

IEEE Standard for WirelessMAN-Advanced Air Interface for Broadband Wireless Access Systems

Amendment 2: Higher Reliability Networks

IEEE Computer Society
and the
IEEE Microwave Theory and Techniques Society

Sponsored by the
LAN/MAN Standards Committee

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Abstract: Enhancements to the WirelessMAN-Advanced Air Interface to support high-reliability networks are specified in this amendment to IEEE Std 802.16.1-2012.

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Introduction

This introduction is not part of IEEE Std 802.16.1a-2013, IEEE Standard for WirelessMAN-Advanced Air Interface for Broadband Wireless Access Systems—Amendment 2: Higher Reliability Networks.

This amendment updates and expands IEEE Std 802.16.1, specifying enhanced mechanisms to support higher reliability networks. As of the publication date, IEEE Std 802.16.1-2012 is the current version, as amended by IEEE Std 802.16.1b-2012 and by IEEE Std 802.16.1a-2013.

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IEEE Standard for WirelessMAN-Advanced Air Interface for Broadband Wireless Access Systems

Amendment 2: Higher Reliability Networks

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NOTE—The editing instructions contained in this amendment define how to merge the material contained therein into the existing base standard and its amendments to form the comprehensive standard.

The editing instructions are shown in **bold italic**. Four editing instructions are used: change, delete, insert, and replace. **Change** is used to make corrections in existing text or tables. The editing instruction specifies the location of the change and describes what is being changed by using ~~strike through~~ (to remove old material) and underscore (to add new material). **Delete** removes existing material. **Insert** adds new material without disturbing the existing material. Deletions and insertions may require renumbering. If so, renumbering instructions are given in the editing instruction. **Replace** is used to make changes in figures or equations by removing the existing figure or equation and replacing it with a new one. Editing instructions, change markings, and this NOTE will not be carried over into future editions because the changes will be incorporated into the base standard.¹

¹Notes in text, tables, and figures are given for information only and do not contain requirements needed to implement the standard.

1. Overview

Insert new subclause 1.6 after 1.5 from IEEE Std 801.16.1b as indicated:

1.6 Support for high-reliability networks

A high-reliability (HR) network implements features that enable increased robustness and alternative radio path establishment in a degraded network, in the case of failure of one or more infrastructure nodes or network connectivity.

To support high reliability in the WirelessMAN-Advanced Air Interface, the multi-mode operation of a base station (BS) as a relay and a mobile station (MS) as a relay, direct communication between MSs, forwarding of MS traffic to the network and another MS by another MS, standalone network, local forwarding bypassing backhaul links, path management against single point of failures by providing alternative radio and backhaul paths, and enhanced multicast-based service among a group of mobile stations are supported.

Those distinct functionalities in HR networks support mission-critical applications, including public safety, avionics, airport surface, and Smart Grid.

3. Definitions

Insert the following definitions in alphabetical order:

affected high-reliability base station (HR-BS): An HR-BS that is experiencing a failure of its backhaul connection to the backbone network.

high-reliability base station (HR-BS): A base station that is a subset of advanced base station (ABS) features and functions and additionally supports the WirelessMAN-High Reliability Air Interface.

high-reliability mobile station (HR-MS): A subscriber station that is a subset of advanced mobile station (AMS) features and functions and additionally implements the WirelessMAN-High Reliability Air Interface.

high-reliability relay station (HR-RS): A relay station that is a subset of advanced relay station (ARS) features and functions and additionally supports the WirelessMAN-High Reliability Air Interface.

high-reliability station (HR-station): A high-reliability mobile station (HR-MS), high-reliability base station (HR-BS), or high-reliability relay station (HR-RS).

infrastructure station: A high-reliability base station (HR-BS) or high-reliability relay station (HR-RS).

mobile base station: A base station (BS) that is capable of maintaining service while moving.

radio path redundancy: The ability to provide alternative paths between highreliability stations (HR-stations).

self-coexistence: Coexistence of multiple cells in a high-reliability (HR) network.

self-coexistence mode: An operation mode of a high-reliability (HR) network, in which multiple HR cells share the same frequency channel in time.

4. Abbreviations and acronyms

Insert the following abbreviations and acronyms in alphabetical order:

FBIS forwarding between infrastructure stations

HR high reliability

PPDR public protection and disaster relief

SPOF single point of failure

6. WirelessMAN-Advanced Air Interface

6.1 Introduction

6.2 Medium access control

6.2.1 Addressing

6.2.2 MAC PDU formats

Change Table 6-5 in 6.2.2.1.3 as indicated:

Table 6-5—Type field encodings for MAC signaling header types

Type field (5-bits)	MAC signaling header type
00000	BR with STID
00001	BR without STID
00010	Service-specific scheduling control header
00011	Sleep control
00100	AMS battery level report
00101	Uplink power status report
00110	Correlation matrix feedback
00111	MIMO feedback
01000	Grant Management
~~01000–11111~~	~~Reserved~~
<u>01100</u>	<u>Switched access control</u>
<u>01101</u>	<u>Ranging notification</u>
<u>01110–11111</u>	<u>Reserved</u>

6.2.2.1.3.1 Bandwidth request (BR) with STID header

Change the text in the first paragraph as indicated:

When an AMS requests bandwidth through a UL resource allocated by the CDMA Allocation A-MAP IE, it shall transmit BR with STID signalling header on the allocated UL resource. The BR format with STID header is defined in Table 6-6. This BR is also used for requesting bandwidth for transmission over a direct communication link. This is done by setting the field “DC Indicator” to 0b1.

Change Table 6-6 as indicated:

Table 6-6—BR with STID header format

Syntax	Size (bits)	Notes
BR with STID() {		
FID	4	Flow Identifier. Set to 0010. <u>When DC Indicator is set to 0b1, the value of this FID shall be replaced with FID for DC link in HR-Network, which is described in 6.2.3.47.</u>
...	...	...
STID	12	STID of the AMS that requests UL bandwidth. <u>A TWDC address shall be used when this BR is for a flow over a DC link in HR-Network.</u>
<u>DC Indicator</u>	1	<u>Shall be set to 0b0 for normal uplink flow and to 0b1 for flow over a DC link in HR-Network.</u>
~~Reserved~~	4	~~Reserved. This field shall be filled by 0.~~
}		

6.2.2.1.3.5 AMS Battery Level Report header

Change Table 6-10 as indicated:

Table 6-10—AMS Battery Level Report header format

Syntax	Size (bits)	Notes
AMS Battery Level Report header () {	—	—
FID	4	Flow Identifier. This field indicates MAC signaling header. Set to 0010.
Type	5	MAC signaling header type = 0b00100.
Length	3	Indicates the length of the signaling header in bytes.
AMS Battery Status	1	0b0: The AMS is plugged into a power source 0b1: The AMS is not plugged into a power source
Battery Level Indication	1	0b0: Detailed battery level report is not included 0b1: Detailed battery level report is included
If (Battery Level Indication == 1) {		
AMS Battery Level	3	0b000: Battery level is >75% and ≤100% 0b001: Battery level is >50% and ≤75% 0b010: Battery level is >25% and ≤50% 0b011: Battery level is >5% and ≤25% 0b100: Battery level is below 5% 0b101–0b111: <i>Reserved</i>
~~Reserved~~	7	~~Shall be filled by 0~~

