3GPP TSG-RAN WG2#59 R2-073611

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Agenda item: **5.3.1**

Source: **Motorola**

Title: **Measurement Configuration**

Document for: **Discussion and Approval**

1 Introduction

This contribution addresses the issue of measurement configuration for connected mode.

2 Discussion

In order to progress the Stage 3 for RRC, among many other topics we need to conclude on the following issues:

1. Broadcast information for measurements – need and validity

2. Inclusion of measurement configuration in the RRC Connection Reconfiguration message.

3. Measurement Configuration post Handover

2.1 Broadcast Information

It is critical that the UE be able start measurements as soon as it enters RRC Connected Mode to ensure maintenance of connected state. However, given the finite measurement filter duration (typically ~ 200ms) it may not be necessary to have the compete configuration on entering connected mode; the UE should be able to scan and search for neighbors without a neighbor list. What is important is that the network transmits the measurement configuration quickly enough so that if and when the UE needs to trigger a measurement report it has the necessary configuration information to apply against the ongoing measurements (for e.g. offset, threshold, etc.).

In current UTRA specifications, the measurement configuration is provided through both system information and dedicated messaging. The UE indicates to the network whether it has read system information corresponding to the measurement configuration, allowing the network to therefore provide this through dedicated signaling in the case where the UE has not had a chance to do so.

We could in principle follow the same approach; however it might be useful to consider whether it is necessary. In the case where the measurement configuration information is small, it should be always feasible to send the measurement configuration soon after connection set-up is established. The short RTT between the UE and eNode B make this possible. In the meantime, while the UE is waiting to receive the configuration, the UE can scan for neighbors and start making measurements; *it should also be possible to apply this even in the case where the network needs to provide cell-specific offsets to the UE*. The UE can apply any cell specific information such as offset, after receiving the measurement configuration, to the ongoing measurements and before transmitting the first measurement report.

Thus in summary, it is seen sufficient to send dedicated signaling following connection set-up (i.e. successful idle to connected state transition).

If there is however still a strong desire to support both options in the guise of network flexibility, then the following information can be sent on the system broadcast:

1. White list of cells with cell-specific offset information

- one option to help reduce system overhead would be to transmit only the white list and send the cell-specific offset information in dedicated signaling

2. Black Lists

3. Intra-frequency measurement configuration

It is not seen necessary to transmit inter-frequency and inter-RAT measurement configuration since these measurement configurations are much more likely to be UE specific. While it is feasible to have common information sent to all mobiles through the broadcast channel, and provide UEs with “delta” information to handle UE specific configurations, from a specification complexity standpoint this is not preferable. Since inter-freq and inter-RAT measurements will need gaps, the UE cannot start any measurements (even blindly) lest it miss allocations if not receiving EUTRA serving cell transmissions. (Note that this still permits UE implementations using multiple receivers to measure prior to receiving measurement configuration)

2.2 Measurement Configuration in RRC Connection Reconfiguration

In principle, there is little reason to combine the RRC connection setup procedure with the measurement configuration. As stated above, it is sufficient to be able to send the measurement configuration soon after the connection set-up as a separate message.

However, it is worthwhile to consider the issue of semi-persistent scheduling. In this case, the measurement gap pattern/DRX configuration and the semi-persistent scheduling are inter-related to some degree. One precludes the other. Even in this case though the UE will likely receive the scheduling related information first and this in itself should be sufficient to allow the UE to start making intra-freq measurements while awaiting reception of measurement configuration.

2.3 Handling of Measurement Configuration on Handover

One obvious, simple and reliable approach to the handling of measurement configuration on handover, is to stop all measurement reporting until a new measurement configuration is received. Other possibilities include:

For intra-frequency measurements:

- Intra-freq measurements and reporting are continued according to the previous configuration until a new dedicated configuration is received;
- In case of inter-frequency handover, intra-freq measurements and reporting are continued according to the previous configuration but applied to the new carrier frequency.

For inter-frequency measurements:

- Inter-freq measurements and reporting following an inter-freq handover should be stopped according to the previous configuration After the inter-freq handover, any previously received inter-frequency measurement configuration is most likely no longer valid or useful to the network.
- Inter-freq measurements following an intra-freq handover could be continued according to the previous configuration (likely that the network will still wish to perform an inter-freq handover).

For both intra-frequency and inter-frequency handover, inter-RAT measurements could be continued according to the previous configuration since it is likely that the network will still wish to perform an inter-RAT handover.

If measurements are to be continued then the measurement configuration would need to be transferred between eNode Bs at inter-eNode B handover to ensure appropriate handling of any measurement reports sent by the UE prior to receiving a new measurement configuration or measurement reconfiguration at the target. It maybe beneficial for the UE to indicate to the network which configuration has been used for the measurement report.

However, for specification simplicity and given the lack of any good justification seen, there should be no use for activation times for measurement configuration in any case. In addition it is proposed that the target should not send a measurement configuration using a “delta” configuration (i.e. sending only those parameters that are different from the configuration in the source).

3 Proposal

1. It is proposed that broadcast information is not necessary for the connected mode measurement configurations. It is sufficient to send measurement configuration in a *separate* RRC message after connection set-up. The measurement filters to be applied are typically long enough for the UE to be making measurements while awaiting the reception of measurement configuration. This is seen to be true even in the case of cell-specific offsets being necessary.

2. As stated already in proposed conclusion#1, measurement configuration need not be included within the RRC Connection Reconfiguration message. This does not preclude the transmission of this message in the same TTI (though this does introduce some greater inter-layer coupling than is necessary).

3. Following handover, all measurement reporting is stopped unless a new configuration applicable at the target is received. This does not prevent the UE from continuing to make measurements after handover. One exception is that inter-freq and inter-RAT measurement reporting following an intra-freq handover shall be continued according to the previous (source cell) configuration.

4. “delta” configurations wherein only the modified information element is sent when sending a new configuration to be applied shall not be supported in the signaling.

The above is the preferred set of configuration signaling/handling for EUTRA. This will significantly increase overall reliability of the specification and markedly simplify UE implementation. The resulting benefits in terms of test case development, inter-op testing should be clear to all.

If however, the overall opinion is to continue to provide a toolbox of options then the broadcast configuration should focus on intra-frequency measurement configurations with inter-frequency and inter-RAT configurations being sent using dedicated signaling. Intra-freq measurements and reporting are continued according to the previous configuration until a new dedicated configuration is received. In case of inter-frequency handover, intra-freq measurements and reporting are continued according to the previous configuration but applied to the new carrier frequency.