Understanding USB Bandwidth and KVM Applications

OVERVIEW

There are many applications that need USB extension beyond the 5 meter limitation such as remote desktops or KVM (keyboard, video, and mouse). Since the remote desktop is not limited to only a keyboard and mouse, many other devices need to be placed a significant distance away from the PC. Therefore, it is critical to understand what USB bandwidth is required to operate the USB devices. This article will cover the different amounts of bandwidth needed to support various USB devices and the correct Icron product, for each application.

ABOUT USB

USB is a standard for peripheral device connectivity and supports Low Speed, Full Speed and High Speed transfers. USB 1.1 provides support for Low Speed at 1.5Mb/s (mega bits per second) and Full Speed at 12Mb/s. The two interface speeds target specific classes of devices to provide the most efficient and cost-effective interconnect solution. Low Speed devices are typically interactive input devices such as keyboards, mice or game controllers. Full Speed devices are typically application specific input devices such as microphones, cameras and printers. In addition, USB 2.0 offers a complimentary High Speed transfer rate of 480Mb/s delivering a significant bandwidth increase for USB devices.

UNDERSTANDING USB BANDWIDTH

USB devices have instantaneous and operating bandwidths. For example, High Speed devices have an instantaneous bandwidth of 480Mb/s. However, real world throughput of an individual device is never the full transfer rate. USB devices connected to a PC, either directly or through Icron's extension technology, must share the available USB bandwidth. Each device does not have an instantaneous bandwidth of 480Mb/s. The instantaneous and operating bandwidth of four USB devices are shown in the table below to demonstrate the different bandwidths that might be encountered. For example, a mouse has an instantaneous bandwidth of 1.5Mb/s but it takes less than 100kb/s to operate the device

USB Device	Instantaneous Bandwidth	Operating Bandwidth
Mouse	1.5Mb/s	< 100kb/s
Specialty Keyboard	12Mb/s	17 kb/s
Flash Drive	480Mb/s	80Mb/s
Low Resolution/High Compression WebCamera	480Mb/s	80Mb/s

In addition, there are other factors that contribute to transfer rates and therefore, it is important to identify all the areas where bandwidth of the USB device(s) can be affected. These factors are:

- The type of host controller inside the PC
- The operating system running on the PC
- Other applications sharing the bus or running on the host PC
- Other USB devices connected to the host PC
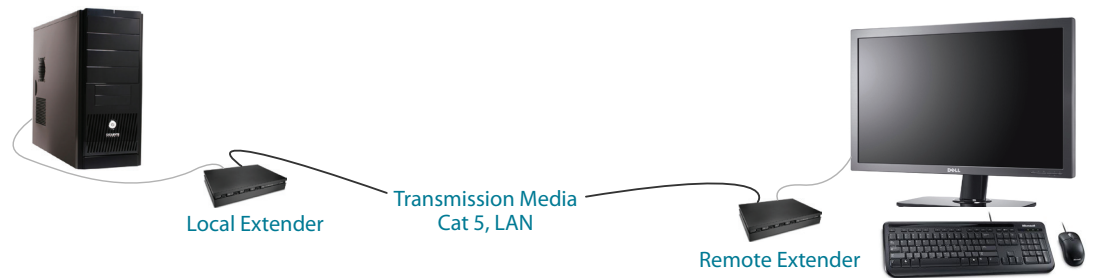
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To become more familiar with the USB bandwidth requirements in real world applications and the appropriate product(s) to meet the needs of those applications, refer to the examples below.

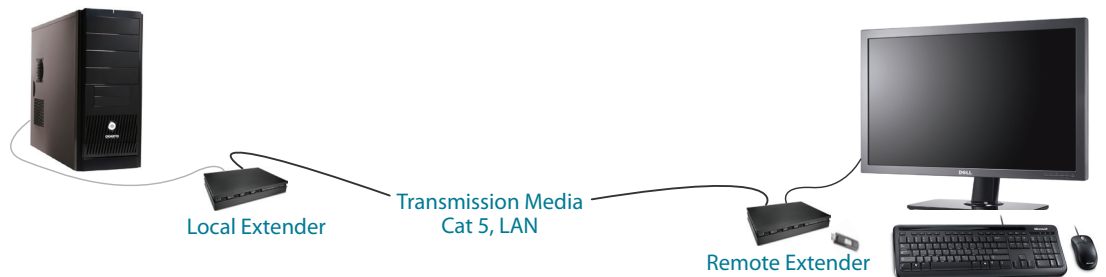## KVM AND USB APPLICATIONS

REMOTE DESKTOP - KEYBOARD AND MOUSE

For a remote desktop application, the typical bandwidth required to operate a keyboard or mouse is less than 100kb/s per device. The exception is gaming devices, full speed mice, or specialty keyboards which can require an operating bandwidth of up to 100kb/s

Local Extender

Transmission Media
Cat 5, LAN

Remote Extender

USB Devices	Keyboard, mouse
Typical USB Bandwidth Required	Up to 100kb/s
Recommended Product	ExtremeLink Family

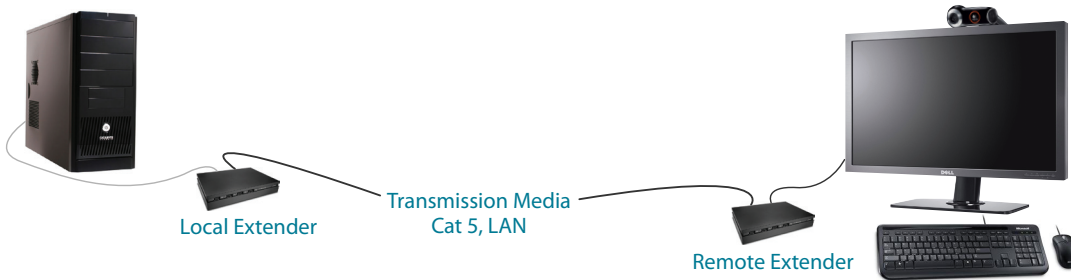### REMOTE DESKTOP - KEYBOARD, MOUSE AND FLASH DRIVE

Adding a flash drive to the remote desktop requires a bandwidth of up to 80Mb/s. However, the flash drive can also effectively operate at transfer rates lower than 80Mb/s.

