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Abstract	This contribution describes coordinated association, a method to pre-schedule association attempts between the MS and the neighboring BS's
Purpose	In some systems, association may be an important part of pre-HO operations. Prescheduled association will allow minimization of each association attempt with each target BS, thus also minimizing the period the MS is unavailable at the Serving BS, which is especially crucial when MS is in an active UGS service flow (such as VoIP).
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Coordinated Association during scanning

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1. Motivation

Association is a process in which the MS performs frequent CDMA ranging with neighboring basestations. Following that, HO may be performed without ranging the designated Target BS, thus shortening the NW reentry process. It is particular beneficial to shorten the actual HO duration, to allow continuity of active services, such as VoIP.

Currently, there are two types of association, non-contention based association and contention based association.

In non-contention based association, the standard provides some level of coordination between the MS and Target BS; during the MOB_SCN-REQ/RSP exchange, the BS provides a " rendezvous time" (in frames) where the Target BS will allocate a non-contention based CDMA ranging opportunity. At that time, the Target BS issues a FAST_RANGING_IE in the UL-MAP, where it provides allocation size and offset.

The main problems with the existing non-contention based association method and related messages:

- FAST_RANGING_IE may include a CDMA ranging allocation. As there are no constrictions on its place in the UL-MAP, it may be situated at a position, where it doesn't allow enough time for UL scheduling.
- Allocating a whole (non-contention based) ranging window for each MS for association imposes unacceptable BW overhead.
- The MS knows the frame number, before the association attempt, but has no knowledge of other ranging window info, such as size and offset.
- Ranging (for association) may take several frames to complete, as the following example may demonstrate (Frame N = "rendezvous frame")
  - Frame N: The MS switches to the Target BS, but only in the next frame it completes DL PHY synchronization.
  - Frame N+1: The MS searches for FAST_RANGING_IE in the UL-MAP.
  - Frame N+2: MS transmits CDMA code for ranging
  - Frame N+3: BS calculates PHY offsets
  - Frame N+4: BS sends RNG_RSP with required PHY corrections.

  This sequence is too long, if the MS is currently in an intense UGS session (e.g. VoIP) with the Serving BS where only 2 frames may be disposed for "off-line" activities such as association.
- As association is always with neighboring BS's, association related messages should use compressed BS_ID's to reduce messages lengths.

2. Proposed solution

We propose a comprehensive association mechanism, comprised of 4 different association levels:

- Level 0 – Scan/Association without coordination
- Level 1 – Association with coordination
- Level 2 – Network assisted association reporting

During the basic capabilities negotiation phase the MS and BS exchange info on the supported association levels.
The level to actually be used by the MS and BS will be negotiated during the SCN-REQ/RSP exchange session.

2.1. Association Level 0 – Association without coordination

When this association level is chosen by the network, the Serving BS and the MS negotiate about the association duration and intervals (via MOB_SCN-REQ and MOB_SCN-RSP). The Serving BS allocates periodic intervals where the MS may range neighboring BS, however the Target BS has no knowledge of the MS and provides only contention-based ranging allocations. After the BS successfully receives ranging code and sends RNG-RSP message with ranging status ‘success’, it will provide uplink allocation of adequate uplink size for the MS to transmit RNG-REQ message with TLV parameters (Serving BS ID, MS MAC address) related to the association ranging.

