Errata for "Universal Serial Bus CDC Subclass Specification for Wireless Mobile Communications Devices Revision 1.1 February 9, 2007" as of November 3, 2010

Issue A.

Related to: 1.2 Scope

Issue: NCM are missing in the list of subclasses

Resolution: Add NCM

This document specifies new device subclasses intended for use with Wireless Mobile Communications devices, based on [USBCDC1.2], [USBPSTN1.2], [USBECM1.2] and [USBNCM1.0]

Deleted: and [USBECM1.2]

Issue B.

Related to: 1.3 related documents

Issue: NCM is missing in list of related documents.

Resolution: Correction as follows.

Reference	Description
[3GPP27.007]	AT command set for User Equipment (UE), 3rd Generation Partnership Project; Technical Specification Group Terminals, Document 27.007,Version 3.9.0 (June 2001). Available on-line at http://www.3gpp.org/ftp/Specs/2001-06/R1999/27_series/27007-390.zip.
[Bluetooth Reserved Numbers]	The reserved numbers section of official Bluetooth website **www.bluetooth.org**.
[C-S0017-0]	3GPP2 TSG.C Specification C-S0017-0. Specifies AT command sets to be used for cmda2000 mobile terminals. Available on-line from http://www.3gpp2.org/public_html/specs/tsgc.cfm .
[GSM07.07]	ETSI GTS GSM 07.07 V5.0.0 (1996-07) Digital cellular telecommunications system (Phase 2+); AT command set for GSM Mobile Equipment (ME) (GSM 07.07), ETSI. Available on-line at http://www.etsi.org/.
[INTTD]	*USB Telephony Devices: Interfaces for Value-Add Feature Set,* Version 1.00, June 19,2000, Intel Corporation.
[LEACH1998]	*UUIDs and GUIDs,* Paul J. Leach et al, IETF draft draft-leach-uuids-guids-01.txt., February 4, 1998.
[MICBUS]	*Guidelines for Bus and Device Specifications* , Version 1.0a, March 29, 2000, Microsoft Corporation. This specification is available online from Microsoft, http://www.microsoft.com/whdc/archive/specguide.mspx
[MICMFD]	*Designing Multifunction Devices for Windows Operating Systems*, Version 1.0, April 25, 2000, Microsoft Corporation. This specification is available online from Microsoft, http://www.microsoft.com/whdc/device/mf/mfdesin.mspx.
[OBEX1.2]	*IrDA Object Exchange Protocol IrOBEX*, V1.3. This specification is available online from the website **http://www.irda.org**.
[OPENC309]	DCE: Remote Procedure Call, Open Group CAE Specification C309 ISBN 1-85912-041-5 28cm. 674p. pbk. 1,655g. 8/94
[PCCA101]	PCCA STD-101, Data Transmission Systems and Equipment - Serial Asynchronous Automatic Dialing and Control for Character Mode DCE on Wireless Data Services, Portable Computer and Communications Association. Available on-line at http://www.pcca.org/standards.1 Annexes to this document are:

[PCCA101-A]	common commands, in main document (== TIA/EIA-678 Annex A)
[PCCA101-D]	*Pad Control*, http://www.pcca.org/standards/Annex_d.doc, (== TIA/EIA-678 Annex D)
[PCCA101-F]	*Commands for wireless networks*, http://www.pcca.org/standards/Annex_f.doc (== TIA/EIA-678 Annex B)
[PCCA101-I]	*Commands for Analog Cell Phones*, http://www.pcca.org/standards/Annex_i.doc (== TIA/EIA-678 Annex C)
[PCCA101-L]	*Commands for CDPD modems*, http://www.pcca.org/standards/Annexl20.PDF (not in TIA/EIA-678)
[PCCA101-O]	*Commands for Wakeup control*, http://www.pcca.org/standards/Annex_o_ballot_version.doc (not in TIA/EIA-678)
[USB2.0]	*Universal Serial Bus Specification*, revision 2.0 (also referred to as the *USB Specification*). This specification is available on the World Wide Web site **http://www.usb.org**.
[USBAUD1.0]	*Universal Serial Bus Device Class Definition for Audio Devices,* Release 1.0. This specification is available on the World Wide Web site **http://www.usb.org**.
[USBCDC1.2]	*Universal Serial Bus Class Definitions for Communications Devices*, Version 1.2. This specification is available on the World Wide Web site **http://www.usb.org**.
[USBDFU1.0]	*Universal Serial Bus Device Class Specification for Device Firmware Upgrade,* Release 1.0. This specification is available on the World Wide Web site **http://www.usb.org**.
[USBHID1.1]	*Universal Serial Bus Device Class Definition for Human Interface Devices,* Version 1.1. This specification is available on the World Wide Web site **http://www.usb.org**.
[USBECM1.2]	Universal Serial Bus USB CDC Subclass Specification for Ethernet Control Model Devices, Release 1.2. This specification is available on the World Wide Web site **http://www.usb.org**.
[USBMASS1.1]	*Universal Serial Bus Mass Storage Class Specification Overview,* Release 1.1. This specification is available on the World Wide Web site **http://www.usb.org**.
[USBPSTN1.2]	Universal Serial Bus USB CDC Subclass Specification for PSTN Devices, Release 1.2. This specification is available on the World Wide Web site **http://www.usb.org**.
[USBNCM1.0]	Universal Serial Bus Communications Class Subclass Specifications for Network Control Model Devices, Release 1.0. This specification is available on the World Wide Web site **http://www.usb.org**.

