Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**	
Title	**ASN.1 coding for AAI-NBR-ADV message over IEEE 802.16.1a**	
Date Submitted	**2012-03-06**	
Source(s)	Eunkyung Kim, Sungcheol Chang, Won-Ik Kim, Seokki Kim, Sungkyung Kim, Miyoung Yun, Hyun Lee, Chulsik Yoon, Kwangjae Lim ETRI	Voice: +82-42-860-5415 E-mail: ekkim@etri.re.kr scchang@etri.re.kr
Re:	"IEEE 802.16-12-0142," in response to Letter Ballot #38 on P802.16.1a/D1	
Abstract	AAI-NBR-ADV message on GRIDMAN Draft Standard	
Purpose	To discuss and adopt the proposed text in the draft amendment document on GRIDMAN	
Notice	*This document does not represent the agreed views of the IEEE 802.16 Working Group or any of its subgroups*. It represents only the views of the participants listed in the "Source(s)" field above. It is offered as a basis for discussion. It is not binding on the contributor(s), who reserve(s) the right to add, amend or withdraw material contained herein.	
Copyright Policy	The contributor is familiar with the IEEE-SA Copyright Policy <http://standards.ieee.org/IPR/copyrightpolicy.html>.	
Patent Policy and Procedures	The contributor is familiar with the IEEE-SA Patent Policy and Procedures: <http://standards.ieee.org/guides/bylaws/sect6-7.html#6> and <http://standards.ieee.org/guides/opman/sect6.html#6.3>. Further information is located at <http://standards.ieee.org/board/pat/pat-material.html> and <http://standards.ieee.org/board/pat>.	

ASN.1 coding for AAI-NBR-ADV message over IEEE 802.16.1a

Eunkyung Kim, Sungcheol Chang, Won-Ik Kim, Seokki Kim, Sungkyung Kim, Miyoung Yun, Hyun Lee, Chulsik Yoon, Kwangjae Lim

ETRI

1. Introduction

This document provides ASN.1 coding of AAI-NBR-ADV message for HR-Network.

2. References

[1] IEEE 802.16-12-0132-00, GRIDMAN System Requirement Document including SARM annex, January 2012.

[2] IEEE P802.16n[TM]/D1, Air Interface for Broadband Wireless Access Systems - Draft Amendment: Higher Reliability Networks, February 2012.

[3] IEEE P802.16.1a[TM]/D1, WirelessMAN-Advanced Air Interface for Broadband Access Systems - Draft Amendment: Higher Reliability Networks, February 2012.

[4] EEE P802.16Rev3/D4, IEEE Draft Standard for Local and metropolitan area networks; Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems," February 2012.

[5] IEEE P802.16.1[TM]/D4, IEEE Draft for WirelessMAN-Advanced Air Interface for Broadband Wireless Access Systems, February 2012.

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

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

[*Remedy: Add the following text in Annex in page 212 on P802.16.1a/D1*]

Annex A

...

A.2 MAC control message definitions (normative)