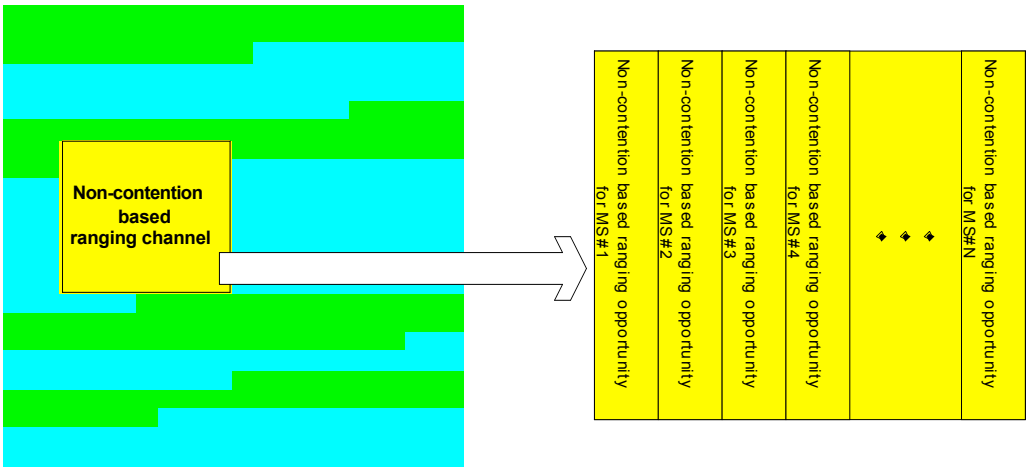
2.2. Association Level 1 – Association with coordination

When this association level is chosen by the network, the Serving BS provides association parameters to the MS and coordinates association between the MS and neighboring BS's.

Each neighboring BS will provide a ranging allocation for association, but unlike the existing situation, we propose that each BS, in addition to the "rendezvous time", (in terms of relative frame number), will also assign:

- a unique code number (from within the initial ranging codeset)
- a transmission opportunity within the allocated ranging region (in terms of offset from the start of the region)

Thus, one non-contention base ranging region may be shared and used by a multiple number of MS's; thereby reducing BW overhead.



The Target BS may assign the same code or transmission opportunity to more than one MS, but not both (otherwise it cannot distinguish between MS's). In case all allocated transmission opportunities in current region are different, there is no potential for collision of transmissions form different MSs. In case Serving BS allocates same transmission opportunity to several MSs there is some probability of collision and then neighbor BS may fail to identify transmitted codes.
It is up to the Serving BS (of the associating MS), as the coordinator of this process, to assure that the neighboring BS's do not assign overlapping "rendezvous times" to the MS, i.e. allocating ranging windows in frames that are too close in time to each other (or even concurrent).

As the proposed ranging window is allocated in a multicast fashion, FAST_RANGING_IE, which is a unicast IE, can no longer be used for that purpose. Thus, the ranging window will be allocated via UIUC=12 in the UL-MAP, using the "Dedicated ranging indicator" bit.

When " Dedicated ranging indicator" is 0, then the ranging allocation window shall be used for normal ranging, i.e. it may be used by all MS's that have normal operations with the BS and wish to perform contention based ranging or by MS's from neighboring cells that wish to perform non-coordinated association (level 0).

When "Dedicated ranging indicator" is 1, then the ranging allocation is for the purpose of ranging using dedicated CDMA codes and transmit opportunities assigned in the MOB-PAG-ADV message (for location update in idle mode) or in the MOB-SCN-RSP message (for coordinated association).
MSs registered to this BS are prohibited from use of the named ranging region in this case.

The process in summary:

- The MS negotiates association parameters with the Serving BS and is assigned a frame number ("rendezvous time"), CDMA code and transmission opportunity to use when ranging the Target BS. Optionally, the ranging allocation size and offset may also be provided.
- The MS is in normal operation at the Serving BS
- If the dedicated ranging allocation size and offset was provided in advance, the MS may range the Target BS at the "rendezvous time" without reading the UL-MAP of the Target BS first.

Otherwise, it shall acquire the ranging allocation via the UL_MAP of the Target BS one frame prior to "rendezvous time".

- The Target BS responds to the CDMA transmission via RNG-RSP with required PHY corrections (ranging status=success)

Modifications will be required to the following messages: MOB_SCN-REQ/RSP, UL-MAP_IE (UIUC=12), FAST_RANGING_IE.

2.3. Association Level 2 – NW Assisted Association Reporting

This association type functions in a way very much similar to the previous one (level 1). However, using this association type the MS does not have to wait for RNG-RSP from the Target BS. Instead, the RNG-RSP info (i.e. PHY corrections) will be sent by each Target BS to the Serving BS (over the backbone). The Serving BS aggregates all the RNG-RSP messages to a single message, namely "association report", which the Serving BS then sends to the MS. This is a new message; MOB_ASC_REPORT (resembles MOB_SCAN_REPORT).
When receiving this message, the MS updates its association database (PHY offsets) and timers for each associated BS.

