Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Proposal for Adding Mobility Handover and Paging group MIBs**
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Re:	Contribution to IEEE 802.16i
Abstract	This contribution proposed to add mobility related handover and paging group MIBs
Purpose	Adoption
Notice	
Release	
Patent Policy and Procedures	

Proposal for Adding Mobility Handover and Paging group MIBs

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Introduction

With the mobility feature introduced, handover between BS and its neighbouring BS is inevitable. This contribution proposes to add BS handover related parameters which will help to execute smoothly handover.

Paging group configuration is also very important in the mobility scenario, proper paging group settings will make the paging procedure simple and effective. The configuration of paging group is also included in this contribution.

Proposed Text

X.1 wmanIfBsObjects

X.1.1 wmanIfBsMobility

X.1.1.1 wmanIfBsHandoverConfiguration

wmanIfBsHandoverConfiguration contains handover related parameters. Handover related parameters include BS configuration parameters and its neighbouring BSes configuration parameters.

X.1.1.2 wmanIfBsPagingGroupTable

wmanIfBsPagingGroupTable contains paging group related parameters.

ASN.1 Definitions of 802.16 MIB for SNMP

```
wmanIfBsMobility OBJECT IDENTIFIER ::= { wmanIfBsObjects 1 }

wmanIfBsHandoverConfiguration OBJECT IDENTIFIER  ::= { wmanIfBsMobility 2 }

wmanIfBsOperatorId OBJECT-TYPE
        SYNTAX Integer32
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "An unique operator identifier."
        ::= { wmanIfBsHandoverConfiguration 1 }

wmanIfBsId OBJECT-TYPE
        SYNTAX WmanIfBsIdType
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "An unique BS identifier."
        ::= { wmanIfBsHandoverConfiguration 2 }
```

```
wmanIfBsHandoverSupport OBJECT-TYPE
        SYNTAX BITS
                {
                MDHO/FBSS HO not supported(0),
                FBSS/MDHO DLRF combining supported(1),
                MDHO DL soft combining supported monitoring single MAP from anchor BS(2),
                MDHO DL soft combining supported monitoring MAPS from active BSs(3),
                reserved1(5),
                reserved2(6),
                reserved3(7)
                }
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "The Handover supported field indicates what type(s) of HO the BS and the MS supports."
        ::= { wmanIfBsHandoverConfiguration 3 }

wmanIfBsHandoverSupport OBJECT-TYPE
        SYNTAX BITS
                {
                mdho/fbss HO not supported(0),
                fbss/mdho DLRF combining supported(1),
                mdho DL soft combining supported monitoring single MAP from anchor BS(2),
                mdho DL soft combining supported monitoring MAPS from active BSs(3)
                }
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "The Handover supported field indicates what type(s) of HO the BS and the MS supports."
        ::= { wmanIfBsHandoverConfiguration 3 }

wmanIfBsResourceRetainTime OBJECT-TYPE
        SYNTAX Integer32
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "The Resource_Retain_Time is the duration for MS s connection information that will be
retained in serving BS. BS shall start Resource_Retain_Time timer at MS notification of pending HO attempt
through MOB_HO-IND or by detecting an MS drop. The unit of this value is 100 milliseconds."
        ::= { wmanIfBsHandoverConfiguration 4 }

wmanIfBsHOProcessOptimizationMSTimer OBJECT-TYPE
        SYNTAX INTEGER
        MAX-ACCESS read-write
```

```
        STATUS current
        DESCRIPTION
                "the duration in frames MS shall wait until receipt
                 of the next unsolicited network re-entry MAC
                management message as indicated in the HO Process
                 Optimization element of the RNG-RSP message."
        ::= { wmanIfBsHandoverConfiguration 5 }

wmanIfBsMsHORetransmissionTimer OBJECT-TYPE
        SYNTAX INTEGER
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "After a MS transmits MOB_MSHO-REQ to initiate a handover process, it shall start MS
