



# Lenovo BIOS Windows Management Instrumentation Interface Deployment Guide for Desktop

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## Preface

The purpose of this guide is to explain how to modify BIOS settings and boot order using Windows Management Instrumentation (WMI) through the Lenovo client-management interface. This guide is intended for skilled IT administrators who are familiar with configuring BIOS settings on computers in their organizations.

This guide is provided in a ZIP file package that contains this deployment guide as well as Visual Basic sample scripts to use when configuring BIOS settings.

This deployment guide is developed for IT professionals to assist with the unique challenges that they encounter. If you have suggestions or comments, communicate with your Lenovo<sup>®</sup> authorized representative. To learn more about the technologies that can help you lower the total cost of ownership and to check for periodic updates to this guide, visit the following Web site:  
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## Chapter 1. Overview

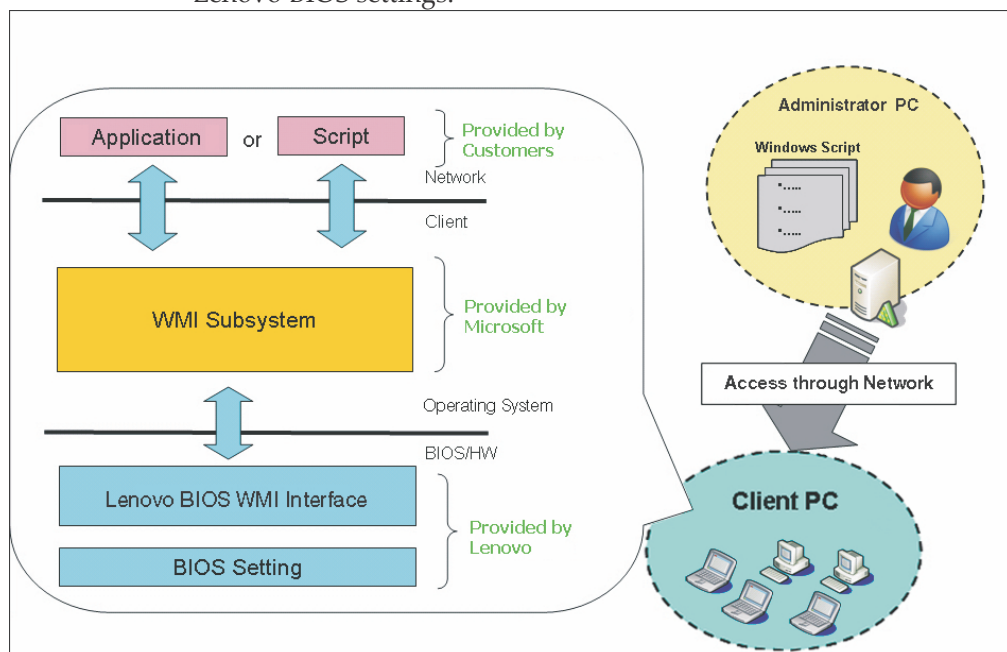
IT administrators are always looking for easier ways to manage client computer BIOS settings, which include hardware settings and boot order. The Lenovo BIOS WMI interface provides a simplified way to change these settings. Lenovo has developed a BIOS interface that can be manipulated through Windows Management Instrumentation (WMI). The Lenovo BIOS WMI interface enables IT administrators to make queries on current BIOS settings, restore settings to their factory defaults, change single settings, and modify the boot order either at client computers or remotely.

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### Using Windows Management Instrumentation

WMI is provided as a standard feature in most Windows® operating systems. It provides a powerful set of functions, such as query-based information retrieval and event notification, which enables users to manage both local and remote computers. The Lenovo BIOS WMI interface extends the capabilities of WMI to allow management of BIOS settings.

The following illustration shows how WMI can be used to access Lenovo BIOS settings.



WMI uses Windows Script Host (WSH) to interpret scripts. You can write your scripts in either Windows Visual Basic Scripting Edition (VBScript) or JavaScript.

