Overview

The Virtual NIC project is a simple demonstration program based on the MCUXpresso SDK. It is enumerated as a network adapter. Users can access the network by properly configuring this network adapter. The purpose of this demo is to show how to build a device of USB CDC class to implement RNDIS protocol and to provide a simple project for further development.

System Requirement

Hardware requirements

- Mini/micro USB cable
- USB A to micro AB cable
- Hardware (Tower module/base board, and so on) for a specific device
- Personal Computer

Software requirements

- The project files are in:
 - <MCUXpresso_SDK_Install>/boards/<board>/usb_examples/usb_device_cdc_vnic/<rtos>/<toolchain>.

For lite version, the project files are in:

<MCUXpresso_SDK_Install>/boards/<board>/usb_examples/usb_device_cdc_vnic_lite/<rtos>/<toolchain>.

Note

The <rtos> is Bare Metal or FreeRTOS OS.

Getting Started

Hardware Settings

Note

Set the hardware jumpers (Tower system/base module) to default settings.

Prepare the example

- 1. Download the program to the target board.
- 2. Either press the reset button on your board or launch the debugger in your IDE to begin running the demo.
- 3. Plug in the network cable before running this example. (Or you may have to disable and then enable the RNDIS network adapter after you plug in the network cable.)
- 4. Connect the USB device port on the board to the host PC and the using a USB cable.

Note

For detailed instructions, see the appropriate board User's Guide.

Duo to the speed missmatch between usb and enet, some enet frame will be discard when lots of data are received in short time, this issue is obvious, especially on Full speed usb.

The upper layer protocol will handle this issue, such as TCP/IP protocol.

Based on the test on TWR-K65,add the buffer number to receive enet frame data could reduce the discard frame, user may add the buffer number if ram is enough.

Run the example in Windows[®]

1. A network adapter is enumerated in Device Manager.



Figure 1: Virtual NIC in device manager

Note

On Windows 10, the device would be identified as an virtual com for the first time.

Ports (COM & LPT) ¥ JLink CDC UART Port (COM206) USB Serial Device (COM207)

Figure 2: Virtual com in device manager on Windows 10

2. In Control PanelNetwork and InternetNetwork Connections, the RNDIS network adapter is listed as below.



Local Area Connection 6

Figure 3: Virtual NIC in Network Connections

3. Connect the ethernet port to another test PC using a network cable. The IP address of this test PC can be configured as 192.168.1.102.

General	
You can get IP settings assigned au this capability. Otherwise, you nee for the appropriate IP settings.	utomatically if your network supports d to ask your network administrator
Obtain an IP address automat	tically
• Use the following IP address:	
IP address:	192.168.0.102
Subnet mask:	255 . 255 . 255 . 0
Default gateway:	192.168.0.1
Obtain DNS server address au	utomatically
- O Use the following DNS server	addresses:
Preferred DNS server:	
Alternate DNS server:	
Validate settings upon exit	Advanced
	OK Cancel

Figure 4: Test PC NIC configuration

4. Then configure the RNDIS adapter in Windows for your host PC. For this testing example, please make sure your PC host and the test PC are in the same network segment. E.g

ou can get IP settings assigne is capability. Otherwise, you r the appropriate IP settings.	d automatically if your network supports need to ask your network administrator
🔘 Obtain an IP address auto	omatically
Ose the following IP address	ess:
IP address:	192.168.1.109
Subnet mask:	255 . 255 . 255 . 0
Default gateway:	192 . 168 . 1 . 1
 Obtain DNS server addres Use the following DNS ser 	s automatically ver addresses:
Preferred DNS server:	192.168.1.1
Alternate DNS server:	· · ·
	it for the second

Figure 5: Host PC Virtual NIC configuration

5. Then you are supposed to access the test PC through this USB RNDIS network adapter from your host PC

C:\Use	ers\(⊳ping	-t -s	\$ 192.168	.1.109 19	2.168.1.102	
Pingir	ng 192	2.168	.1.10	2 from	192.168	.1.109 wi	th 32 bytes	of data:
Reply	from	192.	168.1	.102:	bytes=32	time=1ms	TTL=64	
Reply	from	192.	168.1	.102:	bytes=32	time=1ms	TTL=64	
Reques	st tin	ned o	ut.		1999 7 98948004 - 0.940.			
Reply	from	192.	168.1	.102:	bytes=32	time=1ms	TTL=64	
Reply	from	192.	168.1	.102:	bytes=32	time=1ms	TTL=64	
Reply	from	192.	168.1	.102:	bytes=32	time=1ms	TTL=64	
Reply	from	192.	168.1	.102:	bytes=32	time=1ms	TTL=64	

Figure 6: Ping to other PC

Note

1. The VNIC CIC CLASS code can be changed to be miscellaneous device to implement that there is no need to install inf file by changing the codes for descriptor. Provide the following codes macros for descriptor to change its related codes:

#define USB_CDC_IFACE_DESCRIPTOR_VNIC_CIC_CLASS (0xEF)

#define USB_CDC_IFACE_DESCRIPTOR_VNIC_CIC_SUBCLASS (0x04)

#define USB_CDC_IFACE_DESCRIPTOR_VNIC_CIC_PROTOCOL (0x01)

Note that the above change is only applied for descriptor, please do not change the codes of class driver. This is not verified under all conditions, so please be cautious to change.

