Application Note

# Windows Technology: Still the Best Choice

## Introduction

With the proliferation of the Internet, and the attendant explosion of virus and SPAM email attacks, Windows has come under criticism in the broadcast industry. Additionally, the lifespan of a typical Microsoft operating system product has not been as long as the broadcast industry would prefer, particularly for core infrastructure product, such as a Router and Router Control system. Miranda recognizes these concerns, and has developed hardware, software, and service plan options that eliminate these operating risks.

### The Past and the Present

Miranda has been using the Windows software platform for its NV9000 family of router control system products for nearly a decade. When installed and maintained correctly, the combination of Miranda's application code and the Windows operating system has provided millions of hours of continuous operation. Major network operations, satellite uplink programmers, IPTV providers, numerous television stations and post-productions facilities around the world use Miranda software to guarantee uninterrupted operation 24 hours per day, 7 days per week.

Windows technology provides Miranda — and our valued customers — with significant advantages because it is a standard product. Redundancy, cost savings, and long term software support are significant benefits attributable to the ubiquity of the Windows technology framework. It may seem that long-term support is in conflict with earlier statements but we address this conundrum later.

## The Benefits of Windows

### Redundancy, Resiliency and Predictability

Microsoft Windows NT Server was the first standard operating system to enable redundant machine platforms. This feature, integrated with Windows 2000 Server, lead the introduction of Windows software into telephone companies around the world, providing highly reliable, affordable platforms for running SS7 (the primary application for phone call billing).

Miranda exploited this technology to provide redundant server products for NV9000 users. Miranda continues to offer the best redundancy of any other router control system on the market. Built-in process-by-process status monitoring means that the NV9000 control system can oversee and analyze external communications, panel processes, router control processes, internal computational operation, and other critical system status such as power supply, disk, and memory functionality. If a problem is detected, then the fail-over can be carried out at the appropriate level, insuring the minimum impact on system operations. In many cases, the switch to backup is transparent to the user.

### Economies of Scale and Development

Miranda initially developed the NV9000 code base in 1997, with first releases in 1998. In that time, the software has moved from Windows NT 4, To Windows 2000, to Windows XP. The necessary hardware platform has moved concurrently from very expensive 4RU servers, to more affordable 1RU servers. For customers who do not need or want hot-swappable disks, or serviceable power supplies, Miranda's tower PC server platforms provide even more economical operation. The cost benefit passes on directly to Miranda's cus-

tomers very rapidly (and very confidently) because our server computers are designed to be compliant with Windows and because Miranda developed its software to be compliant with industry coding standards. To put this somewhat differently, Miranda has allowed its customers to enjoy the benefits of Moore's law.

## Code Reuse and Stability

Miranda designed, developed, wrote, and continues to write its control system software so that it is compatible with open-market software standards. SQL (structured query language) is perfect for a router control system because it is a database application.

A router control system includes the equipment in a user's facility, the names of the equipment, the synonyms for the equipment, the connections of the equipment to the router, and the connection topology of the plant. As time goes on, the control system changes and the topology of the router system changes to accommodate the desired operations of inter-connected equipment. These activities and data records are efficiently managed as a database. Because SQL is the industry standard for coding such applications, Miranda can ensure that the software it develops is portable to future applications and future operating environments.

## Guaranteed Compatibility between Drivers and OS

Miranda has developed many, many communications protocols for use with automation systems and other third-party applications. These protocols have been developed so that Miranda equipment can control — and be controlled by — other devices and systems. In addition, Miranda has developed, and openly shares, its own protocols for both SMPTE 207 (RS-422/RS-485) and Ethernet physical layers. These protocols ensure that every facility, from the smallest to the largest, from manually-operated to fully automated, can be easily configured and controlled for operation with the NV9000 family of products. This software allows any user in the plant to access the database and invoke router operations or query router status. These communications drivers are also written to be compliant with their respective industry standards so that they can be easily ported to future platforms and products as needed.

## Ability to Exploit Open Platforms Rapidly

Recently, Miranda started shipping NV9000-SE, a new version of router configuration software. This software has a brand new look-and-feel. It is the tool used to configure the router control system for customer-specific operations. It is also used to build and manage control panel configurations, tie lines and path-finding behavior.

This software is independent of the database engine that is the operational piece of the control system. In 1998, the NV9000 configuration software was written in HTML. In 2006, it was written in Java. This utility is now completely portable, and runs on any computer, anywhere in the world, at any time. Only an upload is required, on the primary NV9000 System Controller, or over a network connection to the System Controller.