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### Key benefits

The Lenovo BIOS WMI interface provides the following benefits:

## Function

- Flexible BIOS configuration, including the ability to change a single BIOS setting or all BIOS settings
- No dependency on a specific BIOS level

## Environment

- Remote or local capabilities
- Support of unattended operations
- No software installation, including managed object format (MOF), required
- Replaces DOS-based BIOS configuration tools

## Interface

- Easy to adopt for various management servers
  - Replaces current SMI interface
  - Common interface for different products
- 

## Supported computers

BIOS setup through WMI is supported on the following new Thinkcentre products only:

- Thinkcentre M58/M58p



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## Chapter 2. Script Classes and Parameter

This chapter contains WMI implementation details for configuring BIOS settings.

---

### Configuring BIOS settings

The following interface details can be used to access Lenovo BIOS settings.

- Namespace: "\root\WMI"
- Base Class: "Lenovo\_BIOSElement"
- Interface details (see [Table 1](#))

Table 1. Interface Details

Class Name	Type	Parameter / Return	Example
Lenovo_BiosSetting	Query	CurrentSetting: "Item,Value"	"Wake On LAN ,
Lenovo_SetBiosSetting	Method	"Item,Value,"	"Wake On LAN, Disabled,"
Lenovo_SaveBiosSettings	Method	"Password,Encoding,KbdLang,"	"pswd,ascii,us,"
Lenovo_DiscardBiosSettings	Method	","	","
Lenovo_LoadDefaultSettings	Method	","	","

#### Notes:

1. See [Appendix A, "Sample Visual Basic scripts for configuring BIOS settings,"](#) on page 11 for Visual Basic sample scripts.
2. See [Table 4 on page 4](#) for a listing of acceptable setting names.

---

### Return types

You will receive one of the following return types after making changes to BIOS settings:

Table 2. Return Types

Return Type	Description
Success	Operation completed successfully.
Not Supported	The feature is not supported on this system.
Invalid Parameter	The item or value provided is not valid.
Access Denied	The change could not be made due to an authentication problem. If a supervisor password exists, the correct supervisor password must be provided.

System Busy	BIOS changes have already been made that need to be committed. Reboot the system and try again
-------------	--

## Password Authentication

If an Administrator password is already set, you must specify that administrator password before you can change any BIOS settings.

The format for password parameters is "abc,ascii,us" with descriptions in [Table 3](#).

Table 3. Password parameters format, password authentication

Parameter	Description	Possible selections
Parameter 1	Current password	<ul style="list-style-type: none"> <li>• "abc" - raw ascii character</li> <li>• "1e302e" - scancode</li> </ul>
Parameter 2	Password encoding	<ul style="list-style-type: none"> <li>• "ascii"</li> <li>• "scancode"</li> </ul>
Parameter 3	Keyboard languages (valid only if encoding is "ascii")	<ul style="list-style-type: none"> <li>• "us" - English US, English, French-Canadian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Spanish-European, Spanish-Latin American, Swiss, Turkish</li> <li>• "fr" - French-European, Belgian</li> <li>• "gr" - German, Czech, Slovak, Slovenian</li> </ul>

## Available BIOS setting names

Some BIOS settings are dependent on the presence of certain hardware features. Settings might vary on different computers.

### Notes:

1. BIOS settings and values are case sensitive.
2. The security-related options are not changed even if the "load default" is requested.

Table 4. List of available BIOS settings

Item name	Selection name	Load
USB Support	"Disabled", "Enabled"	Y
USB Front PORTS	"Disabled", "Enabled"	Y
USB Rear PORTS	"Disabled", "Enabled"	Y
USB1	"Disabled", "Enabled"	Y
USB2	"Disabled", "Enabled"	Y
USB3	"Disabled", "Enabled"	Y
USB4	"Disabled", "Enabled"	Y
USB5	"Disabled", "Enabled"	Y
USB6	"Disabled", "Enabled"	Y

