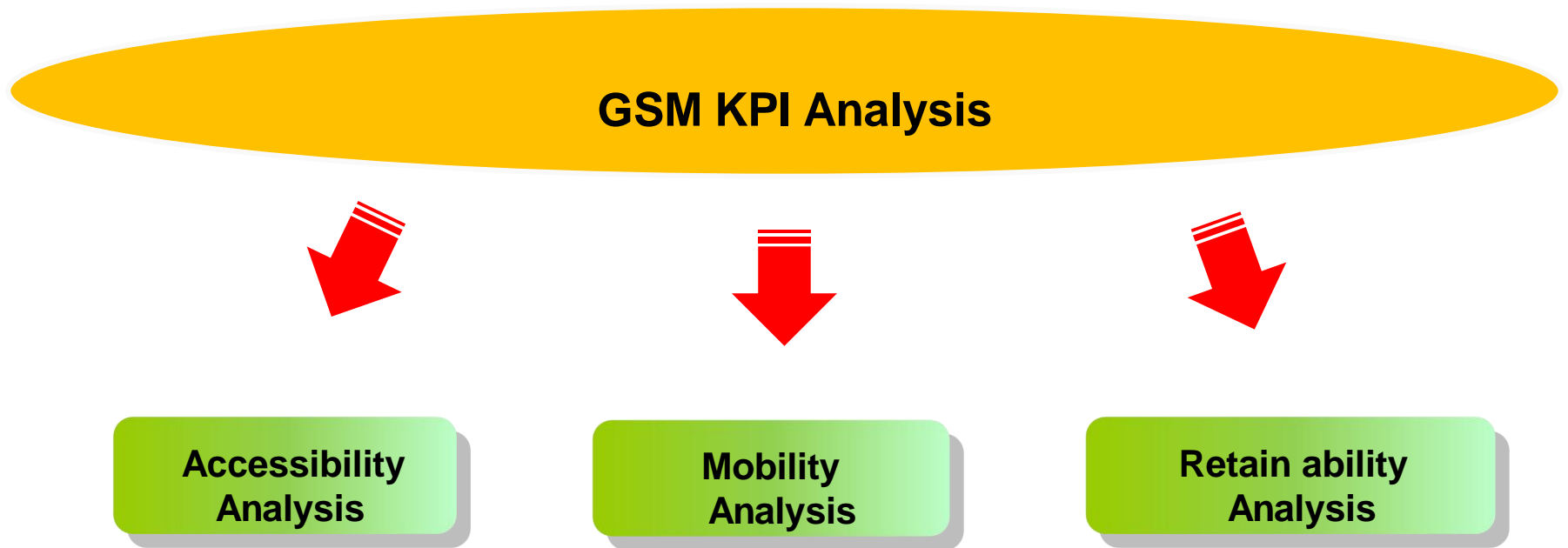
Agenda

GSM Main KPIs

GSM DT Analysis

GSM DT Problems

GSM Main KPIs (1/2)



GSM DT Analysis (2)

