

Customizing SMBIOS Table via OEM Identity Module

Capabilities and use cases of OEM Identity Module feature to customize SMBIOS Table on Dell EMC PowerEdge Servers

Abstract

This white paper describes the capabilities of the Dell PowerEdge SMBIOS Customization tool.

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Revisions

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Executive summary

System Management BIOS (SMBIOS) provides management information about a product in a standard format defined by Distributed Management Task Force ([DMTF](#)). A reseller of Dell PowerEdge servers (referred to as “OEM customer” for the rest of this white paper) often requires the information in SMBIOS table to be customized for their solution needs.

[Dell OEM solutions](#) has limited support for SMBIOS customization via Identity Module (ID Module) which changes only the manufacturer and product name of the Dell PowerEdge server. Some OEM customers want to customize additional SMBIOS strings programmatically. This whitepaper describes a Dell proprietary tool to facilitate this customization.

Introduction

SMBIOS table is a data structure in system memory which provides management information provided by the system manufacturer/vendor.

OEM customers sometimes require customizing the SMBIOS fields in Type 1 (System Information), Type 2 (Baseboard or Module Information), Type 3 (System Enclosure or Chassis), and optionally Type 80 (OEM Strings).

The SMBIOS strings customization capability is a Premium tier feature of Dell Identity Module (ID Module) and requires a Dell OEM project request to create and deliver. Visit www.dellyourid.com for more details on how to create and submit an ID Module project.

Upon completion of the ID Module project, Dell will provide the tool to customization SMBIOS strings on the system along with the ID Module to be installed. The tool is an UEFI shell application.

CUSTOMIZABLE SMBIOS STRINGS

- System Information (Type 1)
 - Manufacturer (Offset 4)
 - Product Name (Offset 5)¹
 - Version (Offset 6)
 - SKU Number (Offset 25)
 - Family (Offset 26)
- Baseboard (or Module) Information (Type 2)²
 - Manufacturer (Offset 4)
 - Product Name (Offset 5)
 - Version (Offset 6)
 - Asset Tag (Offset 8)³
- System Enclosure or Chassis (Type 3)
 - Manufacturer (Offset 4)
 - Version (Offset 6)
 - Asset Tag (Offset 8)
- OEM Strings (Type 11)⁴
 - Up to 20 new custom string fields.
 - The format of the custom string field will be “<tag_number>[<string>]”, with <tag_number> ranging from 80 to 99.
 - For example, if adding “Acme Brick Company” with tag number 80 and “1-888-888-8888” with tag number 91, SMBIOS Type 11 structure will have the strings:
 - 80[Acme Brick Company]
 - 91[1-888-888-8888]

¹ Applied to SMBIOS table only and does not change the Product Name passed to iDRAC.

² Modular PowerEdge servers may have more than 1 SMBIOS Type 2 structures. Only the strings in the first Type 2 structure is supported.

³ May not exist in monolithic PowerEdge servers. This tool cannot customize non-existing fields except Type 11 strings.

⁴ Defined by Dell.

Identity Module Project

Identity Module (ID Module) is an iDRAC capability that enables customization of various aspects of PowerEdge servers such as branding (logos and some SMBIOS strings), Microsoft OS activation, BIOS and iDRAC custom default settings and other advanced customization as required by an OEM configuration. The www.dellyourid.com website describes these features and enables an OEM customer to configure the Express and Professional tier customizations by using a web browser.

The SMBIOS strings customization feature is a Premium tier option in the ID Module. Initially, an ID Module project in the Professional tier is required to be submitted. The OEM Customer can configure this IDM Module to submit all other branding and default settings in addition to SMBIOS tool-based customization. Dell will then convert the ID Module project to be of Premium Tier and enable SMBIOS customization.

To enable the SMBIOS strings customization feature, a pass phrase must be provided to Dell, to integrate into the Premium ID Module that is built for this solution. The runtime UEFI application that customizes the SMBIOS strings must provide the matching pass phrase so it can be verified during the actual customization. The length of the pass phrase is 1-80 characters. Dell recommends 3 words or more for the passphrase.

