CableLabs® Specifications

Battery Backup MIB

CL-SP-MIB-BB-I05-180209

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Closed	A static document, reviewed, tested, validated, and closed to further engineering change requests to the specification through CableLabs.

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1 SCOPE

This specification describes the Battery Backup Uninterrupted Power Supply (UPS) MIB requirements for CableLabs devices.

1.1 Requirements

Throughout this document, the words that are used to define the significance of particular requirements are capitalized. These words are:

"MUST"	This word means that the item is an absolute requirement of this specification.
"MUST NOT"	This phrase means that the item is an absolute prohibition of this specification.
"SHOULD"	This word means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications should be understood and the case carefully weighed before choosing a different course.
"SHOULD NOT"	This phrase means that there may exist valid reasons in particular circumstances when the listed behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
"MAY"	This word means that this item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because it enhances the product, for example; another vendor may omit the same item.

2 REFERENCES

2.1 Normative References

In order to claim compliance with this specification, it is necessary to conform to the following standards and other works as indicated, in addition to the other requirements of this specification. Notwithstanding, intellectual property rights may be required to use or implement such normative references.

[1] DOCSIS 2.0 Operations Support System Interface Specification, CM-SP-OSSIv2.0-C01-081104, November 4, 2008, Cable Television Laboratories, Inc.

[2] IETF RFC 1628, UPS Management Information Base, May 1994.

[3] CLAB-UPS-MIB, http://mibs.cablelabs.com/MIBs/common/

2.2 Informative References

[4] IETF RFC 3410, Introduction and Applicability Statements for Internet-Standard Management Framework, December 2002.

2.3 Reference Acquisition

- Cable Television Laboratories, Inc., 858 Coal Creek Circle, Louisville, CO 80027;
  Phone +1-303-661-9100; Fax +1-303-661-9199; http:// www.cablelabs.com.
- Internet Engineering Task Force (IETF) Secretariat 48377 Fremont Blvd., Suite 117, Fremont, California 94538, USA, Phone: +1-510-492-4080, Fax: +1-510-492-4001, http://www.ietf.org/Abbreviations.

3 ABBREVIATIONS

This document uses the following abbreviations and acronyms.

BBU	Battery Backup Unit
eDOCSIS	Embedded Data-Over-Cable Service Interface Specifications
eCM	Embedded Cable Modem
E-MTA	Embedded Multimedia Terminal Adapter
LED	Light Emitting Diode
MIB	Management Information Base
MTA	Multimedia Terminal Adapter
SNMP	Simple Network Management Protocol
UPS	Uninterrupted Power Supply

4 UPS MIB AND LED FUNCTIONALITY

4.1 Introduction

CableLabs devices MAY support battery backup capabilities with Uninterrupted Power Supply (UPS) functionality. An example of such device is a PacketCable Embedded Multimedia Terminal Adapter (MTA) eDOCSIS device. This document extends the set of CableLabs MIB modules to provide SNMP management of the UPS power source and battery backup functions.

Support for battery backup capabilities with UPS functionality is becoming important as some broadband services rely on constant uptime. The CableLabs UPS components consist of one or more battery packs and associated management functions to allow the control of power supply inputs and outputs. When the UPS is being provided power via the utility line (power outlet), the battery pack(s) are able to charge. When utility power is removed, the UPS component switches to the battery backup power source to provide power to the device until utility power has been reapplied or the battery pack(s) have been depleted.

CableLabs compliant devices that include battery backup with UPS functionality MUST include a Battery LED that relays information on the status of the UPS and battery pack(s). For more information about the Battery LED requirements, refer to Section 4.2.12.

Figure 1 describes the typical functional blocks of a UPS component connected to an eDOCSIS device.

