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Title	Comment on AAI-RNG-REQ Message over IEEE 802.16.1a	
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Source(s)	Eunkyung Kim, Sungcheol Chang, Won-Ik Kim, Seokki Kim, Sungkyung Kim, Miyoung Yun, Hyun Lee, Chulsik Yoon, Jaesun Cha, Soojung Jung, Anseok Lee, Wooram Shin, Kwangjae Lim ETRI	Voice: +82-42-860-5415 E-mail: ekkim@etri.re.kr
Re:	“IEEE 802.16-12-271,” in response to Letter Ballot Recirc #38a on P802.16.1a/D2	
Abstract	Comments on AAI-RNG-REQ message in GRIDMAN Draft Standard	
Purpose	To discuss and adopt the proposed text in the draft amendment document on GRIDMAN	
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Comment on AAI-RNG-REQ Message over IEEE 802.16.1a

Eunkyung Kim, Sungcheol Chang, Won-Ik Kim, Seokki Kim, Sungkyung Kim, Miyoung Yun, Hyun Lee, Chulsik Yoon, Jaesun Cha, Soojung Jung, Anseok Lee, Wooram Shin, Kwangjae Lim
ETRI

1. Introduction

This document provides clarification on extended ranging purpose indication in AAI-RNG-REQ message.

2. References

- [1] IEEE 802.16-12-0132-00, GRIDMAN System Requirement Document including SARM annex, January 2012.
- [2] IEEE P802.16nTM/D2, Air Interface for Broadband Wireless Access Systems - Draft Amendment: Higher Reliability Networks, April 2012.
- [3] IEEE P802.16.1aTM/D2, WirelessMAN-Advanced Air Interface for Broadband Access Systems - Draft Amendment: Higher Reliability Networks, April 2012.
- [4] IEEE P802.16Rev3/D6, IEEE Draft Standard for Local and metropolitan area networks; Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems,” April 2012.
- [5] IEEE P802.16.1TM/D6, IEEE Draft for WirelessMAN-Advanced Air Interface for Broadband Wireless Access Systems, April 2012.

3. Proposed Text on the IEEE 802.16.1a Amendment Draft Standard

[-----Start of Text Proposal-----]

[Remedy1: change Table 27 - AAI-RNG-REQ message field description, page 10 on P802.16.1a/D2 as follows:]

6.2.3.1 AAI-RNG-REQ

Change Table ~~27~~30 in section 6.2.3.1 as indicated:

Table 2730 - AAI-RNG-REQ message field description

Field	Size (bits)	Value/Description	Condition
<u>Ranging Purpose Indication</u>	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 0b1110-0b1111 = reserved <u>0b1110 = Ranging purpose for HR- Network</u> <u>0b1111 = reserved</u>	

Table 2730 - 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 0b1111 = Reserved <u>0b1111 = Ranging Purpose Indicator Extension</u>	
If (Ranging Purpose Indication == 0b000) {		// Initial network entry	
If (S-SFH Network Configuration bit == 0b0 and AMSID privacy is enabled) {			

Table 2730 - AAI-RNG-REQ message field description

Field	Size (bits)	Value/Description	Condition
AMSID*	48	The AMSID hash value. Refer to 6.2.5.3.1	
} else if (S-SFH Network Configuration bit == 0b1 or AMSID privacy is disabled){			
AMS MAC address	48	AMS's real MAC address	
}			
MAC version	8	See 11.1.3	
Initial Offset for uplink power control (OffsetInitial)	5	The bit size represents power level ranging from – 15 dB (0x00) to 16dB (0x1F) with 1dB step The value is determined by AMS after successful initial ranging process	
<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 after coverage loss in HR-Networks</u>
.....
}else if (Ranging Purpose Indication == 0b1101) {		//NS/EP call setup	
AMS MAC address	48	AMS' s real MAC address	
MAC version	8	See 11.1.3	
Initial Offset for uplink power control (OffsetInitial)	5	The bit size represents power level ranging from – 15 dB (0x00) to 16dB (0x1F) with 1dB step The value is determined by AMS after successful initial ranging process	
}else if (Ranging Purpose Indication == 0b1110) {		// Network Reentry from idle mode of AMS which has entered idle mode in R1 BS	
Paging Controller ID	48	The Paging Controller ID to which the AMS previously belonged in serving legacy BS	
if (S-SFH Network Configuration bit == 0b1 or AMSID privacy is disabled) {			