Table 6-10—AMS Battery Level Report header format (continued)

Syntax	Size (bits)	Notes
<u>Max Capacity of AMS Battery</u>	4	0b0000: No support 0b0001~0b1111: The value shall be increased by 0.2 from 1.0 in units of Ah. Values outside this range shall be assigned the closest extreme. Value: 1.0~4.0 Max. Capacity of AMS Battery: Value + 0.2
<i>Reserved</i>	3	Shall be filled by 0
}		
else {		
<i>Reserved</i>	2	Shall be filled by 0
}		
}		

Insert new subclause 6.2.2.1.3.13 after 6.2.2.1.3.12 from IEEE Std 801.16.1b as indicated:

6.2.2.1.3.13 Switched access control

The switched access control signaling header shall be used to convey control signaling related to the switched access in FBIS by FBIS HR-MS or any of two serving HR-BSs (Table 6-15d).

Table 6-15d—Switched access control header format

Syntax	Size (bits)	Notes
Switched Access Control () {		
FID	4	Flow Identifier. This field indicates MAC signaling header. Set to 0010.
Type	5	MAC signaling header type = 01100.
Length	3	Indicates the length of the signaling header in bytes.
SAC sub-type	3	0b000 = Access Request 0b001 = Access Response 0b010 = Switched Access Termination Request 0b011 = Switched Access Termination Response 0b101~0b111 = <i>Reserved</i>
If (SAC subtype == 0b000) {		
Requested Switched Access Window Size	7	Duration (in units of frames) of the requested Switched Access Window.
Bandwidth Request Indication	1	Indicates whether the HR-MS requests bandwidth. 0: The HR-MS does not request bandwidth. 1: The HR-MS requests bandwidth.
If (Bandwidth Request Indication == 1) {		

Table 6-15d—Switched access control header format *(continued)*

Syntax	Size (bits)	Notes
BR Size	19	Aggregate bandwidth request size in bytes.
BR FID	4	The FID for which UL bandwidth is requested.
STID	12	STID of FBIS HR-MS that is requesting UL bandwidth.
}		
} else if (SAC subtype == 0b001) {		
Status	1	0b0 : Switched access granted, allocates Switched Access Window 0b1 : Switched access not granted, Switched Access Window not allocated
If (Status == 0) {		
Switched Access Window	7	7 LSBs of frame sequence that indicates the last frame of the allocated Switched Access Window.
} else if (SAC subtype == 0b010) {		
Termination reason	2	0b00 : Backbone recovery 0b01 : No connection for FBIS 0b10 : Link failures 0b11 : <i>Reserved</i>
} else if (SAC subtype == 0b011) {		
Status	1	0b0 : Termination request granted 0b1 : Termination request not granted
}		
Padding	variable	For byte alignment.
}		

Insert new subclause 6.2.2.1.3.14 as indicated:

6.2.2.1.3.14 Ranging notification header

The Ranging notification header should be used when an HR-MS notifies one or more HR-MSs of the Ded-CH preamble's transmission at the DC frame, which is identified by the DC frame offset field. The format of Ranging notification header is defined in Table 6-15e.

Table 6-15e—Ranging notification header format

Syntax	Size (bits)	Notes
Ranging Notification header () {		
FID	4	Flow Identifier. This field indicates MAC signaling header. Set to 0010.
Type	5	MAC signaling header type = 01101.
Length	3	Indicates the length of the signaling header in bytes. Set to 2.
DC frame offset	4	Indicate the location of DC frame where the Ded-CH preamble is transmitted.
}		

6.2.3 MAC Control messages

Change Table 6-28 as indicated:

Table 6-28—MAC Control messages

No.	Functional Areas	Message names	Message description	Security	Connection
24	Security	AAI-PKM-RSP	Privacy Key Management Response	Before AK is derived at network entry: NULL at network entry and EAP-transfer message is enclosed: encryption/ICV after AK is derived after AK is derived at network entry and the other message is enclosed: CMAC	Unicast <u>or</u> <u>Multicast</u>
...					
<u>73</u>	<u>Multimode</u>	<u>AAI-MM-ADV</u>	<u>Multimode advertisement</u>	<u>N/A</u>	<u>Broadcast</u>
<u>74</u>	<u>Multimode</u>	<u>AAI-MM-RS-REQ</u>	<u>Multimode Relay request</u>	<u>Encrypted/ICV</u>	<u>Unicast</u>

Table 6-28—MAC Control messages (continued)

No.	Functional Areas	Message names	Message description	Security	Connection
<u>75</u>	<u>Multimode</u>	<u>AAI-MM-RS-RSP</u>	<u>Multimode Relay response</u>	<u>Encrypted/ICV</u>	<u>Unicast</u>
<u>76</u>	<u>Multimode</u>	<u>AAI-MM-RL-REQ</u>	<u>Multimode release request</u>	<u>Encrypted/ICV</u>	<u>Unicast</u>
<u>77</u>	<u>Multimode</u>	<u>AAI-MM-RL-RSP</u>	<u>Multimode release response</u>	<u>Encrypted/ICV</u>	<u>Unicast</u>
<u>78</u>	<u>Multimode</u>	<u>AAI-MM-BS-REQ</u>	<u>Multimode Base station request</u>	<u>Encrypted/ICV</u>	<u>Unicast</u>
<u>79</u>	<u>Multimode</u>	<u>AAI-MM-BS-RSP</u>	<u>Multimode Base station response</u>	<u>Encrypted/ICV</u>	<u>Unicast</u>
<u>80</u>	<u>Multimode</u>	<u>AAI-MM-BS-CMD</u>	<u>Multimode Base station command</u>	<u>Encrypted/ICV</u>	<u>Unicast</u>
<u>81</u>	<u>Multimode</u>	<u>AAI-MM-RS-SYN-REQ</u>	<u>Multimode Relay Synchronization request</u>	<u>Encrypted/ICV</u>	<u>Unicast</u>
<u>82</u>	<u>Multimode</u>	<u>AAI-MM-RS-SYN-RSP</u>	<u>Multimode Relay Synchronization response</u>	<u>Encrypted/ICV</u>	<u>Unicast</u>
<u>83</u>	<u>BS-controlled direct communication</u>	<u>AAI-HR-RNG-CMD</u>	<u>HR-MS/HR-MS ranging command</u>	<u>Encrypted/ICV</u>	<u>Unicast or Multicast</u>
<u>84</u>	<u>BS-controlled direct communication</u>	<u>AAI-HR-RNG-REP</u>	<u>HR-MS/HR-MS ranging report</u>	<u>Encrypted/ICV</u>	<u>Unicast</u>
<u>85</u>	<u>BS-controlled direct communication</u>	<u>AAI-HR-PCC</u>	<u>Power control configuration</u>	<u>Encrypted/ICV</u>	<u>Unicast</u>
<u>86</u>	<u>BS-controlled direct communication</u>	<u>AAI-DC-LC-REQ</u>	<u>Link creation request</u>	<u>Encrypted/ICV</u>	<u>Unicast</u>
<u>87</u>	<u>BS-controlled direct communication</u>	<u>AAI-DC-LC-RSP</u>	<u>Link creation response</u>	<u>Encrypted/ICV</u>	<u>Unicast</u>
<u>88</u>	<u>BS-controlled direct communication</u>	<u>AAI-DC-LD-REQ</u>	<u>Link deletion request</u>	<u>Encrypted/ICV</u>	<u>Unicast</u>
<u>89</u>	<u>BS-controlled direct communication</u>	<u>AAI-DC-LD-RSP</u>	<u>Link deletion response</u>	<u>Encrypted/ICV</u>	<u>Unicast</u>
<u>90</u>	<u>BS-controlled direct communication</u>	<u>AAI-DC-LR-REQ</u>	<u>Link status report request</u>	<u>Encrypted/ICV</u>	<u>Unicast</u>