Using Java allowed Miranda to create a very intuitive platform-independent tool for creating a database of equipment, building and managing control panels, configuring routers, defining tie lines, and creating path-finding rules. Because Java-based configuration software operates "on top of" the NV9000 software platform, there is no reliability impact on the NV9000 Control System or redundant operations. The control system software — proven for millions of hours — was left unchanged.

Clearly, using Windows open-market software and PC server technology has provided Miranda and its customers the most flexibility and the best upgrade path in the industry. However, recent changes in technology and customer demands cited earlier have led Miranda to offer another significant improvement in the NV9000 family of products to its customers.

# The Miranda System Controller

## A New Hardware Technology

Recent changes in computer hardware have allowed Miranda to manufacture its own system controller that is compatible with PC-based machines, but affords a higher degree of stability than machines designed for the commercial market. In short, Miranda has used PC-standard components to build an NV9000 System Controller that is not an IBM PC.

This new NV9000 System Controller offers redundant power supplies and dual drivers in addition to an I/O-connection capability specifically tailored to the needs of broadcast customers. Disk drives are industry-standard, and so replacement or repair is more easily accomplished than in the past. Also, disk drives can be either rotating, or managed flash.

In typical use, a larger managed flash drive can provide continuous operational logging, in addition to normal operations, for over 100 years. Compact flash is now large enough to hold the operating system for the controller, or the NV9000 application: CD or DVD drives are no longer necessary.

And since the controller package is designed by Miranda, there is no need to doubt the robust, long-term operational capabilities of this new system controller. Vibration, cooling, EMI, RFI, safety and any other regulatory requirements have been met.

## A New Proprietary Embedded OS

The NV9000 System Controller also uses Windows, but not in the same way as before. It uses an Miranda version of Windows XP Embedded. Windows has become too large, with too many unnecessary features and too little virus protection for many industrial applications. Windows Embedded solves these problems by allowing the operating system to be assembled using only the software modules and features required for the application. Essentially, every embedded XP customer can create their own proprietary operating system with open-market code-base compatibility. This means that Miranda can create a proprietary operating system with a hard firewall.

No third-party applications can be loaded on the system controller. Infecting a controller with a virus is extremely difficult, if not impossible. Network settings can also be controlled so that “out-of-the-box” configuration requirements are minimal and longer-term support is simplified. Miranda’s proprietary System Controller OS is also small enough to fit on compact flash. Upgrades are simplified and backup storage is easier than ever.

## Alternative Operating Systems Considered

Miranda did consider LINUX, among other embedded operating systems. Although LINUX is available from multiple sources, there is no guarantee that any two vendors will provide a product which performs identically. We realized that any operating system that supports the NV9000 would require some level of customization.

Because there is no significant technological advantage or development time advantage for moving to a new operating system, Miranda’s NVISION business unit wanted to protect one of its most valuable assets: device drivers. Re-writing and re-certifying the software would have major implications for communications drivers, third-party protocol support, and most critically, redundant controller management. In addition, NV9000 system controller hardware changes could be more difficult to manage because the verification of BIOS is tightly married to device driver support.

OS stability is a key factor in reducing costs, increasing reliability and guaranteeing that future versions of hardware and software remain compatible. Because Windows XP Embedded is based on the ubiquitous Windows OS, BIOS changes are infrequent, particularly communications drivers. Miranda believes that solving system security issues and guaranteeing future upgrade compatibility are accomplished more effectively, efficiently, affordably, and reliably with a proprietary build of Windows XP Embedded, combined with a proprietary hardware platform.

Processor speed has also increased, so the computing costs associated with running the OS and NV9000 application have been greatly reduced. System controller costs can be kept low and, as network bandwidth increases, so does the capacity to carry more panels and routers per network segment, reducing network count, cabling, and switch costs.

And, once again, because the NV9000 System Controller OS is based on Windows XP Embedded, there are no significant changes to the NV9000 control system application. The experience gained through millions of hours of continuous on-air operations is preserved and exploited for the benefit of our NV9000 customers.

### The Miranda HSMA

Now that we can build the NV9000 System Controller and proprietary OS, we can also offer the best support agreement in the industry: the Miranda HSMA (hardware/software maintenance agreement). This is a three-year agreement which provides not only a complete software upgrade at the end of three years, but a replacement of the system controller hardware as well. Customers who enroll in this plan receive a new system controller every three years.

## Summary

Because the NV9000 system controller's OS is based on Windows® technology, and because affordable hardware platform technology is also compatible with Windows technology, we can actually provide our customers with a solution that lasts well beyond the life of any consumer operating system sold by Microsoft, or any other vendor, or consortium. Our platform ensures that every NV9000 customer enjoys the benefits of the most stable router control system available on the market today, tomorrow, and well into the future.