Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**BS and SS Event Log for wmanIfMib**
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Re:	
Abstract	Event logging provides a standard and centralized way to record important software and hardware events. It is instrumental to fault mitigation, system debugging, and the monitoring of the system operation, performance. This contribution proposed the BS and SS event log MIB to be included wmanIfMib in IEEE P802.16f/D1.
Purpose	Adoption
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1. Introduction

Event logging provides a standard and centralized way to record important software and hardware events. Event Log MIB records the transient information associated with an event against the possibility that the Notification message can be lost. It is instrumental to fault mitigation, system debugging, and the monitoring of the system operation, performance. This contribution proposed the BS and SS event log MIB to be included in wmanIfMib in IEEE P802.16f/D1.

2. Event Log Requirements

wmanIfBsEventTable and wmanIfBsEventTable store the events that are are supported by BS and SS respectively. Each event entry contains the following attributes:

- wmanIfBsEventIdentifier – the identifier of an event
- wmanIfBsEventDescription – a string description of the event. It can be configurable from NMS.
- wmanIfBsEventSeverity -- the severity of an event. It is configurable from NMS.
    - **Emergency –** Reserved for vendor-specific 'fatal' hardware or software errors that prevents normal system operation and causes reporting system to reboot. Vendors may define their own set of emergency events.
    - **Alert –** A serious failure, which causes reporting system to reboot but it is not caused by hardware or software malfunctioning. After recovering from the critical event, the system MUST send a cold/warm start notification. The alert event could not be reported as a Trap or SYSLOG message and MUST be stored in the internal log file. The code of this event MUST be saved in non-volatile memory and reported later.
    - **Critical –** A serious failure that requires attention and prevents the device from transmitting data but could be recovered without rebooting the system. After recovering from the error event SS MUST send the Link Up notification. Critical events could not be reported as a Trap or SYSLOG message and MUST be stored in the internal log file. The code of this event MUST be reported later.
    - **Error –** A failure occurred that could interrupt the normal data flow but will not cause the SS to re-register. Error events could be reported in real time by using the trap or SYSLOG mechanism.
    - **Warning –** A failure occurred that could interrupt the normal data flow but will not cause the SS to re-register. 'Warning' level is assigned to events both SS and BS have information about. To prevent sending the same event both from the SS and the BS, the trap and Syslog reporting mechanism is disabled by default for this level.
    - **Notice –** The event is important, but is not a failure and could be reported in real time by using the trap or SYSLOG mechanism.

- **Informational –** The event is of marginal importance, and is not failure, but could be helpful for tracing the normal modem operation.
- **Debug –** Reserved for vendor-specific non-critical events.

- wmanIfSsEventNotification – a Boolean value determines if a trap should be reported.
- wmanIfSsEventNotificationOid – the object identifier of the event.

The Event Log consists of the following requirements:

- Event log uses the wrap-around buffers to store events. When the buffer is full, the oldest entry will be removed to make room for the new entry. The wrap-around can be disabled by NMS to prevent faulty events from flooding the log buffer quickly.
- The sizes of the buffers are configurabale.
- Events in the log have a lifespan that is also configurable.
- NMS can set the minimum severity fo the events that should be logged into the buffer.
- The content of each entry will be retained after the power reset.
- Certain events can trigger notifications that will be sent to NMS.
- A pointer is provided to enable the access the latest event.

Each entry consists of the following objects:

- wmanIfSsEventIdentifier – the event ID.
- wmanIfSsEventLoggedTime – the time when the event occurred.
- wmanIfSsEventDescription – a string description of the event.
- wmanIfSsEventSeverity – the severity of the event.

