Application Note

NV9000 System Configurations

Introduction

This document describes several system configurations using NV9000 system controllers.

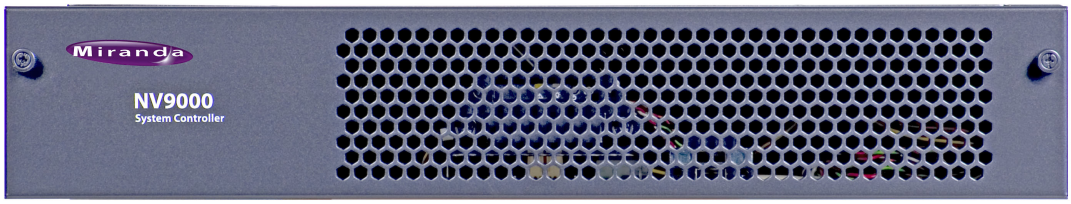

Figure 1. NV9000 (Front View)

Miranda's ES9060 is a stand-alone system (one NV9000). An ES9065 is a redundant system (two NV9000s, coupled).

There is now one choice. There are no longer "LS" or "enhanced" NV9000 system controllers. Each NV9000 is 2 RUs; 4 RUs are required for redundant systems. Redundant power supplies are standard.

Figure 2 shows the NV9000's connectors. Six Ethernet ports are standard. Other connectors (COM ports, for example) are options in the NV9000's expansion slot:

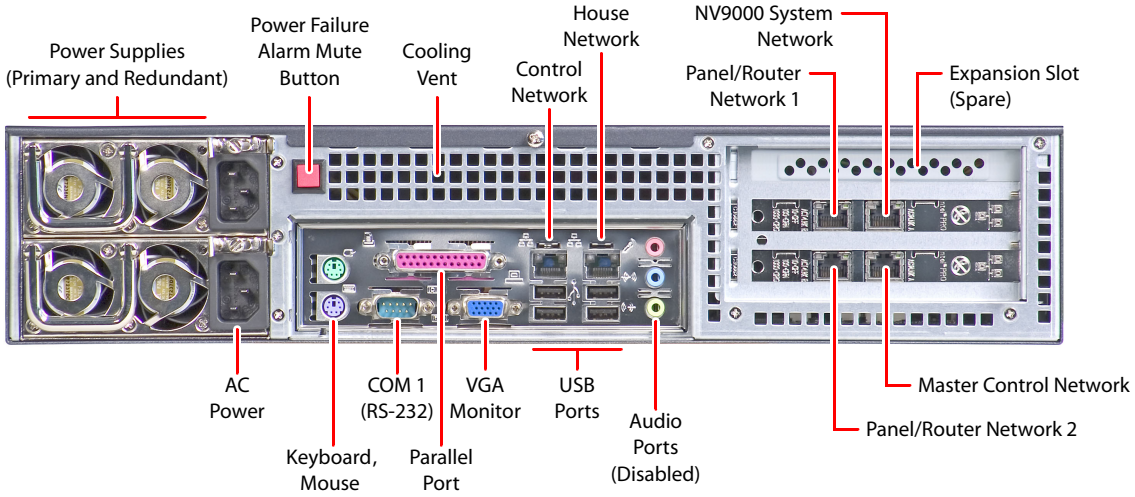

Figure 2. NV9000 Connectors (Rear View)

Their normal use is as follows:

- The *control net* supports redundancy controllers. This is a private network between two system controllers. No other equipment may be connected on this network. A crossover cable is acceptable between the two system controllers.
- The *house net* connects controllers to a public network. It is typically used for GUI control panels and Ethernet interfaces to third-party equipment. No hardware control panels or routers may be connected to this network.
- The *system net* connects multiple NV9000 systems. Some customers want to install multiple redundant NV9000 systems and have the system controllers connected. *Any* panel may control *any* router in the extended system.

- Both of the panel/router nets, 1 and 2, support a combination of routers, hardware control panels, and software control panels (GUIs). It is certainly allowable to have only routers on one network and panels on the other.

  Up to 100 devices (panels and routers) can be connected on a panel/router network. (The limit is *not* 100 devices per *switch*; it is 100 panels per *network*.)

