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Source(s)	Dominic Tolli, Mark Cudak, Stavros Tzavidas Motorola 1501 West Shure Dr. Arlington Heights, IL 60004 Itzik Shahar Intel Corporation Mary Chion ZTE Communications John J. Humbert, Ivy. Y. Kelly Sprint Communications	Voice: +1 847 576 1617 Fax: +1 847 576 8378 tolli@motorola.com, Mark.Cudak@motorola.com, STZAVID1@motorola.com itzik.shahar@intel.com mchion@ztesandiego.com John.J.Humbert@mail.sprint.com, Ivy.Y.Kelly@mail.sprint.com
Re:	IEEE P802.16e/D8
Abstract	This contribution discusses methods for improving interoperability for MS handover measurement by allowing the serving base station to specify the metrics that should be used for scanning, enabling event-based scan reports from the mobile and creation of two prioritized levels of handovers.
Purpose	Discuss and approve.
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Introduction

The mobile devices of cellular systems often possess widely-varying capabilities and complexity, and while the network can offer services such as handoff to serve the mobility needs of the MS, the MS may have limited abilities to assist or control such a service. In cases where the network can provide guidance or even control of a handoff procedure, the ability to signal to the MS the techniques of measurement, the conditions under which reporting should occur, and the specific candidate BSs from which metrics should be gathered can improve greatly the operation of such services. The current version of the specification provides the MS with much of this capability, but does not allow the BS and network to control these procedures should it be necessary. Additionally, the conditions and metrics used for the event triggering and subsequent reporting of metrics are incomplete.

The major goals of this contribution are:
1. To optionally enable the network to direct the procedures of handover, association, and scanning, as well as the parameters and conditions related to these procedures.
2. To enable event-based scan reports and/or HO request from the mobile. In other words, to allow the base station to specify the trigger conditions used to issue a scan report and/or HO request.
3. To enable the mobile to use a distance-based metric for measuring BS channel conditions and triggering event-based reports and/or HO requests.

In support of goal 1, the BS is provided the ability to indicate to served MSs whether to make neighbor BS association mandatory. Upon satisfaction of conditions favorable for a handover, pre-arranged associations can minimize handover latency. Existing fields within the current messages supporting association and handover already provide significant support for making association a preferred process, while the proposed solution supplements this support to benefit those networks which perform network-directed handovers. Similarly, the use of scanning by MSs of neighbor BSs indicated by the serving BS is proposed to be mandatory when the response for scanning is event-triggered. A limit on the scanning duration required to be performed by the MS also is provided via a new global parameter.

In support of goal 2, a set of triggers has been proposed for the DCD and MOB_NBR-ADV messages to communicate the conditions which may invoke MS to generate scan reports or handover requests based on the MS detecting certain channel conditions. These conditions have been introduced into the DCD and MOB_NBR-ADV messages using an efficient encoding scheme.

In support of goal 3, the RSSI and CINR metrics currently utilized for scan reports are supplemented with the round-trip delay (RTD) metric which reports the two-way duration of message transmission. This allows a scan report or a HO request to be generated when the distance from the serving BS meets specified criteria which are not reflected in power-based metrics such as RSSI and CINR.

The proposed changes preserve the existing agreed functionality and default modes of handoff, association, scanning and reporting while providing for flexibility for the network control of these procedures. Impact to the standard has been minimized while at the same time providing for enhanced functionality.

The earlier stated goals are addressed by the proposed text changes as follows:
BS Side:
1. The interpretation of the Recommended BS list that currently exists in MOB_SCN-RSP message is modified, so that the MS is explicitly required to scan the BSs identified in this list.
2. In the DCD and MOB_NBR-ADV messages, triggers are included to specify the conditions under which the MS should respond.
3. The serving BS's round trip delay is introduced as an option on which to trigger an event-based scan report or handover.
MS side:
1. In MOB_SCN-RSP, MOB_SCAN-REPORT and MOB_MSHO-REQ, all serving cell metrics are included so that the information is readily available at the time of processing the message and determining an appropriate action.

2. The type and value of the trigger metric, calculation function, and action (response) are included in a compact encoding for each trigger within the DCD and MOB_NBR-ADV messages.

3. A metric for round trip delay is introduced to trigger MOB_SCAN-REPORT or MOB_MSHO-REQ to provide consistency with the introduced possible trigger metrics specified by the BS.