Table 6-28—MAC Control messages (continued)

No.	Functional Areas	Message names	Message description	Security	Connection
91	<u>BS-controlled direct communication</u>	<u>AAI-DC-LR-RSP</u>	<u>Link status report response</u>	<u>Encrypted/ICV</u>	<u>Unicast</u>
92	<u>Talk-around direct communication</u>	<u>AAI-DC-LEST-REQ</u>	<u>Link Establishment Request</u>		<u>Unicast</u>
93	<u>Talk-around direct communication</u>	<u>AAI-DC-LEST-RSP</u>	<u>Link Establishment Response</u>		<u>Unicast</u>
94	<u>Talk-around direct communication</u>	<u>AAI-DC-LEST-CMD</u>	<u>Link Establishment Command</u>		<u>Multicast</u>
95	<u>Talk-around direct communication</u>	<u>AAI-DC-MES-REP</u>	<u>Measurement Report</u>		<u>Unicast</u>
96	<u>Talk-around direct communication</u>	<u>AAI-DC-MES-CMD</u>	<u>Measurement Command</u>		<u>Unicast or Multicast</u>
97	<u>Talk-around direct communication</u>	<u>AAI-DC-RCHG-REQ</u>	<u>Resource Change Request</u>		<u>Unicast</u>
98	<u>Talk-around direct communication</u>	<u>AAI-DC-RCHG-RSP</u>	<u>Resource Change Response</u>		<u>Unicast</u>
99	<u>Talk-around direct communication</u>	<u>AAI-DC-RCHG-CMD</u>	<u>Resource Change Command</u>		<u>Unicast or Multicast</u>
100	<u>Talk-around direct communication</u>	<u>AAI-DC-TKN-REQ</u>	<u>Token Request</u>		<u>Unicast</u>
101	<u>Talk-around direct communication</u>	<u>AAI-DC-TKN-RSP</u>	<u>Token Response</u>		<u>Unicast</u>
102	<u>Talk-around direct communication</u>	<u>AAI-DC-TKN-HO</u>	<u>Token Handover</u>		<u>Unicast or Multicast</u>
103	<u>Talk-around direct communication</u>	<u>AAI-DC-TKN-ADV</u>	<u>Token Advertisement</u>		<u>Multicast</u>
104	<u>Talk-around direct communication</u>	<u>AAI-DC-LREL-CMD</u>	<u>Link Release Command</u>		<u>Unicast or Multicast</u>
105	<u>Talk-around direct communication</u>	<u>AAI-DC-DSA-CMD</u>	<u>Dynamic Service Addition Command</u>		<u>Unicast or Multicast</u>

Table 6-28—MAC Control messages (continued)

No.	Functional Areas	Message names	Message description	Security	Connection
<u>106</u>	<u>Talk-around direct communication</u>	<u>AAI-DC-DSC-CMD</u>	<u>Dynamic Service Change Command</u>		<u>Unicast or Multicast</u>
<u>107</u>	<u>Talk-around direct communication</u>	<u>AAI-DC-DSD-CMD</u>	<u>Dynamic Service Delete Command</u>		<u>Unicast or Multicast</u>
<u>108</u>	<u>Talk-around direct communication</u>	<u>AAI-DC-RTS</u>	<u>Request To Send</u>		<u>Unicast or Multicast or Broadcast</u>
<u>109</u>	<u>Talk-around direct communication</u>	<u>AAI-DC-CTS</u>	<u>Clear To Send</u>		<u>Unicast</u>
<u>110</u>	<u>Talk-around direct communication</u>	<u>AAI-DC-CFG-CMD</u>	<u>Configuration Command</u>		<u>Unicast or Multicast</u>
<u>111</u>	<u>Talk-around direct communication</u>	<u>AAI-DC-RELAY-ADV</u>	<u>Relay Advertisement</u>		<u>Broadcast</u>
<u>112</u>	<u>Talk-around direct communication</u>	<u>AAI-DC-RELAY-REQ</u>	<u>Relay Request</u>		<u>Unicast</u>
<u>113</u>	<u>Talk-around direct communication</u>	<u>AAI-DC-RELAY-RSP</u>	<u>Relay Response</u>		<u>Unicast</u>
<u>114</u>	<u>Talk-around direct communication</u>	<u>AAI-DC-FWD-ADV</u>	<u>Forwarding advertisement</u>		<u>Broadcast</u>
<u>115</u>	<u>Talk-around direct communication</u>	<u>AAI-DC-FWD-JOIN</u>	<u>Forwarding Join</u>		<u>Unicast</u>
<u>116</u>	<u>BS-controlled HR-MS forwarding to network</u>	<u>AAI-FN-CONFIG-CMD</u>	<u>Forwarding Configure Command</u>		<u>Unicast or Multicast</u>
<u>117</u>	<u>BS-controlled HR-MS forwarding to network</u>	<u>AAI-FN-RNG-ACK</u>	<u>Acknowledging successful receiving of ranging preamble by forwarding HR-MS</u>		<u>Broadcast (toward new HR-MS that is carrying out network entry through the forwarding HR-MS)</u>

Table 6-28—MAC Control messages (continued)