USB7	"Disabled","Enabled"	Y
USB8	"Disabled","Enabled"	Y
Select Active Video	"IGD","PEG","PCI","Auto"	Y
Pre-Allocated Memory Size	"32MB", "64MB", "128MB"	Y
Total Graphics Memory	"NULL", "128MB", "256MB", "MaxDVMT"	Y
PAVP Configuration	"Disabled","Enabled"	Y
External SATA Port	"Disabled","Enabled"	Y
Serial ATA	"Disabled","Enabled"	Y
Native Mode operation:	"Automatic", "Serial ATA"	Y
Enable RAID Support	"Disabled","Enabled"	Y
Enable AHCI Support	"Disabled","Enabled"	Y
Hard Disk Pre-Delay:	"Disabled", "3 Seconds", "6 Seconds", "12 Seconds", "15 Seconds", "21 Seconds", "30 Seconds"	Y
Audio Support	"Disabled","Enabled"	Y
Onboard GBE LAN	"Disabled","Enabled"	Y
Boot Agent	"Disable", "PXE", "SMC"	Y
Plug and Play Operating System	"No", "Yes"	Y
Legacy Free	"Disabled","Enabled"	Y
PCI Parity	"Disabled","Enabled"	Y
Core Multi-Processing	"Disabled","Enabled"	Y
Processor Power Management	"Disabled","GV1/GV3 Only", "C States Only", "Enabled"	Y
C State supported	"C1","C12","C123","C1234"	Y
Execute Disable Bit	"Enabled", "Disabled"	Y
MEBx Reset	"Disabled","Enabled"	Y
Press <CTRL-P> to enter MEBx	"Disabled","Enabled"	Y
Console Type	"VT100","VT100 8bit","PC-Ansi 7bit","PC ANSI","VT100+", "VT-UTF8","ASCII"	Y
Continue C.R. after POST	"Automatic", "Enabled", "Disabled"	Y
After Power Loss	"Stay Off", "Last State", "Power on"	Y
Hard Disk Timeout	"Disabled","Enabled"	Y
Wake on LAN	"Disabled", "Automatic", "Primary"	Y
PCI Modem Ring Detect	"Disabled", "Automatic", "Primary"	Y
Serial Port A Ring Detect	"Disabled", "Automatic", "Primary"	Y
PCI Wake Up	"Disabled", "Automatic", "Primary"	Y

Primary Startup Sequence	"UN_DEFINED","IDE_HDD","IDE_CD","USB_FDC","USB_HDD","USB_KEY","USB_CDROM","USB_LS120","PCI_BEV","PCI_SCSI","AHCI_HDD","AHCI_CD","Bootable Add-in Cards","Nothing Here",	Y
Automatic Startup Sequence	"UN_DEFINED","IDE_HDD","IDE_CD","USB_FDC","USB_HDD","USB_KEY","USB_CDROM","USB_LS120","PCI_BEV","PCI_SCSI","AHCI_HDD","AHCI_CD","Bootable Add-in Cards","Nothing Here",	Y
Error Startup Sequence	"UN_DEFINED","IDE_HDD","IDE_CD","USB_FDC","USB_HDD","USB_KEY","USB_CDROM","USB_LS120","PCI_BEV","PCI_SCSI","AHCI_HDD","AHCI_CD","Bootable Add-in Cards","Nothing Here",	Y
Manufacturing Startup Sequence	"UN_DEFINED","IDE_HDD","IDE_CD","USB_FDC","USB_HDD","USB_KEY","USB_CDROM","USB_LS120","PCI_BEV","PCI_SCSI","AHCI_HDD","AHCI_CD","Bootable Add-in Cards","Nothing Here",	Y

---

## Chapter 3. Typical Usage

Through WMI, you can configure BIOS settings in the following ways:

- List BIOS settings
- Change BIOS settings
- Change the boot order (sometimes referred to as the startup sequence)
- Load default BIOS settings

---

### Listing current BIOS settings

For a list of all available BIOS settings that can be changed through WMI on a specific computer, use the `Lenovo_BiosSetting` class (see “List all BIOS settings on the local computer” on page 12 and “List all BIOS settings on the remote computer” on page 14 for sample scripts).

See Table 4 on page 4 for a list of available BIOS settings.

---

### Changing BIOS settings

To change a BIOS setting, complete the following steps:

1. Identify the BIOS setting you want to change using the `Lenovo_BiosSetting` class (see “List all BIOS settings on the local computer” on page 12 and “List all BIOS settings on the remote computer” on page 14 for sample scripts).
2. Identify the value to which the setting will be changed.

**Note:** See Table 4 on page 4 for a list of available values for a particular setting.

3. Change the BIOS setting to the desired value using the `Lenovo_SetBiosSetting` class, then use the `Lenovo_SaveBiosSetting` class to save the settings (see “Set a single BIOS setting on the local computer” on page 12 and “Set a single BIOS setting on a remote computer” on page 14 for sample scripts).

