TECHNICAL WHITE PAPER

How MiraLink mirrors data to any remote location
over low bandwidth data connections

Overview

When data is lost, a business is powerless. Data protection is obviously important, but what about continuous access to data during a real disaster?

Ask yourself these questions:

- How many dollars does my company lose with every hour of downtime?

- What kind of disaster is my company prepared to meet at this very moment?

- How quickly could my company recover and resume **full** operations?

MiraLink's goal is to make your company completely disaster-proof and enable it to resume operations in just a few minutes. No company is more committed to protecting data than MiraLink™.

> MiraLink's mission is very simple: provide a reliable and inexpensive way for **any** company to mirror critical data off-site.

The MiraLink Model 2000 allows data from any server to be mirrored remotely **across any data connection** (including the Internet) **to any remote location**. For example, a business with headquarters on the East Coast can mirror its data to a West Coast office using the Internet connection it already owns.

MiraLink works with an existing computer network. There are no server compatibility issues. There are no drivers or software to install on the production server. There is no memory or processor overhead to slow the system down. Additionally, MiraLink is easy to manage, which results in **low cost of ownership and minimal recurring costs**. Most important, it complements existing backup and data protection plans. It **protects your business from lost revenues** due to server failure, power failure, and natural disasters.

The MiraLink Solution

All data is off-site and ready to take over. MiraLink offers a patented mirroring appliance that allows a complete and real time copy of data to be maintained off-site. Data can be mirrored to any remote location. Critical data is continuously updated and **changes occur constantly and instantaneously**. In the event of a local disaster, data is safe at the remote location, and business can resume in as little as 5 minutes. MiraLink will allow your business to continue with little or no disruption of service to customers in the event of a catastrophe.

How does it work? The MiraLink unit connects to the production server via standard SCSI cable or to your SAN via fibre. The MiraLink appliance appears as a standard hard drive to the system. Your operating system performs a mirror between the two drives.
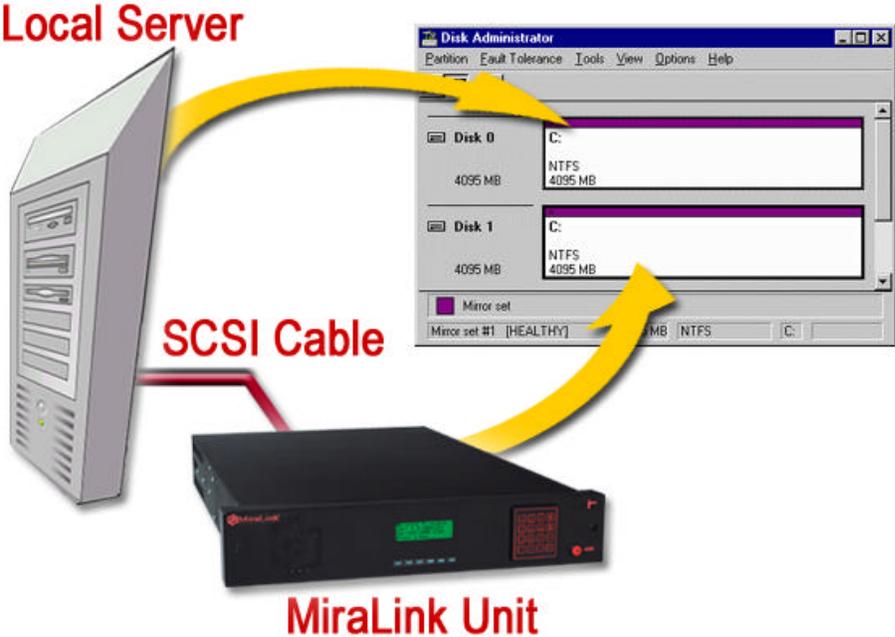
In the background, the MiraLink device mirrors your server's primary drive and sends all of the data to a peer device located at the remote location, thus creating another exact copy of the critical data. If for any reason the primary site is incapacitated, the business can resume operations from the unaffected offsite location.

The Intellibuffer

Inside the MiraLink device, all incoming data is forked into two drives. The first drive is the local mirror of the critical data. The second drive is the Intellibuffer, which queues data change information while it awaits transmission to the remote MiraLink device.