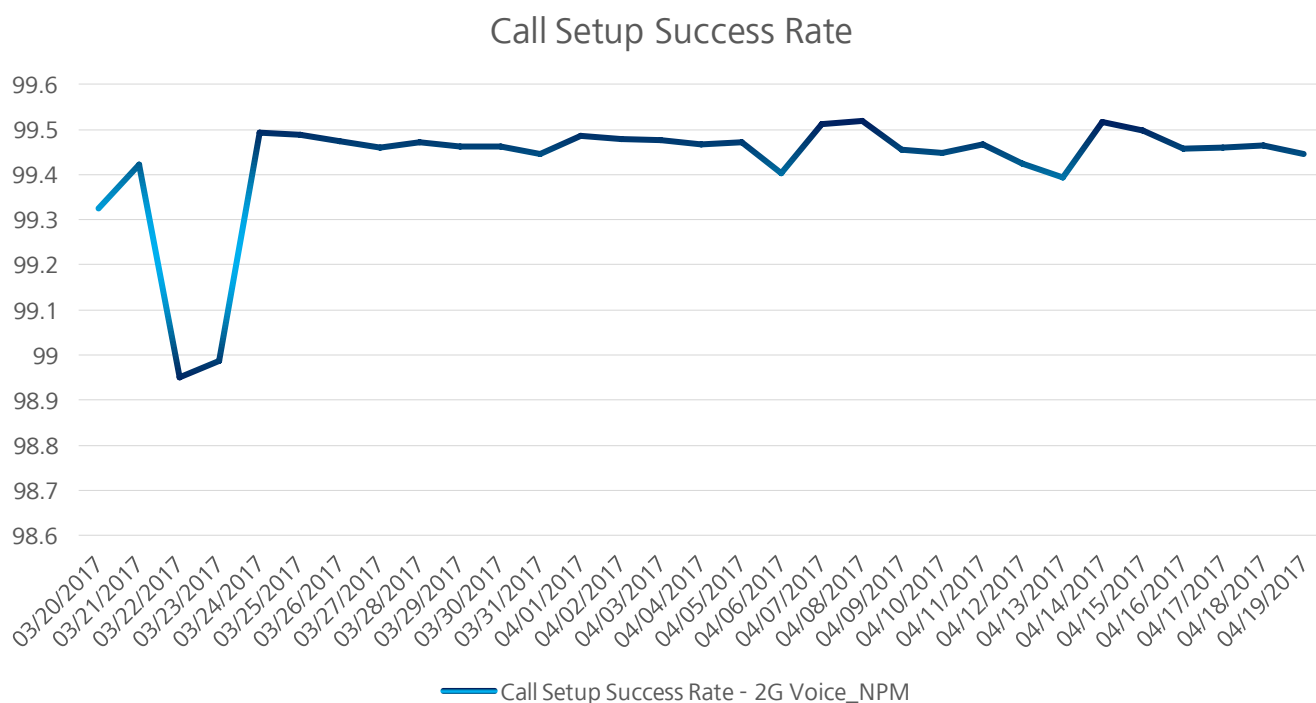
- **DT Output :**
- Rx Level.
- Rx Qual.
- C/I.
- TA.
- Serving Cell. (Cell Name & CGI "MCC, MNC, LAC, CI")
- MOS.
- Neighbor Measurements "Rx Level".
- Events (Call Setup Fail, HO Fail, Call Drop).

GSM DT Analysis (3)

- Rx Level : Received Signal Level. "0 - -110 dbm"
 - 0- -60 Excellent , -60 - -70 Good , -70 - -80 Average , -80 - -90 Poor , -90 - -110 Worst
-
- Rx Qual : Voice Signal Quality. "0 - 7"
 - 0- 3 Excellent , 3 - 4 Average , 4 - 7 Worst
- C/I : Carrier to Interference Ratio. "-5 - 32"
 - 32 - 12 Excellent , 12 - 9 Average , 9 - 5 Poor , 5 - -5 Worst
- TA : Timing Advance. "0 - 63" 1 Step Size = 550m.
- MOS: Mean opinion score. "1 - 5"
 - 1 Worst , 2 Poor , 3 Average , 4 Good , 5 Excellent