No.	Functional Areas	Message names	Message description	Security	Connection
<u>118</u>	<u>BS-controlled HR-MS forwarding to network</u>	<u>AAI-FN-RNG-FLU</u>	<u>HR-BS/RS selects one or group of HR-MS to follow-up with the ranging process of new HR-MS</u>	<u>Encrypted/ICV</u>	<u>Unicast or Multicast</u>
<u>119</u>	<u>BS-controlled HR-MS forwarding to network</u>	<u>AAI-MSPG-GRP</u>	<u>HR-MS paging group list (add/delete)</u>		<u>Unicast</u>
<u>120</u>	<u>BS-controlled HR-MS forwarding to network</u>	<u>AAI-MSPG-PG</u>	<u>HR-MS paging group configuration</u>		<u>Unicast or Multicast</u>
<u>121</u>	<u>Standalone</u>	<u>AAI-SA-BPAG-ADV</u>	<u>Blind Page Advertisement</u>		<u>Broadcast</u>
<u>122</u>	<u>Standalone</u>	<u>AAI-SA-BPAG-ACK</u>	<u>Blind Page Acknowledgment</u>		<u>Unicast</u>
<u>123</u>	<u>Path management</u>	<u>AAI-AP-NBR-REQ</u>	<u>Alternative path neighbor request</u>	<u>Encrypted/ICV</u>	<u>Unicast</u>
<u>124</u>	<u>Path management</u>	<u>AAI-AP-NBR-REP</u>	<u>Alternative path neighbor report</u>	<u>Encrypted/ICV</u>	<u>Unicast</u>
<u>125</u>	<u>Multicast</u>	<u>AAI-HR-MG-IND</u>	<u>Multicast Group Indication Message</u>		<u>Broadcast</u>
<u>126</u>	<u>Multicast</u>	<u>AAI-HR-MT-IND</u>	<u>Multicast Traffic Indication Message</u>		<u>Broadcast or Multicast</u>
<u>127</u>	<u>Multicast</u>	<u>AAI-HR-DSC-CMD</u>	<u>Multicast-based Service Flow Change</u>	<u>Encrypted/ICV by Multicast Key</u>	<u>Multicast</u>
<u>128</u>	<u>Multicast</u>	<u>AAI-HR-DSD-CMD</u>	<u>Multicast-based Service Flow Delete</u>	<u>Encrypted/ICV by Multicast Key</u>	<u>Multicast</u>
<u>129–255</u>			<u>Reserved</u>		

6.2.3.1 AAI-RNG-REQ

Change Table 6-29 as indicated:

Table 6-29—AAI-RNG-REQ message field description

Field	Size (bits)	Value/Description	Condition
Ranging Purpose Indication	4	0b0000 = Initial network entry 0b0001 = HO reentry 0b0010 = Network reentry from idle mode 0b0011 = Idle mode location update 0b0100 = DCR mode extension 0b0101 = Emergency call setup (e.g., E911) 0b0110 = Location update for updating service flow management encodings of E-MBS flows 0b0111 = Location update for transition to DCR mode from idle mode 0b1000 = Reentry from DCR mode, coverage loss or detection of different ABS restart count. 0b1001 = Network reentry from a Legacy BS 0b1010 = Zone switch to MZONE from LZONE 0b1011 = Location update due to power down. 0b1100 = Interference mitigation request to a CSG Femto ABS when experiencing interference from the CSG Femto ABS 0b1101 = NS/EP call setup 0b1110 = Network Reentry from idle mode of AMS which has entered Idle Mode in R1 BS <u>0b1111 = ~~Reserved~~ Ranging Purpose Indicator Extension</u>	—
...	...	...	...
If (Ranging Purpose Indication == 0b0000) {		// Initial network entry	
...	...	...	...
<u>Serving BSID</u>	<u>48</u>	<u>The BSID of the HR-MS's previous Serving HR-BS before incurring a coverage loss</u>	<u>Shall be present if the initial network entry is after coverage loss in HR-Networks</u>
...	...	...	...
} else if (Ranging Purpose Indication == 0b1101) {		//NS/EP call setup	
...	...	...	...
<u>} else if (Ranging Purpose Indication == 0b1110) {</u>		<u>// Network Reentry from idle mode of AMS, which has entered idle mode in R1 BS</u>	

Table 6-29—AAI-RNG-REQ message field description (continued)

Field	Size (bits)	Value/Description	Condition
...	...	...	...
<u>}else if (Ranging Purpose Indication == 0b1111) {</u>		<u>// Ranging purpose for HR-Network</u>	
<u>Ranging Purpose Indicator Extension</u>	<u>3</u>	<u>0b000 = Reserved</u> <u>0b001 = Ranging request for HR multicast service</u> <u>0b010 = Network reentry for FBIS operation</u> <u>0b011 = Network reentry from idle mode for extension of TDC</u> <u>0b100-0b111 = Reserved</u>	
<u>If(Ranging Purpose Indicator Extension == 0b001) {</u>		<u>// Ranging request for HR multicast service</u>	
<u>action code</u>	<u>3</u>	<u>bit0: multicast service flow update</u> <u>bit1: location update due to HR multicast zone change</u> <u>bit2: multicast security key update</u>	
<u>if (action code bit0 is set) {</u>			
<u>If (STID is not pre-assigned) {</u>			
<u>Serving BSID</u>	<u>48</u>	<u>The BSID of the AMS's previous S-ABS before incurring a coverage loss, or the BSID of the S-ABS to which the AMS is currently connected (has completed the registration cycle and is in Connected State)</u>	
<u>Previous STID</u>	<u>12</u>	<u>The STID which the AMS uses in the previous S-ABS</u>	
<u>} else {</u>			
<u>STID</u>	<u>12</u>	<u>The Station ID pre-assigned by the T-ABS</u>	
<u>}</u>			
<u>If (CMAC indicator == 0b1){</u>			
<u>AK_COUNT</u>	<u>16</u>	<u>The AMS's current value of the AK_COUNT, which is used to update the security keys in the T-ABS.</u>	<u>Shall be presented if the AMS has a CMAC Tuple necessary to expedite security authentication</u>
<u>}</u>			
<u>}</u>			
<u>if (action code bit1 is set) {</u>			
<u>if (S-SFH Network Configuration bit == 0b1){</u>			

Table 6-29—AAI-RNG-REQ message field description (continued)

