



## VMware ESX Server

# Using AnywhereUSB to Connect USB Devices

Digi International's AnywhereUSB® Remote I/O Concentrator is a remote networking solution that utilizes USB over IP technology, called RealPort® USB, to enable you to connect USB devices over a network.

This technical note explains how you can use AnywhereUSB to send USB data over an Ethernet or wireless IP network to a virtual machine running on VMware ESX Server, so you can support nearly any USB device through the virtual machine's standard Ethernet interface. This Ethernet-attached solution, supported by Digi International, provides five USB ports to connect peripheral devices such as bar-code scanners and receipt printers.

AnywhereUSB also breaks the traditional 5 meter distance limitation between USB device and host. Now USB devices may be located anywhere on a wired or wireless LAN — without a local attachment to a host PC. Since the host virtual machine and the VMware server system where it is running may be located remotely, AnywhereUSB enables devices to be deployed in harsh or nonsecure environments, making it ideal for point-of-sale devices, kiosks, surveillance, industrial automation, or any mission-critical enterprise application.

This technical note covers the following topics:

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## Understanding RealPort USB Technology

Many of today's key business applications were written to talk to USB devices that are directly connected to servers. To serve their customers better, businesses have found it necessary to locate USB devices in places that are not always close to servers or PCs or to connect them to virtual machines provided by VMware server software.

Using RealPort USB software in conjunction with the AnywhereUSB network-enabled USB hub, users can connect USB devices anywhere on the LAN. The solution is seamless — the USB



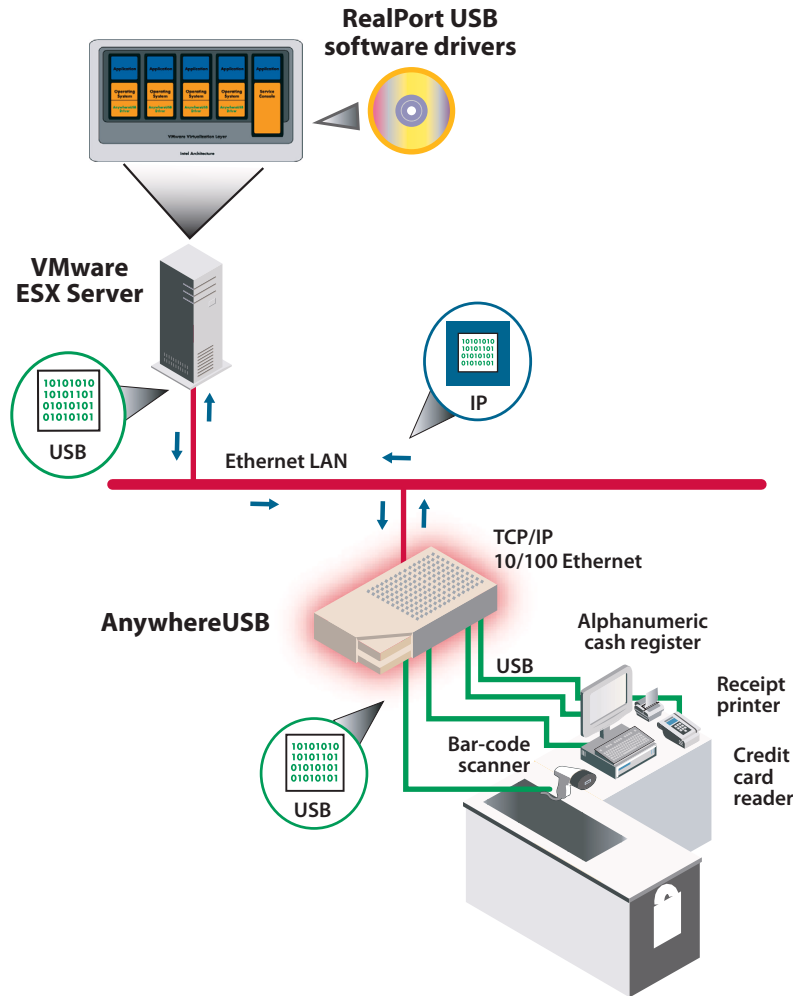


devices appear as though they are plugged directly into the host PC or virtual machine, when they are actually connected to an AnywhereUSB concentrator anywhere on the network. This ensures compatibility with existing applications without any modifications

RealPort USB software is unique among USB extender solutions. It is the only implementation that allows multiple connections to multiple USB ports over a single TCP/IP connection. This means that USB devices may be placed anywhere a network connection exists. Also, RealPort USB supports as many USB devices over the network as the virtual machine would if the devices were directly connected to the host system.