Local Extender

Transmission Media
Cat 5, LAN

Remote Extender

USB Devices	Keyboard, mouse, flash drive
Typical USB Bandwidth Required	Up to 80Mb/s
Recommended Product	ExtremeLink Family

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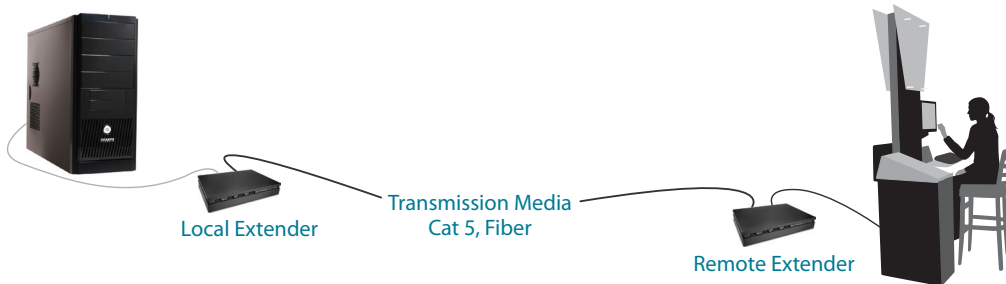**REMOTE DESKTOP - KEYBOARD, MOUSE, AND WEB CAMERA**

When using a web camera with a remote desktop, a low resolution/high compression camera is more than sufficient for any type of online video conferencing and operates up to 80Mb/s.

Local Extender — Transmission Media Cat 5, LAN — Remote Extender

USB Devices	Keyboard, mouse, low resolution/ high compression resolution web camera
Typical USB Bandwidth Required	Up to 80Mb/s
Recommended Product	ExtremeLink Family

INTERACTIVE KIOSK

With an interactive kiosk, there can be a number of USB devices attached connected to the host PC requiring transfer rates up to 144Mb/s. In this application, all the USB devices must share the available bandwidth.
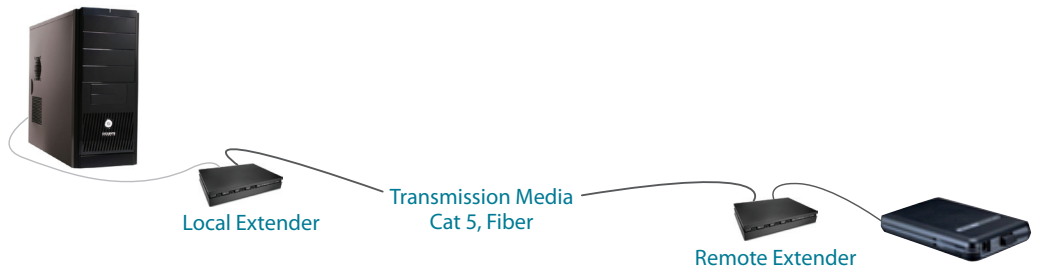

Local Extender — Transmission Media Cat 5, Fiber — Remote Extender

USB Devices	Touch screen, high resolution/high definition web camera, USB audio speakers, document scanner
Typical USB Bandwidth Required	Up to 144Mb/s
Recommended Product	Ranger 2200 Family

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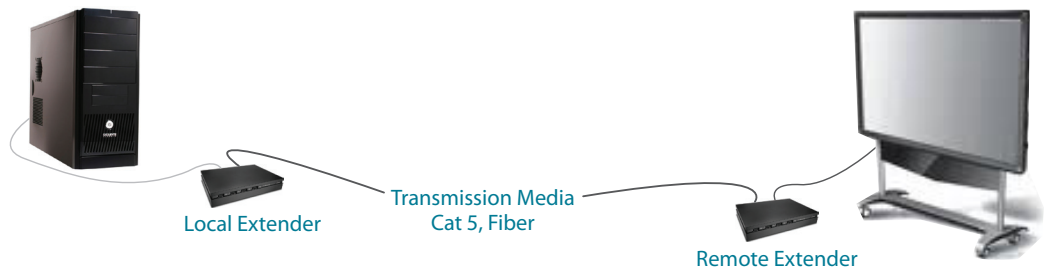www.icron.com

REMOTE DVD OR CD WRITER

With a typical DVD or CD writer, only USB needs to be extended. The DVD or CD writer operates up to 80Mb/s to write data to a disk and is supported by Icron's USB extension products.

Local Extender

Transmission Media
Cat 5, Fiber

Remote Extender

USB Devices	DVD or CD Writer
Typical USB Bandwidth Required	Up to 80Mb/s
Recommended Product	Ranger 2200 Family Ranger 2101

INTERACTIVE WHITE BOARD

Many installations call for the extension of an interactive white board in the classroom. These devices typically require an operating bandwidth of up to 100kb/s.

Local Extender

Transmission Media
Cat 5, Fiber

Remote Extender

USB Devices	Interactive White Board
Typical USB Bandwidth Required	Up to 100kb/s
Recommended Product	Ranger 2200 Family Rover 1650 or 2650

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