Using this association type, the MS is required only to transmit the CDMA ranging code, thus it may be unavailable to the Serving BS for a very short time (up to two frames).

Modifications will be required to the following messages: MOB_SCN-REQ/RSP, UL-MAP (UIUC=12), FAST_RANGING_IE and SBC-REQ/RSP.
A new MAC message will be required: MOB_ASC_REPORT

3. Changes summary

[In D7, change subclause 6.3.21.1.3 as follows]

6.3.21.1.3 Association Procedure

Association is an optional initial ranging parameter negotiation occurring during Scanning. The function of association is to enable the MS to acquire and record ranging parameters and service availability information for the purpose of expediting a potential future hand-over to a target BS. Recorded ranging parameters of an Associated BS may be further used for setting initial ranging values in future ranging events during actual handover.

There are 3 levels of association as follows:

- Association Level 0 – Scan / Association without coordination
- Association Level 1 – Association with coordination
- Association Level 2 – Network assisted association reporting

~~MS may perform scheduled Association through non-contention based initial ranging opportunity using the method provided in 6.3.20.1.2.~~

Upon completion of a successful MS initial-ranging of a BS, if the RNG-RSP message contains a Service Level Prediction parameter set to 2, the MS may mark the BS as Associated in its MS local Association table of identities, recording elements of the RNG-RSP to the MS local Association table, and setting an appropriate aging timer (See Table 340a Parameters and Constants, ASC-AGING-TIMER). Association state in the MS local Association table shall be aged-out after ASC-AGING-TIMER timeout and the Association entry removed.

6.3.21.1.3.1 Association Level 0 – Scan / Association without coordination

When this association level is chosen by the network, the Serving BS and the MS negotiate about the association duration and intervals (via MOB_SCN-REQ with ASSOCIATION_TYPE = 0b000) and MOB_SCN-RSP). The Serving BS allocates periodic intervals where the MS may range neighboring BSs., However the Target BS has no knowledge of the MS and provides only contention-based ranging allocations. An MS chooses randomly a ranging code from the initial ranging domain of the Target BS and transmits it in the contention-based ranging interval of the Target BS

After the BS successfully receives ranging code and sends RNG-RSP message with ranging status 'success', it will provide uplink of adequate size for the MS to transmit RNG-REQ message with TLV parameters (Serving BS ID, MS MAC address) related to the association ranging.

6.3.21.1.3.2 Association Level 1 – Association with coordination

When this association level is chosen, the Serving BS provides association parameters to the MS and coordinates association between the MS and neighboring BSs.

The MS may request to perform association with coordination by sending the MOB_SCN-REQ message to the Serving BS with ASSOCIATION_TYPE = 0b001. This message will include a list of neighboring BS's with which the MS wishes to perform association.

The Serving BS will then coordinate the association procedure with the requested neighboring BSs.

Each neighboring BS will provide a ranging window for association at a predefined "rendezvous time", in terms of relative frame number. The neighboring BS will also assign:

- a unique code number (from within the initial ranging codeset)
- a transmission opportunity within the allocated region (in terms of offset from the start of the region)

The neighboring BS may assign the same code or transmission opportunity to more than one MS, but not both. In case all allocated transmission opportunities in current region are different, there is no potential for collision of transmissions from

different MSs. In case Serving BS allocates same transmission opportunity to several MSs there is some probability of collision and then neighbor BS may fail to identify transmitted codes.

The Serving BS (of the associating MS), will coordinate to assure that the neighboring BSs do not assign overlapping "rendezvous times" to the MS, i.e. allocating ranging windows in frames that are too close in time to each other (or even concurrent).
The Serving BS will provide the pre-assigned association ranging info via the MOB_SCN-RSP message.