DELIVERABLES FROM DELL

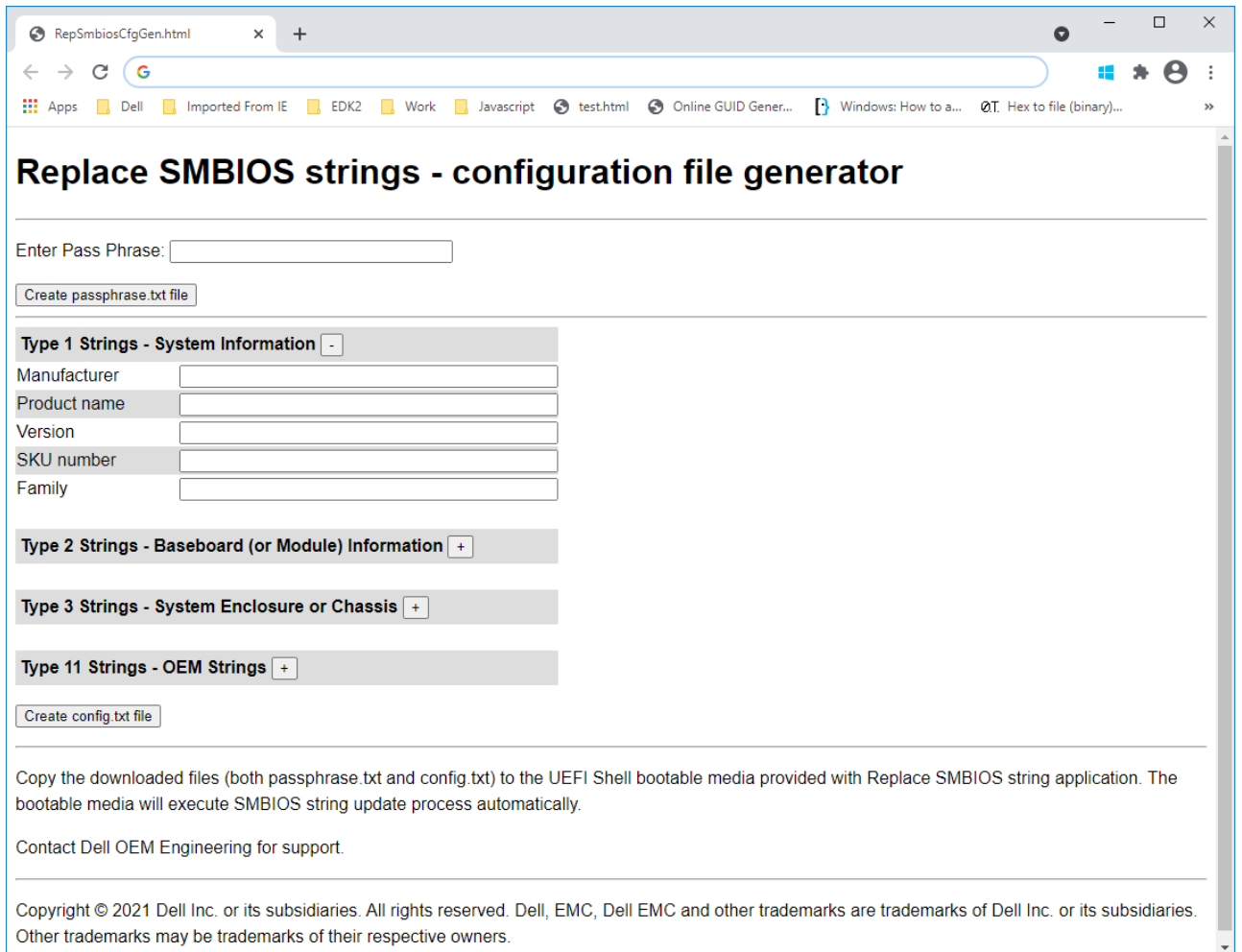
The following files are provided by Dell upon successful completion of the ID Module project at www.dellyourid.com

- Premium Tier ID Module
- RepSmbiosPackage.zip – contains the following files
 - ReplaceSmbiosString.efi – UEFI shell application to customize SMBIOS strings
 - delloem_sm.nsh – UEFI shell script to run ReplaceSmbiosString.efi
 - startup.nsh – UEFI shell start up script which runs automatically upon booting to UEFI shell
- RepSmbiosCfgGen.html – An optional helper HTML file takes user inputs to generates the configuration files needed for ReplaceSmbiosString.efi to run

Configuration Files Generation

Open the **RepSmbiosCfgGen.html** file provided to generate **passphrase.txt** and **config.txt** files. This is an HTML file that can be opened using a standard browser. Entering the same pass phrase that was provided during the submission of the ID Module project.

Then enter desired SMBIOS strings to be customized. Any value left blank will be unchanged. Any SMBIOS field not listed in this HTML is not supported for customization.