Table 2730 - AAI-RNG-REQ message field description

Field	Size (bits)	Value/Description	Condition
AMS MAC address	48	AMS's real MAC address	
}			
If (CMAC indicator == 0b1) {			
AK_COUNT	16	The AMS's current value of the AK_COUNT, which is used to ? update the security keys in the TABS.	Shall be present if the AMS has a CMAC Tuple necessary to expedite security authentication.
}			
} else if (Ranging Purpose Indication == 0b1110) {		// Ranging purpose for HR Network	
} else if (Ranging Purpose Indication == 0b1111) {			
Extended Ranging Purpose Indication	4	0b0000 = HR multicast service location update 0b0001 = Network reentry for FBIS operation 0b0010 = Network reentry from idle mode for extension of TDC 0b0011-0b1111 = reserved	
<u>Ranging Purpose Indicator Extension</u>	<u>3</u>	<u>0b000 = Reserved 0b001 = Ranging request for HR multicast service 0b010 = Network reentry for FBIS operation 0b011 = Network reentry from idle mode for extension of TDC 0b100-0b111 = Reserved</u>	
if (Extended Ranging Purpose Indication == 0b0000) {		// Ranging request for HR multicast service	
if (Ranging Purpose Indicator Extension == 0b001) {			
<u>action code</u>	<u>3</u>	<u>bit0: multicast service flow update bit1: location update due to multicast zone change bit2: multicast security key update</u>	

Table 2730 - AAI-RNG-REQ message field description

Field	Size (bits)	Value/Description	Condition
<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>			
<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>			

Table 2730 - AAI-RNG-REQ message field description

Field	Size (bits)	Value/Description	Condition
<u>Paging Controller ID</u>	48	<u>The Paging Controller ID that the AMS currently maintains in idle mode</u>	
<u>PGID</u>	16	<u>The identification of the paging group to which the AMS previously belonged</u>	
<u>Paging Cycle</u>	4	<u>PAGING_CYCLE applied to the AMS</u>	
<u>Paging Offset</u>	12	<u>PAGING_OFFSET applied to the AMS</u>	
<u>If (CMAC indicator == 0b1) {</u>			
<u>AK_COUNT</u>	16	<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 (Extended Ranging Purpose Indication == 0b0001) {</u> <u>} else if (Ranging Purpose Indicator Extension == 0b010) {</u>		<u>// Network reentry for FBIS operation</u>	
<u>If (STID is not pre assigned) {</u>			
<u>Serving BSID</u>	48	<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>	12	<u>The STID which the AMS uses in the previous S-ABS.</u>	
<u>} else {</u>			
<u>STID</u>	12	<u>The Station ID pre-assigned by the T-ABS</u>	
<u>}</u>			

Table 2730 - AAI-RNG-REQ message field description

Field	Size (bits)	Value/Description	Condition
<u>If (CMAC indicator == 0b1){</u>			
<u>AK_COUNT</u>	16	<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>	8	<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>	8	<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>	8	<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>	

Table 2730 - AAI-RNG-REQ message field description

Field	Size (bits)	Value/Description	Condition
} //end of Extended Ranging Purpose Indication Ranging Purpose Indicator Extension			
} //end of Ranging Purpose Indication			
.....
for (i=0;i<N_CSG_ID_Infos;i++) {		N_CSG_ID_Infos is the number of CSG ID Information blocks. 1 ≤ N_CSG_ID_Infos ≤ 15	Optional for loop. May be included for quick CSG membership detection or ABS reselection assistance.
Operator ID of the CSG Femtocell	24	The Operator ID of the CSG δ Femtocell.	Present if the Operator ID is different from the one of the ABS
for (j = 0; j < N_CSG_IDs; j++) {		N_CSG_IDs is the number of CSG IDs belongs to this Operator ID.	
CSGID	variable	The CSGID within the Operator ID. It may be part of the BS ID, with certain bits inside indicating its length. If the CSG has single BS, it may be of maximum length, which is the LSB-24- bits of the full BS ID.	
}			
}			

[Remedy2: change the 4th row on Table 28 in page 15 on P802.16.1a/D2 as follows:]

.....
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<u>New Multicast Group Zone ID</u>	<u>12</u>	<u>Indicates a Multicast Group Zone ID to update in target HR-BS.</u>	Shall be included in HR-Network in response to the <u>AAI-RNG-REQ</u> message where ranging purpose indication is set to 0b1110 and Extended Ranging Purpose Indication is set to 0b0000. <u>Ranging Purpose Indication is set to 0b1111 and Ranging Purpose Indicator Extension is set to 0b001 and action code bit0 is set to 1.</u>
.....