Incoming Data

Fixed Local Disk
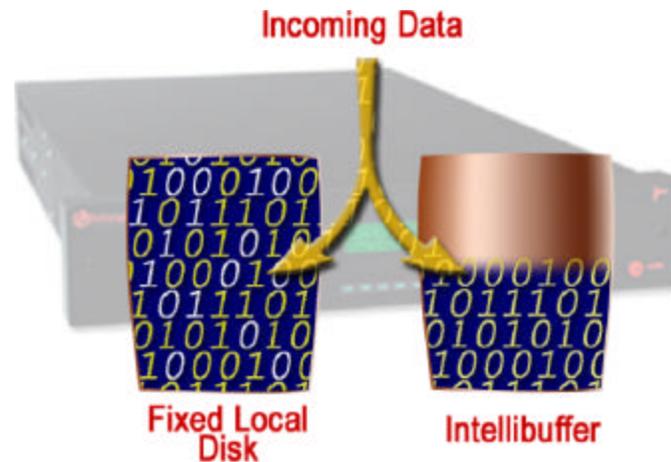
Intellibuffer

The Intellibuffer allows MiraLink to offer several special features.

- **Works on slow connections.** MiraLink's patented and patent-pending technology allows it to use any speed of data connection, making our bandwidth requirements far less than those of our competitors'. Most companies can use MiraLink over their existing 56k or DSL connection. Communication between the primary and alternate sites utilizes Transmission Control Protocol/Internet Protocol (TCP/IP) over a standard 10/100 Ethernet connection to provide LAN/WAN connectivity

- **Tolerates bad lines.** Other remote storage products need a clean, dedicated data connection that never goes down. MiraLink is just the opposite. The link between the MiraLink devices can be severed at any time without interrupting the mirror. The two units merely wait until the line is back up, and automatically start sending data again. Since your critical data is still being written to a local mirror, there is no slow down to your network if your data connection is severed.

- **Checkpoints can be used for incremental backups.** The communication between the two MiraLink units can be temporarily paused at any time, allowing an incremental tape backup to be run on the remote unit. While outgoing traffic is paused at the local unit, it still continues to receive data from the host, allowing your business to continue uninterrupted while running tapes.

> The benefit of remote mirroring is that an alternate site can take over operations within minutes of any local disaster.

With MiraLink, your data is safe, your downtime is significantly reduced, your customers remain satisfied, and your revenue stream continues to flow.

Why Miralink doesn't need a fast connection

Central to MiraLink's remote mirroring system is its patent-pending intelligent buffer technology (Intellibuffer™). Traditionally, remote-mirroring solutions require a dedicated, high-bandwidth, high-availability circuit for reliable transmission of data to the alternate site. The data link has to be fast enough to meet peak demand, during the busiest times of the day. Data transmission is higher than normal at these times, and usually consumes all available bandwidth.

With the typical data transaction pattern depicted in Figure 2, a company would have to buy enough bandwidth to accommodate peak usage (about 1300Kbps), even though that bandwidth is needed for just a few moments every day. Most of the time all that bandwidth goes unused, which means wasted money.
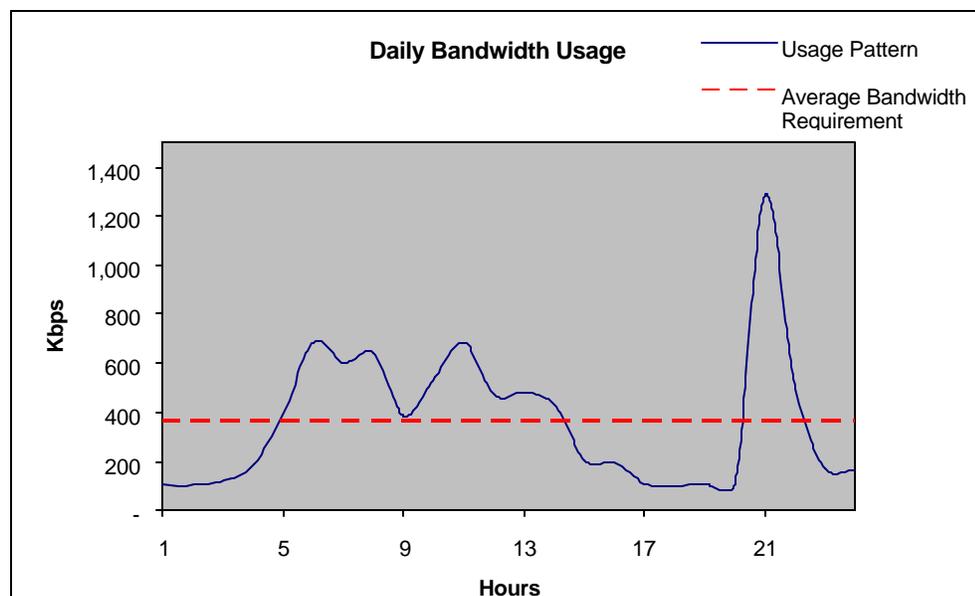
• Figure 2. Bandwidth usage pattern of an actual company measured over three weeks.