**Note:** BIOS settings and values are case sensitive.

After making changes to the BIOS settings, you must reboot the computer before the changes will take effect.

---

### Changing the boot order

To change the boot order, complete the following steps:

1. Determine the current setting for “BootOrder” by using the

Lenovo\_BiosSetting class (see [“List all BIOS settings on the local computer” on page 12](#) and [“List all BIOS settings on the remote computer” on page 14](#) for sample scripts).

2. To set a new boot order, use the Lenovo\_SetBiosSetting class, then use the Lenovo\_SaveBiosSetting class to save the settings (see [“Set a single BIOS setting on the local computer” on page 12](#) and [“Set a single BIOS setting on a remote computer” on page 14](#) for sample scripts). Specify a new boot order by listing the boot devices in order, separated by colons. Devices that are not specified are excluded from the boot order. In the following example, the CD drive 0 is the first boot device and hard disk drive 0 is the second startup device.

```
AHCI_CD:AHCI_HDD
```

---

## Restoring default settings

To restore default BIOS settings, use the Lenovo\_LoadDefaultSettings class, and then use the Lenovo\_SaveBiosSettings class to save the BIOS changes (see sample scripts).

---

## Limitations

The following WMI limitations exist for BIOS setup:

- Password setting and changing are not supported .

---

## Chapter 4. Security

WMI-based administration scripts operating over a remote connection send data over the network in clear text by default. You can enhance security by modifying WMI-based administration scripts to establish an encrypted remote connection as follows:

1. Set an impersonation level of "impersonate"
2. Set an authentication level of "pktPrivacy"

See [Appendix A, "Sample Visual Basic scripts for configuring BIOS settings," on page 11](#) for sample scripts used to implement WMI-based administration scripts that include these parameters for encryption.





---

## Appendix A. Sample Visual Basic scripts for configuring BIOS settings

The Visual Basic command line scripts in the ZIP file are examples that you may find helpful when configuring BIOS settings.

The scripts in the ZIP file can be used as-is on Windows XP or Windows Vista to modify BIOS settings on your Lenovo computer. The scripts can be executed on a command prompt using the cscript.exe utility. On Windows Vista, you must run the scripts from an administrator command prompt.

**Note:** The scripts in this appendix are for reference only. To copy and paste scripts, use the scripts in the ZIP file.

---

## Restore default settings

Use the example scripts in the ZIP file as templates to restore default settings on the local computer.

**Syntax:** cscript.exe LoadDefaults.vbs

**Example:** cscript.exe LoadDefaults.vbs

```
,
' Load default BIOS settings
,
On Error Resume Next
Dim colItems

strComputer = "LOCALHOST" 'Change as needed
Set objWMIService = GetObject("WinMgmts:" _
&"{ImpersonationLevel=Impersonate}!\\" & strComputer _
&"\root\wmi")

Set colItems = objWMIService.ExecQuery("Select * from
Lenovo_LoadDefaultSettings")

strReturn = "error"
For Each objItem in colItems
    ObjItem.LoadDefaultSettings ",", strReturn
Next

WScript.Echo " LoadDefaultSettings: " + strReturn

If strReturn <> "Success" Then
    WScript.Quit
End If

Set colItems = objWMIService.ExecQuery("Select * from
Lenovo_SaveBiosSettings")

strReturn = "error"
For Each objItem in colItems
    ObjItem.SaveBiosSettings ",", strReturn
Next

WScript.Echo " SaveBiosSettings: " + strReturn
```

---

## List all BIOS settings on the local computer

Use the sample scripts in the ZIP file as templates to list all BIOS settings and values on the local computer.

