USB Feature Specification:Version Descriptor

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1. Introduction

The following feature specification describes a standard format for identifying the CCS feature support required by a device and the revision level of those features. The standardized format allows easy identification by the CCS of the specific feature support required by a device

1.1 Purpose

The purpose of this document is to provide a common specification for reporting CCS feature requirements, version information and feature specific flags.

1.2 Scope

This document fully describes the Common Class Version Descriptor extension for USB Devices. It describes:

- The format of the CCS Version Descriptor.
- Rules for positioning the CCS Version Descriptor in the set of descriptors returned by the GetDescriptor(Configuration) request.
- The Descriptor Type code used to identify the CCS Version Descriptor.

1.3 Related Documents

USB Specification, Version 1.1, available at http://www.usb.org.

USB Common Class Specification, *Version 1.0*, available at http://www.usb.org.

2. Management Overview

The USB Common Class supports the development of independent Features to augment the core USB functionality. The following requirements have been identified:

- The host must be able to identify whether a device needs CCS Feature support.
- The host must be able to identify the specific features supported by a device.
- The host must ensure that there is version compatibility between the device and the system drivers.

The existence of the CCS Version Descriptor in a configuration indicates to the host that the device requires CCS feature support. The Version Descriptor lists the specific CCS features requirements of a device.

For each CCS feature required by a device the CCS Version Descriptor identifies the version of the feature that a device has been implemented to and provides some auxiliary static flags for that feature. The host can scan the Feature list declared in the Version Descriptor and determine whether it is capable of supporting the device’s requirements.

The USB Common Class allows Features to be added as new functionality is identified.

3. Functional Characteristics

The intent of this document is to define features that are available to any device implementation, regardless of the functionality provided by the device. In addition, the ability to use these features is dependent upon specific support in the host system. This creates specific concerns about backward and forward compatibility for both device and host implementations.

From the host's perspective, if a device is detected that indicates that it requires CCS features not implemented on the host, the host will not be able to use the device unless configurations are available that do not use these CCS features. For the greatest interoperability, a device should consider providing a configuration that does not require CCS features, allowing a host that does not support the full set of CCS features to gracefully degrade to a simpler configuration.

It is recommended that when a system software vendor develops a CCS support that they would implement all CCS Features approved to date.

3.1 Requirements

In order to use CCS the support must exist on both the Host and Device.

The CCS driver must be able to identify the CCS feature set and the versions of those features required by the device.

3.2 Specification

The host will bind the USB system software to the CCS interface at device enumeration time. The CCS driver will recognize the CCS Feature support required by the device and invoke the appropriate CCS Feature handlers.

The specification for CCS Versioning includes the following:

- A method of identifying that a device requires CCS support.
- A method of identifying the specific Features required by a device.
- A method of identifying the version of a specific Feature required by a device.

Each of these areas is discussed in more detail below.

4. Operational Model

4.1 Managing CCS Devices

This section provides an overview of the Common Class Versioning mechanism, the definition of the format for CCS Version Descriptor and the CCS Feature Version Information Record.

In response to a GetDescriptor(CONFIGURATION) request, a device that requires the CCS support will return a CCS Interface Descriptor followed by a CCS Version Descriptor. The CCS Version descriptor will follow the Interface descriptor but precede any Logical-Device or other CCS related descriptors.

The CCS Interface descriptor will define a CCS class code as defined by the USB-IF.

The CCS Version descriptor will define a Descriptor ID of 0x01 to identify itself.

The CCS Version descriptor will identify all Features that the device may use in a particular configuration.

When a system software vendor develops a CCS driver they will typically implement the latest versions of all the Features that have been approved to date.

4.2 Feature Set Identification

The USB Common Class allows Features to be added as new functionality is identified. At any point in time, the latest “version” of CCS is actually comprised of the latest revisions of currently approved set of CCS Features as well as the core CCS Document. A device identifies the CCS Features that it requires in the CCS Version descriptor. The CCS Version Descriptor declares the core CCS Revision code as well as the ID and version of each Feature that the device intends to use.

Each CCS Feature Specification lists any other CCS Features and the revisions that are required for its proper operation.

5. Descriptors

To invoke the Common Class support a CCS Interface Descriptor and a CCS Version Descriptor must be declared.

The CCS Interface Descriptor is a standard USB interface descriptor with a CCS class code assigned. For more information see the CCS Feature Specification for Logical-Devices.

A CCS Version Descriptor consists of a fixed, 4-byte header followed by a variable number of Version Information Records. The number of Version Information Records depends on the numbers of CCS features that are used by the configuration.

5.1 Version Information Record

The Version Information Record is a set of fields that is declared for each CCS Feature that a device will require. For instance, if a device supports Dynamic Logical-Devices then it will declare three Version Information Records, one for the CCS Logical-Device Feature, one for the Dynamic Logical-Device Feature, and a third for the CCS Notification Feature.

Offset	Field	Size	Value	Description
0	*bFeatureID*	1	Class	Common Class ID (assigned by USB CCS Committee).
1	*bmFeatureFlags*	1	Bitmap	Feature specific flags.
2	*bcdFeatureVersion*	2	BCD	A BCD Value that encodes the revision of the CCS Feature as 4 BCD digits where the decimal point is between the 2nd and 3rd digits.

Figure 5-1: CCS Version Info Record

The *bFeatureID* for a specific feature is defined in the respective feature specification.

The Feature ID (*bFeatureID*) 0x00 is reserved and cannot be used by any feature.

The contents of the *bmFeatureFlags* field are specific to a feature and defined by the respective feature specification.

Changes to the major version number (e.g. 1.1 to 2.0) denote incompatible changes. Changes to the minor version number (e.g. 1.1 to 1.2) denote upward compatible changes. System software not recognizing the major version number should not attempt to use this CCS feature.

5.2 CCS Version Descriptor

If declared, a CCS Version Descriptor follows the CCS INTERFACE descriptor. Only one CCS Version Descriptor is declared per configuration.

Offset	Field	Size	Value	Description
0	*bLength*	1	Number	Size of this descriptor in bytes
1	*bDescriptorType*	1	Constant	CCS VERSION Descriptor Type = 0x01
2	*bcdCCSVersion*	2	BCD	A BCD Value that encodes the revision of the main CCS specification as 4 BCD digits where the decimal point is between the 2nd and 3rd digits.
4	*Version Info Record [0]*	4	Version Info Record	One or more CCS Version Info Records
		…		
4+4n	*Version Info Record [n]*	4	Version Info Record	One or more CCS Version Info Records

Figure 5-2: CCS Version Descriptor

The CCS Version code (*bcdCCSVersion*) is included in the header to allow more fields to be added to the header or the format of the Version Information record to change in the future. Changes to the major version number (e.g. 1.1 to 2.0) denote incompatible changes. Changes to the minor version number (e.g. 1.1 to 1.2) denote upward compatible changes. System software not recognizing the major version number should not attempt to use CCS features.

5.3 Rules for Placing CCS Version Descriptors

Device developers must place version descriptors using the following rules.

- A CCS version descriptor (CVD) applies to one or more CCS Logical-Device, CCS Feature and endpoint descriptors that follow it.
- Place a CVD so that it immediately follows the CCS interface descriptor. All other CCS related descriptors and endpoint descriptors will follow the CVD.