Proposed text changes:

[Change the text and table of section 6.3.2.3.49 as indicated]

6.3.2.3.49   Scanning Interval Allocation Response (MOB_SCN-RSP) message

[Change table 108i as indicated]

Table 108i—MOB_SCN-RSP message format

Syntax	Size (bits)	Notes
MOB_SCN-RSP_Message_Format() {	—	—
Management Message Type = 55	8	—
Report mode	2	0b00: no report 0b01: periodic report 0b10: event triggered report 0b11: reserved
reserved	6	Shall be set to zero
Scan report period	8	Available when the value of Scan Report Mode is set to 0b01. Scan report period in frames.
Scan duration	8	In units of frames. When Scan Duration is set to zero, no scanning parameters are specified in the message. When MOB_SCN-RSP is sent in response to MOB_SCN-REQ, setting Scan Duration to zero denies MOB_SCN-REQ.
If (Scan Duration !=0) {	—	—
Start frame	4	—
Association type	3	0b000: Scanning with association level 0: scanning and association without coordination 0b001: Scanning with association level 1: association with coordination. 0b010: Scanning with association level 2: NW assisted association reporting. 0b011-0b111: Reserved
reserved	1	Shall be set to zero
Interleaving interval	8	Duration in frames
Scan iteration	8	—
~~Report mode~~	~~2~~	~~0b00: no report~~ ~~0b01: periodic report~~ ~~0b10: event triggered report~~ ~~0b11: reserved~~
~~Scan report period~~	~~8~~	~~Available when the value of Scan Report Mode is set to 0b01. Scan report period in frames.~~
Comp_NBR_BSID_IND	1	—
padding	3	Shall be set to zero
Report metric	8	Bitmap indicating presence of metric in message Bit 0: BS CINR mean Bit 1: BS RSSI mean Bit 2: Relative delay Bit 3: BS RTD; this metric shall be only measured on serving BS/anchor BS. Bits 4-7: reserved; shall be set to zero
If (Comp_NBR_BSID_IND ==1) {	—	—
Configuration change count for MOB_NBR_ADV	8	Configuration Change Count value of referring MOB_NBR_ADV message

}	—	—
N_Recommended_BS	4	Number of neighboring BS's to be scanned/associated
For (j=0; j<N_Recommended_BS; j++) {	—	—
If (Comp_NBR_BSID_IND ==1) {	—	—
Neighbor_BS_index	8	BS index corresponds to position of BS in MOB_NBR_ADV message
} Else {	—	—
Recommended BS ID	48	BS IDs of BSs that MS shall scan
}	—	—
If (Association type == 0b001) OR (Association type == 0b010) {	—	—
Rendezvous time	8	Units are frames
CDMA_code	8	From initial ranging codeset
Transmission_opportunity offset	8	Units are transmission opportunity
}	—	—
}	—	—
Padding	variable	
}		
TLV encoded information	variable	
}		

[Insert the following after 'Report mode' parameter description:]

Report metric
Bitmap indicator of trigger metrics that the serving BS requests the MS to report. Serving BS shall indicate only the trigger metrics negotiated through SBC-REQ/RSP message. For each bit location, a value of '0' indicates the trigger metric should not be included, while a value of '1' indicates the trigger metric should be included in the message. The bitmap interpretation for the metrics shall be:
Bit 0: BS CINR mean
Bit 1: BS RSSI mean
Bit 2: Relative delay
Bit 3: BS RTD; this metric shall be only measured on serving BS/anchor BS.
Bits 4-7: reserved; shall be set to zero.

[Change the text and table of section 6.3.2.3.50 as indicated]

6.3.2.3.50   Scanning Result Report (MOB_SCAN-REPORT) message

[Change table 108j as indicated]