Handover Retransmission Timer and shall not transmit another MOB_MSHO-REQ until the expiration of the
MS Handover Retransmission Timer."
        ::= { wmanIfBsHandoverConfiguration 6 }

wmanIfBsMobilityModeSupport OBJECT-TYPE
        SYNTAX BITS
                {
                handover support(0),
                sleep-mode support(1),
                idle-mode support(2)
                }
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "This parameter is to represent the supported mobility mode."
        ::= { wmanIfBsHandoverConfiguration 7 }

wmanIfBsMsHOConnectProcessingTime OBJECT-TYPE
        SYNTAX INTEGER
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "Time in ms the MS needs to process information
                on connections provided in
                RNGRSP or REG-RSP message during
                HO."
        ::= { wmanIfBsHandoverConfiguration 8 }

wmanIfBsMsHoTekProcessingTime OBJECT-TYPE
        SYNTAX INTEGER
        MAX-ACCESS read-write
```

```
        STATUS current
        DESCRIPTION
                "Time in ms the MS needs to completely
                process TEK information during HO."
        ::= { wmanIfBsHandoverConfiguration 9 }

wmanIfBsULPermutationBase OBJECT-TYPE
        SYNTAX OCTET STRING
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "This parameter is used for uplink subcarrier allocation."
        ::= { wmanIfBsHandoverConfiguration 10 }

wmanIfBsDLPermutationBase OBJECT-TYPE
        SYNTAX OCTET STRING
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "This parameter is used for downlink subcarrier allocation."
        ::= { wmanIfBsHandoverConfiguration 11 }

wmanIfBsPreambleIndex OBJECT-TYPE
        SYNTAX OCTET STRING
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "This parameter is used for downlink synchronization by MS."
        ::= { wmanIfBsHandoverConfiguration 12 }

wmanIfBsSegmentNumber OBJECT-TYPE
        SYNTAX INTEGER
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "This parameter is an unique segment identifier ."
        ::= { wmanIfBsHandoverConfiguration 13 }

wmanIfNeighbourBsTable OBJECT-TYPE
        SYNTAX SEQUENCE OF WmanIfNeighbourBsEntry
        MAX-ACCESS not-accessible
        STATUS current
        DESCRIPTION
                "This table contains neighbouring BS related parameters."
        ::= { wmanIfBsHandoverConfiguration 14 }
```

```
wmanIfNeighbourBsEntry OBJECT-TYPE
        SYNTAX WmanIfNeighbourBsEntry
        MAX-ACCESS not-accessible
        STATUS current
        DESCRIPTION
                "This table is indexed by wmanIfNeighbourBsId."
        INDEX { wmanIfNeighbourBsId }
        ::= { wmanIfNeighbourBsTable 1 }

wmanIfNeighbourBsEntry ::= SEQUENCE {
        wmanIfNeighbourBsId                         WmanIfBsIdType,
        wmanIfNeighbourBsFAIndex                    INTEGER,
        wmanIfNeighbourBsEIRP                       INTEGER (-128..127),
        wmanIfNeighbourBsHOProcessOptimization      Integer32,
        wmanIfNeighbourBsSchedulingServiceSupport   BITS,
        wmanIfNeighbourBsBandwidth                  Integer32,
        wmanIfNeighbourBsFFTSize                    Integer32,
        wmanIfNeighbourBsCyclePrefix                Integer32,
        wmanIfNeighbourBsFrameDurationCode          Integer32,
        wmanIfNeighbourBsULPermutationBase          Integer32,
        wmanIfNeighbourBsDLPermutationBase          Integer32,
        wmanIfNeighbourBsSegmentNumber          Integer32,
        wmanIfNeighbourBsPreambleIndex              Integer32
}

wmanIfNeighbourBsId OBJECT-TYPE
        SYNTAX WmanIfBsIdType
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "The neighbouring BS identifier."
        ::= { wmanIfNeighbourBsEntry 1 }

wmanIfNeighbourBsFAIndex OBJECT-TYPE
        SYNTAX INTEGER
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "Frequency Assignment Index."
        ::= { wmanIfNeighbourBsEntry 2 }

wmanIfNeighbourBsEIRP OBJECT-TYPE
        SYNTAX INTEGER (-128..127)
        MAX-ACCESS read-write
```

```
        STATUS current
        DESCRIPTION
                "Neighbour BS EIRP."
        ::= { wmanIfNeighbourBsEntry 3 }

wmanIfNeighbourBsHOProcessOptimization OBJECT-TYPE
        SYNTAX Integer32