- The *master control nest* connects to master control panels, master control processors (MCPMs), and master control configuration and GUI PCs. Miranda's master control allows control of routers. Router source names can appear on the buttons of a master control panel. The NV9000 obtains master control status which can be used by UMD systems connected to the NV9000 and by on-air GPI tally closures using NV9795-VF tally interfaces.

Some of these Ethernet ports may be used for other purposes. Contact Miranda for details.

Expansion Slot

The NV9000 has 3 PCI expansion slots. One of those slots is a spare slot. Expansion card options include:

EC9412	A 10/100baseT PCI card that adds one Ethernet port.
EC9414	A 10/100/1000baseT PCI card that adds two Ethernet ports.
EC9420	An 8-port RS-232/422/485 PCI card with DE9 breakout box.
EC9422	A serial "Y" cable (the same as a WC0137) for use with an EC9420 card in a redundant NV9000 system. One cable is required for each serial port.
EC9421	An external 1RU Ethernet-to-serial converter that has 16 RS-232/422/485 ports.
EC9423	An external 1RU Ethernet-to-serial converter that has 32 RS-232/422/485 ports.
EC9424	A serial "Y" cable (the same as a WC0153) for use with an EC9421 or EC9423 converter in a redundant NV9000 system. One cable is required for each serial port.

(Miranda also offers unmanaged 3-COM 24-port Ethernet switches. The part number is EC9415)

These parts are discontinued and no longer available:

EC9409	An 8-port RS-422 card with cable and DE9 breakout box.
EC9414	A 10/100/1000baseT card that adds two Ethernet ports.
EC9416	A 32-port RS-422 card with cable and two 1RU breakout boxes, each having 16 RJ-45 connectors.

System Configurations

Following are 5 sample system configurations.

All 5 examples have redundant NV9000 control systems. If you are interested in only non-redundant systems, just ignore one of the system controllers and any connections to it, including the second Ethernet switch in a pair.

All 4 examples use unmanaged Ethernet switches.

Example 1. Single Panel and Router Network

This is the simplest (redundant) system. A single network is used for hardware control panels and routers.

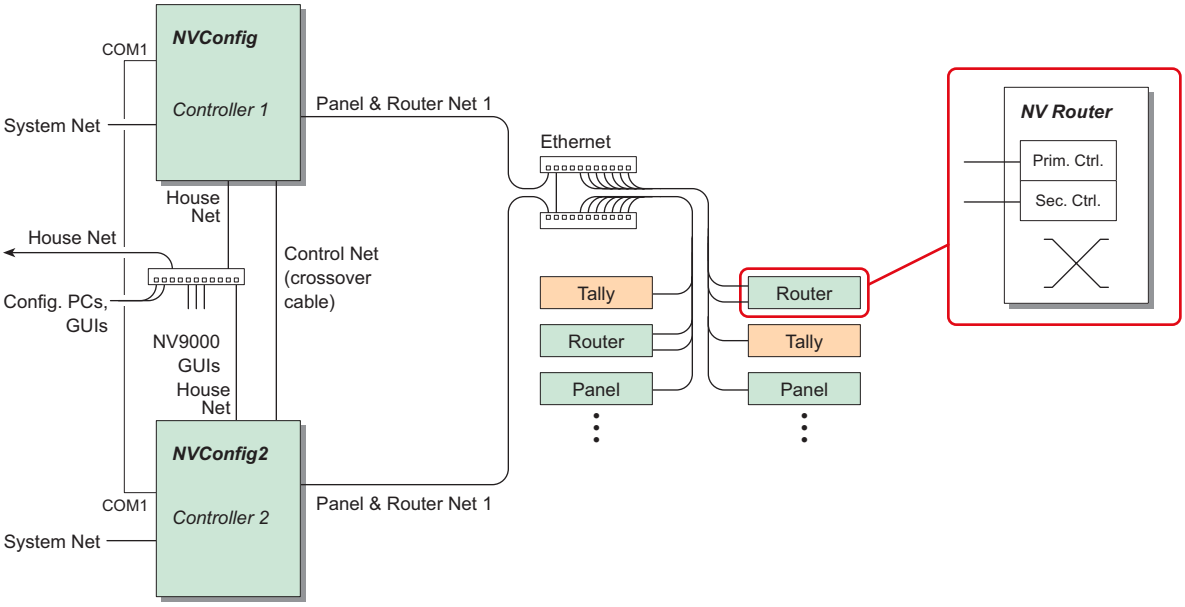

Figure 3. Basic Redundant System, Single Network

The example in Figure 3 includes the following:

- Dual NV9000 system controllers. (Each has redundant power supplies.)
- Dual networking.
- Dual wiring.