The Intellibuffer effectively flattens the data traffic peaks, making possible the use of lower-bandwidth links. Therefore, the company in Figure 2 would only need bandwidth to accommodate its average usage, 365 Kbps, rather than its peak 1300Kbps. Equally important, the Intellibuffer—coupled with MiraLink's ability to route data via the industry-standard TCP/IP—makes possible the use of shared bandwidth links such as the Internet. These features create an enormous reduction in recurring data communications costs. MiraLink may even be used through an existing data connection!

Furthermore, there is no server slow-down while the remote volume is written because the Intellibuffer acknowledges data coming from the primary server before it transmits it to the remote MiraLink. Therefore, the server is not waiting for the remote site to

respond before continuing to do its job. During transmission between MiraLink units, the Intellibuffer dynamically adapts to the varying speeds of communication.

MiraLink Provides Levels of Protection

Data Safety

This off-site storage solution is the industry's simplest method for protecting data. The remote site requires only a MiraLink unit to provide remote data storage. Critical data is protected against destruction or loss. For companies that do not require assured, seamless continuation of operations, but merely safe off-site storage of their data, this option is ideal. Should the main office suffer a catastrophe, the data is safe, awaiting restoration of the production facility. Upon re-establishment of primary site capability, the remote disk may be physically transported and attached, or the data can be transmitted in reverse electronically via the MiraLink units.

Data Vaulting

The next level of MiraLink data protection supports enterprises, which require remote depositories of point-in-time back-up tapes. This vaulting of archival data can impose severe demands on the operations of the production site, both in terms of creating the tapes and in transporting them to the offsite vault.

With the addition of a tape control system connected to the remote MiraLink, both the impact of tape creation and the costly transport of tapes can be avoided.

The creation of an archive tape library using MiraLink involves the utilization of the **Checkpoint feature**. Checkpoint is an automatic and instantaneous function which periodically halts the transmission of data between MiraLink units. Therefore, a stable point-in-time copy of the data can be copied to tape at the offsite vault. Meanwhile, work at the production site never has to stop. All data changes are queued in the Intellibuffer until after the tape is created and the Checkpoint automatically reconnects the MiraLink units. Your users are online the whole time - MiraLink takes over in the background and there is no downtime and no tape transportation costs.

Business Continuation

MiraLink's most comprehensive data protection solution is its' High Availability Business Continuation solution. A full failover site is built around the remote MiraLink unit with a secondary server attached for immediate file and application recovery. Should the main office suffer a catastrophe, operations can continue at the alternate site while the primary site is being brought back on line.

Features of MiraLink

The advantages MiraLink has over traditional solutions to store and mirror data are numerous. MiraLink is…

Non-Intrusive

Competing solutions require that you place software agents or drivers on the file server, thereby negatively impacting the memory and CPU power available for the server to do its job. Additional agents or drivers also introduce the possibility of compatibility issues with existing drivers on the server.

A common problem when using drivers for mission-critical applications is that problematic server drivers can wreak havoc in a server environment. If a driver is found to be problematic, your business can't afford to wait for repairs. Additionally, with the dynamic nature of hardware, software providers must continually provide new drivers for all the hardware platforms—existing and new, resulting in the use of shortcuts and generic drivers that were written for an entire family of products rather than being optimized for your particular configuration.

MiraLink requires no software or drivers to be installed on the file server.

Interoperable

MiraLink is a multi-platform solution and is Operating System **(OS) independent**. The unique platform independent architecture works with any operating system or Network Operating System (NOS) that supports Small Computer System Interface (SCSI) storage (including Windows 2000, Windows NT, Windows 98, Windows 95, Windows 3.0, Windows XP, all versions of Novell Netware, Sun Solaris, Linux, FreeBSD, SCO Unix, HPUX, AIX, and even MS-DOS).

Many vendors lock customers into their proprietary SCSI hardware by making their products incompatible with those of other vendors. MiraLink is the opposite. MiraLink's unique technology and architecture seamlessly works with any vendor's SCSI hardware and is even unaffected when companies decide to change hardware. MiraLink also supports connections to a fiber channel router, which makes it compatible with Storage Attached Networks (SAN).

Versatile

MiraLink does not require a dedicated telecommunications link. If you already have a link to the Internet, use it for MiraLink. MiraLink's ability to mirror over any TCP/IP communications link allows enterprises to save data and dollars by avoiding the massive expense of dedicated high-speed links required by most other remote backup and recovery solutions. Based on current costs for dedicated links, MiraLink can remotely mirror *100* primary servers for less than the cost of mirroring just one server with competing remote mirroring solutions.