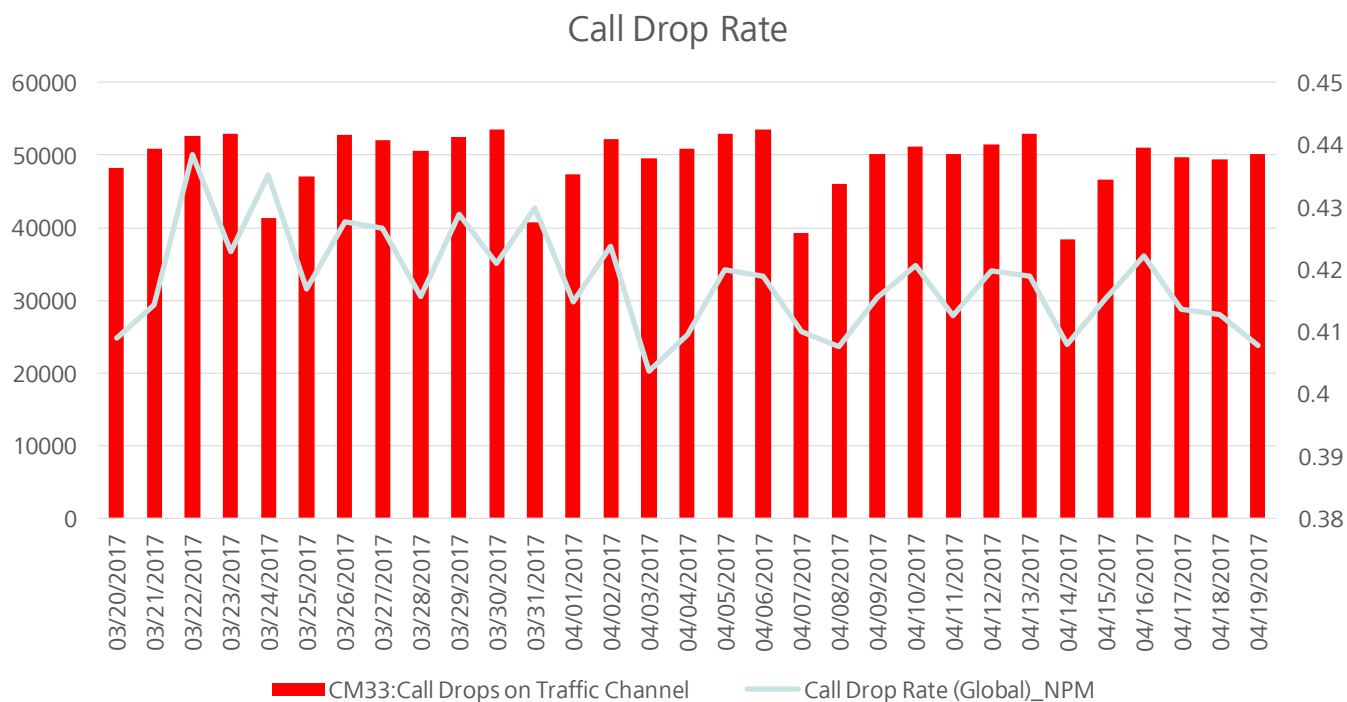
Example of KPI (4)

- Voice CSSR



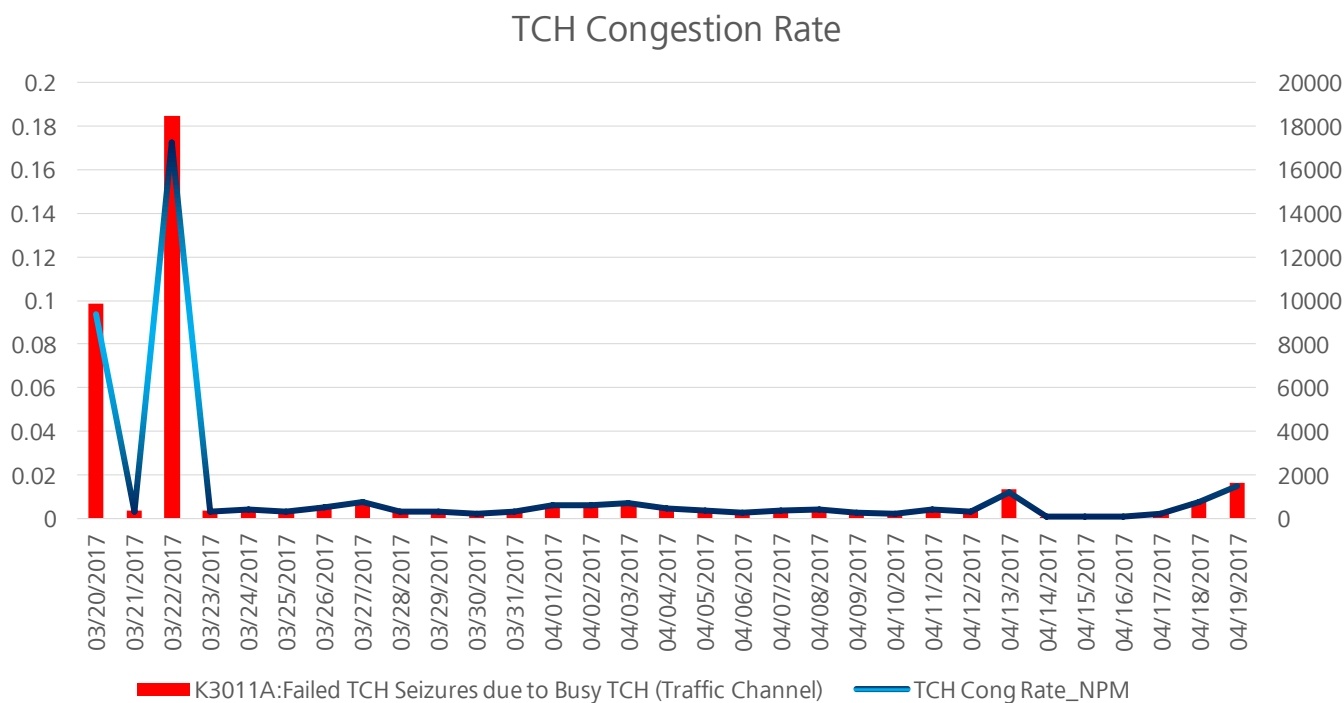
Example of KPI (2)