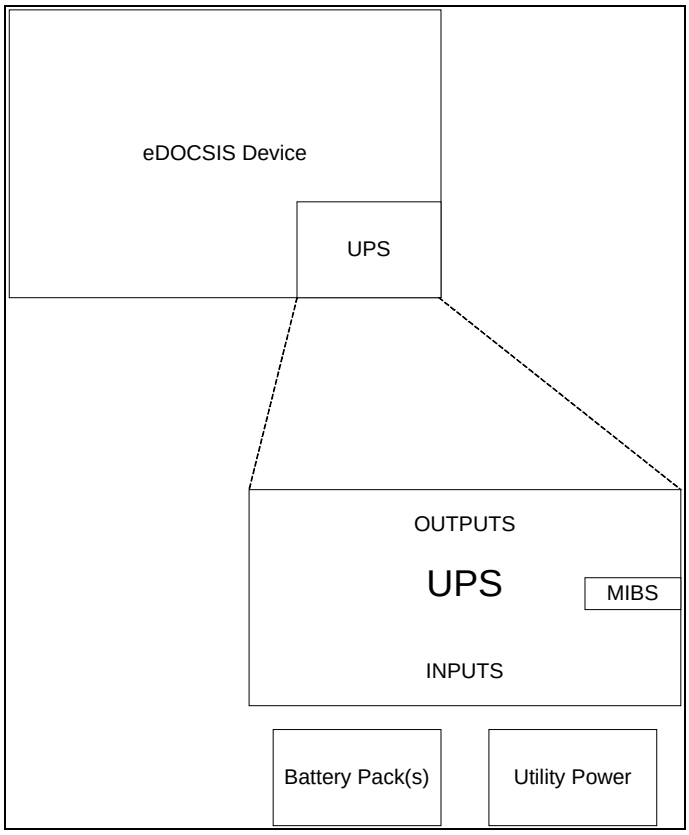

Figure 1 - UPS Components in eDOCSIS Devices

4.2 UPS Management

The purpose of this section is to define the UPS management requirements for CableLabs devices supporting battery backup UPS functionality.

CableLabs compliant devices supporting battery backup functionality MUST support UPS management and MUST comply with the SNMP MIB requirements of IETF RFC 1628 [2] as defined in this section. RFC 1628 [2] contains more information than is required for the simple UPS devices used for PacketCable digital voice or DOCSIS broadband data services. This document defines an SMI compliance statement for IETF RFC 1628 [2] that MUST be supported by CableLabs compliant devices with UPS functionality. Further, access to the UPS MIB objects MUST be provided via the eCM interface.

4.2.1 CableLabs Battery Backup UPS MIB Requirements

The Battery Backup and UPS MIB objects MUST be implemented as defined below.

4.2.2 upsSubsetIdentGroup

Table 1 - upsSubsetIdentGroup Object Attributes

Attribute Name	Type	Required Attribute	Type Constraints	Units	Default Value
upsIdentManufacturer,	String	Yes	SIZE(0..63))		
upsIdentModel,	String	No	SIZE(0..63))		
upsIdentAgentSoftwareVersion	String	No	SIZE(0..63))		
upsIdentName,	String	Yes	SIZE(0..63))		“”
upsIdentAttachedDevices	String	Yes	SIZE(0..63)		

4.2.2.1 upsIdentManufacturer

The name of the BBU manufacturer. The value of the upsIdentManufacturer object MUST contain the name of the device manufacturer.

4.2.2.2 upsIdentModel

The UPS Model designation.

4.2.2.3 upsIdentAgentSoftwareVersion

The UPS agent software version. This object may have the same value as the upsIdentUPSSoftwareVersion object.

4.2.2.4 upsIdentName

The upsIdentName object identifies the UPS and its value SHOULD be provided in the device configuration file. If the upsIdentName value is not provided in the configuration file, the default value MUST be an empty string.

4.2.2.5 upsIdentAttachedDevices

The upsIdentAttachedDevices MUST contain a column separated list of the names of the embedded devices attached to the UPS power output as specified in CableLabs' DHCP Options Registry.

For example, if the eDOCSIS device is an E-MTA with an integrated eCM, eMTA eSAFE, and a vendor device named 'VendorXEmbeddedDevice', this object will contain the value 'ECM:EMTA:vVendorXEmbeddedDevice' (without the single quotes).

4.2.3 upsFullBatteryGroup

Objects in this group are read only and provide a status of the battery or the Battery Backup Unit (BBU).

