Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Proposal for BS Software Management**
Date Submitted	**2005-07-12**
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Re:	Contribution on IEEE 802.16f/D5
Abstract	This contribution proposed a method to upgrade the software of BS from network management center through adding Software management entry MIB. Add this feature can greatly save operators' CAPEX and OPEX.
Purpose	Adoption
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Proposal for BS Software Management

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Introduction

Software upgrading is frequently used procedures for operators during maintenance work. And it's very common improper upgrading will easily cause the system working abnormal. As most of the upgrading is made by human being and consequently it requires professional engineers to do the upgrading work. Nonstandard upgrading operations increased the maintenance expenses and also increased the risk of operator mistakes.

Actually software upgrading procedures will only contain two steps. One is downloading the new software version to devices, another is activating the corresponding software version. It's a very easy and common way for operator to understand and follow. These two steps are steps shown to operators. The complex internal processing should be encapsulated for vendor specific implementation.

Also the download progress is also very important information for operators to know what's going on during the downloading procedure.

Software Management feature for BS becomes more and more important when network expanding. It's very useful and convenient for the remote operation from network management center. Not need to go site by site to perform the upgrading operation, especially when the BS sites are scattered located. It will save CAPEX and OPEX for operators. Also, based on this feature, from the network management system, bulk upgrading can be made and greatly shorten the upgrading time during the whole system upgrading procedures.

This contribution proposes to add Software management MIB definition in the current 802.16f MIB, the new added MIB entry can be used for software management entry to upgrade BS from network manager locally or remotely.

Proposed Text Changes

1. [Change the text in section 13. 2 wmanDevMib as the following]
1.1 Add Node wmanDevBsSoftwareUpgradeTable in Figure 15—wmanDevMib Structure, keep the previous structure definition intact.

wmanDevMib (1.0.8802.16.1)
1.2 Add new section 13.2.1.2 wmanDevBsSoftwareUpgradeTable:

13.2.1.2 wmanDevBsSoftwareUpgradeTable

wmanDevBsSoftwareUpgradeTable contains objects associated with BS software upgrades..

wmanDevBsObjects
- wmanDevBsSoftwareUpgradeTable
- wmanDevBsNotification

ASN.1 Definitions:

```
wmanDevBsSoftwareUpgradeTable OBJECT-TYPE
    SYNTAX SEQUENCE OF wmanDevBsSoftwareUpgradeEntry
    MAX-ACCESS not-accessible
    STATUS current
```

```
        DESCRIPTION
                "This table contains objects associated with BS software upgrades."
                        ::= { wmanDevBsObjects 1 }

wmanDevBsSoftwareUpgradeTableEntry OBJECT-TYPE
        SYNTAX wmanDevBsSoftwareUpgradeTableEntry
        MAX-ACCESS not-accessible
        STATUS current
        DESCRIPTION
                "This table may have multiple entries, and is indexed
                by wmanDevBsDeviceIndex. "
        INDEX { wmanDevBsDeviceIndex }
        ::= { wmanDevBsSoftwareUpgradeTable 1 }

wmanDevBsSoftwareUpgradeEntry ::= SEQUENCE {
                wmanDevBsDeviceIndex                INTEGER,
                wmanDevBsVendorId                       OCTET STRING,
                wmanDevBsHwId                       OCTET STRING,
                wmanDevBsCurrentSwVersion               OCTET STRING,
                wmanDevBsDownloadSwVersion          OCTET STRING,
                wmanDevBsUpgradeFileName                OCTET STRING,
                wmanDevBsSoftwareUpgradeState       TruthValue,
                wmanDevBsDownloadSwProgress         Integer32,
                wmanDevBsSoftwareUpgradeTimeStamp   DateAndTime }

wmanDevBsDeviceIndex OBJECT-TYPE
        SYNTAX INTEGER (1 .. 10)
        MAX-ACCESS not-accessible
        STATUS current
        DESCRIPTION
                "An index identifies the BS sector in a multiple sector BS environment."
        ::= { wmanDevBsSoftwareUpgradeEntry 1 }

wmanDevBsVendorId OBJECT-TYPE
        SYNTAX OCTET STRING (SIZE (2..256))
        MAX-ACCESS read-only
        STATUS current
        DESCRIPTION
```

"This value identifies the managed BS vendor to which the software upgrade is to be applied."
::= { wmanDevBsSoftwareUpgradeEntry 2 }

wmanDevBsHwId **OBJECT-TYPE**

SYNTAX OCTET STRING(SIZE (2..256))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This value identifies the hardware version to which the software upgrade is to be applied."
::= { wmanDevBsSoftwareUpgradeEntry 3 }

wmanDevBsCurrentSwVersion **OBJECT-TYPE**

SYNTAX OCTET STRING(SIZE (2..256))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This value identifies the version of software currently running in the BS. The value is administered by the vendor identified in the Vendor ID field. It should be defined by the vendor to be unique with respect to a given hardware ID. After the downloaded software being successfully activated , the BS shall copy wmanDevBsDownloadSwVersion into wmanDevBsCurrentSwVersion."
::= { wmanDevBsSoftwareUpgradeEntry 4 }

wmanDevBsDownloadSwVersion **OBJECT-TYPE**

SYNTAX OCTET STRING(SIZE (2..256))

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This value identifies the version of software to be downloaded. The value is administered by the vendor identified in the Vendor ID field. It should be defined by the vendor to be unique with respect to a given hardware ID. This value shall be initialized before wmanDevBsSoftwareUpgradeState is set to Download or Activate."
::= { wmanDevBsSoftwareUpgradeEntry 5 }

wmanDevBsUpgradeFileName **OBJECT-TYPE**

SYNTAX OCTET STRING(SIZE (2..256))

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The filename is a fully qualified directory path name, indicating where the software is located."

::= { wmanDevBsSoftwareUpgradeEntry 6 }

wmanDevBsSoftwareUpgradeState **OBJECT-TYPE**

SYNTAX TruthValue
{

Null(0),

Download(1),

Activate(2)

}

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Setting this value to Download causes the BS to initiate the software download from a server (e.g. software image server).
Setting this value to Activate will activate the newly downloaded BS software.
Reading this object returns the last operation.
The download and activation procedure is vendor specific which will not be defined in this standard."

DEFVAL { Null }

::= { wmanDevBsSoftwareUpgradeEntry 7 }

wmanDevBsDownloadSwProgress **OBJECT-TYPE**

SYNTAX Integer32 (0..100)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This value indicates the progress of software download in percentage.
For example, 50 means 50% of BS software has been downloaded."

::= { wmanDevBsSoftwareUpgradeEntry 8 }

wmanDevBsSoftwareUpgradeTimeStamp **OBJECT-TYPE**

SYNTAX DateAndTime

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This time stamp indicates when the BS software was last downloaded

or activated."

::= { wmanDevBsSoftwareUpgradeEntry 9 }