Table 108j—MOB_SCAN-REPORT message format

Syntax	Size (bits)	Notes
MOB_SCAN-REPORT_Message_Format() {	—	—
Management Message Type = 60	8	—
Report Mode	1	0: ~~Event-triggering~~ Event-triggered report 1: ~~reserved~~ Periodic report
Report metric	8	Bitmap indicating presence of metric in message Bit 0: BS CINR mean Bit 1: BS RSSI mean Bit 2: Relative delay Bit 3: BS RTD; this metric shall be only measured on serving BS/anchor BS. Bits 4-7: reserved; shall be set to zero
Comp_NBR_BSID_IND	1	—
If (Comp_NBR_BSID_IND == 1){	—	—
Configuration Change Count for MOB_NBR_ADV	8	Configuration Change Count value of referring MOB_NBR_ADV message
}	—	—
N_current_BSs	3	When FBSS/SHO is supported, N_current_BSs is the number of BSs currently in the active set; when FBSS/SHO is not supported or the MS has an empty active set, N_current_BSs is set to 1 (= serving /anchor BS).
Reserved	3	Shall be set to zero
For (j=0; j<N_current_BSs; j++) {	—	—
Temp BSID	4	Active set member ID assigned to this BS. When the MS has an empty active set or FBSS/SHO is not supported, Temp BSID shall be set to 0.
~~BS CINR mean~~	~~8~~	~~—~~
~~BS RSSI mean~~	~~8~~	~~—~~
Reserved	4	Shall be set to zero
If(Report metric[Bit 0]==1)		
BS CINR mean	8	—
If(Report metric[Bit 1]==1)		
BS RSSI mean	8	—
If(Report metric[Bit 2]==1)		
Relative delay	8	Only when FBSS/SHO is supported, this field will include the relative delay of BSs currently in the active set, except anchor BS
If(Report metric[Bit 3]==1)		
BS RTD	8	This field will include the RTD of the serving BS/anchor BS.

}	—	—
N_NEIGHBORS	8	—
For (i=0; i<N_NEIGHBORS; i++) {	—	—
If (Comp_NBR_BSID_IND == 1){	—	—
Neighbor BS index	8	—
}	—	—
Else{	—	—
Neighbor BSID	24	The least significant 24 bits of the Neighbor BSID
}	—	—
~~BS CINR mean~~	~~8~~	~~—~~
~~BS RSSI mean~~	~~8~~	~~—~~
~~Relative delay~~	~~8~~	~~—~~
If(Report metric[Bit 0]==1)		
BS CINR mean	8	—
If(Report metric[Bit 1]==1)		
BS RSSI mean	8	—
If(Report metric[Bit 2]==1)		
Relative delay	8	
}	—	—
TLV encoded information	*variable*	Optional
}	—	—

[Add the following text in section 6.3.2.3.50 after Table 108j and within the list of parameters as indicated]

A MS shall generate MOB_SCAN-REPORT messages in the format shown in Table 108j. The following parameters shall be included in the MOB_SCAN-REPORT message:

[…]

Report mode
   Action code for an MS's scan report of its measurement:
   0: Event triggered report
   1: Periodic report according to Scan report period of MOB_SCN-RSP

Report metric
   Bitmap indicator of trigger metrics that the serving BS requests the MS to report. Serving BS shall indicate only the trigger metrics negotiated through SBC-REQ/RSP message. For each bit location, a value of '0' indicates the trigger metric should not be included, while a value of '1' indicates the trigger metric should be included in the message. The bitmap interpretation for the metrics shall be:
   Bit 0: BS CINR mean
   Bit 1: BS RSSI mean
   Bit 2: Relative delay
   Bit 3: BS RTD; this metric shall be only measured on serving BS/anchor BS.
   Bits 4-7: reserved; shall be set to zero.

For each neighbor BS, the following parameter shall be included:

[…]

According to Report metric that MS indicates, the MOB_SCAN-REPORT message includes the following parameters.

   BS CINR mean

The BS CINR mean parameter indicates the CINR measured by the MS from the particular BS. The value shall be interpreted as a signed byte with units of 0.5 dB. The measurement shall be performed on the frame preamble and averaged over the measurement period.

BS RSSI mean

The BS RSSI mean parameter indicates the Received Signal Strength measured by the MS from the particular BS. The value shall be interpreted as an unsigned byte with units of -0.25 dB, and have 40 dBm subtracted from it (such that 0xff is interpreted as -104103.75 dBm), an MS shall be able to report values in the range -100103.75 dBm to -40 dBm. The measurement shall be performed on the frame preamble and averaged over the measurement period.

Relative delay

This parameter indicates the delay of neighbor DL signals relative to the serving BS, as measured by the MS for the particular BS. The value shall be interpreted as a signed integer in units of samples.

BS RTD

The BS RTD parameter indicates the round trip delay (RTD) measured by the MS from the serving BS. RTD is calculated by using RTD = (TTG - SSRTG - timing offset), where timing offset is given by the accumulated value of Time Adjusts in RNG-RSP messages received from the serving BS through ranging. The value shall be interpreted as an unsigned byte with units of 1/Fs (see Section 10.3.4.3). This parameter shall be only measured on serving BS/anchor BS.