RealPort USB also provides connection recovery. If there is a network interruption, RealPort USB automatically reconnects the device to the virtual machine's USB port. RealPort USB offers extensive operating system support, including support for Microsoft Windows Server 2003, Windows XP, and Windows 2000.

The diagram below illustrates the use of various USB devices, connected through an AnywhereUSB concentrator to a virtual machine running on a VMware server system.





## Features and Benefits of RealPort USB

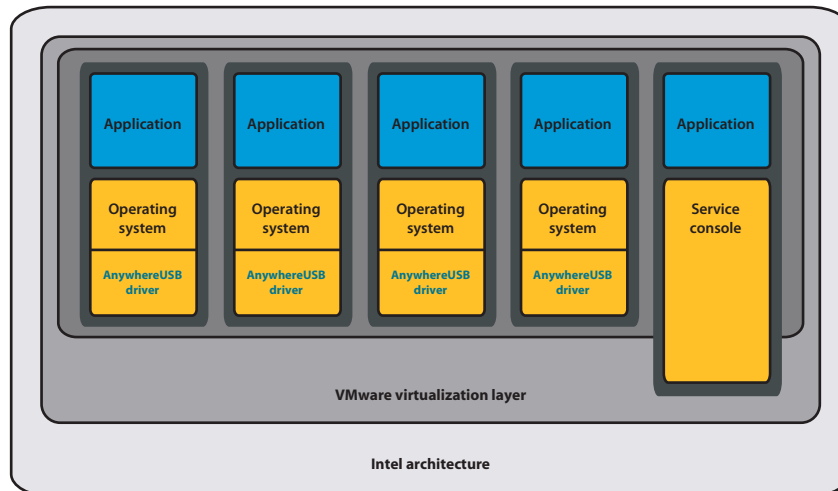
Features of the RealPort USB technology support your remote USB solutions in a variety of ways.

Feature	Benefit
USB connections over any IP network	Extends USB cabling distance beyond 5 meters. USB peripherals may be anywhere.
Transparent network connection	USB ports appear to be locally attached and provide same Plug and Play user experience as onboard USB ports.
Connections to multiple USB ports over a single TCP/IP connection	Reduces overhead compared to other USB extenders.
Multiple AnywhereUSB hubs per virtual machine	Virtually unlimited numbers of extended USB ports.
Supports bulk or interrupt mode devices	Compatible with hundreds of different USB products.
Connection recovery	Provides fault tolerance for network failures.
Connections to back room server	Increases security.
Comprehensive OS support	Compatible with nearly any Windows program.

RealPort USB comes standard with Digi's AnywhereUSB network-enabled hub.

## Architecture of the Solution

AnywhereUSB supports USB at the level of the individual virtual machine. That is, each virtual machine that requires USB device support has one or more AnywhereUSB concentrators connected to that virtual machine. You install drivers for the concentrators in the guest operating system running in the virtual machine, as illustrated in the diagram below.



You then connect USB devices to a concentrator. The AnywhereUSB driver installed in the guest operating system manages the connection between the device and the guest.

## Installing AnywhereUSB

The basic steps to set up an AnywhereUSB concentrator and connect it to virtual machines running on ESX Server are outlined in this document. For additional detail, see the *AnywhereUSB Remote I/O Concentrator Installation Guide* from Digi International.



## Cabling AnywhereUSB

To connect the AnywhereUSB Concentrator to a network, connect a standard Ethernet network cable to your AnywhereUSB. Connect the other end of the Ethernet cable to a 10/100BaseT switch or hub. Be sure your network is configured so the guest operating system in your virtual machine can connect to the concentrator, as described in the *AnywhereUSB Remote I/O Concentrator Installation Guide*.

## Special Steps for VMware ESX Server Virtual Machines

Since ESX Server does not provide direct support for USB, USB drivers are not installed in the guest operating system by default. The AnywhereUSB device depends on the USB core files to install properly.