**Syntax:** cscript.exe ListAll.vbs

**Example:** cscript.exe ListAll.vbs

```
,
' List all BIOS settings
,
On Error Resume Next
Dim collItems

strComputer = "LOCALHOST" ' Change as needed.
Set objWMIService = GetObject("WinMgmts:" _
&"{ImpersonationLevel=Impersonate}!\\" & strComputer _
&"\root\wmi")
Set collItems = objWMIService.ExecQuery("Select * from
Lenovo_BiosSetting")
For Each objItem in collItems
    If Len(objItem.CurrentSetting) > 0 Then
        Setting = ObjItem.CurrentSetting
        StrItem = Left(ObjItem.CurrentSetting, InStr(
            ObjItem.CurrentSetting, ",")-1)
        StrValue = Mid(ObjItem.CurrentSetting, InStr(
            ObjItem.CurrentSetting, ",")-1)
        WScript.Echo StrItem + " = " + StrValue
    End If
Next
```

---

## Set a single BIOS setting on the local computer

Use the sample scripts in the ZIP file as templates to set a single BIOS setting on the local computer.

**Syntax:** cscript.exe SetConfig.vbs [Item] [Value]

**Example:** cscript.exe SetConfig.vbs "Wake on LAN" Disabled

```
,
' Set specific BIOS Setting
,
On Error Resume Next
Dim collItems

If WScript.Arguments.Count <> 2 Then
    WScript.Echo "SetConfig.vbs [setting] [value]"
    WScript.Quit
End If
strRequest = WScript.Arguments(0) + "," + WScript.Arguments(1) +
","
strComputer = "LOCALHOST" ' Change as needed.
Set objWMIService = GetObject("WinMgmts:" _
&"{ImpersonationLevel=Impersonate}!\\" & strComputer _
&"\root\wmi")
Set collItems = objWMIService.ExecQuery("Select * from
Lenovo_SetBiosSetting")

For Each objItem in collItems
    ObjItem.SetBiosSetting strRequest, strReturn
Next

WScript.Echo strRequest
```

---

```

WScript.Echo "    SetBiosSetting: " + strReturn

If strReturn <> "Success" Then
    WScript.Quit
End If

Set collItems = objWMIService.ExecQuery("Select * from
Lenovo_SaveBiosSettings)

strReturn = "error"
For Each objItem in collItems
    ObjItem.SaveBiosSettings ",", strReturn
Next

WScript.Echo strRequest
WScript.Echo "    SaveBiosSettings: " + strReturn

```

---

## Set a single BIOS setting on the local computer if a Administration password exists

Use the sample scripts in the ZIP file as templates to set a single BIOS setting on the local computer if a supervisor password exists.

**Syntax:** cscript.exe SetConfigPassword.vbs [Item] [Value]  
[Password + Encoding]

**Example:** cscript.exe SetConfigPassword.vbs "Wake on LAN"  
Disabled pass,ascii,us

```

,
' Set specific BIOS Setting
,

On Error Resume Next
Dim collItems

If WScript.Arguments.Count <> 3 Then
    WScript.Echo "SetConfigPassword.vbs [setting] [value]
    [password + encoding]"
    WScript.Quit
End If

strRequest = WScript.Arguments(0) + "," + WScript.Arguments(1) +
","

strComputer = "LOCALHOST" ' Change as needed.
objWMIService = GetObject("WinMgmts:" _
&"{ImpersonationLevel=Impersonate}!\\" & strComputer _
&"root\wmi")
Set collItems = objWMIService.ExecQuery("Select * from
Lenovo_SetBiosSetting")

For Each objItem in collItems
    ObjItem.SetBiosSetting strRequest, strReturn
Next

WScript.Echo strRequest
WScript.Echo "    SetBiosSetting: " + strReturn

If strReturn <> "Success" Then
    WScript.Quit

```

```

End If

Set collItems = objWMIService.ExecQuery("Select * from
Lenovo_SaveBiosSettings")

strReturn = "error"
For Each objItem in collItems
    ObjItem.SaveBiosSettings WScript.Arguments(2) + ",",
strReturn
Next

WScript.Echo strRequest
WScript.Echo "    SaveBiosSettings: " + strReturn

```

---

## List all BIOS settings on the remote computer

Use the sample scripts in the ZIP file as templates to list all BIOS settings and values on a remote computer.