Issue C.

Related to: Table 2-1 Sample Function Representation

Issue: Missing NCM in sample functions.

Resolution: Correction as follows.

Table 2-1: Sample Function Representation

Function	Representation	Endpoints
voice (AT-command call control)	Telephone Control Model (TCM) with AT commands (02-03-*pp*) + Audio	Interrupt IN + audio stream ISO OUT + audio stream ISO IN
voice (AT-command call control, plus ability to use handset's keypad in host, and to use handset's speaker and microphone as host peripherals)	Telephone Control Model (TCM) with AT commands (02-03-*pp*) + Audio + HID	TCM Interrupt IN + audio stream ISO OUT (to network) + audio stream ISO IN (from network) + audio stream ISO OUT (to headset earpiece) + audio stream ISO IN (from headset microphone + HID Interrupt IN
fax/modem	ACM (02-02-*pp*) + Data	Interrupt IN + Data Class Bulk OUT & Bulk IN
OBEX	OBEX (02-0Bh0B-00), + Data	Data Class Bulk OUT & Bulk IN

	Class	
Ethernet Frame (fixed service)	CDC Ethernet Networking Control Model (ECM) (02-06-00) + Data	Interrupt IN + Data Class Bulk OUT & Bulk IN
Device Management	Device Management (02-09h09-*pp*)	Interrupt IN
Network Control Model	NCM (02-0D-pp)	Interrupt IN + Data Class Bulk OUT & Bulk IN

Issue D.

Related to: 4.1 Device Organization

Issue: Lan should also describe NCM.

Resolution: Correction as follows.

LAN: a Communications Class interface (with subclass "Ethernet Networking Control Model" or "Networking Control Model") and a Data Class interface, connected by a Union Functional descriptor that follows the Communications Class interface. Described in [USBECM1.2] and [USBNCM1.0], with additional details as given in section 6.4 and 6.8 of this document.

Issue E.

Related to: 4.3 Function Models

Issue: Lan should also describe NCM.

Resolution: Correction as follows.

This document extends or reuses CDC based control models defined by [USBPSTN1.2], [USBECM1.2] and [USBNCM1.0] for specific kinds of WMC functions:

> All models are extended to allow additional protocols for the control plane.

> Telephone Control Model (TCM) is extended to allow use of AT commands for call control. The optional notification endpoint is mandatory in this specification.

> Abstract Control Model (ACM) is used for data/fax purposes. The optional notification endpoint is mandatory in this specification.

> Ethernet Networking Control Model or Networking Control Model is used for LAN frame exchange. The optional notification endpoint is mandatory in this specification.

Deleted: and [USBECM1.2]

Issue F.

Related to: 6.8 Lan Frame Functions using NCM

Issue: Lan should also describe NCM.

Resolution: Correction as follows.

6.8 LAN Frame Functions

6.8.1 Functional Topology

A LAN frame traffic facility is consists of:

1. A Communications Class/Networking Control Model interface with a notification endpoint.

2. A Data Class interface with two endpoints, one BULK IN, the other BULK OUT.

This is just as defined for a single-function Ethernet adapter in [USBNCM1.0]. However, the notification endpoint is required.

6.8.2 Descriptors

6.8.2.1 Networking Control Model Interface Descriptor

One interface descriptor with bInterfaceClass == COMM, bInterfaceSubClass == Networking Control Model, and bInterfaceProtocol == 00h or FEh shall be embedded in the configuration bundle for each data/fax.