To enable the rest of the installation to proceed normally, copy and rename the required file from the original operating system CD.

- Source: `usbd.sys` in the `\I386` directory of the CD
- Destination: `usbd.sys` in the `\system32\drivers` directory of the guest operating system

After copying this file, reboot your machine. You can then continue with the normal AnywhereUSB installation.

## Installing the Drivers

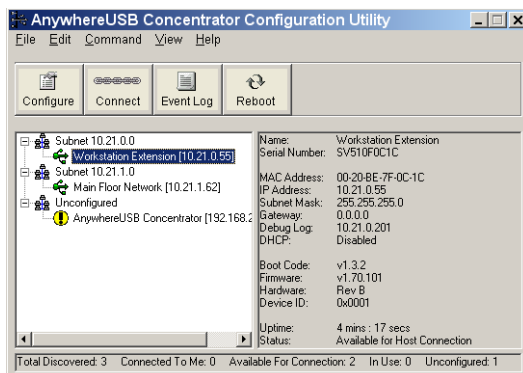
You must install a driver for each AnywhereUSB concentrator in the guest operating system of the VMware virtual machine in which you want to use a USB device connected to the concentrator. Take the following steps in a Windows XP or Windows 2000 guest operating system:

1. Insert the AnywhereUSB Driver CD into the CD drive connected to the virtual machine.
2. A welcome screen allows you to install the drivers.
3. Click **Install Drivers** to start the installation process. Follow the on-screen instructions to complete the installation of your AnywhereUSB concentrator.

After you install the drivers, the AnywhereUSB Configuration Utility automatically starts so you can configure your AnywhereUSB concentrator.

## Configuring Your Concentrator

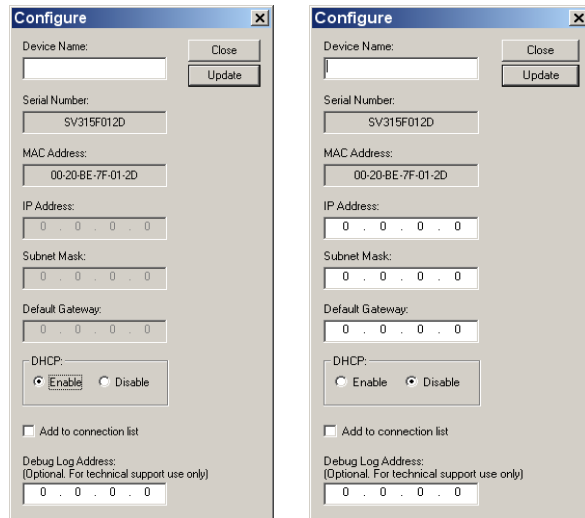
To configure your AnywhereUSB concentrator, launch the AnywhereUSB Configuration Utility from the Start menu. The utility displays a list of discovered AnywhereUSB Concentrators on your local subnet. A new AnywhereUSB concentrator has a default IP address of 0.0.0.0.





You must configure the Concentrator before it can be used on a network. Take the following steps:

1. You can identify each concentrator by its IP address. If the concentrator is unconfigured, you can use the serial number for identification.
2. Double-click the concentrator or select the concentrator and click **Configure** to set the IP address, subnet mask, and gateway.



3. Enter a device name that easily identifies the concentrator.
4. To configure the concentrator to use DHCP, select **Enable**. When DHCP is enabled, you cannot enter anything in the IP Address, Subnet Mask, and Default Gateway fields.
5. If you do not have a DHCP server, select **Disable** and do the following:
  - a. Enter the IP address and subnet mask. Contact your network administrator for IP address information.
  - b. Enter the gateway for your network. In a network using subnets, the gateway is the router that forwards traffic to a destination outside the subnet of the AnywhereUSB device.
6. After configuring the concentrator, select a concentrator and click **Connect** to add the concentrator's IP address to the connection list. The guest operating system then attempts to connect to the concentrator.
7. The Found New Hardware Wizard prompts you to search for the drivers — one time for the remote hub and two times each for the USB host controllers and the USB root hubs. Select **Install software automatically (Recommended)** and click **Next** in each case. If you get a warning message indicating that the drivers have not yet passed Windows logo testing, click **Continue Anyway**.