- Call Drop Rate



Example of KPI (3)

- TCH Congesiton



Agenda

GSM Main KPIs

GSM DT Analysis

GSM DT Problems

GSM DT Problems (1)

- **Rx Quality Problems :**

- Poor Coverage.
- Missing Neighbor.
- Close Frequency Reuse.
- HW Problem at the receiver.
- Congestion.
- Overshooting.

- **Call Drop :**

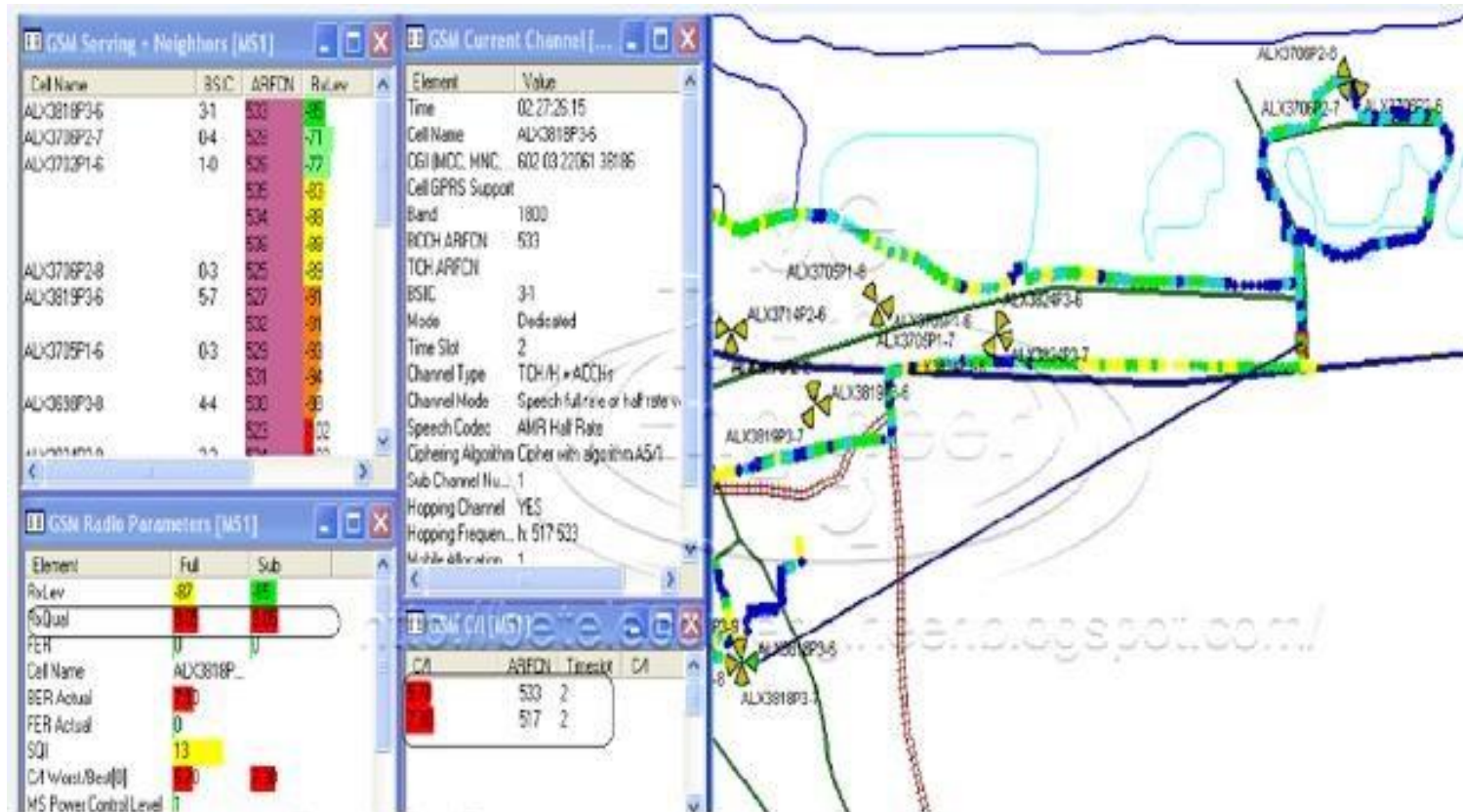
- Poor Coverage.
- Bad Quality.
- Delayed HO.
- Missing Neighbors
- Congestion.
- HW Problems & Path Balance.
- Radio Link Timeout or SACCH Multi-Frame expires.
- Power Problem.