Table 2 - upsFullBatteryGroup Object Attributes

Attribute Name	Type	Required Attribute	Type Constraints	Units	Default Value
upsBatteryStatus	integer	Yes	batteryNormal(2), batteryLow(3), batteryDepleted(4)		
upsSecondsOnBattery	integer	Yes		Seconds	0
upsEstimatedMinutesRemaining	integer	Yes		Minutes	

Attribute Name	Type	Required Attribute	Type Constraints	Units	Default Value
upsEstimatedChargeRemaining	String	Yes			“”

4.2.3.1 upsBatteryStatus

The support of the upsBatteryStatus object value unknown(1) is used to indicate the presumption that the system's battery is absent or disconnected from the power switch controller. In such case, the following values are reported as well:

upsEstimatedMinutesRemaining = 0

upsEstimatedChargeRemaining = 0

upsBatteryVoltage = 0 (if supported)." unknown(1)

batteryNormal(2),

batteryLow(3),

batteryDepleted(4)

This attribute can take the following values:

unknown(1)

batteryNormal(2),

batteryLow(3),

batteryDepleted(4)

4.2.3.2 upsSecondsOnBattery

If the device is on battery power, the upsSecondsOnBattery object MUST return the elapsed time since the UPS last switched to battery power, or the time since the device was last restarted, whichever is less.

The upsSecondsOnBattery object MUST return a value of 0 if the attached devices are not on battery power.

4.2.3.3 upsEstimatedMinutesRemaining

An estimate of the time to battery charge depletion under the present load conditions if the utility power is off and remains off, or if it were to be lost and remain off.

4.2.3.4 upsEstimatedChargeRemaining

An estimate of the battery charge remaining expressed as a percent of full charge.

4.2.4 upsBasicInputGroup

The upsBasicInputGroup defines the objects that are common to the Input groups of compliant UPSs which support basic functions.

Table 3 - upsBasicInputGroup Object Attributes

Attribute Name	Type	Required Attribute	Type Constraints	Units	Default Value
upsInputLineBads	integer	Yes			
upsInputNumLines	integer	Yes			
upsInputFrequency	integer	No			
upsInputVoltage	String	Yes			

4.2.4.1 upsInputLineBads

The upsInputLineBads object MAY be supported.

4.2.4.2 upsInputNumLines

The upsInputNumLines object specifies the number of input lines utilized in this device. For example, for an eDOCSIS E-MTA device with 1 battery pack and 1 AC power source, this object value must be 2.

4.2.4.3 upsInputFrequency

The upsInputFrequency object MAY be supported.

4.2.4.4 upsInputVoltage

The upsInputVoltage object MAY be supported.

4.2.5 upsBasicOutputGroup

The upsBasicOutputGroup defines the objects that are common to the Output groups of compliant UPSs which support basic functions.

Table 4 - upsBasicOutputGroup Object Attributes

Attribute Name	Type	Required Attribute	Type Constraints	Units	Default Value
upsOutputSource	integer	Yes	other(1) none(2), normal(3), battery(5)		
upsOutputFrequency	integer	No			
upsOutputNumLines	integer	Yes			
upsOutputVoltage	integer	No			

4.2.5.1 upsOutputSource

The devices capable of supporting battery backup and UPS functionality MUST support the upsOutputSource values of none(2), normal(3), battery(5).

The upsOutputSource value of other(1) may be used to represent transient states.

4.2.5.2 upsOutputFrequency

The upsOutputFrequency object MAY be supported.

4.2.5.3 upsOutputNumLines

The upsOutputNumLines object specifies the number of output lines utilized in this eDOCSIS device.

For example, for an eDOCSIS E-MTA devices with both the eCM and eMTA attached to the UPS, this object value must be 2.

4.2.5.4 upsOutputVoltage

The upsOutputVoltage object MAY be supported.

4.2.6 upsBasicAlarmsGroup

The upsBasicAlarmGroup defines the objects that are common to the Alarm groups of compliant UPSs that support basic functions.

Table 5 - upsBasicAlarmsGroup Object Attributes

Attribute Name	Type	Required Attribute	Type Constraints	Units	Default Value
upsAlarmsPresent	Gauge32	Yes	other(1) none(2), normal(3), battery(5)		

Attribute Name	Type	Required Attribute	Type Constraints	Units	Default Value
upsAlarmDescr	String	Yes	upsAlarmBatteryBad, upsAlarmOnBattery, upsAlarmLowBattery, upsAlarmDepletedBattery, upsAlarmOutputOffAsRequested, upsAlarmUpsOutputOff, upsAlarmGeneralFault, upsAlarmAwaitingPower, upsAlarmShutdownPending, upsAlarmShutdownImminent		
upsAlarmTime	dateTime	Yes			

4.2.6.1 upsAlarmsPresent

4.2.6.2 upsAlarmDescr

The following well known alarm types MUST be supported by the CableLabs UPS capable devices:

upsAlarmBatteryBad,
upsAlarmOnBattery,
upsAlarmLowBattery,
upsAlarmDepletedBattery,
upsAlarmOutputOffAsRequested,
upsAlarmUpsOutputOff,
upsAlarmGeneralFault,
upsAlarmAwaitingPower,
upsAlarmShutdownPending,
and upsAlarmShutdownImminent

4.2.6.3 upsAlarmTime

The upsAlarmTime object indicates the value of sysUpTime when the alarm condition was detected.