You have finished installing AnywhereUSB. Now you can plug USB devices into the concentrator's USB ports. These devices and the guest operating system in your ESX Server virtual machine operate as if the USB devices were locally attached to the server system.



## Supported Devices

AnywhereUSB has been successfully tested and deployed with a wide variety of USB storage, HID, and printer devices, as well as a number of other more uncommon devices such as biometric readers or bulk mode cameras.

## Known Issues

### Devices

AnywhereUSB does not support isochronous USB devices. This includes most audio devices and some (but not all) streaming video devices. Bulk mode and interrupt devices are supported. This includes the vast majority of USB devices on the market today. Digi International provides a compatibility checker you can use to determine whether your device should work properly with AnywhereUSB:

[www.digi.com/support/index.jsp](http://www.digi.com/support/index.jsp)

AnywhereUSB supports USB 1.1 devices and USB 2.0 devices at USB 1.1 speeds. USB 2.0 high speed performance is not supported.

### Operating Systems

AnywhereUSB is supported on most Windows operating systems. It is not supported on Linux or Unix platforms.

## AnywhereUSB and ESX Server Go to Work

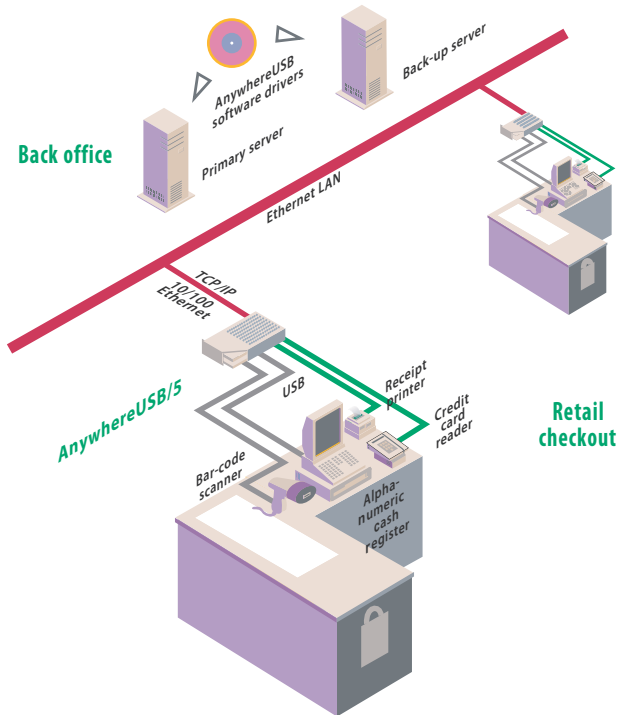
Point of sale (POS) system manufacturers can use AnywhereUSB and ESX Server to take the PC out of the checkout lane, creating smaller retail stations and simplifying operations with USB Over IP technology.

Real estate, especially floor space inside a store, is invaluable to a retailer. The smaller the POS stations, the more room for merchandise, and the higher potential for revenue. A major POS system manufacturer was searching for a way to build a thinner POS station for a retailer with three checkout stations per store. The retailer wanted not just a smaller footprint, but also an easy way to centrally manage each station.

The POS system manufacturer tested the AnywhereUSB/5, a 7-inch-wide network-enabled USB concentrator, and found that it could take the place of the PC or dumb terminal at each POS station. Special software drivers are loaded on the back-office server, where all transaction processing takes place via RealPort USB technology. Each POS station includes one AnywhereUSB concentrator, which is connected to the LAN over a standard TCP/IP connection. A bar-code scanner, credit card reader, receipt printer, pole display and alphanumeric cash



register are connected to the AnywhereUSB concentrator. The five USB ports on each AnywhereUSB concentrator appear to be locally attached to the back-office server.



The AnywhereUSB also offered this retailer centralized management, instantly increasing security and reducing IT support. Since the AnywhereUSB concentrator replaced the PC at each POS station, less user intervention can occur, reducing data corruption or tampering. It enables IT to perform maintenance and upgrades at a single server rather than at multiple PCs. This set-up also provides system redundancy — if the server fails, another server on the network can take over, reducing system downtime.

## Support

This VMware technical note has been developed in cooperation with Digi International. For any support questions, contact Digi at [www.digi.com/support/index.jsp](http://www.digi.com/support/index.jsp).