Change Annex A.2 as indicated:

```
WirelessMAN-Advanced-Air-Interface DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- MAC Control Messages

MAC-Control-Message ::=        SEQUENCE {
      message MAC-Control-Msg-Type,
```

```
        ...

        }

MAC-Control-Msg-Type ::=        CHOICE {
        -- System information
        aaiSCD                          AAI-SCD,
        aaiSIIAdv                       AAI-SII-ADV,
        aaiULPCNi                       AAI-ULPC-NI,
        -- Network entry / re-entry
        aaiRngReq                       AAI-RNG-REQ,
        aaiRngRsp                       AAI-RNG-RSP,
        aaiRngAck                       AAI-RNG-ACK,
        aaiRngCfm                       AAI-RNG-CFM,
        aaiSbcReq                       AAI-SBC-REQ,
        aaiSbcRsp                       AAI-SBC-RSP,
        aaiRegReq                       AAI-REG-REQ,
        aaiRegRsp                       AAI-REG-RSP,
        -- Network exit
        aaiDregReq                      AAI-DREG-REQ,
        aaiDregRsp                      AAI-DREG-RSP,
        -- Connection management
        aaiDsaReq                       AAI-DSA-REQ,
        aaiDsaRsp                       AAI-DSA-RSP,
        aaiDsaAck                       AAI-DSA-ACK,
        aaiDscReq                       AAI-DSC-REQ,
        aaiDscRsp                       AAI-DSC-RSP,
        aaiDscAck                       AAI-DSC-ACK,
        aaiDsdReq                       AAI-DSD-REQ,
        aaiDsdRsp                       AAI-DSD-RSP,
        aaiGrpCfg                       AAI-GRP-CFG,
        -- Security
        aaiPkmReq                       AAI-PKM-REQ,
        aaiPkmRsp                       AAI-PKM-RSP,
        -- ARQ
        aaiArqFbk                       AAI-ARQ-FBK,
        aaiArqDsc                       AAI-ARQ-DSC,
        aaiArqRst                       AAI-ARQ-RST,
        -- Sleep mode
        aaiSlpReq                       AAI-SLP-REQ,
        aaiSlpRsp                       AAI-SLP-RSP,
        aaiTrfInd                       AAI-TRF-IND,
        aaiTrfIndReq                    AAI-TRF-IND-REQ,
        aaiTrfIndRsp                    AAI-TRF-IND-RSP,
        -- Handover
        aaiHoInd                        AAI-HO-IND,
        aaiHoReq                        AAI-HO-REQ,
        aaiHoCmd                        AAI-HO-CMD,
        aaiNbrAdv                       AAI-NBR-ADV,
        aaiScnReq                       AAI-SCN-REQ,
        aaiScnRsp                       AAI-SCN-RSP,
        aaiScnRep                       AAI-SCN-REP,
        -- Idle mode
        aaiPagAdv                       AAI-PAG-ADV,
        aaiPgidInfo                     AAI-PGID-INFO,
        -- Multicarrier
        aaiMcAdv                        AAI-MC-ADV,
        aaiMcReq                        AAI-MC-REQ,
        aaiMcRsp                        AAI-MC-RSP,
```