4.2.7 upsBasicControlGroup

The upsBasicControlGroup defines the objects that are common to the Control groups of compliant devices that support basic functions.

Table 6 - upsBasicControlGroup Object Attributes

Attribute Name	Type	Required Attribute	Type Constraints	Units	Default Value
upsShutdownType	Integer	Yes	output(1)		
upsShutdownAfterDelay	Integer	Yes		Seconds	
upsStartupAfterDelay	Integer	Yes	1..604800	Seconds	
upsRebootWithDuration	Integer	Yes		Seconds	
upsAutoRestart	Integer	No			

4.2.7.1 upsShutdownType

The upsShutdownType object defines the nature of the action to be taken at the time when the countdown of the upsShutdownAfterDelay and upsRebootWithDuration object values reach zero.

The support for the upsShutdownType value system is not required (for CableLabs compliant devices, a system shutdown or reset can be achieved using other mechanisms.

4.2.7.2 upsShutdownAfterDelay

Setting this object will shutdown (i.e., turn off) either the UPS output or the UPS system (as determinedby the value of upsShutdownType at the time of shutdown) after the indicated number of seconds, or less if the UPS batteries become depleted. Setting this object to 0 will cause the shutdown to occur immediately. Setting this object to -1 will abort the countdown. If the system is already in the desired state at the time the countdown reaches 0, then nothing will happen. That is, there is no additional action at that time if upsShutdownType = system and the system is already off. Similarly, there is no additional action at that time if upsShutdownType = output and the output is already off. When read, upsShutdownAfterDelay will return the number of seconds remaining until shutdown, or -1 if no shutdown countdown is in effect. On some systems, if the agent is restarted while a shutdown countdown is in effect, the countdown may be aborted. Sets to this object override any upsShutdownAfterDelay already in effect.

4.2.7.3 upsStartupAfterDelay

The upsStartupAfterDelay MUST be supported.

The CableLabs devices capable of support battery backup and UPS functionality MUST support a maximum upsStartupAfterDelay value of 604800 seconds, equivalent to 7 days.

4.2.7.4 upsRebootWithDuration

The upsRebootWithDuration controls a reboot procedure with a countdown. It also indicates whether a reboot procedure is in progress and the number of seconds remaining in the countdown.

4.2.7.5 upsAutoRestart

The upsAutoRestart is only applicable for UPS system shutdown; it MAY be supported.

4.2.8 upsBasicConfigGroup

The upsBasicConfigGroup defines the objects that are common to the Config groups of UPSs which support basic functions.

Table 7 - upsBasicConfigGroup Object Attributes

Attribute Name	Type	Required Attribute	Type Constraints	Units	Default Value
upsConfigInputVoltage,	Integer	No	output(1)		
upsConfigInputFreq,	Integer	No		Seconds	
upsConfigOutputVoltage	Integer	No	1..604800	Seconds	
upsConfigOutputFreq,	Integer	No		Seconds	
upsConfigOutputVA,	Integer	No			
upsConfigOutputPower,		No			
upsConfigLowBattTime,		No			
upsConfigAudibleStatus		No			

4.2.8.1 upsConfigInputVoltage

The upsConfigInputVoltage MAY be supported.

4.2.8.2 upsConfigInputFreq

The upsConfigInputFreq MAY be supported.

4.2.8.3 upsConfigOutputVoltage

The upsConfigOutputVoltage MAY be supported.

4.2.8.4 upsConfigOutputFreq

The upsConfigOutputFreq MAY be supported.

4.2.8.5 upsConfigOutputVA

The upsConfigOutputVA MAY be supported.

4.2.8.6 upsConfigOutputPower

The upsConfigOutputPower MAY be supported.

4.2.8.7 upsConfigLowBattTime

The upsConfigLowBattTime specifies the value of upsEstimatedMinutesRemaining at which a lowBattery condition is declared.