GSM DT Problems (2)

- **Call Setup Fail :**
- Poor Coverage.
- Bad Quality.
- HW Problems.
- Transmission Problem.
- Congestion on SD or TCH.

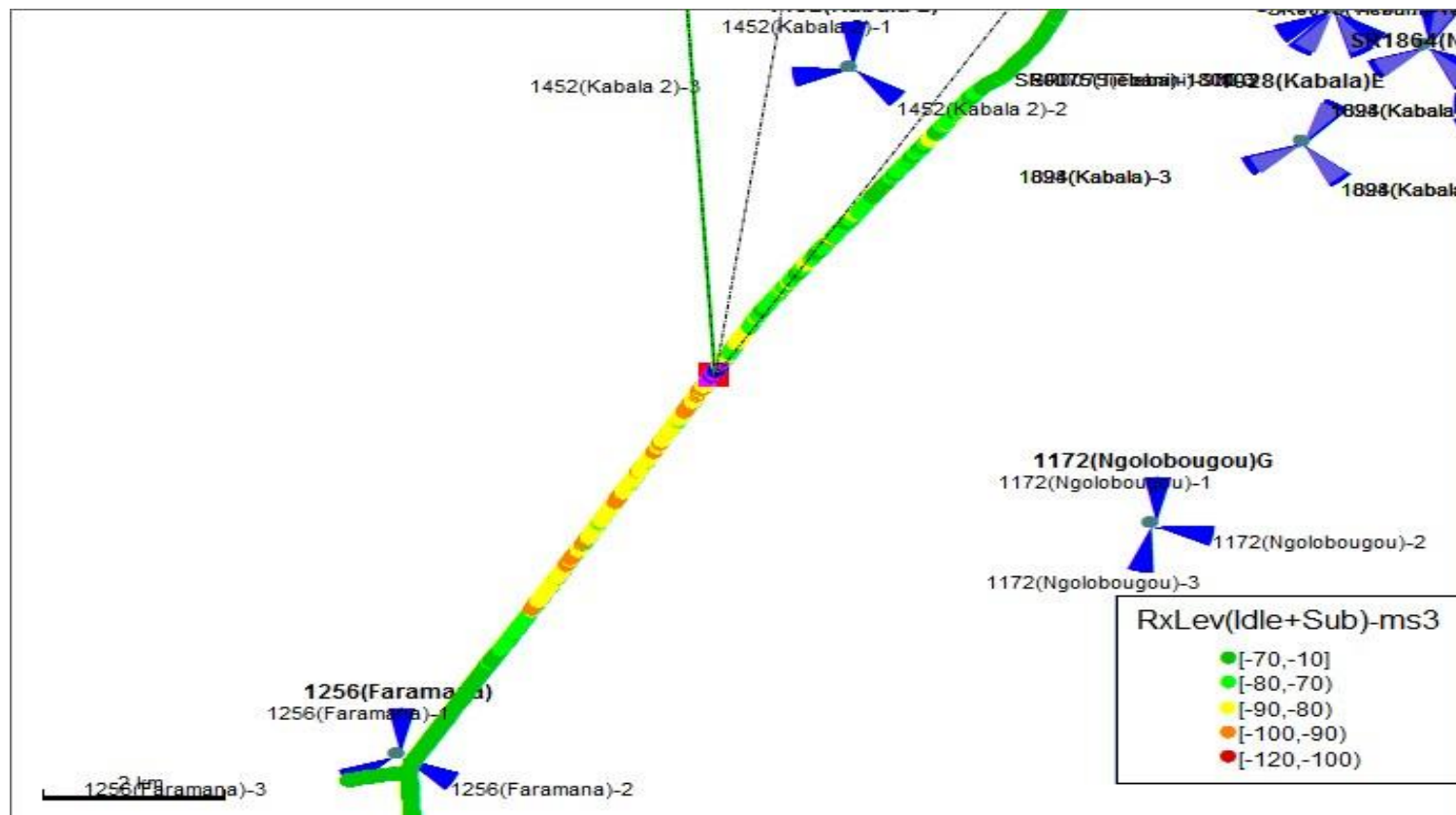
GSM DT Problems (3)