The router frames provide additional options:

- Dual router control cards.
- Dual router power supplies.
- Dual router reference signals.

A pair of Ethernet switches provide main and backup networks between the NV9000 system controllers and the router frame control cards. The switches are cross-connected. Either NV9000 system controller can communicate with any control card in any router frame.

Dividing control panels between the switches reduces the number of panels affected by loss of a single switch. Simpler systems might use just one switch, with reduced redundancy.

The NV9000 system controllers use DHCP to assign IP addresses to control panels. Router frame control cards have static IP addresses.

Example 2. Separate Panel and Router Networks

Example 2 an expansion of example 1. It isolates panels and routers on separate networks. (Such isolation is not essential.) This might provide a more robust configuration than example 1 because the router network is isolated from the panel network which might extend all over your building.

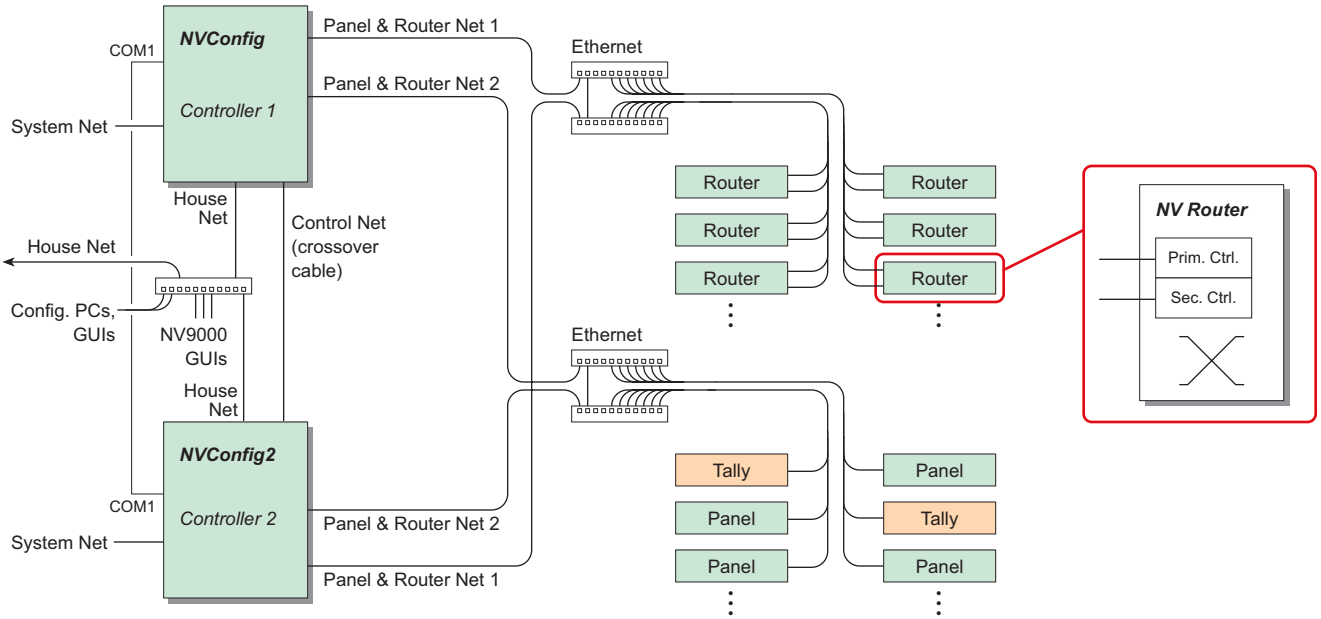

Figure 4. Basic Redundant System, Dual Network

Figure 4 also shows 2 Ethernet switch pairs, one for each network.

