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| Project | **IEEE 802.16 Broadband Wireless Access Working Group <**<http://ieee802.org/16>**>** |
| Title | **ASN.1 coding for control messages of multimode operation over IEEE 802.16.1a**  |
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| Re: | In response to Sponsor Ballot on P802.16.1a |
| Abstract | Comments on ASN.1 coding for multimode operation in IEEE P802.16.1a/D5 |
| Purpose | To discuss and adopt the proposed text in the draft amendment document on GRIDMAN |
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**ASN.1 coding for control messages of multimode operation over IEEE 802.16.1a**

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# Introduction

This document provides ASN.1 code for control messages of multimode operation over HR-Network.

# References

[1] IEEE P802.16nTM/D5, Air Interface for Broadband Wireless Access Systems - Draft Amendment: Higher Reliability Networks, 2012.

[2] IEEE P802.16.1aTM/D5, WirelessMAN-Advanced Air Interface for Broadband Access Systems - Draft Amendment: Higher Reliability Networks, 2012.

[3] IEEE Std 802.16™-2012, IEEE Standard for Air Interface for Broadband Wireless Access Systems,” 2012.

[4] IEEE P802.16.1™/D6, IEEE Draft for WirelessMAN-Advanced Air Interface for Broadband Wireless Access Systems, 2012.

# Proposed Text for the 802.16.1a AWD

Note:

The text in **BLACK** color: the existing text in the 802.16.1a AWD

The text in **~~RED~~** color: the removal of existing 802.16.1a AWD

The text in **BLUE** color: the new text added to the 802.16.1a AWD

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

**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,

...

}

**[*Remedy1: Add the following codes below Line# 61, Page#235 in IEEE P802.16.1a/D5.*]**

MAC-Control-Msg-Type ::= CHOICE {

...

-- HR Multimode operation

aaiMmAdv AAI-MM-ADV,

aaiMmRsReq AAI-MM-RS-REQ,

aaiMmRsRsp AAI-MM-RS-RSP,

aaiMmRlReq AAI-MM-RL-REQ,

aaiMmRlRsp AAI-MM-RL-RSP,

aaiMmBsReq AAI-MM-BS-REQ,

aaiMmBsRsp AAI-MM-BS-RSP,

aaiMmBsCmd AAI-MM-BS-CMD,

aaiMmRsSynReq AAI-MM-RS-SYN-REQ,

aaiMmRsSynRsp AAI-MM-RS-SYN-RSP,

-- HR-BS controlled direct communication

...

}

...

**[*Remedy2: Add the following codes below Line# 52, Page#249 in IEEE P802.16.1a/D2.*]**

-- \*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-

-- MAC control messages for HR-Networks

-- \*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-\*-

-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-

-- HR Multimode Advertisement message

-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-

ReconfBsRs ::= SEQUENCE {

newIDCell IDCell OPTIONAL,

frameConfigurationIndex INTEGER (0..63) OPTIONAL,

-- Start of unavailable time in unit of frame

unavailableStartTime INTEGER (0..255),

-- Interval of unavailable time in unit of superframe

unavailableTimeInterval INTEGER (0..255)

}

RestartBsRs ::= SEQUENCE {

-- Start of unavailable time in unit of frame

unavailableStartTime INTEGER (0..255),

-- Interval of unavailable time in unit of superframe

unavailableTimeInterval INTEGER (0..255)

}

PowerDownBsRs ::= SEQUENCE {

--powered down in units of frame

timeOfPowerDown INTEGER (0..255),

-- Expected uptime of BS in units of superframe

expectedUptimeOfBs INTEGER (0..255) OPTIONAL

}

PowerReductionBsRs ::= SEQUENCE {

-- dB value of Tx power reduction

txPowerReduction INTEGER (0..1023),

-- Expected resource adjustment time in units of frame

expectedTimeOfPowerReduction INTEGER (0..255)

}

BackhaulLinkDown ::= SEQUENCE {

--backhaul link down in units of superframe

timeOfBackhaulLinkDown INTEGER (0..255) OPTIONAL,

-- Expected uptime of BS in units of superframe

expectedTimeOfBackhaulLinkAvailalbe INTEGER (0..255) OPTIONAL

}

BackhaulLinkUp ::= SEQUENCE {

--backhaul link up in units of superframe

timeOfBackhaulLinkUp INTEGER (0..255) OPTIONAL

}

FaChangeBsRs ::= SEQUENCE {

-- FA index

fAIndex FAIndex,

-- Expected current FA downtime in units of frame

expectedDowntimeOfCurrentFa INTEGER (0..255),

-- Expected uptime of new FA in units of superframe

expectedUptimeOfNewFa INTEGER (0..255) OPTIONAL

}

MmServiceEndMs ::= SEQUENCE {

--backhaul link up in units of superframe

timeOfBackhaulLinkUp INTEGER (0..255) OPTIONAL

}

ScanningOperationRsModeMs ::= SEQUENCE {

scanDuration INTEGER (0..255),

interleavingInterval INTEGER (0..255),

recommendStartSuperFrame SuperframeNumberLSB,

recommendedStartFrame INTEGER (0..3)