3. Event Log ASN.1 Definition

```
WmanIfEventSeverity ::= TEXTUAL-CONVENTION
        STATUS      current
        DESCRIPTION
            "WmanIfEventSeverity defines the alarm Severity of an
             event."
        SYNTAX      INTEGER {emergency(1),
                             alert(2),
                             critical(3),
                             error(4),
                             warning(5),
                             notice(6),
                             informational(7),
                             debug(8)}
```

```
--
-- BS Event log configuration
--
wmanIfBsEventLogEntryLimit    OBJECT-TYPE
        SYNTAX      INTEGER
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "The maximum number of event entries that may be held
             in wmanIfBsEventLogTable. If an application changes
             the limit while there are events in the log, the
             oldest events must be discarded to bring the log down
             to the new limit."
        DEFVAL      { 200 }
        ::= { wmanIfBsEventLog 1 }

wmanIfBsEventLifeTimeLimit    OBJECT-TYPE
        SYNTAX      INTEGER
        UNITS       "minutes"
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "The number of minutes an event should be kept in the log
             before it is automatically removed. If an application
             changes the value of wmanIfBsEventLifeTimeLimit, events
             that are older than the new time may be discarded to meet
             the new lifetime. A value of 0 means lifetime limit."
        DEFVAL      { 1440 }
        ::= { wmanIfBsEventLog 2 }

wmanIfBsEventLogSeverityThreshold    OBJECT-TYPE
        SYNTAX      WmanIfEventSeverity
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "This object defines the minimum severity level of the
             event that will be logged into the buffer."
        DEFVAL      { warning }
        ::= { wmanIfBsEventLog 3 }

wmanIfBsEventLogWrapAroundBuffEnable    OBJECT-TYPE
        SYNTAX      TruthValue
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "True (1), indicates that the log buffer will be wrapped
             around when the buffer is full."
        DEFVAL      { 1 }
        ::= { wmanIfBsEventLog 4 }

wmanIfBsEventLogLatestEvent OBJECT-TYPE
        SYNTAX      Unsigned32 (1..4294967295)
        MAX-ACCESS  not-accessible
        STATUS      current
```

```
        DESCRIPTION
            "This object is the index pointing to the latest event in
             wmanIfBsEventLogTable"
        DEFVAL      { 1 }
        ::= { wmanIfBsEventLog 5 }

wmanIfBsEventTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF WmanIfBsEventEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "This table provides the events that are supported by BS."
        ::= { wmanIfBsEventLog 6 }

wmanIfBsEventEntry OBJECT-TYPE
        SYNTAX      WmanIfBsEventEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "Each entry in this table represents an event that can be
             generated by BS. It is indexed by ifIndex and
             wmanIfBsEventId."
        INDEX       { ifIndex, wmanIfBsEventIdentifier }
        ::= { wmanIfBsEventTable 1 }

WmanIfBsEventEntry ::= SEQUENCE {
        wmanIfBsEventIdentifier                 INTEGER,
        wmanIfBsEventDescription                SnmpAdminString,
        wmanIfBsEventSeverity                   WmanIfEventSeverity,
        wmanIfBsEventNotification               TruthValue,
        wmanIfBsEventNotificationOid            OBJECT IDENTIFIER}

wmanIfBsEventIdentifier OBJECT-TYPE
        SYNTAX      INTEGER (1..100000)
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "A numeric value represents the Event Identifier."
        ::= { wmanIfBsEventEntry 1 }

wmanIfBsEventDescription  OBJECT-TYPE
        SYNTAX      SnmpAdminString
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "This object describes the event."
        ::= { wmanIfBsEventEntry 2 }

wmanIfBsEventSeverity  OBJECT-TYPE
        SYNTAX      WmanIfEventSeverity
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "This object describes the severity of such event.
```

```
             The system will assign a severity for each event. But,
             it can be configurable by NMS"
        ::= { wmanIfBsEventEntry 3 }

wmanIfBsEventNotification  OBJECT-TYPE
        SYNTAX      TruthValue
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "An event notification will be reported when it is
             True (1)."
--        DEFVAL      { 0 }
        ::= { wmanIfBsEventEntry 4 }

wmanIfBsEventNotificationOid OBJECT-TYPE
        SYNTAX      OBJECT IDENTIFIER
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "This is the object identifier of a NOTIFICATION-TYPE
             object. If wmanIfBsEventNotification is True, a trap that
             is identified by this OID will be reported."
        DEFVAL      { wmanBsEventTrap }
        ::= { wmanIfBsEventEntry 5 }

wmanIfBsEventLogTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF WmanIfBsEventLogEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "This is the Syslog table that is used to store Bs local
             events. This table should reside in the non-volatile
             memory that should presist after power cycle or reboot.