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "Identifies re-entry process management messages that may be omitted during the current HO attempt due to the availability of MS service and operational context information, and the MS service and operational status post-HO completion."
        ::= { wmanIfNeighbourBsEntry 4 }

wmanIfNeighbourBsSchedulingServiceSupport OBJECT-TYPE
        SYNTAX BITS
                {
                real-time polling service(0),
                extended real-time polling service(1),
                non-real-time polling service(2),
                unsolicited grant service(3),
                best effort(4)
                }
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "This parameter is used to indicate neighbouring BS scheduling service type."
        ::= { wmanIfNeighbourBsEntry 5 }

wmanIfNeighbourBsBandwidth OBJECT-TYPE
        SYNTAX Integer32
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "This parameter is used to indicate neighbouring BS bandwidth."
        ::= { wmanIfNeighbourBsEntry 6 }

wmanIfNeighbourBsFFTSize OBJECT-TYPE
        SYNTAX Integer32
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "This parameter is used to indicate neighbouring BS FFT size."
        ::= { wmanIfNeighbourBsEntry 7 }
```

```
wmanIfNeighbourBsCyclePrefix OBJECT-TYPE
        SYNTAX Integer32
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "This parameter is used to indicate neighbouring BS Cycle prefix."
        ::= { wmanIfNeighbourBsEntry 8 }

wmanIfNeighbourBsFrameDurationCode OBJECT-TYPE
        SYNTAX Integer32
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "This parameter is used to indicate neighbouring BS Frame duration code."
        ::= { wmanIfNeighbourBsEntry 9 }

wmanIfNeighbourBsULPermutationBase OBJECT-TYPE
        SYNTAX Integer32
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "This parameter is used to indicate neighbouring BS uplink permutation base."
        ::= { wmanIfNeighbourBsEntry 10 }

wmanIfNeighbourBsDLPermutationBase OBJECT-TYPE
        SYNTAX Integer32
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "This parameter is used to indicate neighbouring BS downlink permutation base."
        ::= { wmanIfNeighbourBsEntry 11 }

wmanIfNeighbourBsSegmentNumber OBJECT-TYPE
        SYNTAX Integer32
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "This parameter is used to indicate neighbouring BS segment number."
        ::= { wmanIfNeighbourBsEntry 12 }

wmanIfNeighbourBsPreambleIndex OBJECT-TYPE
        SYNTAX Integer32
        MAX-ACCESS read-write
        STATUS current
```

```
        DESCRIPTION
                "This parameter is used to indicate neighbouring BS preamble index."
        ::= { wmanIfNeighbourBsEntry 13 }

wmanIfBsPagingGroupTable OBJECT-TYPE
        SYNTAX SEQUENCE OF WmanIfBsPagingGroupEntry
        MAX-ACCESS not-accessible
        STATUS current
        DESCRIPTION
                "This table contains paging group related parameters."
        ::= { wmanIfBsMobility 3 }

wmanIfBsPagingGroupEntry OBJECT-TYPE
        SYNTAX WmanIfBsPagingGroupEntry
        MAX-ACCESS not-accessible
        STATUS current
        DESCRIPTION
                "This table is indexed by wmanIfBsPagingGroupId."
        INDEX { wmanIfBsPagingGroupId }
        ::= { wmanIfBsPagingGroupTable 1 }

wmanIfBsPagingGroupEntry ::= SEQUENCE {
        wmanIfBsPagingControlId                          IpAddress,
        wmanIfBsPagingGroupId                            INTEGER,
        wmanIfBsMgmtResourceHoldingTimer                 Integer32,
        wmanIfBsT46Timer                                 Integer32,
        wmanIfBsPagingRetryCount                         INTEGER,
        wmanIfBsREQDuration                              INTEGER,
        wmanIfBsMACHashSkipThreshold                     Integer32,
        wmanIfBsCDMATransmissionOpportunityAssignment    INTEGER,
        wmanIfBsPagingResponseWindow                     INTEGER,
        wmanIfBsIdleModeTimer                            INTEGER,
        wmanIfBsIdleModeSystemTimer                      INTEGER,
        wmanIfBsPagingIntervalLength                     INTEGER,
        wmanIfBsPagingCycle                              INTEGER
}

wmanIfBsPagingControlId OBJECT-TYPE