The ranging window will be allocated via UIUC=12 in the UL-MAP, when the "Dedicated ranging indicator" bit is set to 1.
When " Dedicated ranging indicator" is set to 1, then the ranging region and ranging method defined shall be used for the purpose of ranging using dedicated CDMA code and transmit opportunity assigned in the MOB-PAG-ADV message (for location update in idle mode) or in the MOB-SCN-RSP message (for coordinated association).
MSs registered to this BS are prohibited from use of the named ranging region.

If no ranging window exist with "Dedicated ranging indicator" is set to 1 but Fast ranging IE for this MS is allocated by the BS at the Rendezvous time, then MSS may use this allocation for the coordination process

6.3.21.1.3.3 Association Level 2 – NW Assisted Association Reporting

The MS may request to perform association with NW assisted association reporting by sending the MOB_SCN-REQ message to the Serving BS with ASSOCIATION TYPE = 0b010. This message will include a list of neighboring BSs with which the MS wishes to perform association.

The Serving BS will then coordinate the association procedure with the requested neighboring BS's in a fashion similar to association level 2. However, when using this association type, the MS does not have to wait for RNG-RSP from the Target BS. Instead, the RNG-RSP info (i.e. PHY corrections) will be sent by each Target BS to the Serving BS (over the backbone). The Serving BS may aggregate all the RNG-RSP messages to a single message, namely MOB_ASC_REPORT, which the Serving BS then sends to the MS.
When receiving this message, the MS updates its association database (PHY offsets and CID's) and timers for each associated BS.
Using this association type, the MS is required only to transmit the CDMA ranging code at the Target BS.

If no ranging window exist with "Dedicated ranging indicator" is set to 1 but Fast ranging IE for this MS is allocated by the BS at the Rendezvous time, then MS may use this allocation for the coordination process.

[In D7, change table 108h in subclause 6.3.2.3.48, Scanning Interval Allocation Request (MOB_SCN-REQ) message, as follows]

Table 108h – MOB_SCN-REQ message format

Syntax	Size (bits)	Notes
MOB_SCN_REQ_Message_Format() {		
Management Message Type = 54	8	
~~Scan type~~	~~1~~	~~0 = scanning~~ ~~1 = association~~
Association type	3	0b000: Scanning with association level 0: 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
Interleaving interval	8	Units are frames
Scan iteration	8	In frames
Comp_NBR_BSID_IND	1	1 = use compressed BS ID
Padding	4	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	8	Number of neighboring BS's to be scanned/associated
For (j=0;J<N_Recommended_BS ~~Scanning~~;j++) {		
~~N_Recommended_BS_scanning~~	~~3~~	~~Number of BS's that the MS plans to scan~~
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 ~~Scanning~~	48	
}		
~~If (scan type = 1) {~~		
~~N_Recommended_BS_Associations~~	~~4~~	
~~For (j=0;J<N_Recommended_BS_Association;j++) {~~	-	
~~Recommended BS_ID_Association~~	~~48~~	
~~}~~		
HMAC tuple		Full size or truncated
}		

Scan duration
Duration (in units of frames) of the requested scanning period.

Association type
Type of association to be used by the MS and coordinated by the Serving BS (if Association type >=0b010).

Comp_NBR_BS_ID_IND
Indicates whether to use BS index (8 bits) or BS_ID (48 bits) or.

BS_index
BS_index is a compressed identifier of a neighboring BS, with the index assigned in the order of appearance of the BS in the MOB_NBR_ADV message.

HMAC Tuple (see 11.1.2)
The HMAC Tuple Attribute contains a keyed Mmessage digest (to guarantee the origin and integrity of the message).

Interleaving Interval
The period of MS's Normal Operation which is interleaved between Scanning Durations.

Scan Iteration
The requested number of iterating scanning interval by an MS

N_Recommended_BS
Number of BSs which the MSS plans to scan with or without association

Recommended BS ID
BS IDs of those BSs the MS plans to scan with or without association. This field may be included only if an MS has a candidate available BS. It means that MS calls Serving BS for assistance to make appointment with the Recommended BS for non-contention based ranging opportunity to perform association.