2

```
        aaiCmCmd                    AAI-CM-CMD,
        aaiCmInd                    AAI-CM-IND,
        aaiGlobalConfig             AAI-GLOBAL-CFG,
        -- Power Control
        aaiUlPowerAdj               AAI-UL-POWER-ADJ,
        aaiUlPsrConfig              AAI-UL-PSR-CFG,
        -- Collocated Coexistence
        aaiClcReq                   AAI-CLC-REQ,
        aaiClcRsp                   AAI-CLC-RSP,
        -- MIMO
        aaiSbsMimoFbk               AAI-SBS-MIMO-FBK,
        aaiMbsMimoFbk               AAI-MBS-MIMO-FBK,
        aaiMbsMimoReq               AAI-MBS-MIMO-REQ,
        aaiMbsMimoRsp               AAI-MBS-MIMO-RSP,
        aaiMbsMimoSbp               AAI-MBS-MIMO-SBP,
        aaiMbsSoundingCal           AAI-MBS-SOUNDING-CAL,
        aaiDlIm                     AAI-DL-IM,
        -- FFR
        aaiFfrCmd                   AAI-FFR-CMD,
        aaiFfrRep                   AAI-FFR-REP,
        -- SON
        aaiSonAdv                   AAI-SON-ADV,
        -- Relay
        aaiARSCfgCmd                AAI-ARS-CFG-CMD,
        -- EMBS
        aaiEmbsCfg                  AAI-EMBS-CFG,
        aaiEmbsRep                  AAI-EMBS-REP,
        aaiEmbsRsp                  AAI-EMBS-RSP,
        -- LBS
        aaiLbsAdv                   AAI-LBS-ADV,
        aaiLbsInd                   AAI-LBS-IND,
        -- Misc
        aaiL2Xfer                   AAI-L2-XFER,
        aaiMsgAck                   AAI-MSG-ACK,
        aaiResCmd                   AAI-RES-CMD,
        ...
}


-- *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-
-- Common type definitions
-- *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-

PhyCarrierIndex ::=          INTEGER (0..62)

.........


-- Common type definitions for HR-Network
MulticastGroupZoneID::=      BIT STRING (SIZE (12))
MulticastIndicationCycle::=  BIT STRING (SIZE (8))
HRMultimodeIndication::=     ENUMERATED {
      normalBRorRS,
      hrMSActingAsBRorRS,
      hrBsActingAsBRorRS
}

-- *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-
-- Some boundary values
-- *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-
maxReceivedCodes            INTEGER ::= 32      -- N_Received_Codes(6 bits)
-- Equal to the size of RngAckBitmap
```

```
maxRngOpps                 INTEGER ::= 4
maxRngAckFrames            INTEGER ::= 8          -- N_Frame_Identifiers(3 bits)
maxPreassignedCarriers     INTEGER ::= 8          -- N_Preassigned_Carriers
maxPhyCarrierIndices       INTEGER ::= 64         -- N-PHY-Carrier-Indices
maxNeighborABSs            INTEGER ::= 64         -- N-NBR-ABSs
maxNeighborR1BSs           INTEGER ::= 64         -- N-NBR-R1BSs
maxCarriers                INTEGER ::= 64         -- N-Carrier-Info


-- *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-
-- System Configuration Descriptor Messages
-- *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-

.................

-- *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-
-- Network entry / re-entry messages
-- *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-

.................

-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-
-- Ranging Request
-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-

.................

-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-
-- Ranging Response Message
-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-

.................

-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-
-- Handover Command
-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-

.................

-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-
-- Neighbor Advertisement
-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-
AAI-NBR-ADV ::=        SEQUENCE {
       changeCount          INTEGER (0..7),
       totalNumberOfCellTypes INTEGER (1..8),
       cellType             ENUMERATED {
                                    macro,
                                    micro,
                                    macro-hotzone,
                                    femto,
                                    ttrRelay,
                                    r1-lzone,
                                    spare2,
                                    spare1
                            },
       totalNumberOfSegments       INTEGER (1..16),
       segmentIndex                INTEGER (0..15),
       startingABSIndex            INTEGER (0..255),
       nbrABSInfoList              SEQUENCE (SIZE (1..maxNeighborABSs)) OF NeighborABSInfo,
       nbrR1BSInfoList             SEQUENCE (SIZE (1..maxNeighborR1BSs))  OF  NeighborR1BSInfo
            OPTIONAL,
       -- For ABS type whose system info are not included in AAI_NBR-ADV
       cellTypeInfo                CellTypeInfo         OPTIONAL,
```

```
        -- Optional LDM parameters included when they are to be changed
        ...
}

CellTypeInfo ::=        SEQUENCE {
        rangeIDCell         SEQUENCE (SIZE (1..maxPhyCarrierIndices)) OF RangeIDCell OPTIONAL
}

RangeIDCell ::=                     SEQUENCE {
        phyCarrierIndex                 PhyCarrierIndex,
        idCellStartEnd                  SEQUENCE {
                startIDCell                     IDCell,
                endIDCell                       IDCell
        }
}

NeighborABSInfo ::=                 SEQUENCE {
        bsID                            BSID,
        macVersion                      MacProtocolVersion,
        cpLength                        CPLength,
        hrMultimodeIndication           HRMultimodeIndication OPTIONAL,
        neighborMulticastGroupZoneId    MulticastGroupZoneIDOPTIONAL,
        neighborMulticastIndicationCycle    MulticastIndicationCycleOPTIONAL,
        neighborMulticastInfo           SEQUENCE (SIZE (1..16)) OF SEQUENCE {
                currentMulticastGroupID         MulticastGroupID,
                currentFID                      FID,
                neighborMulticastGroupID        MulticastGroupID,
                neighborFID                     FID
        } OPTIONAL,

        carrierInfoList                 SEQUENCE (SIZE (1..maxCarriers)) OF CarrierInfo,
        nbrSpecificTrigger              Triggers            OPTIONAL
}

CarrierInfo ::=                     SEQUENCE {
        idCell                          IDCell,
        phyCarrierIndex                 PhyCarrierIndex,
        pgid                            PGID,
        sfhChangeCount                  INTEGER (0..15),
        sfhEncFmt                       CHOICE {
                -- All parameters of SFHSubpacket shall be included
                fullSubpkt                      SFHSubpacket,
                -- Parameters of SFHSubpacket are partially included
                deltaInfoCurrentCxr             OptSFHSubpacket,
                -- Parameters of SFHSubpacket are partially included
                deltaInfoPrecedingCxr           OptSFHSubpacket,
                noSFHIncluded                   NULL
        }
}

NeighborR1BSInfo ::=                SEQUENCE {
        bsID                            BSID,
        r1PreambleIndex                 BIT STRING (SIZE (8)),