Field	Size (bits)	Value/Description	Condition
<u>AMS MAC Address</u>	<u>48</u>	<u>AMS's real MAC address</u>	
<u>} else {</u>			
<u>Deregistration Identifier (DID)</u>	<u>18</u>	<u>The ID that the AMS is assigned for idle mode and currently maintains</u>	
<u>}</u>			
<u>Paging Controller ID</u>	<u>48</u>	<u>The Paging Controller ID that the AMS currently maintains in idle mode</u>	
<u>PGID</u>	<u>16</u>	<u>The identification of the paging group to which the AMS previously belonged</u>	
<u>Paging Cycle</u>	<u>4</u>	<u>PAGING_CYCLE applied to the AMS</u>	
<u>Paging Offset</u>	<u>12</u>	<u>PAGING_OFFSET applied to the AMS</u>	
<u>If (CMAC indicator == 0b1){</u>			
<u>AK_COUNT</u>	<u>16</u>	<u>The AMS's current value of the AK_COUNT, which is used to update the security keys in the T-ABS</u>	<u>Shall be presented if the AMS has a CMAC Tuple necessary to expedite security authentication</u>
<u>}</u>			
<u>}</u>			
<u>} else if (Ranging Purpose Indicator Extension == 0b010) {</u>		<u>// Network reentry for FBIS operation</u>	
<u>If (STID is not preassigned) {</u>			
<u>Serving BSID</u>	<u>48</u>	<u>The BSID of the AMS's previous S-ABS before incurring a coverage loss, or the BSID of the S-ABS to which the AMS is currently connected (has completed the registration cycle and is in Connected State)</u>	
<u>Previous STID</u>	<u>12</u>	<u>The STID that the AMS uses in the previous S-ABS</u>	
<u>} else {</u>			
<u>STID</u>	<u>12</u>	<u>The Station ID preassigned by the T-ABS</u>	
<u>}</u>			
<u>If (CMAC indicator == 0b1){</u>			

Table 6-29—AAI-RNG-REQ message field description (continued)

Field	Size (bits)	Value/Description	Condition
<u>AK_COUNT</u>	<u>16</u>	<u>The AMS's current value of the AK_COUNT, which is used to update the security keys in the T-ABS</u>	<u>Shall be presented if the AMS has a CMAC Tuple necessary to expedite security authentication</u>
<u>}</u>			
<u>Primary Serving ABS flag</u>	<u>1</u>	<u>0b0 : The AMS shall set its primary serving ABS as S-ABS (Degraded HR-BS) after network reentry</u> <u>0b1 : The AMS shall set its primary serving ABS as T-ABS (Target HR-BS) after network reentry</u>	
<u>If (switch access mode is switch access with fixed Switched Access Windows) {</u>			
<u>Switched Access Window Size</u>	<u>8</u>	<u>The size of fixed Switched Access Window in unit of frame</u>	<u>Shall be present if Switched Access Mode is fixed Switch Access Window</u>
<u>}else if (switch access mode is switch access with variable Switched Access Windows) {</u>			
<u>Maximum Switched Access Window Size</u>	<u>8</u>	<u>Maximum size of Switched Access Window in unit of frame</u>	<u>Shall be present if Switched Access Mode is variable Switch Access Window</u>
<u>}</u>			
<u>Switched Access Start Time</u>	<u>8</u>	<u>The 8 least significant bits of the absolute frame number at the T-ABS where the AMS starts to perform the Switched Access operation</u>	
<u>} //end of Ranging Purpose Indicator Extension</u>			
<u>} //end of Ranging Purpose Indication</u>			
...	...	...	...

6.2.3.2 AAI-RNG-RSP

Change Table 6-30 as indicated:

Table 6-30—AAI-RNG-RSP message field description

Field	Size (bits)	Value/Description	Condition
...	...	...	...
Location Update Response	4	0x0 = Success of Location Update 0x1 = Failure of Location Update 0x2 = <i>Reserved</i> 0x3 = Success of location update and DL traffic pending 0x4 = Allow AMS's DCR mode initiation request or DCR mode extension request 0x5 = Reject AMS's DCR mode initiation request or DCR mode extension request 0x6~0xF: <i>Reserved</i>	Shall be included when this message is sent in response to an AAI- RNG-REQ message used to perform location update or DCR mode initiation from Idle Mode or DCR mode extension.
If (Location Update Response == 0x0) {			
...	...	...	...
}//end of for (N-E-MBS-Zone-IDs)			
For ($i = 0; i < M; i++$) {		Number of Multicast Group ID and FID (M) to update in the T-ABS[1..16]. Mapping of current Multicast Group ID and FID and new Multicast Group ID and FID to be updated. Based on the value of Num of Multicast Group ID and FID to be updated.	Present if it needs to be updated.
Current Multicast Group ID	12		
Current FID	4		
New Multicast Group ID	12		
New FID	4		
}			
<u>New HR Multicast Group Zone ID</u>	<u>12</u>	<u>Indicates an HR Multicast Group Zone ID to update in target HR-BS.</u>	<u>Shall be included in HR-Network in response to the AAI-RNG-REQ message where ranging purpose indication is set to 0b1110. Extended Ranging Purpose Indication is set to 0b0000, and action code bit0 is set to 1.</u>

Table 6-30—AAI-RNG-RSP message field description (continued)

Field	Size (bits)	Value/Description	Condition
<u>New HR Multicast Indication cycle</u>	8	<u>Start of HR multicast indication cycle. The first superframe is the multicast available interval, and subsequent superframes are the multicast unavailable interval. 8 LSBs of superframe number</u>	<u>Shall be present if needed to update in HR-Network</u>
<u>For($n = 1; n \leq \text{HR_M}; n++$){</u>		<u>Number of HR Multicast Group ID and FID (HR_M) to update in the T-ABS[1..16]. Mapping of current HR Multicast Group ID and FID and new HR Multicast Group ID and FID to be updated. Based on the value of Number of HR Multicast Group ID and FID to be updated.</u>	<u>Present if it needs to be updated in HR-Network.</u>
<u>Current HR Multicast Group ID</u>	<u>12</u>		
<u>Current FID</u>	4		
<u>New HR Multicast Group ID</u>	<u>12</u>		
<u>New FID</u>	<u>4</u>		
<u>}</u>			
<u>for ($k = 1; k \leq N; k++$){</u>		<u>Number of security key of HR multicast (N) to update [1..16]</u>	<u>Present if it needs to update MTEK in HR-Network.</u>
<u>HR Multicast Group ID</u>	<u>12</u>	<u>HR Multicast Group ID to update MTEK or MC_Nonce</u>	<u>Shall be present if needed to update MTEK or MC_Nonce in HR-Network</u>
<u>FID</u>	4	<u>FID to update MTEK</u>	<u>Shall be present if needed to update MTEK or MC_Nonce in HR-Network</u>
<u>MC_Nonce</u>	<u>128</u>	<u>The key used to derive the MCMAC-MTEK Prekey</u>	<u>Shall be present if needed to update MTEK or MC_Nonce in HR-Network</u>
<u>COUNTER_MTEK</u>	<u>16</u>	<u>COUNTER_MTEK used for deriving current MTEK</u>	<u>Shall be present if needed to update MTEK or MC_Nonce in HR-Network</u>
<u>MEKS</u>	<u>2</u>	<u>Encryption key sequence number for current MTEK</u>	<u>Shall be present if needed to update MTEK or MC_Nonce in HR-Network</u>

Table 6-30—AAI-RNG-RSP message field description (continued)