[Change the text and table of section 6.3.2.3.53 as indicated]

6.3.2.3.53 MS HO Request (MOB_MSHO-REQ) message

The MS may transmit an MOB_MSHO-REQ message when it wants to initiate an HO. The message shall be transmitted on the basic CID.

Table 108m—MOB_MSHO-REQ message format

Syntax	Size (bits)	Notes
MOB_MSHO-REQ_Message_Format() {	—	—
Management Message Type = 57	8	—
Report metric	8	Bitmap indicating presence of metric in message Bit 0: BS CINR mean Bit 1: BS RSSI mean Bit 2: Relative delay Bit 3: BS RTD; this metric shall be only measured on serving BS/anchor BS. Bits 4-7: reserved; shall be set to zero
Comp_NBR_BSID_IND	1	—
if (Comp_NBR_BSID_IND == 1){	—	—
Configuration Change Count for MOB_NBR_ADV	8	Configuration Change Count value of referring MOB_NBR_ADV message
}	—	—
N_new_BSs	3	Number of new BSs that are recommended by the MS
Padding	4	Shall be set to zero.
for (j=0; j<N_New_BSs; j++){	—	—
if (Comp_NBR_BSID_IND == 1){	—	—
Neighbor BS index	8	—
}	—	—
else {	—	—
Neighbor BSID	48	—
}	—	—
Preamble index/ Preamble Present & Subchannel Index	8	For the SCa and OFDMA PHY this parameter defines the PHY specific preamble for the neighbor BS. For the OFDM PHY the 5 LSB contain the active DL subchannel index for the neighbor BS. The 3 MSB shall be Reserved and set to '0b000'
If(Report metric[Bit#0]==1)		
BS CINR mean	8	—
If(Report metric[Bit#1]==1)		
BS RSSI_mean	8	—
If(Report metric[Bit#2]==1)		
Relative delay	8	—
Service level prediction	3	—
Arrival Time Difference Indication	1	If the MS is transmitting this message to request HO or SHO/FBSS is not supported by either BS or MS, this bit shall be set to 0
If (Arrival Time Difference Indication == 1) {	—	—

Arrival Time Difference (t)	4	Relative difference in arrival time between the neighbor BS and the anchor BS, in terms of fraction of CP
}	—	—
}	—	—
N_current_BSs	3	When FBSS/SHO is supported and the MS has non-empty active set, N_current_BSs is the number of BSs that are currently in the Active Set of the MS When FBSS/SHO is not supported or the MS has an empty active set, N_current_BSs is set to 1
Padding	1	Shall be set to zero.
For (j=0 ; j<N_current_BSs ; j++) {		
Temp BSID	4	Active Set member ID assigned to this BS. When the MS has an empty active set or FBSS/SHO is not supported, Temp BSID shall be set to 0
If(Report metric[Bit#0]==1)		
BS CINR mean	8	—
If(Report metric[Bit#1]==1)		
BS RSSI mean	8	—
If(Report metric[Bit#2]==1)		
Relative delay	8	Only when FBSS/SHO is supported, this field will include the relative delay of BSs currently in the active set, except anchor BS.
If(Report metric[Bit#3]==1)		
BS RTD	8	This field will include the RTD of the serving BS/anchor BS.
}	—	—
Padding	*variable*	Padding bits to ensure byte aligned.
TLV encoded information	*variable*	
}	—	—

An MS shall generate MOB_MSHO-REQ message in the format shown in Table 108m. The following parameters shall be included in the MOB_MSHO-REQ message:
[…]

Report metric
  Bitmap indicator of trigger metrics that the serving BS requests the MS to report. Serving BS shall indicate only the trigger metrics negotiated through SBC-REQ/RSP message. For each bit location, a value of '0' indicates the trigger metric should not be included, while a value of '1' indicates the trigger metric should be included in the message. The bitmap interpretation for the metrics shall be:
  Bit 0: BS CINR mean
  Bit 1: BS RSSI mean
  Bit 2: Relative delay
  Bit 3: BS RTD; this metric shall be only measured on serving BS/anchor BS.
  Bits 4-7: reserved; shall be set to zero.

  Comp_NBR_BSID_IND
[…]

When the MS supports FBSS/SHO and has a non-empty active set, the MS shall include the following parameters for each active BS. When the MS does not support FBSS/SHO or has an empty active, the MS shall include the following parameters for the current serving BS.