             The number of entries in this table is determined by
             wmanIfBsEventLogEntryLimit. It is a wrap around buffer.
             When the buffer is full, the oldest entry will be removed
             to make room for the newest entry."
        ::= { wmanIfBsEventLog 7 }

wmanIfBsEventLogEntry OBJECT-TYPE
        SYNTAX      WmanIfBsEventLogEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "Entries appear in this table when events occur, and are
             removed to make ways for new entries when buffer is full,
             the entry passes the lifetime limit. This table is
             indexed by ifIndex and wmanIfBsEventLogIndex."
        INDEX       { ifIndex, wmanIfBsEventLogIndex }
        ::= { wmanIfBsEventLogTable 1 }

WmanIfBsEventLogEntry ::= SEQUENCE {
        wmanIfBsEventLogIndex                   Unsigned32,
        wmanIfBsEventId                         INTEGER,
```

```
        wmanIfBsEventLoggedTime                 TimeStamp,
        wmanIfBsEventLogDescription             SnmpAdminString,
        wmanIfBsEventLogSeverity                WmanIfEventSeverity}

wmanIfBsEventLogIndex OBJECT-TYPE
        SYNTAX      Unsigned32 (1..4294967295)
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "A monotonically increasing integer for the sole purpose
             of indexing entries within the event log. When it
             reaches the maximum value, the agent wraps the value
             back to 1."
        ::= { wmanIfBsEventLogEntry 1 }

wmanIfBsEventId OBJECT-TYPE
        SYNTAX      INTEGER
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The identifier of a BS event."
        ::= { wmanIfBsEventLogEntry 2 }

wmanIfBsEventLoggedTime OBJECT-TYPE
        SYNTAX      TimeStamp
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The value of sysUpTime when the entry was placed in the
             log. If the entry occurred before the most recent
             management system initialization this object value must
             be set to zero."
        ::= { wmanIfBsEventLogEntry 3 }

wmanIfBsEventLogDescription  OBJECT-TYPE
        SYNTAX      SnmpAdminString
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "This object describes the event."
        ::= { wmanIfBsEventLogEntry 4 }

wmanIfBsEventLogSeverity  OBJECT-TYPE
        SYNTAX      WmanIfEventSeverity
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "This object describes the severity of such event."
        ::= { wmanIfBsEventLogEntry 5 }

wmanBsEventTrap NOTIFICATION-TYPE
        OBJECTS     {wmanIfBsEventId,
                     wmanIfBsEventLogIndex,
                     wmanIfBsEventLoggedTime,
```

```
                     wmanIfBsEventDescription,
                     wmanIfBsEventSeverity}
        STATUS      current
        DESCRIPTION
            "This trap report the event."
        ::= { wmanIfBsTrapDefinitions 12 }

--
-- SS Event log configuration
--
wmanIfSsEventLogEntryLimit    OBJECT-TYPE
        SYNTAX      INTEGER
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "The maximum number of event entries that may be held
             in wmanIfSsEventLogTable. If an application changes
             the limit while there are events in the log, the
             oldest events must be discarded to bring the log down
             to the new limit."
        DEFVAL      { 100 }
        ::= { wmanIfSsEventLog  1 }

wmanIfSsEventLifeTimeLimit    OBJECT-TYPE
        SYNTAX      INTEGER
        UNITS       "minutes"
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "The number of minutes an event should be kept in the log
             before it is automatically removed. If an application
             changes the value of wmanIfSsEventLifeTimeLimit, events
             that are older than the new time may be discarded to meet
             the new lifetime. A value of 0 means lifetime limit."
        DEFVAL      { 1440 }
        ::= { wmanIfSsEventLog  2 }

wmanIfSsEventLogSeverityThreshold    OBJECT-TYPE
        SYNTAX      WmanIfEventSeverity
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "This object defines the minimum severity level of the
             event that will be logged into the buffer."
        DEFVAL      { warning }
        ::= { wmanIfSsEventLog 3 }

wmanIfSsEventLogWrapAroundBuffEnable    OBJECT-TYPE
        SYNTAX      TruthValue
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "True (1), indicates that the log buffer will be wrapped
             around when the buffer is full."
```

```
        DEFVAL      { 1 }
        ::= { wmanIfSsEventLog 4 }

wmanIfSsEventLogLatestEvent OBJECT-TYPE
        SYNTAX      Unsigned32 (1..4294967295)
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "This object is the index pointing to the latest event in
             wmanIfSsEventLogTable"
        DEFVAL      { 1 }
        ::= { wmanIfSsEventLog 5 }

wmanIfSsEventTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF WmanIfSsEventEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "This table provides the events that are supported by SS."
        ::= { wmanIfSsEventLog 6 }

wmanIfSsEventEntry OBJECT-TYPE