The screenshot shows a web browser window with the title "RepSmbiosCfgGen.html". The page content is titled "Replace SMBIOS strings - configuration file generator". It features a form with the following elements:

- An input field labeled "Enter Pass Phrase:" followed by a "Create passphrase.txt file" button.
- A section titled "Type 1 Strings - System Information" with a minus sign, containing input fields for "Manufacturer", "Product name", "Version", "SKU number", and "Family".
- A section titled "Type 2 Strings - Baseboard (or Module) Information" with a plus sign.
- A section titled "Type 3 Strings - System Enclosure or Chassis" with a plus sign.
- A section titled "Type 11 Strings - OEM Strings" with a plus sign.
- A "Create config.txt file" button.
- Instructions: "Copy the downloaded files (both passphrase.txt and config.txt) to the UEFI Shell bootable media provided with Replace SMBIOS string application. The bootable media will execute SMBIOS string update process automatically."
- Contact information: "Contact Dell OEM Engineering for support."
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Figure 1 Running RepSmbiosCfgGen.html

The generated files are:

- **passphrase.txt** – contains the same pass phrase used in the ID Module.
- **config.txt** – contains the custom SMBIOS strings to be applied.

Save these files in a suitable location for the next step.

Bootable Target Preparation

The next step is to prepare a UEFI Shell bootable media to execute the SMBIOS customization tool on the target system.

Note: If you already have a UEFI bootable target (either local or network-based) then skip the steps to prepare a suitable USB drive.

To create a bootable USB drive as a 1 to 1 bootable target.

- 1) Prepare a USB memory drive formatted in FAT32.
- 2) Create a folder on the USB memory drive: **lefi\boot**
- 3) Download ShellBinPkg.zip from: <https://github.com/tianocore/edk2/releases/download/edk2-stable202002/ShellBinPkg.zip>
- 4) Unzip **ShellBinPkg.zip**, go to **UefiShell\X64** folder, and find **Shell.efi** file. This is the UEFI shell boot file.
- 5) Rename **Shell.efi** file to **BootX64.efi** and copy it to the USB memory drive under **lefi\boot** folder.

Copy SMBIOS Customization Files

- 6) Copy **passphrase.txt** and **config.txt** files generated earlier to the root of the USB memory drive or the UEFI bootable target.
- 7) Unzip the **RepSmbiosPackage.zip** file (Unzip password: **delloem**) to the root of the USB memory drive or the UEFI bootable target.