[…]

According to Report metric that MS indicates, the MOB_MSHO-REQ message includes the following parameters.

BS CINR mean
> The BS CINR mean parameter indicates the CINR measured by the MS from the particular BS. The value shall be interpreted as a signed byte with units of 0.5 dB. The measurement shall be performed on the frame preamble and averaged over the measurement period.

BS RSSI mean
> The BS RSSI mean parameter indicates the Received Signal Strength measured by the MS from the particular BS. The value shall be interpreted as an unsigned byte with units of -0.25 dB, and have 40 dBm subtracted from it (such that 0xff is interpreted as -103.75 dBm), an MS shall be able to report values in the range -103.75 dBm to -40 dBm. The measurement shall be performed on the frame preamble and averaged over the measurement period.

Relative delay
> This parameter indicates the delay of neighbor DL signals relative to the serving BS, as measured by the MS for the particular BS. The value shall be interpreted as a signed integer in units of samples.

BS RTD
> The BS RTD parameter indicates the round trip delay (RTD) measured by the MS from the serving BS. RTD is calculated by using RTD = (TTG - SSRTG - timing offset), where timing offset is given by the accumulated value of Time Adjusts in RNG-RSP messages received from the serving BS through ranging. The value shall be interpreted as an unsigned byte with units of 1/Fs (see Section 10.3.4.3). This parameter shall be only measured on serving BS/anchor BS.

[Change the text in section 6.3.21.1.2 on page 170, after line 52]

6.3.21.1.2   MS Scanning of neighbor BSs

…..

Scanning Interval and Interleaving interval repeat with the number of Scan iteration.

When the Trigger Action in the DCD message in encoded as 0x3, the MS shall send the MOB_SCN-REQ message to the BS to begin the neighbor BS scanning process when the trigger condition is met. In the MOB_SCN-REQ message the MS (the MOB_SCN-RSP message the BS) shall indicate group of neighbor BSs for which only Scanning or Scanning with Association are requested by MS (recommended by BS). Presence of those BSs for which Association is requested (recommended) is indicated by encoding of Scan type = 1. The BS may negotiate over the backbone with a BS Recommended for Association allocation unicast ranging opportunities. Then the MS will be informed on Rendezvous time to conduct Association ranging with the Recommended BS. When conducting initial ranging to a BS recommended for Association, MS shall use allocated unicast ranging opportunity, if available. Regardless of the presence of Recommended BS IDs, MS may determine and perform any scanning or association activities during Scanning Interval at its own discretion, except where the indicated Report Mode is 0b10 (i.e., event triggered report) in the most recently received MOB_SCN-RSP. When the Report Mode is 0b10 in the MOB_SCN-RSP message, the MS shall scan all BSs within the Recommended BS list of the message and then report the scanning result with the MOB_SCAN-REPORT message. In this case, if the Trigger Function in the most recently-received DCD channel encoding is 0x0, the MS shall include all recommended BSs of the MOB_SCN-RSP within the MOB_SCAN-REPORT. Otherwise, the MS shall add only the BSs which met the Trigger Function conditions within the MOB_SCAN-REPORT message. The scanning duration performed by the MS on all neighbor BSs shall be no longer than the parameter Max_Dir_Scan_Time (as specified in Section 10.1) to limit the time before a report is sent to the BS.

[Add the text in section 6.3.21.1.3 as indicated]

6.3.21.1.3   Association Procedure

[at the end of the section, add:]

The BS may direct the MS to associate with recommended BSs by setting Association type to 0b01 or 0b10. If the MS supports association, it shall perform association as directed by the serving BS. If MS does not support association, it may ignore this message (when association type is 0b01 or 0b10).

[Change the text in section <u>10.1</u> as indicated]

10.1   Global values

[Insert the following entries to Table 342:]

Table 342—Parameters and Constants

System	Name	Time reference	Value		
			Minimum	Default	Maximum
MS	Max_Dir_Scan_Time	Maximum scanning time of neighbor BSs by MS before reporting any results	—	—	1 s

[Change the text in section 11.4.1 as indicated]

11.4.1 DCD channel encodings

[Insert the following entries to Table 358 before the MAC version entry (correct location is shown):]

Table 358 – DCD channel encoding

Name	Type (1 byte)	Length	Value	PHY scope
Trigger metric	54	Variable	The Trigger metric is a compound TLV value that indicates trigger metrics. The trigger metric in this encoding is defined for serving BS or commonly applied to neighbor BSs.	