        SYNTAX      WmanIfSsEventEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "Each entry in this table represents an event that can be
             generated by SS. It is indexed by wmanIfSsEventId."
        INDEX       { ifIndex, wmanIfSsEventIdentifier }
        ::= { wmanIfSsEventTable 1 }

WmanIfSsEventEntry ::= SEQUENCE {
        wmanIfSsEventIdentifier                 INTEGER,
        wmanIfSsEventDescription                SnmpAdminString,
        wmanIfSsEventSeverity                   WmanIfEventSeverity,
        wmanIfSsEventNotification               TruthValue,
        wmanIfSsEventNotificationOid            OBJECT IDENTIFIER}

wmanIfSsEventIdentifier OBJECT-TYPE
        SYNTAX      INTEGER (1..100000)
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "A numeric value represents the Event Identifier."
        ::= { wmanIfSsEventEntry 1 }

wmanIfSsEventDescription  OBJECT-TYPE
        SYNTAX      SnmpAdminString
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "This object describes the event."
        ::= { wmanIfSsEventEntry 2 }
```

```
wmanIfSsEventSeverity  OBJECT-TYPE
        SYNTAX      WmanIfEventSeverity
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "This object describes the severity of such event.
             The system will assign a severity for each event. But,
             it can be configurable by NMS"
        ::= { wmanIfSsEventEntry 3 }

wmanIfSsEventNotification  OBJECT-TYPE
        SYNTAX      TruthValue
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "An event notification will be reported when it is
             True (1)."
--        DEFVAL      { 0 }
        ::= { wmanIfSsEventEntry 4 }

wmanIfSsEventNotificationOid OBJECT-TYPE
        SYNTAX      OBJECT IDENTIFIER
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "This is the object identifier of a NOTIFICATION-TYPE
             object. If wmanIfSsEventNotification is True, a trap that
             is identified by this OID will be reported."
        DEFVAL      { wmanSsEventTrap }
        ::= { wmanIfSsEventEntry 5 }

wmanIfSsEventLogTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF WmanIfSsEventLogEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "This is the Syslog table that is used to store SS local
             events. This table should reside in the non-volatile
             memory that should presist after power cycle or reboot.
             The number of entries in this table is determined by
             wmanIfSsEventLogEntryLimit. It is a wrap around buffer.
             When the buffer is full, the oldest entry will be removed
             to make room for the newest entry."
        ::= { wmanIfSsEventLog 7 }

wmanIfSsEventLogEntry OBJECT-TYPE
        SYNTAX      WmanIfSsEventLogEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "Entries appear in this table when events occur, and are
             removed to make ways for new entries when buffer is full,
             the entry passes the lifetime limit. This table is
             indexed by ifIndex and wmanIfSsEventLogIndex."
```

```
        INDEX       { ifIndex, wmanIfSsEventLogIndex }
        ::= { wmanIfSsEventLogTable 1 }

WmanIfSsEventLogEntry ::= SEQUENCE {
        wmanIfSsEventLogIndex                   Unsigned32,
        wmanIfSsEventId                         INTEGER,
        wmanIfSsEventLoggedTime                 TimeStamp,
        wmanIfSsEventLogDescription             SnmpAdminString,
        wmanIfSsEventLogSeverity                WmanIfEventSeverity}

wmanIfSsEventLogIndex OBJECT-TYPE
        SYNTAX      Unsigned32 (1..4294967295)
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "A monotonically increasing integer for the sole purpose
             of indexing entries within the event log. When it
             reaches the maximum value, the agent wraps the value
             back to 1."
        ::= { wmanIfSsEventLogEntry 1 }

wmanIfSsEventId OBJECT-TYPE
        SYNTAX      INTEGER
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The identifier of a SS event."
        ::= { wmanIfSsEventLogEntry 2 }

wmanIfSsEventLoggedTime OBJECT-TYPE
        SYNTAX      TimeStamp
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The value of sysUpTime when the entry was placed in the
             log. If the entry occurred before the most recent
             management system initialization this object value must
             be set to zero."
        ::= { wmanIfSsEventLogEntry 3 }

wmanIfSsEventLogDescription  OBJECT-TYPE
        SYNTAX      SnmpAdminString
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "This object describes the event."
        ::= { wmanIfSsEventLogEntry 4 }

wmanIfSsEventLogSeverity  OBJECT-TYPE
        SYNTAX      WmanIfEventSeverity
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "This object describes the severity of such event."
```

```
        ::= { wmanIfSsEventLogEntry 5 }

wmanSsEventTrap NOTIFICATION-TYPE
        OBJECTS     {wmanIfSsEventId,
                     wmanIfSsEventLogIndex,
                     wmanIfSsEventLoggedTime,
                     wmanIfSsEventDescription,
                     wmanIfSsEventSeverity}
        STATUS      current
        DESCRIPTION
            "This trap report the event."
        ::= { wmanIfSsTrapDefinitions 5 }
```