[In D7, change table 108i in subclause 6.3.2.3.49, Scanning Interval Allocation Response (MOB_SCN-RSP) message, as follows]

Table 108i – MOB_SCN-RSP message format

Syntax	Size (bits)	Notes
MOB_SCN_RSP_Message_Format() {		
Management Message Type = 55	8	
Scan duration	8	In frames
~~If (Scan duration == 0) {~~		
~~HMAC tuple~~	~~(21 bytes)~~	
~~} else {~~		
~~Start frame~~	~~4~~	
If (Scan duration != 0) {		
Start frame	4	
~~Scan_type~~	~~1~~	~~0 = scanning~~ ~~1 = association~~
~~reserved~~	~~7~~	~~Shall be set to zero~~
Association type	3	0b000: Scanning with association level 0: 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
Padding	1	Shall be set to zero
~~If (Scan type = 0) {~~		
Interleaving interval	8	Units are frames
Scanning iteration	8	Units are frames
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 is set to 0b01. Scan report period in frames
~~*reserved*~~	~~2~~	~~Shall be set to zero~~
Comp_NBR_BSID_IND	1	
Padding	3	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~~_Scanning~~	4	Number of neighboring BS's to be scanned/associated
For (j=0;J<N_Recommended_BS~~_Scanning~~;j++) {		~~N_Recommended_BS can be derived from the length field in the MAC header of the message~~
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~~_Scanning~~	48	BS IDs of ~~available~~ BSs ~~for association~~ 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	Padding bits to complement message length to an integer number of bytes
}		
If (scan type = 1) {		
N_Recommended_BS_Associations	4	
For (j=0;J<N_Recommended_BS_ Association;j++) {	-	
Recommended BS_ID_Association	48	-
Rendezvous time	16	-
}		
HMAC tuple		Full size or truncated
}		
}		
}		

The following parameters shall be included in the MOB_SCN-RSP message:

Scan duration
Duration (in units of frames) where the MS may perform scanning or association for Available BS. If the BS sets this field to be zero to disapprove the MSS's request, all other parameters except HMAC Tuple shall be omitted in the message.

Start Frame
Measured from the frame in which this message was received. A value of zero means that first Scanning Interval starts in the next frame.

Scan type
Signals presence of information on BSs with which Serving BS recommends to perform Association.

Association type
Type of association to be used by the MS and coordinated by the Serving BS

Comp_NBR_BS_ID_IND
Indicates whether to use BS index (8 bits) or BS_ID (48 bits).

BS_index
BS_index is a compressed identifier of a neighboring BS, with the index assigned in the order of appearance of the BS in the MOB_NBR_ADV message.

Interleaving interval
The period interleaved between Scanning Intervals when MS shall perform Normal Operation.

Scan iteration
The number of iterating scanning interval

Report mode
Action code for an MS's report of CINR measurement:

00: The MS measures channel quality of the Available BSs without reporting.
01: The MS reports the result of the measurement to Serving BS periodically. The period of reporting is different from that of scanning.
10: The MS reports the result of the measurement to Serving BS after each measurement.
11: *reserved*

Scan report period
The period of MS's report of CINR measurement when the MS is required to report the value periodically.

N_Recommended_BS ~~_Scanning~~
Number of BSs which the BS recommends to scan with or without scanning

Recommended BS ID ~~_Scanning~~
Recommended BS ID list for scan with or without association.

~~If Scan type is set to 1, the following parameters shall be included in the MOB-SCN-REQ message:~~

~~**N_Recommended_BS_Association**~~
~~Number of BSs which the BS recommends to scan and try association~~

~~**Recommended BS Association**~~
~~Recommended BS ID list for Association. Serving BS may request, over the backbone, from Recommended BS allocation of non-contention based ranging opportunity for MS Association activity. When conducting initial ranging to Recommended BS, MS shall use allocated noncontention based ranging opportunity, if available.~~

If association type > 0 then Serving BS may request, over the backbone, from Recommended BS allocation of non-contention based ranging opportunity for MS association activity. When conducting initial ranging to Recommended BS, MS shall use allocated non-contention based ranging opportunity, if available.