}

NeighborCellScanning ::= SEQUENCE {

scanDuration INTEGER (0..255),

interleaving INTEGER (0..255),

scanIteration INTEGER (0..63),

recommendStartSuperFrame SuperframeNumberLSB,

recommendedStartFrame INTEGER (0..3)

}

HandoverMmStation ::= SEQUENCE {

-- Start of unavailable time in unit of frame

unavailableStartTime INTEGER (0..255),

-- Interval of unavailable time in unit of superframe

unavailableTimeInterval INTEGER (0..255)

}

AAI-MM-ADV ::= SEQUENCE {

actionType CHOICE {

reconfBsRs ReconfBsRs, -- 0b0000

restartBsRs RestartBsRs, -- 0b0001

powerDownBsRs PowerDownBsRs, -- 0b0010

powerReductionBsRs PowerReductionBsRs, -- 0b0011

backhaulLinkDown BackhaulLinkDown, -- 0b0100

backhaulLinkUp BackhaulLinkUp, -- 0b0101

faChangeBsRs FaChangeBsRs, -- 0b0110

mmServiceEndMs MmServiceEndMs, -- 0b0111

scanningOperationRsModeMs ScanningOperationRsModeMs, -- 0b1000

neighborCellScanning NeighborCellScanning, -- 0b1001

handoverMmStation HandoverMmStation, -- 0b1010

reportStatusInfoMmStation NULL, -- 0b1011

...

}

}

-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-

-- HR Multimode RS Request message

-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-

AAI-MM-RS-REQ ::= SEQUENCE {

requestRelayMode ENUMERATED {

ttrRelayMode,

strRelayMode

},

subordinateStationInitReq SEQUENCE {

--present if request relay mode == 0

sTTTG INTEGER (0..49) OPTIONAL,

sTRTG INTEGER (0..49) OPTIONAL,

--present if request relay mode == 0

subordinateStationIsBs SEQUENCE {

tA INTEGER (0..2047),

tBs INTEGER (0..31),

tRs INTEGER (0..31)

} OPTIONAL,

--present if request relay mode == 1

duplexModeSupportIndication BIT STRING {

fDDSupport (0),

tDDSupport (1)

} (SIZE (2)) OPTIONAL,

--present if request relay mode == 1

numOfAvailableFrequency SEQUENCE (SIZE (1..16)) OF SEQUENCE {

carrierFrequency INTEGER (0..1023)

} OPTIONAL

} OPTIONAL,

subordinateStationInitReqAndRcvByBs SEQUENCE {

--present if request relay mode == 0

tA INTEGER (0..2047),

tBs INTEGER (0..31),

tRs INTEGER (0..31)

} OPTIONAL

}

-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-

-- HR Multimode RS Response message

-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-

SuperordinateBsTxMMRSRSP ::= SEQUENCE {

responseCode ENUMERATED {

acceptRequest,

retxAfterActionTimeExpires,

rejectRequest,

spare1

},

acceptAndSubordinateStationIsBsForTTR SEQUENCE {

tA INTEGER (0..2047),

tBs INTEGER (0..31),

tRs INTEGER (0..31)

} OPTIONAL,

retxAfterActionTime SEQUENCE {

actionTime INTEGER (0..31)

} OPTIONAL

}

TTRRevMMRSREQ ::= SEQUENCE {

sTTTG INTEGER (0..49),

sTRTG INTEGER (0..49),

subordinateStationIsBs SEQUENCE {

tA INTEGER (0..2047),

tBs INTEGER (0..31),

tRs INTEGER (0..31)

} OPTIONAL

}

STRRevMMRSREQ ::= SEQUENCE {

duplexModeSupportIndication BIT STRING {

fDDSupport (0),

tDDSupport (1)

} (SIZE (2)) OPTIONAL,

--present if request relay mode == 1

numOfAvailableFrequency SEQUENCE (SIZE (1..16)) OF SEQUENCE {

carrierFrequency INTEGER (0..1023)

}

}

SubordinateStTxMMRSREQ ::= SEQUENCE {

recRelayMode CHOICE {

ttrRevMMRSREQ TTRRevMMRSREQ,

strRevMMRSREQ STRRevMMRSREQ

}

}

AAI-MM-RS-RSP ::= SEQUENCE {

responseStation CHOICE {

superordinateBS SuperordinateBsTxMMRSRSP,

subordinateStation SubordinateStTxMMRSREQ

}

}

-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-

-- HR Multimode Release Request message

-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-

AAI-MM-RL-REQ ::= SEQUENCE {

releaseRequestCode ENUMERATED {

multimodeRelease,

responseUnsolicitReleaseRspMsgByBs,

rejectUnsolicitReleaseRspMsgByBs,

spare1

},

releaseReasonCode ENUMERATED {

insufficientBatteryLevel,

impermissibleInterferenceLevel,

powerOffInitiation,

spare1

}

}

-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-

-- HR Multimode Release Response message

-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-

ActionTime ::= SEQUENCE {

actionTime INTEGER (0..15)

}

AAI-MM-RL-RSP ::= SEQUENCE {

actionCode CHOICE {

terminateMultimodeServiceImmediately NULL,

terminateMultimodeServiceAtActionTime ActionTime,

responseForRetransmissionAtActionTime ActionTime,

rejectReleaseRequest NULL

}

}

-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-

-- HR Multimode BS Request message

-- +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-

...

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