As an alternative, customers may use a managed switch that provides all the network ports required, rather than use several independent switches. The managed switch must be partitioned into VLANS (virtual networks) to perform the functions of the independent switches. Miranda can provide the details of networking protocols and ports to be configured within the managed switch.

Example 3. Integration with Master Control using Direct Master Control Inputs

Example 3 adds two master control processors (MCPMs) in a single NV5128-MC frame to the configuration in example 2. The master control subsystem accepts both direct inputs and router inputs. Router destinations supply router sources to master control. The router sources are not connected directly to the NV5128-MC frame.

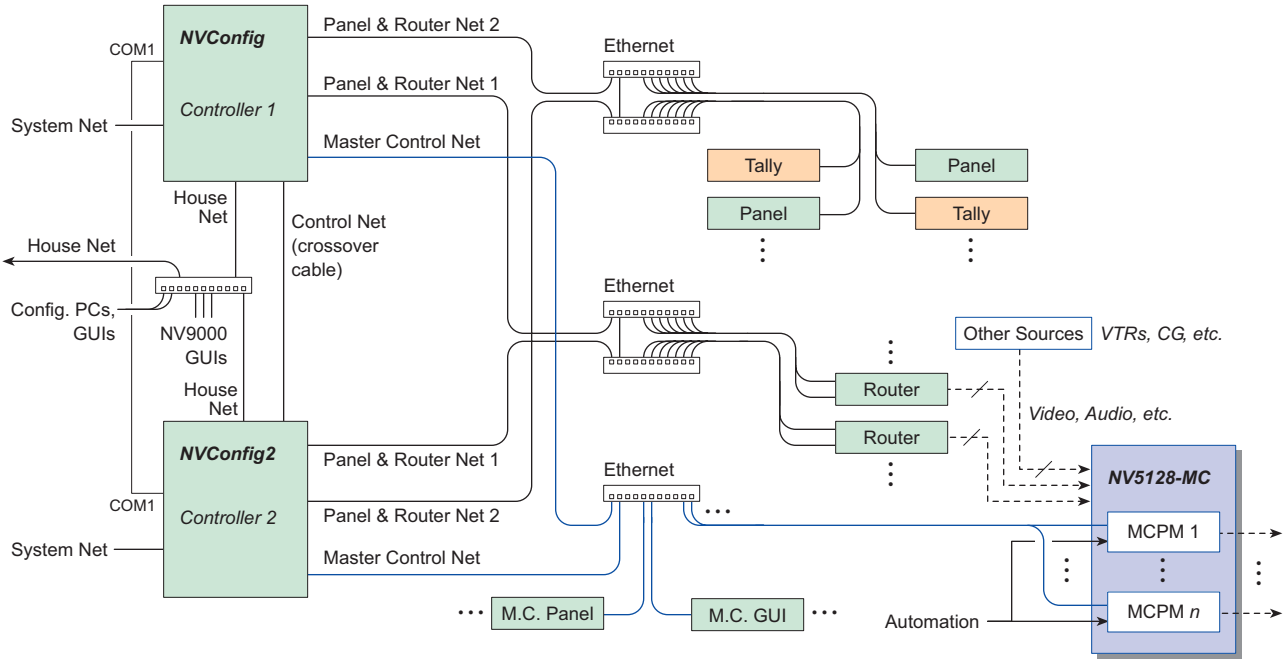

Figure 5. Two Panel and Router Networks and Master Control

The master control network connects the master control processors, master control panels, NV9000 system controllers, and master control GUI and configuration PCs. (A master control configuration PC can also be use to configure the NV9000 and its control panels.)

Although Figure 5 cannot show it, the connection from master control to the NV9000 provides the following functions:

- A master control panel can control the router destinations that are feeding the master control switcher as inputs. Important master control inputs are connected directly to the master control frame, whereas the router supplies less frequently used sources. Router source names appear as button legends on the master control panel.

  The operator performs a router “take” at the master control panel that connects the router source to the router destination feeding the MCPM. The take will occur on one or more levels, depending on the routers present and the nature of the video and audio signals.
- A UMD system can obtain master control source status information for UMD displays. The UMD may then display the master control sources’ names, whether they are router sources or directly connected sources.
- The NV9575-VF tally interface provides GPI contacts for on-air tally. This device provides on-air tally closures for both router inputs and master control inputs. Each NV9575-VF has 64 GPI outputs that support several master control channels.