Rendezvous time
This is offset, measured in units of ~~500us~~ frame duration (of Serving BS), when the corresponding Recommended BS is expected to provide non-contention based ranging opportunity for the MSS. The offset is calculated from the frame where MOB_SCN-~~REQ~~RSP message is transmitted. In case ~~Scan~~ Association type = 0 the parameter is not applicable and shall be encoded as 0. The Recommended BS is expected to provide non-contention based Ranging opportunity within 5 frames interval starting from the frame specified by Rendezvous time parameter.

CDMA code
A unique code assigned to the MS, to be used for association with the neighbor BS. Code is from the initial ranging codeset.

Transmission opportunity offset
A unique transmission opportunity assigned to the MS, to be used for association with the Target BS in units of symbol duration.

[In D7, change table 302h in subclause 8.4.5.4.21, OFDMA Fast_Ranging_IE format IE, as follows]

Table 302h – FAST_RANGING_IE message format

Syntax	Size (bits)	Notes
FAST_RANGING_IE {		
Extended UIUC	4	0x06
Length	4	variable
HO ID indicator	1	0: MAC Address is present 1: HO ID is present
Reserved	3	Shall be set to zero
if (HO ID indicator == 1) {		
HO ID	8	
Reserved	40	Shall be set to zero
} else {		
MAC address	48	MS MAC address as provided on the RNG_REQ message on initial system entry
}		
UIUC	4	UIUC ≠ 15. A four-bit code used to define the type of uplink access and the burst type associated with that access.
~~if (UIUC == 12) {~~		
~~OFDMA Symbol offset~~	~~8~~	
~~Subchannel offset~~	~~7~~	
~~No. OFDMA Symbols~~	~~7~~	
~~No. Subchannels~~	~~7~~	
~~Ranging Method~~	~~2~~	~~0b00 - Initial Ranging over two symbols~~ ~~0b01 - Initial Ranging over four symbols~~ ~~0b10 - BW Request/Periodic Ranging over one symbol~~ ~~0b11 - BW Request/Periodic Ranging over three symbols~~
~~reserved~~	~~1~~	~~Shall be set to zero~~
~~} else {~~		
Duration	10	In OFDMA slots (see 8.4.3.1)
Repetition coding indication	2	0b00 - No repetition coding 0b01 - Repetition coding of 2 used 0b10 - Repetition coding of 4 used 0b11 - Repetition coding of 6 used
~~*Reserved*~~	~~20~~	~~Shall be set to zero~~
}		
}		

[Delete the following text from the message:]

~~**CID**~~
~~Basic CID of MSS to which ranging opportunity is allocated. In case UIUC = 12 allocation shall be used for CDMA code transmission as specified in 8.4.7~~

UIUC
UIUC used for the burst.

~~**OFDMA Symbol offset**~~
~~The offset of the OFDMA symbol in which the burst starts, the offset value is defined in units of OFDMA symbols and is relevant to the Allocation Start Time field given in the UL-MAP message.~~

~~**Subchannel offset**~~

~~The lowest index subchannel used for carrying the burst, starting from subchannel 0. When allocation of mini-subchannels is used this offset will always be even numbered and will point to the first subchannel of the couple split into mini-subchannels and used in the allocation.~~

~~**No. OFDMA Symbols**~~
~~The number of OFDMA symbols that are used to carry the uplink Burst.~~

~~**No. subchannels**~~
~~The number of subchannels with subsequent indices~~

~~**Ranging Method**~~
~~Specifies option of CDMA code transmission according to 8.4.7~~

Duration
Indicates the duration, in units of OFDMA slots, of the allocation.

Repetition coding indication
Indicates the repetition code used inside the allocated burst.

HO ID indicator
An indicator to indicate whether HO ID or MAC Address is being used to identify an MS during HO.

HO ID
An identifier assigned to an MS for use during initial ranging to the selected target BS.