Field	Size (bits)	Value/Description	Condition
$\downarrow$			
SMS	<i>variable</i>	Short Message content up to the size of 140 bytes.	May be included when SMS contents is sent in idle mode.
}//end of If (Location Update Response == 0x0)			
Reentry Process Optimization	5	Reentry process optimization bitmap indicates which MAC control message transactions may be omitted during an attempted reentry (i.e., reentry during HO (including zone switching), and reentry from idle mode). A value of 1 in the bitmap indicates that the corresponding MAC control message transaction may be omitted, while a 0 indicates that the corresponding MAC control message transaction shall be completed. The AMS shall only commence Connected State with the T-ABS after completing all the required MAC control message transactions. Bit 0: Omit AAI-SBC-REQ and AAI-SBC-RSP MAC control messages during reentry processing Bit 1: Omit PKM Authentication phase Bit 2: Omit AAI-REG-REQ and AAI-REG-RSP message during reentry processing Bit 3: Omit higher layer protocol triggering for IP address refresh during reentry processing Bit 4: For the case of reentry during HO including zone switching, a 1 indicates to the AMS that the T-ABS has received the full service and operational states for static and dynamic context (including ARQ window parameters and state machines). For the case of reentry from Idle mode, a 1 indicates to the AMS that the T-ABS has received the static context of the AMS. The static context includes SFIDs and related description (QoS descriptors and CS classifier information) for all service flows that the AMS has currently established as well as any SAs with their related keying information	It shall be included when the AMS is attempting to perform network reentry (i.e., reentry during HO (including zone switching), and reentry from idle mode), and the T-ABS wishes to identify which MAC control message transactions may be omitted.
...	...	...	...
If (it is under network reentry for HO){			

Table 6-30—AAI-RNG-RSP message field description (continued)

Field	Size (bits)	Value/Description	Condition
For ($i = 0; i < M; i++$) {	—	Number of Multicast Group ID and FID (M) to update in the T-ABS[1..16]. Mapping of current Multicast Group ID and FID and new Multicast Group ID and FID to be updated. Based on the value of Num of Multicast Group ID and FID to be updated.	Present if it needs to be updated.
Current Multicast Group ID	12		
Current FID	4		
New Multicast Group ID	12		
New FID	4		
}			
<u>New HR Multicast Group Zone ID</u>	<u>12</u>	<u>Indicates an HR Multicast Group Zone ID to update in target HR-BS.</u>	<u>Shall be included in HR-Network in response to the AAI-RNG-REQ message where ranging purpose indication is set to 0b1110. Extended Ranging Purpose Indication is set to 0b0000, and action code bit0 is set to 1.</u>
<u>New HR Multicast Indication cycle</u>	<u>8</u>	<u>Start of HR multicast indication cycle. The first superframe is the multicast available interval, and subsequent superframes are the multicast unavailable interval. 8 LSBs of superframe number</u>	<u>Shall be present if needed to update in HR-Network</u>
<u>For($n = 1; n \leq \text{HR_M}; n++$){</u>		<u>Number of HR Multicast Group ID and FID (HR_M) to update in the T-ABS[1..16]. Mapping of current HR Multicast Group ID and FID and new HR Multicast Group ID and FID to be updated. Based on the value of Number of HR Multicast Group ID and FID to be updated.</u>	<u>Present if it needs to be updated in HR-Network.</u>
<u>Current HR Multicast Group ID</u>	<u>12</u>		
<u>Current FID</u>	<u>4</u>		
<u>New HR Multicast Group ID</u>	<u>12</u>		
<u>New FID</u>	<u>4</u>		
<u>}</u>			

Table 6-30—AAI-RNG-RSP message field description (continued)

Field	Size (bits)	Value/Description	Condition
<u>for ($k = 1; k \leq N; k++$) {</u>		<u>Number of Security key of HR multicast (N) to update [1..16]</u>	<u>Present if it needs to update MTEK in HR-Network.</u>
<u>HR Multicast Group ID</u>	<u>12</u>	<u>HR Multicast Group ID to update MTEK or MC_Nonce</u>	<u>Shall be present if needed to update MTEK or MC_Nonce in HR-Network</u>
<u>FID</u>	<u>4</u>	<u>FID to update MTEK</u>	<u>Shall be present if needed to update MTEK or MC_Nonce in HR-Network</u>
<u>MC_Nonce</u>	<u>128</u>	<u>The key used to derive the MCMAC-MTEK Prekey</u>	<u>Shall be present if needed to update MTEK or MC_Nonce in HR-Network</u>
<u>COUNTER_MTEK</u>	<u>16</u>	<u>COUNTER_MTEK used for deriving current MTEK</u>	<u>Shall be present if needed to update MTEK or MC_Nonce in HR-Network</u>
<u>MEKS</u>	<u>2</u>	<u>Encryption key sequence number for current MTEK</u>	<u>Shall be present if needed to update MTEK or MC_Nonce in HR-Network</u>
<u>}</u>			
<u>}//end of If (it is under network reentry for HO)</u>			
...	...	...	...

6.2.3.5 AAI-SBC-REQ

Change Table 6-33 as indicated:

Table 6-33—AAI-SBC-REQ message field description

Field	Size (bits)	Value/Description	Condition
...	...	...	...
If (ARS is a sender of AAI-SBC-REQ) {			//only available during ARS network entry phase.
Relay mode	1	0b0: TTR relay mode 0b1: STR relay mode	

Table 6-33—AAI-SBC-REQ message field description (continued)

Field	Size (bits)	Value/Description	Condition
if (Relay mode == 0b0){			
ARSTTG	6	ARSTTG value (μs). It shall be less than 50 μs.	
ARSRTG	6	ARSRTG value (μs). It shall be less than 50 μs.	
}			
}			
Visited NSP ID	24	NSP ID of the Network Service Provider the AMS intends to be the conduit for authentication to the AMS home network.	Present as needed.
<u>Multimode capability supported</u>	<u>3</u>	<u>If bit0 = 1, TTR relay mode is supported</u> <u>If bit1 = 1, STR relay mode is supported</u> <u>If bit2 = 1, The base station function is supported</u>	<u>Present as needed in HR-Network</u>
<u>FBIS capability supported</u>	<u>1</u>	<u>If Bit 0 = 1, FBIS capability supports</u>	<u>Present as needed in HR-Network</u>
<u>1</u>			
<u>If (HR-RS is the sender of AAI-SBC-REQ) {</u>			
<u>Local Forwarding Capability</u>	<u>2</u>	<u>0b00: LF is not supported.</u> <u>0b01: HR-RS detects LF opportunity and performs LF</u> <u>0b10: HR-RS does not detect LF opportunity but can perform LF;</u> <u>0b11: Reserved</u>	<u>Present if needed in HR Network</u>
}			
<u>Talk Around Direct Communication Forwarding Capability supported</u>	<u>1</u>	<u>0x0: The capability as a Forwarding HR-MS is not supported</u> <u>0x1: The capability as a Forwarding HR-MS is supported</u>	<u>Present during the network entry procedure of HR-MS having the capability of Talk-around Direct Communication</u>
<u>For (i = 0; i < N_Slot; i++){</u>		<u>N_Slot is the number of direct mode slots in the Talk-around Direct Communication frame structure to prevent an HR-BS from allocating the corresponding subframes for the HR-MS in order to support forwarding to the network. N_Slot Range is 1..8</u>	<u>Present if Direct Communication Forwarding Capability supported == 1</u>