[Insert the following tables and text following Table 358 to explain the entries introduced into Table 358:]

The trigger metric (type 54) in Table 358 is encoded using the following description.

Table 358b—Trigger description

Name	Type	Length (1 byte)	Value
Type/Function/action	54.1	1	see Table 358c for description
Trigger value	54.2	1	Trigger value is the value used in comparing measured metric for determining a trigger condition
Trigger averaging duration	54.3	1	Trigger averaging duration is the time in ms over which the metric measurements are averaged. When the mean value of the measurement meets the trigger condition, the MS reacts using the specified action.

The Type/function/action byte field of the trigger description shown in Table 358b is encoded using the following description.

Table 358c — Trigger; Type / function / action encoding

Name	Type	Length	Value
Type	54.1.1	2 bits (MSB)	Trigger metric type: 0x0: CINR metric 0x1: RSSI metric 0x2: RTD metric 0x3: *reserved*
Function	54.1.2	3 bits	Computation defining trigger condition: 0x0: *reserved* 0x1: Metric of neighbor BS is greater than absolute value 0x2: Metric of neighbor BS is less than absolute value 0x3: Metric of neighbor BS is greater than serving BS metric by relative value 0x4: Metric of neighbor BS is less than serving BS metric by relative value 0x5: Metric of serving BS greater than absolute value 0x6: Metric of serving BS less than absolute value 0x7: *reserved* *Note: 0x1-0x4 not applicable for RTD trigger metric*
Action	54.1.3	3 bits (LSB)	Action performed upon reaching trigger condition: 0x0: *reserved* 0x1: Respond on trigger with MOB_SCAN-REPORT 0x2: Respond on trigger with MOB_MSHO-REQ 0x3: On trigger, MS starts neighbor BS scanning process by sending MOB_SCAN-REQ 0x4-0x7: *reserved* *Note: 0x3 is not applicable when neighbor BS metrics are defined.*

The CINR, RSSI, and RTD metric fields are encoded according to the descriptions found within section 6.3.2.3.50 for the MOB_SCAN-REPORT message and 6.3.2.3.53 for the MOB_MSHO-REQ message.

The RTD trigger shall only be measured on the serving BS rather than relative to or from neighbor BSs. The trigger functions 0x5 and 0x6 shall be the only applicable ones for the RTD trigger.

[Change the text in section 11.1.7 as indicated]

11.1.7 MOB-NBR-ADV message encodings

[Modify table 348e, as follows:]

Table 348e – MOB-NBR-ADV encodings

Name	Type (1 byte)	Length (1 byte)	Value (variable length)
DCD_settings	1	*variable*	The DCD_settings is a compound TLV value that encapsulates a DCD message that may be transmitted in the advertised BS downlink channel. This information is intended to enable fast synchronization of the MS with the advertised BS downlink. The DCD settings fields shall contain only neighbor's DCD TLV values which are different from the serving BS corresponding values. For values that are not included, the MS shall assume they are identical to the serving BSs corresponding values.
UCD_settings	2	*variable*	The UCD_settings is a compound TLV value that encapsulates a UCD message that may be transmitted in the advertised BS downlink channel. This information is intended to enable fast synchronization of the MS with the advertised BS uplink. The UCD settings fields shall contain only neighbor's UCD TLV values which are different from the Serving BS's corresponding values. For values that are not included, the MS shall assume they are identical to the Serving BS's corresponding values
Neighbor BS trigger metric	4	variable	The Neighbor BS trigger metric is a compound TLV value that indicates the trigger metrics being applied to this neighbor BS. The Neighbor BS trigger metric is included in MOB_NBR-ADV message, only if it is different from Trigger metric that is defined for the neighbor BS in DCD message or from the Neighbor BS trigger metric for the preceding neighbor BS.

[Insert the following tables and text following Table 348e to explain the entries introduced into Table 348e:]

The neighbor BS trigger metric (type 4) in Table 348e is encoded using the following description.

Table 348f - Trigger description

Name	Type	Length (1 byte)	Value
Type/function/action	4.1	1	see Table 348g for description
Trigger value	4.2	1	Trigger value is the value used in comparing measured metric for determining a trigger condition

Trigger averaging duration	4.3	1	Trigger averaging duration is the time in ms over which the metric measurements are averaged. When the mean value of the measurement meets the trigger condition, the MS reacts using the specified action.