Implementation of all possible values may be onerous for some systems. Consequently, not all possible values must be supported. However, at least two different manufacturer-selected values for upsConfigLowBattTime MUST be supported.

4.2.8.8 upsConfigAudibleStatus

The upsConfigAudibleStatus MAY be supported.

4.2.9 MtaDevPwrSupplyControl

Table 8 - MtaDevPwrSupplyControl Object Attributes

Attribute Name	Type	Required Attribute	Type Constraints	Units	Default Value
MtaDevPwrSupplyBatteryTest	Integer	Yes	disableAutoTesting(1) testScheduled(2) testInProgress(3) testPending(4)	N/A	
MtaDevPwrSupplyConfigRunTime	Integer	Yes		Minutes	
MtaDevPwrSupplyRatedMinutes	Integer	Yes		Minutes	
MtaDevPwrSupply AvailableMinutes	Integer	Yes		Minutes	
MtaDevPwrSupplyConfigReplaceBatteryTime	Integer	Yes		Minutes	50% of the value of MtaDevPwrSupplyRatedMinutes

4.2.9.1 MtaDevPwrSupplyBatteryTest

This attribute enables the automated testing of a device's battery and battery charging system when applicable. Automatic battery testing is enabled by default and is performed immediately from a cold power start if a valid test has not been previously completed or if the scheduled test is due, and then repeats every 180 days.

The number of days left until a battery test is scheduled to run can be found using MtaDevPwrSupplyBatteryTestTime MIB.

When the value TestScheduled(0) is set, the battery test scheduler resumes at its current value.

When the value DisableAutoTesting(1) is set the device stops the countdown timer MtaDevPwrSupplyBatteryTestTime at it's current value.

When the value TestInProgress(2) is set, the device initiates the battery test cycle and the MtaDevPwrSupplyBatteryTestTime object is reset to its default value of 180 days. This command is ignored if there is a test in progress. The remaining scheduled time may be skipped by issuing a value of "testInProgress" which will cause the battery test to run immediately when AC power is present. Auto testing is re-enabled (testScheduled) following the test.

When the test is active, the object will return the value "testInProgress(2)", unless AC power is lost or a Full Charge has been initiated. In that case, the will return the value testPending(3).

4.2.9.2 MtaDevPwrSupplyConfigRunTime

This attribute provides the current programmed battery backup minimum run time value. The minimum battery backup run time may also from this value. By programming the run-time to a lower value, the total service life of the battery is extended by decreasing the battery's recharge threshold causing it to recharge less often and to maintain a lower average charge state. Increasing the run-time value in turn decreases the total service life of the battery by causing it to recharge more often and to maintain a higher average charge state. Setting this value greater than MtaDevPwrSupplyAvailableMinutes will not provide a run-time greater than the value in MtaDevPwrSupplyAvailableMinutes.

4.2.9.3 MtaDevPwrSupplyRatedMinutes

This attribute provides the device's estimate of the rated battery backup run-time which is based upon the unit's typical idle power, the internal battery management power and the tested energy-capacity of the battery when fully charged.

4.2.9.4 MtaDevPwrSupplyAvailableMinutes

This attribute provides an estimate of the available run-time on the battery based upon the unit's typical idle power and the tested capacity of the battery when fully charged.

4.2.9.5 MtaDevPwrSupplyConfigReplaceBatteryTime

This attribute allows the operator to establish a replace battery threshold value in terms of backup battery run-time minutes. If a battery's Available Minutes has degraded to a point where it can no longer provide more than the value of this object minutes of run-time, an uspAlarmBatteryBad alarm condition is declared. The default value at power up is the equivalent Battery Backup run time using 50% of the Rated Minutes.

4.2.10 MtaDevPwrSupplyTimers

Table 9 - MtaDevPwrSupplyTimers Object Attributes

Attribute Name	Type	Required Attribute	Type Constraints	Units	Default Value
MtaDevPwrSupplyFullChargeTime	Integer	Yes	0, 1..16	Days	
MtaDevPwrSupplyBatteryTestTime	Integer	Yes	1..180, 255	Days	180

4.2.10.1 MtaDevPwrSupplyFullChargeTime

This attribute configures the number of days that the device will maintain a fully charged battery. Setting this object value from 1 to 16 will cause the battery to be immediately charged to its full state, which is equal to the value reported by MtaDevPwrSupplyAvailableMinutes. The attribute when read serves as a countdown timer for the number of days remaining at the fully charged state. If the value 0 is read, this indicates that battery is not being maintained in the fully charged state.