Table 6-33—AAI-SBC-REQ message field description (continued)

Field	Size (bits)	Value/Description	Condition
<u>Direct Mode Zone Type</u>	<u>2</u>	<u>Direct mode zone type for preventing an HR-BS from allocating downlink or uplink subframes.</u> <u>0x0: Common direct mode zone (CDMZ)</u> <u>0x1: Common direct mode zone extended (CDMZ-E)</u> <u>0x2: Cell specific direct mode zone (CSDMZ)</u> <u>0x3: Reserved</u>	
<u>Direct Mode Slot Number prohibiting resource allocation</u>	<u>1</u>	<u>Slot Number in the Talk-around Direct Communication frame structure to prevent an HR-BS from allocation of the infrastructure resources for the corresponding subframes for the HR-MS.</u> <u>0x0: Slot 1</u> <u>0x1: Slot 2</u>	
<u>1</u>			

6.2.3.6 AAI-SBC-RSP

Insert the following new rows at the end of Table 6-34:

Table 6-34—AAI-SBC-RSP message field description

Field	Size (bits)	Value/Description	Conditions
...	...	...	...
Local Forwarding Capability	2	0b00: LF is not allowed 0b01: HR-BS detects LF opportunity and HR-RS performs LF as needed 0b10: HR-RS detects LF opportunity and HR-RS performs LF as needed 0b11: ASN detects LF opportunity and HR-RS performs LF as needed	Present if needed in HR Network
Talk Around Direct Communication Forwarding Capability supported	1	0x0: The capability as a Forwarding HR-MS is not supported 0x1: The capability as a forwarding HR-MS is supported	Present during the network entry procedure of HR-MS having the capability of Talk-around Direct Communication
<u>For ($i = 0; i < N_Slot; i++$) {</u>		<u>N_Slot is the number of direct mode slots in the Talk-around Direct Communication frame structure to prevent an HR-BS from allocating the corresponding subframes for the HR-MS in order to support forwarding to the network</u> <u>N_Slot Range is 1..8</u>	<u>Present if Direct Communication Forwarding Capability supported == 1</u>

Table 6-34—AAI-SBC-RSP message field description (continued)

Field	Size (bits)	Value/Description	Conditions
Direct Mode Zone Type	2	Direct mode zone type for preventing an HR-BS from allocating downlink or uplink subframes 0x0: Common direct mode zone (CDMZ) 0x1: Common direct mode zone extended (CDMZ-E) 0x2: Cell-specific direct mode zone (CSDMZ) 0x3: <i>Reserved</i>	
Direct Mode Slot Number prohibiting resource allocation	1	Slot Number in the Talk-around Direct Communication frame structure to prevent an HR-BS from allocation of the infrastructure resources for the corresponding subframes for the HR-MS 0x0: Slot 1 0x1: Slot 2	
}			

6.2.3.11 AAI-HO-REQ

Change Table 6-39 as indicated:

Table 6-39—AAI-HO-REQ message field description

Field	Size (bits)	Value/Description	Condition
...	...	...	...
Carrier Preassignment Indication	1	Indicates whether AMS needs preassignment of secondary carriers at the T-ABS	May be included when AMS supports MC mode = 0b010 or 0b011 or 0b100.
<u>FBIS Termination Indication</u>	1	<u>0: If the HR-MS is transmitting this message to request HO</u> <u>1: If the HR-MS is transmitting this message to send FBIS Termination request</u>	<u>Present if needed</u>
<u>If (FBIS Termination Indication == 1) {</u>			
<u>Termination Reason</u>	2	<u>0b00 : Backbone recovery</u> <u>0b01 : No connection for FBIS</u> <u>0b10 : Link failures</u> <u>0b11 : reserved</u>	
}			
...	...	...	...

6.2.3.12 AAI-HO-CMD

Change Table 6-40 as indicated:

Table 6-40—AAI-HO-CMD message field description

Field	Size (bits)	Value/Description	Condition
Mode	2	0b00: HO command 0b01: Zone switch command from MZone to LZone 0b10: AMS HO request rejected (ABS in list unavailable). In this case, AAI-HO-CMD message shall not include any T-ABS <u>However, if the requested ABSs in the list are available but MAC information is not shared, those ABSs may be included in candidate T-ABS and serving ABS transfers of MS information via backhaul link or relay link in an HR-Network</u> ~~0b11: Reserved.~~ 0b11: HO command for HR-Network	N/A
<u>If (Mode == 0b00 or 0b11) {</u>			
<u>If (Mode == 0b11) {</u>			
<u>Extended HO Mode</u>	<u>2</u>	<u>0b00: Alternative Path</u> <u>0b01: FBIS Initiation</u> <u>0b10: FBIS Termination</u> <u>0b11: HO command of HR-MS acting as RS</u>	
<u>If (Extended HO Mode == 0b00) {</u>			
<u>Role</u>	<u>1</u>	<u>0b0: Stay as HR-MS</u> <u>0b1: Change to HR-RS</u>	
<u>Target HR-infrastructure station-specific Trigger definitions</u>	<u>variable</u>	<u>Target HR-infrastructure station-specific triggers with encoding defined in Table 6-120</u>	<u>Optional, shall be present if HR-BS present Target HR-Infrastructure station-specific triggers</u>
<u>} else if (Extended HO Mode == 0b01) {</u>			
<u>Primary Serving ABS</u>	<u>1</u>	<u>0b0: The AMS shall set its primary serving ABS as S-ABS (Degraded HR-BS) after network reentry</u> <u>0b1: The AMS shall set its primary serving ABS as T-ABS (Target HR-BS) after network reentry</u>	
<u>Switched Access Mode</u>	<u>1</u>	<u>0: Switched Access with fixed Switched Access Windows</u> <u>1: Switched Access with variable Switched Access Windows</u>	

Table 6-40—AAI-HO-CMD message field description (continued)

Field	Size (bits)	Value/Description	Condition
<u>If(Switched Access Mode == 0)</u> <u>{</u>			
<u>Switched Access Window Size</u>	<u>8</u>	<u>The size of fixed Switched Access Window in unit of frame</u>	
<u>} else if (Switched Access Mode == 1) {</u>			
<u>Maximum Switched Access Window Size</u>	<u>8</u>	<u>Maximum size of Switched Access Window in unit of frame</u>	
<u>}</u>			
<u>Switching Access Start Time offset</u>	<u>8</u>	<u>Difference between Switching Access Start time and Action time in units of frames. The value of Switching Access Start time shall be calculated by adding this value with the value of Action time specified for this T-ABS.</u>	
<u>} else if (Extended HO Mode == 0b10) {</u>			
<u>Termination Reason</u>	<u>2</u>	<u>0b00: Backbone recovery 0b01: No connection for FBIS 0b10: Link failures 0b11 : Reserved</u>	
<u>} else if(Extended HO Mode == 0b11) {</u>			
<u>RS reconfiguration indicator</u>	<u>1</u>	<u>0b0: No change RS configuration 0b: Change RS configuration</u>	
<u>} // end of if (Extended HO Mode == 0b11)</u>			
<u>} // end of if (HO Mode == 0b11)</u>			
...	...	...	...
Resource_Retain_Time	16	The duration in units of 100 ms to which the T-ABD set the ABS-Resource-Retain-Timer	Present if needed
...	...	...	...