[In D7, insert new subclause (and adjust numbering of all subsequent subclauses]

6.3.2.3.51 Association Result Report (MOB_ASC-REPORT) message

This message is transmitted using primary management CID

Table 107h – MOB_ASC-REPORT message format

Syntax	Type	Size	Notes
MOB_ASC_REPORT_Message_Format() {			
Management Message Type = 66		8 bits	
Report mode			0: Event triggered
Comp_NBR_BSID_IND		1 bits	
Padding		3 bits	Shall be set to zero
If (Comp_NBR_BSID_IND ==1) {			
Configuration change count for MOB_NBR_ADV		8 bits	Configuration Change Count value of referring MOB_NBR_ADV message
}			
N_Recommended_BS		8 bits	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 bits	BS index corresponds to position of BS in MOB_NBR_ADV message
}			
Else {			
Neighbor_BS_ID		48 bits	
}			
Timing adjust	1	32 bits	
Power level adjust	2	8 bits	
Offset frequency adjust	3	32 bits	
Ranging status	4	8 bits	
Service level prediction	5	8 bits	
}			
}			
Padding		4 bits	Padding bits to complement message length to an integer number of bytes
}			

Report mode

The offset of the OFDMA symbol in which the burst starts, the offset value is defined in units of OFDMA symbols and is relevant to the Allocation Start Time field given in the UL-MAP message.

Comp_NBR_BSID_IND
This bit indicates whether neighbor BS IDs are compressed or not. MSS can compress BS ID, only when NBR_BS_Index_Validity_Time is larger than the difference of MOB_SCAN_REPORT message transmitting time and MOB_NBR_ADV message receiving time (MOB_NBR_ADV message should be referred in order to compress neighbor BS IDs). This difference time is calculated from Frame number of DL-MAP PHY Synchronization Field.

BS_index
BS_index is a compressed identifier of a neighboring BS, with the index assigned in the order of appearance of the BS in the MOB_NBR_ADV message.

NBR BS_ID
BS_ID of the neighboring BS with which the MS is associated.

Configuration Change Count for MOB_NBR_ADV
The value of Configuration Change Count in MOB_NBR_ADV message referred in order to compress neighbor BSID

Primary management CID
The primary management CID assigned by the neighbor BS to the MS during association

Timing adjust
The time required to advance MS transmissions so frames arrive at the expected time instance at the neighbor BS.

Power level adjust
The power level offset adjustment required so that MS transmissions arrive at the desired level at the neighbor BS.

Frequency offset adjust
The relative frequency adjustment required so that MS transmissions arrive at the desired frequency at the neighbor BS.

Ranging status
Used to indicate whether MS ranging attempt is within acceptable limits of the neighbor BS.

N_Recommended_BS
Number of BSs included in this association report.

[In D7, insert new subclause 11.8.3.7.17]

11.8.3.7.17 Association type support

The 'Association type support' field indicates the association level supported by the MS or the BS

Type	Length	Value	Scope
167	1	0: level 0: Scanning or association without coordination. 1: level 1: association with coordination. 2: level 2: NW assisted association reporting. 4-255 reserved	SBC-REQ (see 6.3.2.3.23) SBC-RSP (see 6.3.2.3.24)

The highest level supported shall be indicated.

[In D7, change the text in 8.4.5.4 UL-MAP IE format, page 269, line 38, as follows]

Syntax	Size	Notes
UL-MAP_IE() {		
CID	16 bits	
UIUC	4 bits	
if (UIUC == 12) {		
OFDMA Symbol offset	8 bits	
Subchannel offset	7 bits	
No. OFDMA Symbols	7 bits	
No. Subchannels	7 bits	
Ranging Method	2 bits	0b00 – Initial Ranging/Handover Ranging over two symbols 0b01 – Initial Ranging/Handover Ranging over four symbols 0b10 – BW Request/Periodic Ranging over one symbol 0b11– BW Request/Periodic Ranging over three symbols

~~*reserved*~~ Dedicated ranging indicator	1 bit	~~shall be set to zero~~ 0: the OFDMA region and Ranging Method defined are used for the purpose of normal ranging 1: the OFDMA region is for the purpose of ranging using dedicated CDMA codes and transmission opportunities assigned in the MOB-PAG-ADV message or in the MOB_SCN-RSP message.
} else if (UIUC == 14) {		
CDMA_Allocation_IE()	32 bits	
~~}~~ else if (UIUC == 15) {		
Extended UIUC dependent IE	*variable*	See subclauses following 8.4.5.4.3
} else {		
…	…	…