4.2.10.2 MtaDevPwrSupplyBatteryTestTime

This attribute is a countdown timer that reflects when the next scheduled Battery Test will be executed. Reading this object will provide the number of days remaining until the next battery test is scheduled to run. This attribute returns 255 whenever the MtaDevPwrSupplyBatteryTest attribute has been set for disableAutoTesting(0).

4.2.11 Summary Compliance Matrix

The following table describes the summary compliance for the CableLabs BB MIB. An 'x' in the column means the object MUST be supported; all the rest is optional and left for vendor decision.

Table 10 - Summary Compliance Matrix

RFC1628 Mib Object	Subset	Basic	Advanced	Clab-UPS MUST	Compliance Group
upsSubsetIdentGroup					
upsIdentManufacturer	X	X	X	X	upsSubsetIdentGroup

RFC1628 Mib Object	Subset	Basic	Advanced	Clab-UPS MUST	Compliance Group
upsIdentModel	X	X	X	X	upsSubsetIdentGroup
upsIdentUPSSoftwareVersion	X	X			
upsIdentName	X	X	X	X	upsSubsetIdentGroup
upsIdentAttachedDevices	X		X	X	upsSubsetIdentGroup
upsFullBatteryGroup					
upsBatteryStatus	X	X	X	X	upsFullBatteryGroup
upsSecondsOnBattery	X	X	X	X	upsFullBatteryGroup
upsEstimatedMinutesRemaining			X	X	upsFullBatteryGroup
upsEstimatedChargeRemaining			X	X	upsFullBatteryGroup
upsBatteryVoltage					
upsBatteryCurrent					
upsBatteryTemperature					
upsBasicInputGroup					
upsInputLineBads		X	X	X	
upsInputNumLines		X	X	X	upsBasicInputGroup
upsInputFrequency		X	X		
upsInputVoltage		X	X		
upsBatteryCurrent					
upsBatteryTemperature					
upsBasicOutputGroup					
upsOutputSource	X	X	X	X	upsBasicOutputGroup
upsOutputFrequency		X	X		
upsOutputNumLines		X	X	X	upsBasicOutputGroup
upsOutputVoltage		X	X		
upsOutputCurrent			X		
upsOutputPower			X		
upsOutputPercentLoad			X		
upsBypassFrequency		X	X		
upsBypassNumLines		X	X		
upsBypassVoltage		X	X		
upsBypassCurrent		X	X		
upsBypassPower		X	X		
upsBasicAlarmsGroup					
upsAlarmsPresent	X	X	X	X	upsBasicAlarmGroup
upsAlarmDescr	X	X	X	X	upsBasicAlarmGroup
upsAlarmTime	X	X	X	X	upsBasicAlarmGroup
upsTestId		X	X		
upsTestSpinLock		X	X		
upsTestResultsSummary		X	X		
upsTestResultsDetail		X	X		
upsTestStartTime		X	X		
upsTestElapsedTime		X	X		
upsBasicControlGroup					
upsShutdownType	X	X	X	X	upsBasicControlGroup

RFC1628 Mib Object	Subset	Basic	Advanced	Clab-UPS MUST	Compliance Group
upsShutdownAfterDelay	X	X	X	X	upsBasicControlGroup
upsStartupAfterDelay		X	X	X	upsBasicControlGroup
upsRebootWithDuration		X	X	X	upsBasicControlGroup
upsAutoRestart	X	X	X		upsBasicControlGroup
upsBasicConfigGroup					
upsConfigInputVoltage	X	X	X		
upsConfigInputFreq	X	X	X		
upsConfigOutputVoltage	X	X	X		
upsConfigOutputFreq	X	X	X		
upsConfigOutputVA	X	X	X		
upsConfigOutputPower	X	X	X		
upsConfigLowBattTime				X	upsBasicConfigGroup

4.2.12 Power and Battery LED requirements

CableLabs devices with UPS functionality MUST provide a special LED labeled as "BATTERY" (referred to as BATTERY LED or Battery LED in this document). The BATTERY LED conventions MUST comply with the requirements defined in this section in Table 11. The "POWER" LED of CableLabs devices with UPS functionality MUST also support the additional requirements defined in Table 11 of this section when the device is running on battery backup power.