Table 6-40—AAI-HO-CMD message field description (continued)

Field	Size (bits)	Value/Description	Condition
Action Time	8	If HO Mode is 0b11 and Extended HO Mode is 0b00, it is the wait time in units of 1 ms before the HR-MS starts to perform fast network reentry. Else if HO Mode is 0b11 and Extended HO Mode is 0b10, it is the 8 least significant bits of the absolute frame number at the serving ABS where the AMS starts to terminate FBIS. Otherwise, it is the 8 least significant bits of the absolute frame number at the T-ABS where the AMS starts to perform network reentry. When CDMA_RNG_FLAG is set to 1, it indicates the frame whereafter the AMS starts a CDMA ranging process. The action time should be set to a frame that includes either a non-dynamic ranging channel or a dynamic ranging channel. When CDMA_RNG_FLAG is set to 0, it indicates the frame where the AMS starts to expect the UL bandwidth allocation for transmission of RNG-REQ at target R1 BS or LZone (i.e., Fast ranging opportunity) or AAI-RNG-REQ at T-ABS.	
...	...	...	...
}else if (Mode == 0b01) {			
...	...	...	...
}else if (Mode == 0b10) {			
<u>REQ-Duration</u>	<u>8</u>	The 8 least significant bits of the absolute superframe number where the AMS may perform handover again (i.e., allowing the AMS to transmit AAI-HO-REQ after REQ-Duration).	Shall be present in HR-Network
<u>for(i = 0; i < N_Target_BS; i++)</u> <u>{</u>		N_Target_BS is the number of T-ABSs or target legacy BSs included in this message in HR-Network. Range: 1...16.	
<u>targetBSID</u>	<u>48</u>	BSID of the T-ABS or target legacy BS.	Shall be included
<u>SA-Preamble Index</u>	<u>10</u>	Indicates the SA-Preamble index of the carrier.	Shall be included if the BS is T-ABS
<u>Preamble Index</u>	<u>7</u>	Indicates the preamble index of the neighbor BS.	Shall be included if the BS is target legacy BS
<u>Center Frequency</u>	<u>32</u>	Indicates center frequency (in unit of Hz) of the carrier.	Shall be included

Table 6-40—AAI-HO-CMD message field description (continued)

Field	Size (bits)	Value/Description	Condition
{			
}			

6.2.3.13 AAI-NBR-ADV

Change the seventh paragraph as indicated:

Within each cell type, if S-ABS chooses to broadcast configuration information for each individual ABS instead of specifying SA-Preamble Index range and Physical carrier range, a list of ABSs is provided and the following parameters are carried for each ABS:

- 48-bit BS-ID
- ABS SA-Preamble Index
- Indication of whether full system information or partial information is carried for this ABS, which includes the following:
 - SFH information
 - Physical carrier index (6 bits, refer to the “physical carrier index” defined in AAI-Global-CFG)
 - MAC protocol versions (8 bits)
 - Paging carrier indication (1 bit, refer to specify if a carrier is a paging carrier or not)
- HR Multicast service flow mapping list (for HR-Network)
 - Neighbor HR Multicast Group Zone ID
 - Neighbor HR Multicast Indication Cycle
 - Mapping of HR Multicast Group ID + FID and neighbor HR Multicast Group ID + FID
- Indication of whether the neighbor infrastructure station is HR multimode station (i.e., acting as BS or RS) for HR-Network

For ABS of macrocell type, all the necessary system information shall be included, and the format may only carry delta information fields with respect to the reference ABS (e.g., the S-ABS or the preceding neighbor BS/ABS of this cell type); and for Wireless-MAN-OFDMA reference system, only 48-bit BS-ID and Preamble index are included in AAI-NBR-ADV.

Change Table 6-41 as indicated:

Table 6-41—AAI-NBR-ADV message field description

Field	Size (bits)	Value/Description	Condition
...	...	...	...
For ($i = 0; i < N\text{-NBR-ABSs}; i++$) {		N-NBR-ABSs is the number of neighbor ABSs included in this message, and has the range of [1..64].	
BSID	48	Neighbor ABS ID	

Table 6-41—AAI-NBR-ADV message field description (continued)

Field	Size (bits)	Value/Description	Condition
MAC protocol version	8	MAC protocol version of the BS Consistent with IEEE Std 802.16 definition, with new MAC protocol version 10 defined for AAI.	
CP time	2	CP time of the BS 0b00: 1/8 0b01: 1/16 0b10: 1/4	
<u>HR Multimode indication</u>	<u>2</u>	<u>Indicates whether neighbor BR/RS is HR-MS acting as BS/RS or HR-BS acting as RS</u> <u>0b00: neighbor BS is neither HR-MS acting as BS/RS nor HR-BS acting as RS</u> <u>0b01: neighbor BS is HR-MS acting as BS/RS</u> <u>0b10: neighbor BS is HR-BS acting as RS</u> <u>0b11: Reserved</u>	<u>Shall be present in HR-Network</u>
<u>Neighbor HR Multicast Group Zone ID</u>	<u>12</u>	<u>Indicates a HR Multicast Group Zone ID provided by neighbor BS.</u>	<u>Present in HR-Network</u>
<u>Neighbor HR Multicast Indication cycle</u>	<u>8</u>	<u>Indicates the start of multicast indication cycle provided by neighbor BS. The first superframe is the multicast available interval, and subsequent superframes are the multicast unavailable interval. 8 LSBs of superframe number</u>	<u>Present in HR-Network</u>
<u>For($j = 1; j \leq M; j++$) {</u>		<u>Number of HR Multicast Group ID and FID (M) mapping between serving BS and neighbor BS[1..16]</u>	<u>Present if needed in HR-Networks</u>
<u>HR Multicast Group ID</u>	<u>12</u>		
<u>FID</u>	<u>4</u>		
<u>Neighbor HR Multicast Group ID</u>	<u>12</u>		
<u>Neighbor FID</u>	<u>4</u>		
<u>}</u>			
<u>For($j = 0; j < N\text{-Carrier-Info}; j++$)</u>			
<u>{</u>		<u>N-Carrier-Info is the number of carrier information listed here for the ABS_i</u>	
...	...	...	...