Installing the RNDIS driver for virtual_nic example

Below are the steps to install the RNDIS driver on Windows 7. Similar steps apply for Windows XP. Step 1. Click "Update Driver Software..."



Step 2. Choose "Browse..."

	8
🕞 🧕 Update Driver Software - MCU VIRTUAL NIC DEMO	
How do you want to search for driver software?	
Search automatically for updated driver software Windows will search your computer and the Internet for the latest driver software for your device, unless you've disabled this feature in your device installation settings.	
Browse my computer for driver software Locate and install driver software manually.	
	ancel

Step 3. Select "Let me pick..."

	Indate Driver Software - MCUVIRTUAL NIC DEMO	×
U		
	Browse for driver software on your computer	
	Search for driver software in this location:	
	Browse	
	✓ Include subfolders	
	• Let me nick from a list of device drivers on my computer	
	This list will show installed driver software compatible with the device, and all driver	
	software in the same category as the device.	
	Next	Cancel
-		

Step 4. Navigate to your RNDIS driver location.

<install_dir>\boards\<board>\usb_examples\usb_device_cdc_vnic\inf or

<install_dir>\boards\<board>\usb_examples\usb_device_cdc_vnic_lite\inf

🕞 🧕 Update Driver So	oftware - MCU VIRTUAL NIC DEMO	
Select Network	Adapter	
Install Fr	om Disk	an
Manufa 2L (Con 21 Inter	Insert the manufacturer's installation disk, and then make sure that the correct drive is selected below.	OK Cancel
AboCor	Copy manufacturer's files from:	
	C:\Freescale\mcu-sdk-2.0\middleware\usb\examp -	Browse
Tell me why dr	iver signing is important	
		Next Cancel

Step 5. Press "Next".

	×
🕝 🧕 Update Driver Software - MCU VIRTUAL NIC DEMO	
Select Network Adapter Click the Network Adapter that matches your hardware, then click OK. If you have an installation disk for this feature, click Have Disk.	
Show compatible hardware Network Adapter:	
NXP USB RNDIS	
This driver has an Authenticode(tm) signature. Have D	isk
Next	Cancel

Step 6. Ignore the warning and press "Yes".

😵 Win	dows can't verify the publisher of this driver software
•	Don't install this driver software
	You should check your manufacturer's website for updated driver software for your device.
•	Install this driver software anyway Only install driver software obtained from your manufacturer's website or disc. Unsigned software from other sources may harm your computer or stea information.

Step 7. Now the RNDIS driver should be installed successfully.

E Computer Management		
File Action View Help		
🗢 🔿 😰 📰 🚺		
E Computer Management	▲ 🚽 B43008-11	Actions
🔺 🎁 System Tools	> 🝃 Batteries	Device Manager
Description: De	Biometric Devices	Device Manager
Event Viewer	Bluetooth Radios	More Actions
Shared Folders	D - Me Computer	
Local Users and Gri	ControlVault Device	
Performance	Disk drives	
📇 Device Manager	Display adapters	
4 📇 Storage	Human Interface Devices	
🗃 Disk Management	Imaging devices	
Services and Applicat	Intel(R) Dynamic Platform and Thermal Framework	
	Þ 🔮 Jungo	
	> Keyboards	
	Memory technology driver	
	Mice and other pointing devices	
	D - Monitors	
	A Letwork adapters	
	Bluetooth Device (Personal Area Network)	
	Bluetooth Device (RFCOMM Protocol TDI)	
	Cisco AnyConnect Secure Mobility Client Virtual Miniport Adapter for Wi	
	Intel(R) Dual Band Wireless-AC 8260	
	Intel(R) Ethernet Connection I219-LM	
	NXP USB RNDIS #5	
	Ports (COM & LPT)	
	Processors	
	Proximity Devices	
	Smart card readers	
	Sound, video and game controllers	
	Storage controllers	
	System devices	

- If a driver signature issue occurs on Windows 8 OS, see the link, Disabling Driver Signature on Windows 8
- To enable driver signing on Windows OS, see the link,
 - Driver Signing
 - Practical Windows Code and Driver Signing