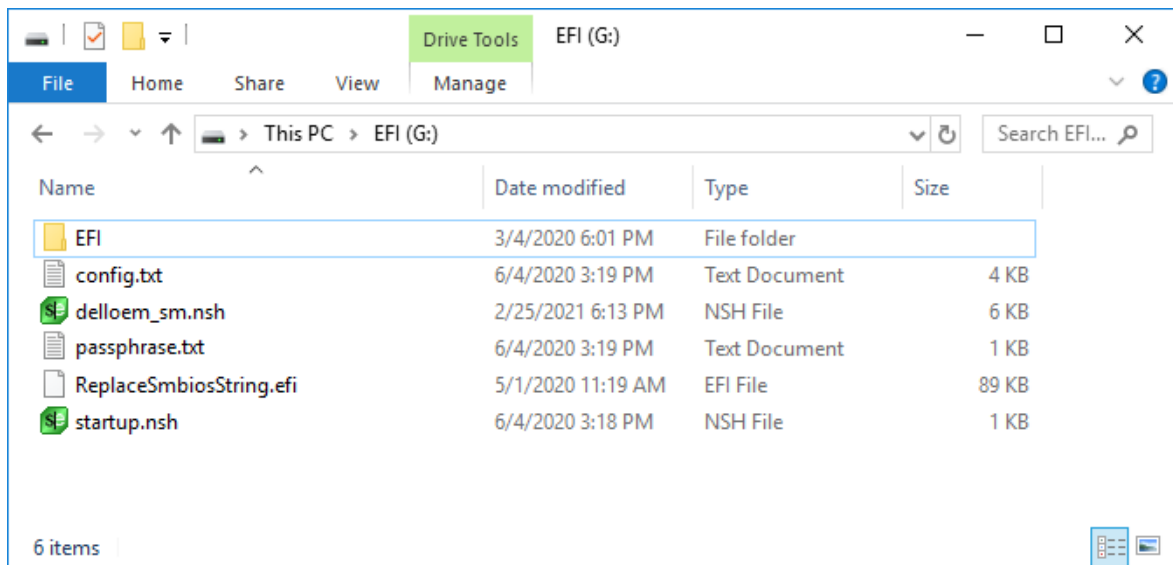


Figure 2 USB memory drive after extracting RepSmbiosPackage.zip file

Customizing SMBIOS Strings on Target System

- 1) Install ID Module which enabled SMBIOS string customization feature with the correct pass phrase. On the target system to be configured.
- 2) Configure the target system's BIOS settings with:
 - Boot Mode: **UEFI**
 - Secure Boot: **Disabled**
- 1) Power on the target system and press F11 hot key to enter **Boot Manager**.
- 2) From **One-shot UEFI Boot Menu**, select the USB memory drive or UEFI bootable target prepared for this SMBIOS customization. Upon booting to this target, the SMBIOS strings customization process would start automatically as below.

```

BLK2: Alias(s) :
      PciRoot (0x5) /Pci (0x4,0x0) /Pci (0x0,0x0) /Ctrl (0x0) /Scsi (0x0,0x0)
BLK3: Alias(s) :
      PciRoot (0x5) /Pci (0x4,0x0) /Pci (0x0,0x0) /Ctrl (0x0) /Scsi (0x0,0x0) /HD (1,6P
T,92A30BCE-B7F1-476D-BB0B-AA2A4AEE0829,0x800,0xF9800)
BLK5: Alias(s) :
      PciRoot (0x5) /Pci (0x4,0x0) /Pci (0x0,0x0) /Ctrl (0x0) /Scsi (0x0,0x0) /HD (3,6P
T,AAC10512-2AFC-4739-914E-4CAF0A60059E,0x12C000,0x8000)
BLK6: Alias(s) :
      PciRoot (0x5) /Pci (0x4,0x0) /Pci (0x0,0x0) /Ctrl (0x0) /Scsi (0x0,0x0) /HD (4,6P
T,98F9DCDD-E2B1-4E21-AC84-7D8C6ACDCCBF,0x134000,0x45BB800)
Press ESC in 1 seconds to skip startup.nsh or any other key to continue.
Updating SMBIOS strings with config.txt file content...
Deleted: 1 4
Deleted: 1 5
Deleted: 2 4
Deleted: 3 8
Deleted: 11 85
Set: 1 4 Acme
Set: 1 5 PowerServer
Set: 2 4 Acme
Set: 3 8 123456
Set: 11 85 OEM engineering!
SMBIOS string update successful. Resetting the system in 5 seconds...
-

```

Figure 3 Booting from UEFI Shell Media and Customizing SMBIOS Strings

- 3) Upon successful execution, the system will reset to customize the SMBIOS table. The customized SMBIOS strings can be verified via SMBIOS table read utility such as dmidecode (Linux), smbiosview (UEFI Shell), etc.
- 4) If any error happens during the SMBIOS customization process, an error message will be displayed.

```

FS0:\> startup.nsh
Updating SMBIOS strings per config.txt file...
ERROR: Invalid passphrase in passphrase.txt file.
Please check passphrase.txt files has the same passphrase as the ID module insta
lled.
ERROR: Unable to clean up SMBIOS strings.

Please consult with the instructions for updating SMBIOS table strings.
FS0:\> _

```

Figure 4 Error situation

SMBIOS Customization for Unique or Serial Indexing

The instructions in the previous sections help the user customize the system's SMBIOS in a "one-to-many" method. That means, the values were chosen during creation of the config.txt file are statically used for all systems for which this is

Some customers will require that the SMBIOS customization be unique per system. Examples include unique SKUs or tags per system or incrementing serial numbers for systems as they get configure. To accomplish this, the config.txt file would have to be edited and updated on a per system basis. OEM Strings (Type 11) is most suited for third party specific information whether one-to-many or unique per system. OEM Customers can define their specific locations for custom data and configure conig.txt to assign values to those locations.

Conclusion

Dell EMC provides its customers with products that simplify and streamline their IT processes, freeing administrator's time to focus on activities that help grow the business. The SMBIOS Customization tool is targeted at OEM customers who want to have deeper customization ability in their SMBIOS tables. This white paper is relevant to those interested in how this feature works and can be leveraged and deployed in a system integrator or customer environment. It also describes how this feature can be used to create a solution where SMBIOS tables of Dell PowerEdge servers can be customized on an individual basis so that these servers can have additional serial numbers for field indexing purposes.

A Technical support and resources

- [Dell.com/support](https://www.dell.com/support) is focused on meeting customer needs with proven services and support.
- [Dell TechCenter](https://www.dell.com/techcenter) is an online technical community where IT professionals have access to numerous resources for Dell EMC software, hardware and services.