Table 6-42: Communications Class Networking Control Model Interface Descriptor

Offset	Field	Size	Value	Description
5	bInterfaceClass	1	Constant (02)	Communications Class
6	bInterfaceSubClass	1	Constant (0D)	Networking Control Model, as defined in [USBNCM1.0].
7	bInterfaceProtocol	1	00h or FEh	No specific protocol or external protocol

6.8.2.2 Communications Class Header Functional Descriptor

This is as described in [USBCDC1.2].

This descriptor is mandatory, and must be first.

6.8.2.3 Ethernet Networking Functional Descriptor

This descriptor is mandatory for LAN frame facilities. For informative purposes, the definition is repeated from [USBECM1.2].

Table 6-43: Union Functional Descriptor for LAN frame facilities

Offset	Field	Size	Value	Description
0	bFunctionLength	1	Number	Size of Descriptor in bytes

1	bDescriptorType	1	Constant	CS_INTERFACE
2	bDescriptorSubtype	1	Constant	Ethernet Networking Functional Descriptor subtype, as defined in [USBCDC1.2]
3	iMacAddress	1	Index	Index of string descriptor giving the Ethernet MAC address for this facility. Must not be zero. The MAC address must be formatted in UNICODE as specified in [USBECM1.2].
4	bmEthernetStatistics	4	Bitmask	Mask of supported statistics. Stored in little-endian order.
8	wMaxSegmentSize	2	Number	The maximum segment size that the LAN frame facility can support, normally 1514 bytes. Stored in little-endian order
10	wNumberMCFilters	2	Bitmask	Indicates the number of multicast filters supported, as defined by table 41 of [USBECM1.2].
12	bNumberPowerFilters	1	Number	Indicates the number of power filters implemented by the function.

This specification requires that the Ethernet address specified by the string at iMacAddress be the same no matter which (valid) language code is used with GetDescriptor to retrieve it. After conversion, the first three octets of the address must be the OUI assigned by the IEEE to the authority assigning the address. The remaining three octets must be unique to this physical device.

6.8.2.4 NCM Functional Descriptor
This descriptor provides information about the implementation of the NCM function. It is mandatory, and must appear after the Header Functional Descriptor.

Table 6-44: NCM Functional Descriptor

Offset	Field	Size	Value	Description
0	bFunctionLength	1	6	Size of Descriptor in bytes
1	bDescriptorType	1	Constant	CS_INTERFACE (0x22)
2	bDescriptorSubtype	1	Constant (1Ah)	NCM Functional Descriptor subtype, as defined in Table 5-4
3	bcdNcmVersion	2	Number 0x0100	Release number of this specification in BCD, with im-plied decimal point between bits 7 and 8. 0x0100 == 1.00 == 1.0. This is a little-endian constant, so the bytes will be 0x00, 0x01.
5	bmNetworkCapabilities	1	Bitmap	Specifies the capabilities of this function. A bit value of zero indicates that the capability is not supported. D7..D5: Reserved (zero) D4: Function can process *SetCrcMode* and *GetCrcMode* requests D3: Function can process *SetMaxDatagram-Size* and *GetMaxDatagramSize* requests. D2: Function can process *SendEncapsulated-Command* and *GetEncapsulatedResponse* requests. D1: Function can process *GetNetAddress* and *SetNetAddress* requests. D0: Function can process *SetEthenetPacket-Filter* requests, as defined in [USBECM12]. If not set, broadcast, directed and multicast packets are always passed to the host.

6.8.2.5 Command Set Functional Descriptor
If the NCM Communications Interface has *bInterfaceProtocol* set to "External Protocol", then the command set transported by *SendEncapsulatedCommand* and *GetEncapsulatedResponse* is governed by a specification external to this document. The specification is identified by a GUID given in a Command Set Functional descriptor, which must appear associated with the NCM Communications Interface descriptor. This descriptor is defined in [USBWMC11], section 8.1.2.2. The GUID is defined by the appropriate external specification. The GUID

identifies the format and contents of the command set. The command set may be, but is not required to be, AT commands and responses. This descriptor is required if *bInterfaceProtocol* is set to "External Protocol". If the NCM Communications Interface has *bInterfaceProtocol* set to any other value, then the Command Set Functional Descriptor shall not appear, and the host shall ignore any such descriptors.

6.8.2.6 Command Set Detail Functional Descriptor
If a Command Set Functional Descriptor appears, it may be followed by one or more Command Set Functional Descriptors, as described in [USBWMC11], section 8.1.2.3. If the Command Set Function Descriptor Revision 1.0 CDC NCM Subclass April 30, 2009 27

6.8.2.7 Communications Class Union Functional Descriptor

This descriptor is formatted as a standard CDC Union Functional descriptor. For informative purposes, we repeat the definition of the Union Functional descriptor here.