The Type/function/action byte field of the trigger description shown in Table 348f is encoded using the following description.

Table 348g - Trigger; Function/action encoding

Name	Type	Length	Value
Type	4.1.1	2 bits (MSB)	Trigger metric type: 0x0: CINR metric 0x1: RSSI metric 0x2: RTD metric 0x3: reserved
Function	4.1.2	3 bits	Computation defining trigger condition: 0x0: *reserved* 0x1: Metric of neighbor BS is greater than absolute value 0x2: Metric of neighbor BS is less than absolute value 0x3: Metric of neighbor BS is greater than serving BS metric by relative value 0x4: Metric of neighbor BS is less than serving BS metric by relative value 0x5-0x7: *reserved*
Action	4.1.3	3 bits (LSB)	Action performed upon reaching trigger condition: 0x0: *reserved* 0x1: Respond on trigger with MOB_SCAN-REPORT 0x2: Respond on trigger with MOB_MSHO-REQ 0x3-0x7: *reserved*

[Modify text in section, 6.3.2.3.47 (MOB_NBR-ADV message, as indicated:]

Table 108g—Bit-by-bit definition of PHY Profile ID of the BS

Item	Size (bits)	Notes
Co-located FA Indicator	1	If the BS (or FA) is co-located with the serving BS, this bit is set to 1.
FA Configuration Indicator	1	If this bit is set 1, the BS has the same FA configuration (the same number of FAs as well as their frequencies) as the BS broadcasting the NBR-ADV. 0b00 = Unsynchronized 0b01 = Time synchronization 0b10 = Time and Frequency synchronization
Time/Frequency Synchronization Indicator	2	If time synchronization is indicated for the OFDMA PHY, then the downlink frames transmitted by the serving BS and the Neighbor BS shall be synchronized to a level of at least 1/8 cyclic prefix length. If frequency synchronization is indicated for the OFDMA PHY, then the BS reference clocks shall be synchronized to a level that yields RF center frequency offset of no more than 1% of the OFDMA carrier spacing of the Neighbor BS.
BS EIRP Indicator	1	If this bit is set, the BS EIRP follows the PHY Profile ID.
DCD/UCD Reference Indicator	1	1: The DCD/UCD settings, not including triggers, of this neighbor BS are the same as those of the preceding neighbor BS unless the TLV information specifies. 0: The DCD/UCD settings, not including triggers, of this neighbor BS are the same as those of the serving BS unless the TLV information specifies.
FA Index Indicator	1	Only if this bit is set to 1, the FA Index follows the PHY Profile ID. In addition, if the FA Indicator is followed, the DL center frequency shall be omitted in the DCD/UCD difference TLV information
Trigger Reference Indicator	1	1: The trigger settings of this neighbor BS are the same as those of the preceding neighbor BS unless the TLV information specifies. 0: The trigger settings of this neighbor BS are the same as those provided by the serving BS (via DCD) unless the TLV information specifies.

[Insert the following text in section 11.8, SBC-REQ/RSP management message encodings, as indicated:]

11.8.3.7.16 HO parameters

The MS shall use the following HO parameters.

Type	Length	Value	Scope
178	1	PINGPONG_T	SBC-REQ (see 6.3.2.3.23) SBC-RSP (see 6.3.2.3.24)

Upon network entry completion at the Target BS, handover must not be initiated by the MS for the duration of PINGPONG_T, in order to prevent a ping-pong situation. The PINGPONG_T timer is maintained by both the MS and the new Serving BS. The PINGPONG_T timer starts upon actual network re-entry initiation, i.e. upon MS transmission (and BS reception) of the RNG-REQ message for network re-entry.

[Insert the following text:]

6.3.21.2.6 Ping-pong prevention

"Ping pong" is a situation which typically exists at cell boundaries and where the signal quality of two adjacent BSs is measured by the MS to be the same. In this situation the MS may perform repetitive handover attempts from one BS to the other, thus degrading the networks performance and available resources. To prevent ping-pong situations, the MS will, upon initiation of actual network re-entry (i.e. when MS transmits RNG-REQ), activate a timer, PINGPONG_T. This timer is maintained by both the MS and Target BS. While PINGPONG_T is active, the MS shall not initiate handover, nor shall the Target BS (i.e. new Serving BS) accept any handover requests. The PINGPONG_T value is obtained during the initial network entry process via the SBC-RSP message.