        phyModeID                       INTEGER (0..65535),
        channelBW                       ENUMERATED {
                                                five-mhz,
                                                seven-mhz,
                                                eightPoint75-mhz,
                                                ten-mhz
                                        },
```

```
        r1BSCenterFreq                      CenterFreq
}


--
-- Parameters of SFH IEs
-- All variables in SFH-SP1, SFH-SP2 and SFH-SP3 will be OPTIONAL
-- so that the SFHSbpacket structure can be reused by CarrierInfo


-- for different sfhEncFormat



.................


-- Triggers
-- Designed based on Table 119
--
maxNumberOfTriggers        INTEGER ::= 64
maxNumberOfConditions      INTEGER ::= 4
Triggers ::=               SEQUENCE {
        triggerList               SEQUENCE (SIZE (1..maxNumberOfTriggers)) OF TriggerInfo
}
TriggerInfo ::=            SEQUENCE {
        absType                   ENUMERATED {
                                          any,
                                          macro,
                                          macro-hotzone,
                                          femto,
                                          r1,
                                          spare11,
                                          spare10,
                                          spare9,
                                          spare8,
                                          spare7,
                                          spare6,
                                          spare5,
                                          spare4,
                                          spare3,
                                          spare2,
                                          spare1
                                  },
        hrMultimodeIndication     HRMultimodeIndication                      OPTIONAL,
        triggerAveParamForIntra   ENUMERATED {
                                          one,
                                          half,
                                          quarter,
                                          one-8th,
                                          one-16th,
                                          one-32th,
                                          one-64th,
                                          one-128th,
                                          one-256th,
                                          one-512th
                                  } OPTIONAL,
        triggerAveParamForInter   ENUMERATED {
                                          one,
                                          half,
                                          quarter,
```

```
                                        one-8th,
                                        one-16th,
                                        one-32th,
                                        one-64th,
                                        one-128th,
                                        one-256th,
                                        one-512th
                                    } OPTIONAL,
        conditionList              SEQUENCE (SIZE (1..maxNumberOfConditions)) OF ConditionInfo
}

ConditionInfo ::=           SEQUENCE {
        typeFuncAction             TypeFuncAction,
        triggerValue               INTEGER (0..255)
}

-- Table 120
TypeFuncAction ::=          SEQUENCE {
        triggerType                ENUMERATED {
                                        cinr,
                                        rssi,
                                        rtd,
                                        nMissedP-SFHs,
                                        rd,
                                        spare3,
                                        spare2,
                                        spare1
                                    },
        triggerFunc                ENUMERATED {
                                        dummy,
                                        nbr-greater-than-absolute-value,
                                        nbr-less-than-absolute-value,
                                        nbr-greater-than-sabs-by-relative-value,
                                        nbr-less-than-sabs-by-relative-value,
                                        sabs-greater-than-absolute-value,
                                        sabs-less-than-absolute-value,
                                        nbr-carriers-greater-than-threshold
                                    },
        triggerAction              ENUMERATED {
                                        dummy,
                                        response-aai-scn-rep,
                                        response-aai-ho-req,
                                        response-aai-scn-req,
                                        declare-abs-unreachable,
                                        cancel-ho,
                                        spare2initiate-mode-change,
                                        spare1
                                    }
}

--
-- CA Specific Triggers
-- Designed based on Table 121 and Table 122--
CAConditionInfo ::=         SEQUENCE {
        triggerType                ENUMERATED {
                                        cinr,
                                        rssi
                                    },
        triggerFunction            ENUMERATED {
```

```
                                        inactive2ndCrxGreaterThanAbsValue,
                                        spare1
                                },
        triggerAction                   ENUMERATED {
                                        responstAAI-SCN-REP,
                                        spare1
                                },
        triggerValue                    INTEGER (0..255),
        triggerAveParam                 ENUMERATED {
                                        one,
                                        half,
                                        quarter,
                                        one-8th,
                                        one-16th,
                                        one-32th,
                                        one-64th,
                                        one-128th,
                                        one-256th,
                                        one-512th,
                                        spare6,
                                        spare5,
                                        spare4,
                                        spare3,
                                        spare2,
                                        spare1
                                }
}

CASpecificTriggers ::= SEQUENCE {
        conditionList           SEQUENCE (SIZE (1..maxNumberOfConditions)) OF CAConditionInfo
}

-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-
-- Scanning Interval Allocation Request
-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-


.................


END
```

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