**Syntax:** cscript.exe ListAllRemote.vbs [Hostname]

**Example:** cscript.exe ListAllRemote.vbs mattdev-c5

```

'
' List all BIOS settings
'
On Error Resume Next
Dim collItems

If WScript.Arguments.Count <> 1 Then
    WScript.Echo "ListAllRemote.vbs [hostname]"
    WScript.Quit
End If

strComputer = WScript.Arguments(0)

Set objWMIService = GetObject("WinMgmts:" _
& "{ImpersonationLevel=Impersonate," _
& "authenticationLevel=pktPrivacy}!\\" _
& strComputer & "\root\wmi")
Set collItems = objWMIService.ExecQuery("Select * from
Lenovo_BiosSetting")
For Each objItem in collItems
    If Len(objItem.CurrentSetting) > 0 Then
        Setting = ObjItem.CurrentSetting
        StrItem = Left(ObjItem.CurrentSetting, InStr(
ObjItem.CurrentSetting, ",")-1)
        StrValue = Mid(ObjItem.CurrentSetting, InStr(
ObjItem.CurrentSetting, ",")+1, 256)
        WScript.Echo StrItem + " = " + StrValue
    End If
Next

```

---

## Set a single BIOS setting on a remote computer

Use the sample scripts in the ZIP file as templates to set a single BIOS setting on a remote computer.

**Syntax:** cscript.exe SetConfigRemote.vbs [Item] [Value]  
[Hostname]

---

**Example:** cscript.exe SetConfigRemote.vbs "Wake on LAN" Disabled  
mattdev-c5

```
,
' Set specific BIOS Setting
,

On Error Resume Next
Dim colItems
If WScript.Arguments.Count <> 3 Then
WScript.Echo "SetConfigRemote.vbs [setting] [value] [hostname]"
WScript.Quit
End If

strRequest = WScript.Arguments(0) + "," + WScript.Arguments(1) +
","
strComputer = WScript.Arguments(2)
Set objWMIService = GetObject("WinMgmts:" _
&"{ImpersonationLevel=Impersonate," _
&"authenticationLevel=pktPrivacy}!\\" _
& strComputer & "\root\wmi")

Set colItems = objWMIService.ExecQuery("Select * from
Lenovo_SetBiosSetting")
For Each objItem in colItems
ObjItem.SetBiosSetting strRequest, strReturn
Next

WScript.Echo strRequest
WScript.Echo " SetBiosSetting: " + strReturn

If strReturn <> "Success" Then
WScript.Quit
End If
Set colItems = objWMIService.ExecQuery("Select * from
Lenovo_SaveBiosSettings")

strReturn = "error"
For Each objItem in colItems
ObjItem.SaveBiosSettings ",", strReturn
Next

WScript.Echo strRequest
WScript.Echo " SaveBiosSettings: " + strReturn
```

---

## Set a single BIOS setting on a remote computer when a Administrator password exists

Use the sample scripts in the ZIP file as templates to set a single BIOS setting on a remote computer when a supervisor password exists.

**Syntax:** cscript.exe SetConfigPasswordRemote.vbs  
[Item] [Value] [Password + Encoding] [Hostname]

**Example:** cscript.exe

SetConfigPasswordRemote.vbs "Wake on LAN"

Disabled pass,ascii,us mattdev-c5

```
,
' Set specific BIOS Setting
```

```

,
On Error Resume Next
Dim collItems

If WScript.Arguments.Count <> 4 Then
    WScript.Echo "SetConfigPasswordRemote.vbs [setting] [value] [password + encoding] [hostname]"
    WScript.Quit
End If

strRequest = WScript.Arguments(0) + "," + WScript.Arguments(1) +
","

strComputer = WScript.Arguments(3)

Set objWMIService = GetObject("WinMgmts:" _
&"{ImpersonationLevel=Impersonate," _
&"authenticationLevel=pktPrivacy}!\\" _
& strComputer & "\root\wmi")
Set collItems = objWMIService.ExecQuery("Select * from
Lenovo_SetBiosSetting")
For Each objItem in collItems
    ObjItem.SetBiosSetting strRequest, strReturn
Next

WScript.Echo strRequest
WScript.Echo " SetBiosSetting: " + strReturn

If strReturn <> "Success" Then
    WScript.Quit
End If

Set collItems = objWMIService.ExecQuery("Select * from
Lenovo_SaveBiosSettings")

strReturn = "error"
For Each objItem in collItems
    ObjItem.SaveBiosSettings WScript.Arguments(2)+",", strReturn
Next

WScript.Echo strRequest
WScript.Echo " SaveBiosSettings: " + strReturn

```

---

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