[In D7, modify the text in 8.4.7.1 Initial-ranging/handover-ranging transmissions, page 430, line 36, as follows]

8.4.7.1 Initial-ranging/handover-ranging transmissions

~~The initial-ranging/handover-ranging transmission shall be used by any MS that wants to synchronize to the system channel for the first time~~ The initial ranging codes shall be used for initial network entry and association. Handover ranging codes shall be used for ranging against a Target BS during handover. An initial-ranging/handover-ranging transmission shall be performed during two or four consecutive symbols. The same ranging code is transmitted on the ranging channel during each symbol, with no phase discontinuity between the two symbols. A time-domain illustration of the initial-ranging/handover-ranging transmission is shown in Figure 239.

[In D7, modify the text in 8.4.7.1 Initial-ranging/handover-ranging transmissions, page 430, line 36, as follows]

[In D7, change section 6.3.22.8.1, as follows]

6.3.22.8.1 MS side

An MS may terminate MS Idle Mode at any time.

An MS shall terminate Idle Mode and re-enter the network if it decodes a BS Broadcast Paging message that contains the MS own MS MAC Address hash and an Action Code of 10, enter network. In the event that an MS decodes a BS Broadcast Paging message that contains the MS own MS MAC Address hash and an Action Code of 01, Perform Ranging, the MS shall conduct and complete Idle Mode Location Update to establish location to the network and acknowledge message decoding. In both cases for the OFDMA PHY, if a PHY specific ranging code and transmission opportunity is assigned to the MS in the MOB_PAG-ADV message, the MS shall perform Idle Mode Location Update by transmitting the code at the transmission opportunity assigned in the MOB_PAG-ADV message on the dedicated ranging region assigned in the UL-MAP-IE (UIUC = 12 and dedicated ranging indicator bit set to '1').

The procedure for PHY specific ranging code and transmission opportunity operation is described as follows:
- After receiving the MOB_PAG-ADV, the MS shall transmit the assigned ranging code at the transmission opportunity in the assigned ranging region in consecutive frames during the Page-Response window. The consecutive transmission can be terminated early if the MS receives a RNG-RSP before the end of the Page-Response window.

- In the case where RNG-RSP message with 'continue' status is received, then the BS may allocate in the ~~DL~~UL-MAP dedicated ranging region, in this case, the MS shall use the assigned ranging code and transmission opportunity provided in the MOB_PAG-ADV message.

[In D7, change subclause 6.3.2.3.55 (MOB_PAG-ADV message), page 119, as follows]

Action Code

Paging action instruction to MS to perform the following action:
00=No Action Required
01=Perform Ranging to establish location and acknowledge message
10=Enter Network
11=reserved

For OFDMA PHY, when a BS pages multiple MSs, the BS may assign dedicated CDMA codes to one or more MS being paged. The BS shall first list the MAC Address Hash of those MSs that are assigned dedicated CDMA codes, followed by the MSs that are not assigned dedicated CDMA codes.

For OFDMA PHY, one of the following TLV may be included in the MOB_PAG-ADV management message:

CDMA code and transmission opportunity assignment (11.18.1)

OFDMA-PHY specific parameter used to indicate CDMA code ~~assignment~~ and transmission opportunity assigned to one or more MSs being paged in this message. One CDMA code and transmission opportunity assignment in the TLV corresponds to one MS paged. The order of the assignments is the same as the order of appearance of MS MAC address hash in this message.

[In D7, change subclause 11.18.1, as follows]

11.18.1 CDMA code and transmission opportunity assignment
This field indicates the assigned code and the transmission opportunity for a MS who is paged to use over dedicated CDMA ranging ~~channel~~region.

Type	Length	Notes	Scope

150	variable; ~~N_assign~~8 + N_assign x ~~8~~16) bits	Bit #0 - #7: N-assign
		Subsequent (N_assign x ~~8~~16) bits:
		for (i = 0, i < N_assign, i++) {
		8 bits code index assigned to a MS who is paged.
		8 bits transmission opportunity offset assigned to a MS who is paged
		}
			OFDMA