The Power and Battery LED requirements and location on CableLabs devices with UPS functionality MUST be consistent with the requirements in Section 7 of the DOCSIS 2.0 OSSI specification [1].

The following table defines the LED functionality used to relay power and battery status information:

Table 11 - Power and Battery LED Operations By State

Mode of Operation	UPS Power Input Source	Battery Status	POWER LED Requirements	BATTERY LED Requirements
Device Initialization			Unlit	Lit
Normal Operation	AC Power (AC Power is ON)	Good Battery	Lit	Lit
		Low Battery	Lit	Flash
		Bad Battery	Lit	Unlit
	Battery Power (AC Power is OFF, battery input source is ON	Good Battery	Flash	Unlit
		Low Battery	Flash	Flash
		Bad Battery	Unlit (see Note 1*)	Unlit

**Note 1*: During AC Power Fail with a bad battery, device operation may not be possible due to lack of battery power; the POWER and BATTERY LEDs may be 'Unlit'.

The Battery LED MUST be 'Lit' under the following conditions:

- The Battery LED MUST be 'Lit' during the initialization of all the components attached to the UPS (the list of components or eSAFE devices attached to the UPS is defined by the `upsIdentAttachedDevices` object in the `CLAB-UPS-MIB` module).
- The Battery LED MUST be 'Lit' if the eDOCSIS UPS is operating on AC power and the battery is functioning normally.

The Battery LED MUST be 'Unlit' under the following conditions:

- One or more batteries are determined to be in "bad" condition.
  A battery "bad" condition occurs when one or more batteries have been determined to require replacement, for example when a battery is malfunctioning or may not be rechargeable. Such condition also triggers the `upsAlarmBatteryBad` alarm in the `CLAB-UPS-MIB` module.
- The UPS is operating on battery power and the battery is functioning normally.

The Battery LED MUST 'Flash' under the following condition:

- The Battery LED MUST 'Flash' if the battery is low. A low battery condition is reached when the remaining battery run-time is less than or equal to the value of the `upsConfigLowBattTime` MIB object in the `CLAB-UPS-MIB` module (such condition also triggers the `upsAlarmLowBattery` alarm condition).

4.2.13 Applicability of the CableLabs Battery Backup UPS MIB requirements

The battery backup and UPS functionality may be implemented in various CableLabs devices, for example a PacketCable Embedded Multimedia Terminal Adapter (E-MTA), a standalone Cable Modem or any eDOCSIS device. This section specifies additional applicability statements.

4.2.13.1 PacketCable E-MTA devices

In the case of a PacketCable Embedded Multimedia Terminal Adapter (E-MTA) device used to provide telephony services, service uptime is critical and the usage of battery backup UPS components may be an operator requirement.

A PacketCable E-MTA supporting battery backup UPS functionality MUST provide UPS output power to both the embedded cable modem (eCM) and the MTA eSAFE device (eMTA). Therefore, the upsIdentAttachedDevices object MUST contain the value 'ECM:EMTA' (without the single quotes).

Appendix I Acknowledgements

On behalf of CableLabs and its participating member companies, we would like to extend our thanks to all those who contributed to the development of this specification. Certainly all the participants of the provisioning focus team have added value to this effort by participating in the review and weekly conference calls. Particular thanks are given to:

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Jean-François Mulé, Sumanth Channabasappa (CableLabs)

Appendix II Revision History

The following ECNs have been incorporated in CL-SP-MIB-BB-I02-070119.

ECN	Date Accepted	Summary
MIB-BB-N-06.0022-2	3/13/06	Clarification of UPS MIB SNMP access
MIB-BB-N-07.0026-1	1/18/07	Editorial Changes

The following ECN has been incorporated in CL-SP-MIB-BB-I03-090811.

ECN	Date Accepted	Summary
MIB-BB-N-09.0042-2	5/6/2009	Editorial updates

The following ECN has been incorporated in CL-SP-MIB-BB-I04-100608.

ECN	Date Accepted	Summary
MIB-BB-N-10.0047-2	4/28/2010	Clarifications on Battery Backup

The following ECN has been incorporated in CL-SP-MIB-BB-I05-180209.

ECN	Date Accepted	Summary
MIB-BB-N-17.0165-1	1/18/2018	Add MTA Power Supply Configuration