
Source: SMG2

To: RAN WG2

Cc: RAN WG1, TSG RAN, TSG S1

Title: Reply to LS on measurement order parameters sent to the MS, for GSM to UMTS handover

SMG2 would like to thank RAN WG2 for the LS on measurement order parameters sent to the MS, for GSM to UMTS handover. SMG2 have discussed the issues related to handover from GSM to other systems and vice versa. The following summarises the preliminary outcome of these discussions.

Assumptions

This contribution takes the following assumptions:

- Dual GSM/other system terminals are based on GSM Release 99 or later
- For reselection of UMTS and GSM networks belonging to different PLMNs, no additional broadcasting is required as periodic Home / Preferred PLMN search may be used.
- It is SMG2's view that handover /cell reselection from GSM should be generic in nature in order to accommodate coexistence with other systems as well as UMTS.

High level requirements

In the preparation of handover and reselection from GSM to other systems and vice versa, SMG2 identified the following issues for which an exchange between systems has to be co-ordinated:

1. System Broadcast
2. Measurement Reporting
3. Assignment/ handover

SMG2 have examined the above issues for both scenarios, i.e. GSM to UMTS handover preparation/cell reselection and UMTS to GSM handover preparation/cell reselection

A. GSM to UMTS

1. System broadcast

a) idle mode

System broadcast in GSM is limited by broadcast capacity. This limit is mainly due to the amount of information broadcast and the frequency of the broadcast. Several possibilities have been specified or proposed to extend the BCCH capacity, such as BCCH ext (GSM phase 2) and secondary BCCH (Tdoc SMG2 1530/99).

SMG 2 would like to bring the attention of RAN WG2 that at present bits on the GSM BCCH are hard coded which makes it impossible to accommodate efficiently future extensions of broadcast parameters. In particular, SMG2 would like RAN2 to confirm that the number of bits for the UARFCN can accommodate any future band extensions for UMTS.

Furthermore, in the interest of saving and optimising capacity on the GSM BCCH, efficient compression of the broadcast data shall be possible. This might entail different encoding depending on the various possible network configurations. The encoding rules can be sent to the mobile at e.g. registration.

b) circuit switched dedicated mode

Dedicated mode system information is based on point to point transmission for which a new message format can be defined for dual system terminals. Assuming that the neighbour cell information does not change with the location of the terminal within one particular cell, the message containing neighbour cell and measurement information may not need to be transmitted more than once after an assignment or handover.

However, taking into account the timing constraints for the terminal on CS dedicated mode, it seems necessary that neighbour cell measurement requirements are optimised in order to keep high service quality.

SMG2 has noted that potential degradations to the GSM tasks are due more to the number of UMTS frequencies in the neighbour list rather than the number of actual neighbour cells.

A potential drawback is the inherent latency of the message broadcast if the SACCH is used. SMG2 have also identified, for the purposes of directed retry and SDCCH handover, that these messages could be transferred faster on a DCCH.

c) Packet mode

SMG2 is at an early phase of studying the issues in packet mode. However, it is believed that in packet mode, limitations are similar as in idle mode, even if no limited amount of resources is allocated to PACCH.

2. Measurement Reporting

SMG2 is currently studying the improvement of GSM measurement reporting (Tdoc SMG2 1616/99). The solution, which is under consideration, shall allow sending measurement reports, which include both GSM and other systems, measurements.

The operator shall be able to control the number of cells of different RATs, which are to be reported by the mobile. This would also allow the operator to minimise the potential degradation of GSM dedicated mode tasks.

SMG2 has considered the view of RAN WG2 regarding event triggered reporting. SMG2 feels that the threshold shall be set in the BSC and not in the mobile.

A first assumption of the number of bits available per measurement per cell is 6 bits, reported at most every 480 ms.

3. Assignment/handover

SMG2 could not identify a critical limit other than latency in sending the handover command or assignment message caused by segmentation of the message.

B. UMTS to GSM

1. System Broadcast

SMG2 identified the following information to be broadcast:

- BCCH allocation list which may contain BSIC
- Information about what GSM band the BA list refers to (450, 480, 850, 900, 1800, 1900), (note that today, context depending encoding is used)
- Synchronisation information of the GSM cell if available

2. Measurement Reporting

The operator shall be able to control the number of cells of different RAT that are to be reported by the mobile. SMG2 would like to draw the attention of RAN WG2 to the fact that GSM is a narrow band system which needs measurements to be averages over a certain period of time in order to ensure meaningful measurement values. In GSM, at least 3 measurements per frequency in the BA (SACCH) list per reporting period (480 ms). The measurements are uniformly distributed over the measurement period.

Extending this to UMTS to GSM handover measurements, the terminal has to be able to perform a reasonable amount of RSSI measurements. Typically the MS shall be capable of monitoring at least 20 GSM carriers and therefore, shall be capable of performing at least 120 measurements per second (960 ms). Furthermore, typical handover algorithm in the BSC relies on around 5 seconds of RXLEV measurement filtering to perform a reliable decision.

The BSIC confirmation is necessary when the cells are identified as being in the top six (or more) stronger cells. It is important to note that the BSIC confirmation and RSSI measurements are essential tools for a reliable handover and should be handled together and not independently.

3. Assignment/handover

The existing GSM Handover or assignment message contains most necessary information, however, SMG2 has identified the following additional information to be sent in the case of UMTS to GSM handover:

- Information about what GSM band the assignment/handover command refers to (450, 480, 850, 900, 1800, 1900), (note that today, context depending encoding is used)
- Ciphering

SMG2 would like to draw attention of RAN 2 to the fact that it shall be a requirement to allow handover to cells which have not been measured by the mobile. In that case, the following additional information should be provided to the mobile:

- Synchronisation information of the GSM cell if available