This descriptor is mandatory.

Table 6-45: Union Functional Descriptor for LAN frame facilities

Offset	Field	Size	Value	Description
0	bFunctionLength	1	5	Size of Descriptor in bytes
1	bDescriptorType	1	Constant	CS_INTERFACE
2	bDescriptorSubtype	1	Constant	Union Functional Descriptor Subtype as defined in [USBCDC1.2]
3	bControlInterface	1	Number	The interface number of this Networking Control Model interface, as given by bInterfaceNumber.
4	bSubordinateInterface	1	Number	The interface number of the Data Class interface.

6.8.2.8 Notification Endpoint Descriptor

This descriptor describes the INTERRUPT IN endpoint that transports notifications for this function.

This descriptor is mandatory.

6.8.2.9 Data Class Interface Descriptor, Alternate Setting Zero

One interface descriptor with bAlternateSetting == 0, bInterfaceClass == DATA, bInterfaceSubClass == 0, and bInterfaceProtocol == 1 shall be embedded in the configuration bundle for each LAN frame facility.

Table 6-46: Data Class Interface Descriptor for LAN frame facilities, Setting 0

Offset	Field	Size	Value	Description
3	bAlternateSetting	1	Number (0)	Indicates that this descriptor is for alternate setting zero
4	bNumEndpoints	1	Number (0)	Indicates that no endpoints are associated with this alternate setting.
5	bInterfaceClass	1	Constant (0x0A)	Data Class
6	bInterfaceSubClass	1	Constant (00)	No subclass

7	bInterfaceProtocol	1	Constant (01)	Must be 0x01, per [USBNCM1.0] section 5.3.

No endpoints are permitted in alternate setting zero (in accordance with [USBNCM1.0]).

Following the Data Class interface descriptor for alternate setting 0, a number of functional descriptors may appear.

6.8.2.10 Data Class Header Functional Descriptor

This is as described above, in Table 6-10.

This descriptor is optional, but must be first if it appears.

6.8.2.11 Data Class Interface Descriptor, Alternate Setting 1

At least one additional interface descriptor with bAlternateSetting == 01h, bInterfaceClass == DATA, bInterfaceSubClass == 0, and bInterfaceProtocol == 01h shall be embedded in the configuration bundle for each LAN frame facility.

Table 6-47: Data Class Interface Descriptor for LAN frame facilities, Setting 1

Offset	Field	Size	Value	Description
3	bAlternateSetting	1	Number (1)	Indicates that this descriptor is for alternate setting one
4	bNumEndpoints	1	Number (2)	Indicates that two endpoints are associated with this alternate setting.
5	bInterfaceClass	1	Constant (0x0A)	Data Class
6	bInterfaceSubClass	1	Constant (00)	No subclass
7	bInterfaceProtocol	1	Constant (01)	Network Transfer Block

The interface protocol is 01, which indicates "Network Transfer Block". Two endpoints are required in the alternate setting one (in accordance with [USBNCM1.0]).
Following the Data Class interface descriptor for the non-zero alternate setting, a number of functional descriptors may appear.

6.8.2.12 Data Class Header Functional Descriptor

This is as described in above, in Table 6-10.

This descriptor is optional, but must be first if it appears.

6.8.2.13 Endpoint Descriptors, Alternate Setting one

Two endpoints must be provided.

1. A bulk IN endpoint

2. A bulk OUT endpoint.

These endpoint descriptors may appear in any order.

6.8.2.14 Additional Alternate Data Class Settings

A designer may provide additional Data Class settings as desired, in order to support alternate encapsulation methods or endpoint types.

6.8.3 Management Elements

The management elements for LAN frame facilities are as defined by [USBNCM1.0].

6.8.4 Notifications

The notifications for LAN frame facilities are as defined by [USBNCM1.0].

6.8.5 Contention

Contentions involving the LAN function is handled by simulating connect and disconnect to the virtual ether. When the host system enables the LAN function, the host driver signals this to the device by selecting a non-zero alternate interface setting on the Data Class interface. The Ethernet Networking Control Model handler on the device then tries to establish a connection, arbitrating with the TA/MT and negotiating with the network. If the connection is successful, the function sends a NetworkConnect (up) notification to the host over the notification pipe; otherwise the function sends a NetworkConnect (down) notification. [Since the handset might or might not be in range of a base station, NetworkConnect (up/down) will happen periodically anyway in response to network changes.]

Provisioning aspects are beyond the scope of this specification.