- Overshooting :



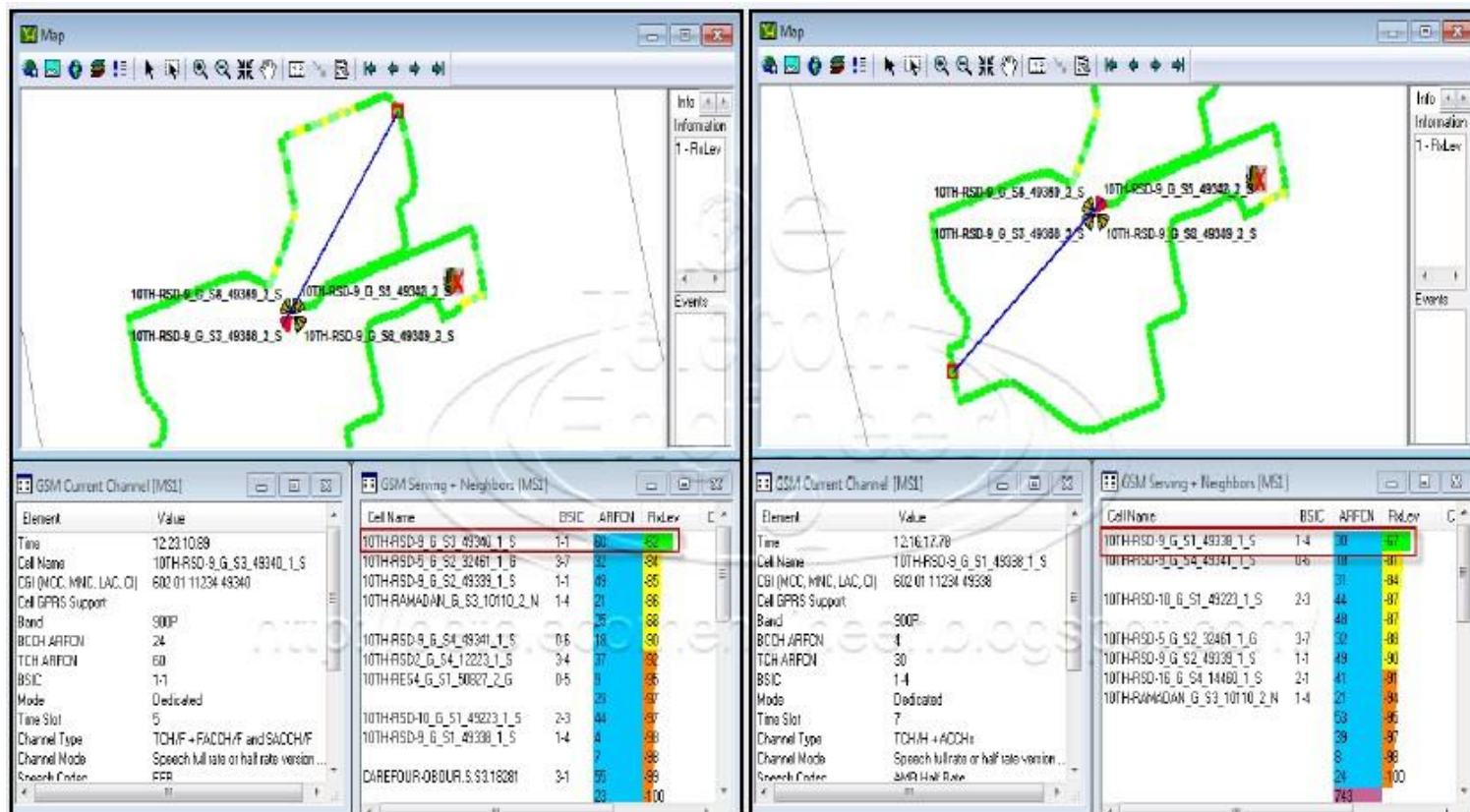
GSM DT Problems (4)

- Missing Neighbor :



GSM DT Problems (5)

- Cross “Swapped” Sector :



Thank you

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