        SYNTAX IpAddress
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "This parameter is used to indicate paging controller identifier connected by BS."
        ::= { wmanIfBsPagingGroupEntry 1 }
```

```
wmanIfBsPagingGroupId OBJECT-TYPE
        SYNTAX INTEGER
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "This parameter is used to indicate the paging group identifier assigned to BS by network."
        ::= { wmanIfBsPagingGroupEntry 2 }

wmanIfBsMgmtResourceHoldingTimer OBJECT-TYPE
        SYNTAX Integer32
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "Time the BS maintain connection
                information with the MS after the
                BS send DREG-CMD to the MS"
        ::= { wmanIfBsPagingGroupEntry 3 }

wmanIfBsT46Timer OBJECT-TYPE
        SYNTAX Integer32
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "Time the BS waits for DREGREQ
                in case of unsolicited Idle
                Mode initiation from BS."
        ::= { wmanIfBsPagingGroupEntry 4 }

wmanIfBsPagingRetryCount OBJECT-TYPE
        SYNTAX INTEGER
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "Number of retries on paging
                transmission. If the BS does not
                receive RNG-REQ from the MS
                until this value decreases to zero,
                it determines that the MS is
                unavailable."
        ::= { wmanIfBsPagingGroupEntry 5 }

wmanIfBsREQDuration OBJECT-TYPE
        SYNTAX INTEGER
        MAX-ACCESS read-write
        STATUS current
```

```
        DESCRIPTION
                "Waiting value for the DREG-REQ message re-transmission
                (measured in frames)."
        ::= { wmanIfBsPagingGroupEntry 6 }

wmanIfBsMACHashSkipThreshold OBJECT-TYPE
        SYNTAX Integer32
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "Maximum number of successive MOB_PAG-ADV messages
                that may be sent from a BS without individual notification for
                an MS for which BS is allowed to skip MS MAC Address Hash
                when the Action Code for the MS is 0b00,'No Action Required'."
        ::= { wmanIfBsPagingGroupEntry 7 }

wmanIfBsCDMATransmissionOpportunityAssignment OBJECT-TYPE
        SYNTAX INTEGER
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "The CDMA code and transmission opportunity
                assignment field indicates the assigned code
                and transmission opportunity for a MS who is
                paged to use over dedicated CDMA ranging region."
        ::= { wmanIfBsPagingGroupEntry 8 }

wmanIfBsPagingResponseWindow OBJECT-TYPE
        SYNTAX INTEGER
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "The Page-Response Window indicates the Page-Response window for a MS who is paged to
transmit
                the assigned code for CDMA ranging channel."
        ::= { wmanIfBsPagingGroupEntry 9 }

wmanIfBsIdleModeTimer OBJECT-TYPE
        SYNTAX INTEGER (128..65536)
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "MS timed interval to conduct
                Location Update. Set timer to MS
                Idle Mode Timeout capabilities
```

```
                setting. Timer recycles on successful
                Idle Mode Location Update."
        ::= { wmanIfBsPagingGroupEntry 10 }

wmanIfBsIdleModeSystemTimer OBJECT-TYPE
        SYNTAX INTEGER (128..65536)
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "For BS acting as Paging Controller,
                timed interval to receive notification
                of MS Idle Mode Location Update. Set
                timer to MS Idle Mode Timeout. Timer
                recycles on successful Idle Mode
                Location Update."
        ::= { wmanIfBsPagingGroupEntry 11 }

wmanIfBsPagingIntervalLength OBJECT-TYPE
        SYNTAX INTEGER (2..5)
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "time duration of Paging Interval
                of the BS."
        ::= { wmanIfBsPagingGroupEntry 12 }

wmanIfBsPagingCycle OBJECT-TYPE
        SYNTAX INTEGER
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
                "Cycle in which the paging message is transmitted
                within the paging group."
        ::= { wmanIfBsPagingGroupEntry 13 }
```