[Remedy3: change the 2th row on Table 28 in page 18 on P802.16.1a/D2 as follows:]

.....
<u>New Multicast Group Zone ID</u>	<u>12</u>	<u>Indicates a Multicast Group Zone ID to update in target HR-BS.</u>	Shall be included in HR-Network in response to the <u>AAI-RNG-REQ</u> message where ranging purpose indication is set to 0b1110 and Extended Ranging Purpose Indication is set to 0b0000. <u>Ranging Purpose Indication is set to 0b1111 and Ranging Purpose Indicator Extension is set to 0b001 and action code bit0 is set to 1.</u>
.....

[Remedy4: change the 6th row on Table 106zz in page 89 on P802.16.1a/D2 as follows:]

.....
Action Code	3	<u>if bit0 = 1, perform network entry or exit sleep mode</u> <u>if bit1 = 1, perform ranging procedure with ranging purpose indication set to 0b1110 and Extended Ranging Purpose Indication set to 0b00000 Ranging Purpose Indication set to 0b1111 and Ranging Purpose Indicator Extension set to 0b001</u> <u>if bit2 = 1, receiving multicast</u>	Shall be present
.....

[Remedy5: change the 5th row on Table 106aaa in page 90 on P802.16.1a/D2 as follows:]

.....
Action Code	3	<u>if bit0 = 1, perform network entry or exit sleep mode</u> <u>if bit1 = 1, perform ranging procedure with ranging purpose indication set to 0b1110 and Extended Ranging Purpose Indication set to 0b00000 Ranging Purpose Indication set to 0b1111 and Ranging Purpose Indicator Extension set to 0b001</u> <u>if bit2 = 1, receiving multicast</u>	Shall be present
.....

[Remedy6: change line #14 - #18 in page 187 on P802.16.1a/D2 as follows:]

In the reentry procedure, Designated FBIS HR-MS shall send AAI-RNG-REQ message with ~~Ranging Purpose Indication to 0b1110 and Extended Ranging Purpose Indication to 0b0001~~ Ranging Purpose Indication set to 0b1111 and Ranging Purpose Indicator Extension set to 0b010 (Network reentry for FBIS operation). In addition, Primary Serving ABS flag and Switched Access Mode shall also be included in the AAI-RNG-REQ message to Target HR-BS. The optimized HO may not be applied due to the failure of backbone connectivity at the Degraded HR-BS.

[Remedy7: change line #8 - #15 in page 191 on P802.16.1a/D2 as follows:]

When the HR-MS transits to a new Multicast Zone while in Active Mode or Sleep Mode, the HR-MS shall send AAI-RNG-REQ message described in 6.2.3.1 with ~~Ranging Purpose Indication = 0b1110 and Extended Ranging Purpose Indication = 0b0000~~ Ranging Purpose Indication set to 0b1111 and Ranging Purpose Indicator Extension set to 0b001 with action code at the target HR-BS. In response to the request for multicast service flow update (~~Ranging Purpose Indication = 0b1110 and Extended Ranging Purpose Indication = 0b0000~~ Ranging Purpose Indication is set to 0b1111 and Ranging Purpose Indicator Extension is set to 0b001 and action code bit0 is set to 1), the HR-BS shall transmit AAI-RNG-RSP message described in 6.2.3.2, which may include Multicast Group Zone Identifier, Multicast Indication Cycle, Multicast Group ID, FID Update, and feedback parameters if used, to provide updated service flow management encodings for any affected multicast flow(s) as part of the handover procedure.

[Remedy8: change line #1 - #6 in page 192 on P802.16.1a/D2 as follows:]

In order to perform the multicast location update process, the HR-MS shall transmit AAI-RNG-REQ message with ~~Ranging Purpose Indication = 0b1110 and Extended Ranging Purpose Indication = 0b0000~~ Ranging Purpose Indication set to 0b1111 and Ranging Purpose Indicator Extension set to 0b001 with action code. When the HR-MS detects the current multicast group zone changes and expects to update service flow, the bit0 of action code is set to 1. In addition to changing the multicast group zone, the HR-MS detects current paging zone changes, the bit1 of action code is set to 1. In the case of performing multicast security key update, the bit2 of the action code is set to 1.

