

Agenda Item: 11
Source: Nokia
Title: Intra-frequency Cell Reselection Algorithm
Document for: Decision

1 INTRODUCTION

In this contribution, we propose a cell re-selection algorithm to be used for intra-frequency cell re-selection. This algorithm shall be used for intra-frequency cell re-selection in idle mode and in RRC connected mode on the common channels.

2 INTRA-FREQUENCY CELL RE-SELECTION ALGORITHM

Cell re-selection to a neighbour cell on the same frequency shall be implemented in the UE as a two phased method. The phases are illustrated in figures 1,2 and 3.

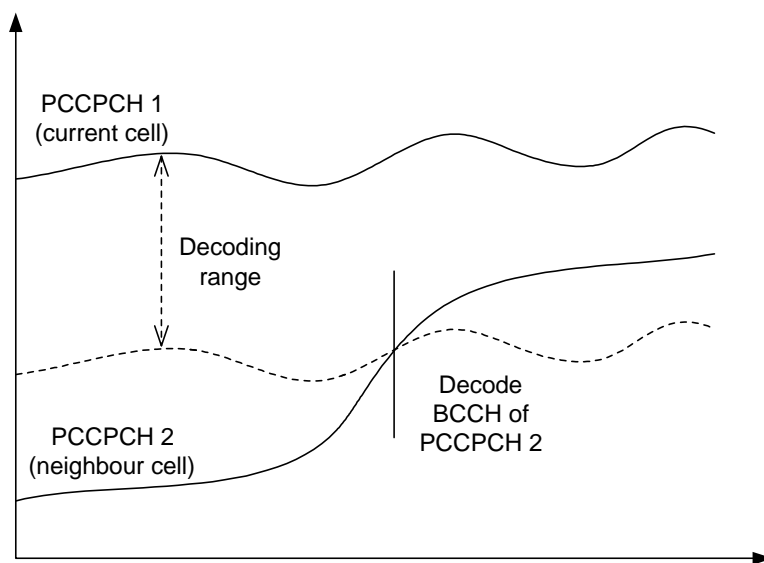


Figure 1: Cell enters BCCH decoding range

In the first phase illustrated in figure 1, the UE shall detect that the measured quantity of the strongest neighbouring cell has entered the BCCH **decoding range**. The decoding range is defined as a relative threshold in reference to the strength of the current cell, where the UE is camped. The UE acquires this parameter from BCCH broadcasts in the current cell.

When a neighbouring cell enters the decoding range, the UE shall decode the BCCH of that cell and receive the **cell re-selection offset** broadcast in that cell. The cell re-selection offset is relatively static, mandatory parameter, which can be positive or negative or zero. It is used to adjust the measurement result of the cell for network planning purposes. The cell-reselection offset and the decoding range are of similar magnitude.

The cell re-selection offset is broadcast together with an **offset expiration timer**. This mandatory parameter indicates, how often the UE shall refresh its cell re-selection offset

value of the given cell. The UE shall not repeat the decoding of the BCCH of the neighbouring cell before the expiration timer has expired even if the neighbouring cell moves in and out of the decoding range.

The offset expiration time shall be relatively long so as not to decrease the UE standby time.

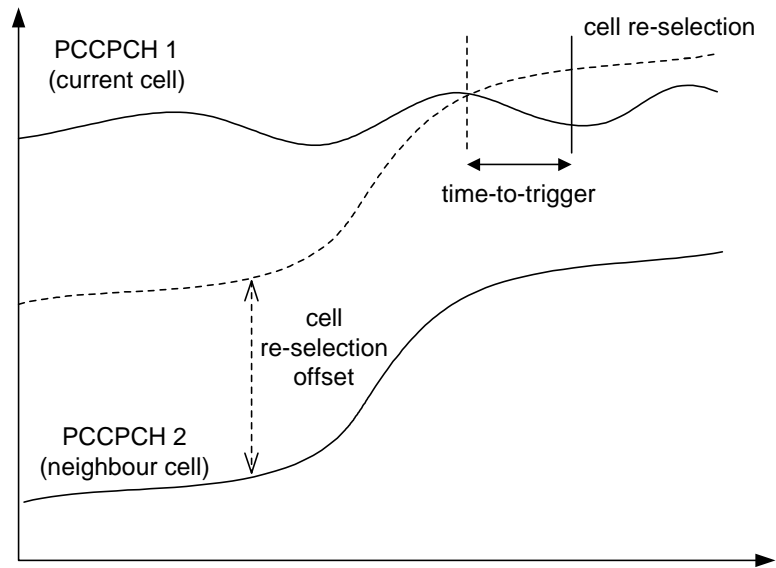


Figure 2: Offset adjusted measurement result of neighbour cell exceeds that of current cell, usage of time-to-trigger

In the second phase, illustrated by figure 2, the UE adjusts the the measurement result of the neighbour cell with the cell re-selection offset acquired from the BCCH of that cell. If this offset adjusted measurement result exceeds the measurement result of the current cell, the UE performs cell re-selection.