For companies migrating from one vendor's product to another's (such as from NetWare to Windows 2000 Advanced Server), your existing MiraLink hardware investment will work with both architectures.

MiraLink supports industry standard architectures for device management. Whether using a web browser or a Simple Network Management Protocol (SNMP) application, flexibility exists to setup, monitor, and alert the system administrator. The use of open-API SNMP programs further allow for solution customization to meet site-specific fault-tolerance requirements, such as setting Checkpoints to coincide with an automated tape backup program at a remote site.

Fault-Tolerant

Traditional remote mirroring requires clean transmission links. Unfortunately, even the best connections are prone to loss, noise, and downtime. Such conditions cause solutions from other vendors to crash. MiraLink appliances can tolerate link faults for weeks—not just seconds or minutes. In the event of a link failure, MiraLink's Intellibuffer continues receiving and logging data changes from the primary server, and then transmits to the alternate site as soon as the link is restored.

MiraLink incorporates software- and hardware-based error correction, allowing it to ensure fast, reliable, and accurate transmission of mirrored data. This is especially important over shared-bandwidth connections.

As a failsafe precaution, data in the local change buffer is not cleared until confirmation is received from the remote unit that the data has been successfully written to the remote site.

MiraLink also provides a local mirror volume, so that a local server can continue operating in the event of a primary disk failure.

Easy to Install

Network administrators prefer appliance devices because they are easy to implement. Unlike many other storage vendors whose products are difficult to install, MiraLink is a server appliance that attaches to your server with just one cable. While other systems require professional installations that can take days or weeks to install, MiraLink appliances are very quick and easy to install. To configure the MiraLink unit, instruct the NOS to mirror to the newly attached drive (the local MiraLink unit).

Easy to Manage

Studies indicate that the cost of managing data is approximately *13* times the cost of buying the actual software or hardware to store data. Many current systems require an entire team of people to continually monitor and manage them. MiraLink has *no* additional management costs. It quietly and efficiently does its job in the background. Furthermore, other software packages often require additional weeks of training and continuing education. Managing MiraLink requires only minimal training.

System status can be monitored and the system can be configured or controlled via any of three redundant user interfaces: the Miralink reporting screens (implemented using Web browser technology); standard SNMP procedures; and the Liquid Crystal Display (LCD) readout and keypad on the front of the MiraLink unit.

Scalable

MiraLink can scale from the base unit—a 72-GB model—to terabytes. It can be configured using any standard SCSI disk technologies for capacity, fault-tolerance, and performance.

For example, the buffer and local volume can be configured with a RAID 5 device, plus a 250 MB write-back cache. Another option is to add a dual-channel controller, allowing the change buffer to be placed on one channel and the mirrored volume on the other. This allows you to write to both the change buffer and mirrored volume in parallel. You can also add hot-pluggable power supplies, multiple controllers, or hot-swapple drive subsystems.

MiraLink can also be connected to a fibre controller and be accessible as a SAN device.

Summary

Even if traditional backup solutions are in place, the data and the business are not necessarily safe. An effective business continuation plan incorporating MiraLink allows any business to continue uninterrupted in the event of server hardware failure, power failure, or even a major disaster.

MiraLink provides the only technical solution that reliably and economically protects enterprises with nearly instant recovery from technical and physical disasters. Our solution can scale to meet the needs of the largest organizations and the smallest offices, all the while saving money for businesses through the lowest initial investment and recurring costs.

MiraLink allows any corporation to recover from a failure and be fully operational again in as little as 5 minutes. This level of protection is unrivaled in the storage industry.

Without data, a business will fail. Nothing preserves data and its availability like MiraLink.

About MiraLink

MiraLink Corporation is the leader in remote disk mirroring over IP networks. The company, both directly and via reseller channels, provides disaster recovery appliances to enterprises and service providers. MiraLink products deliver an unprecedented level of information safety, simplicity, and cost of ownership within the Data Replication market segment, which Dataquest reports to be growing at a compound annual growth rate of 28.5%.

By utilizing existing IP networks, MiraLink appliances enable a complete and real-time copy of critical data to be maintained off-site at a fraction of the cost of competitive solutions. Patent and patent pending technology from MiraLink is optimized to perform on low-bandwidth network segments, which together with the operational simplicity of an appliance, enable smaller enterprises and branch office locations to implement business continuity plans.

MiraLink's expanding product line builds upon the success of the current appliance strategy with additional interfaces, including iSCSI, and optimized features for business continuity planning and disaster recovery testing.

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