[Remedy9: change line #21, page 222 - line #7, page 223 on P802.16.1a/D2 as follows:]

```

RedirectionInfo ::=
    absidForNeighborABS          SEQUENCE {
    preambleForNeighborABS      BSID,
    centerFreqForNeighborABS    PreambleIndex,
                                CenterFreq
    }

RNGPurposeForHRNetworkRNGPurposeIndicatorExtension ::= SEQUENCE {
    extendedRngPurposeInd   rngPurposeIndExt      CHOICE {
    hrMulticastServiceRangingLocationUpdate  HrMulticastServiceRangingLocationUpdate,
    networkReentryForFBISOperation          NetworkReentryForFBISOperation,
    networkReentryFromIdleModeForExtenOfTDC  BOOLEAN,
    ...
    }
}

HrMulticastServiceRangingLocationUpdate ::= SEQUENCE {
    actionCode          BIT STRING {
    multicastServiceFlowUpdate          (0),
    locationUpdateDueToMulticastZoneChange (1),
    multicastSecurityKeyUpdate          (2)
    } (SIZE(3)),
    locationUpdateMulticastFlows        LocationUpdate
}

NetworkReentryForFBISOperation ::= SEQUENCE {
    isStidPreAssigned          CHOICE {
    -- be selected if STID is not pre assigned
    stidInfo          SEQUENCE {
        servingBsid          BSID,
        previousSTID         STID
    },
    -- be selected if STID is pre assigned
    currentSTID         STID
    },
    akCount          AKCount          OPTIONAL,
    -- Primary serving ABS flag

```

```

-- set to 0 when the AMS sets its primary serving ABS as S-ABS (Degraded HR-BS)
-- after network reentry
-- set to 1 when the AMS sets its primary serving ABS as T-ABS (Target HR-BS)
-- after network reentry
primaryServingAbsFlag          BOOLEAN,
switchedAccessWindowSize      CHOICE {
    -- be selected if switch access mode is fixed switched access windows
    switchedAccessWindowSize    SwitchAccessWindowsSize,
    -- be selected if switch access mode is variable switched access windows
    maximumSwitchedAccessWindowSize MAXSwitchAccessWindowsSize
}
switchedAccessStartTime      SwitchAccessStartTime
}

-- +-----+
-- Ranging Request
-- +-----+
AAI-RNG-REQ ::= SEQUENCE {
    -- Indicate whether this message is protected by CM
    cmacIndicator CMACI,
    rangingPurposeDiffMessage CHOICE {
        initialNetworkEntry      InitialNetworkEntry,
        handoverReentry          HandoverReentry,
        networkReentryFromIdleMode NetworkReentryFromIdleMode,
        idleModeLocationUpdate    LocationUpdate,
        dcrModeExtension          DCRModeExtension,
        emergencyCallSetup        EmergencyCallSetup, -- e.g., E911
        -- Location update for updating service flow management encoding
        -- of E-MBS flows
        locationUpdateEmbsFlows    LocationUpdate,
        -- Location update for transition to DCR mode from idle mode
        locationUpdateToDcrMode    LocationUpdate,
        -- Reentry from DCR mode, coverage loss or detection of
        -- different ABS restart count
        reentryFromDcr            ReentryFromDCR,
        -- Network reentry from a R1 BS
        networkReentryFromR1      NetworkReentryFromR1,
        -- Zone switch to MZONE from LZONE
        zoneSwitch                ZoneSwitch,
        locationUpdatePowerDown    LocationUpdate,
        -- experiencing "femto interference"
        femtoInterference          FemtoInterference,
        -- NS/EP Call Setup
        nsEpCallSetup              NsEpCallSetup,
        networkReentryFromIdleModeR1 NetworkReentryFromIdleModeR1,
        rngPurposeIndicatorExtention RngPurposeIndicatorExtension,
        rngPurposeForHRNetwork RngPurposeForHRNetwork OPTIONAL
        ...
    }
    -- CSG information
    csgInformation                SEQUENCE (SIZE (1..15)) OF CsgInfoItem OPTIONAL,
    ...
}

```

[-----End of Text Proposal-----]