Cell re-selection can be delayed by using a **time-to-trigger** parameter, which is broadcast on the BCCH of the current cell. The time-to-trigger parameter defines the minimum time period that the the adjusted measurement result of the neighbour cell shall exceed the measurement result of the current cell, before the UE shall perform cell re-selection. The time-to-trigger value used in FDD intra-frequency cell re-selection should be quite short in order to minimise interference effects.

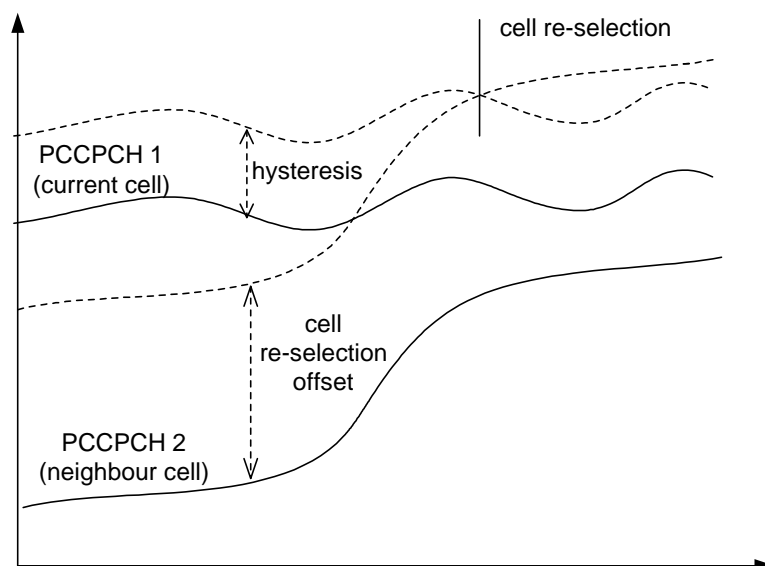


Figure 3: Offset adjusted measurement result of neighbour cell exceeds that of current cell, usage of hysteresis

It is also possible to use a **hysteresis** parameter to avoid excessive cell re-selections in cell border areas. The hysteresis is broadcast on the BCCH of the current cell. The UE shall add the positive hysteresis value to the measurement result of the current cell. This summed value shall then be compared to the offset adjusted measurement result of the neighbouring cell. If the latter exceeds the former, the UE shall perform cell re-selection. The hysteresis value used in FDD intra-frequency cell re-selection should be quite small in order to minimise interference effects.

The usage of hysteresis and/or time-to-trigger enhancements is optional. If they are not used, a zero value shall be broadcast on the BCCH.

3 CHANGE REQUEST TO TS 25.304

We propose to add the contents of section 2 to section 5.2.2 in TS 25.304 [1].

4 CHANGE REQUEST TO TS 25.331

We propose to the following addition to section 10.2.2.2 in TS 25.331 [2].

10.2.2.2 Cell selection and re-selection info

Parameters	REFERENCE	TYPE	NOTE
Decoding range		M	A relative threshold, which indicates to the UE that it shall decode the BCCH of the neighbour cell. Defined in reference to the strength of the current cell, where the UE is camped.
Time-to-trigger		M	Minimum time period, during which a neighbouring cell measurement result must exceed the strength of the current cell before the UE performs cell reselection.
Hysteresis		M	Hysteresis is added to the measurement result of the current cell. The Measurement result of the neighbouring cell must exceed this sum before the UE performs cell reselection.
Cell re-selection offset		M	Offset, which must be added to the measurement result of this cell, when it is being measured by a UE camped on a neighbouring cell.
Offset expiration timer		M	Timer, which indicates to the expiration time of the cell-reselection offset for this cell.

5 REFERENCES

- [1] TS 25.304, v 1.3.2 1999-08, "UE procedures in idle mode", source: TSG RAN WG2.
- [2] TS 25.331, v 1.2.0 1999-07, "Description of the RRC protocol", source: TSG RAN WG2.