Example 4. Master Control with Routers Supplying Master Control Inputs

Like example 3, example 4 has a master control subsystem, but in this case, it uses the router's crosspoints for the "A" and "B" buses. Figure 6 looks exactly like Figure 5 (of example 3), but the system operates very differently.

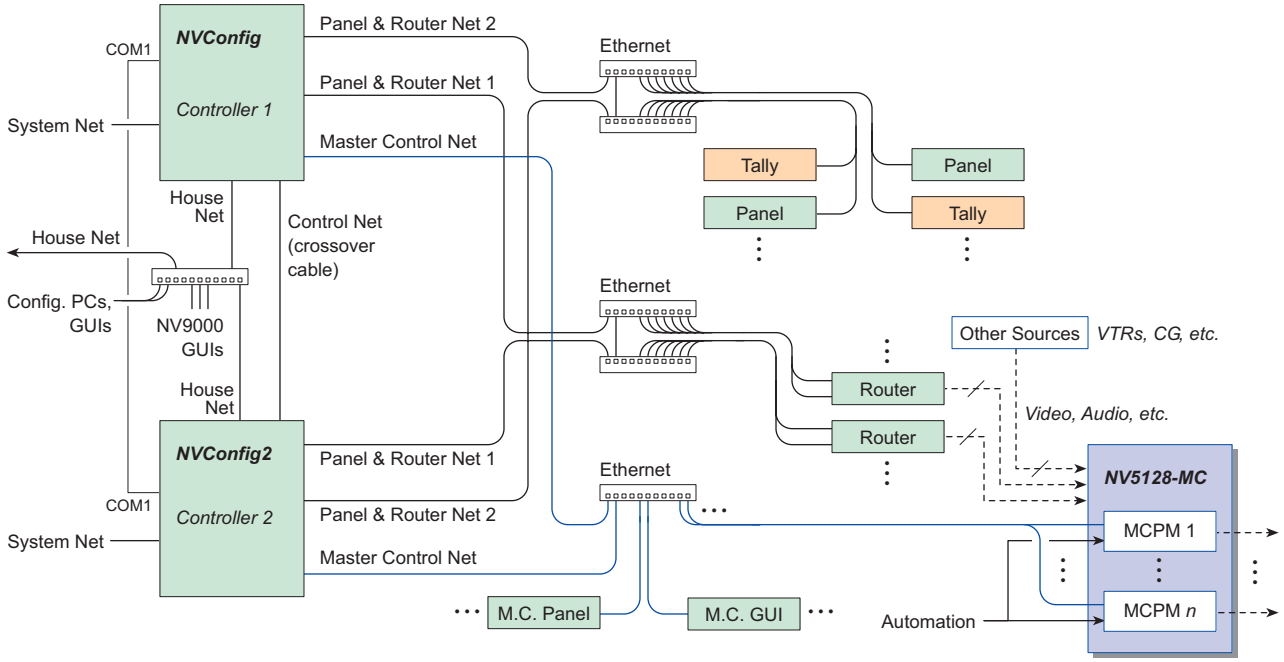

Figure 6. Two Panel and Router Networks and Master Control

In example 3, the router is not the primary supplier of video to the master control switcher. There, the most frequently used inputs are those connected directly to the NV5128-MC frame. The router supplies less frequently used sources as "pre-selection" inputs. The master control subsystem is relatively independent of the router.

In contrast, example 4's master control subsystem relies on the router for the majority of its sources. Other router outputs provide key signals and squeeze background inputs if they are needed. Additional sources can be connected directly to the NV5128-MC frame and would not be dependent on the router. These sources could be from the network, commercial servers, and a news studio.

Master control offers a range of dependence on the router, from none to complete. Miranda also supports hybrid configurations that provide source protection.

Example 4's connection from the master control to the NV9000 has these characteristics:

- A master control panel has a large measure of control over crosspoints in the router. If needed, router destinations can be used for keyer sources nd squeeze backgrounds inputs.

  As with router pre-select, router source names appear as source button legends.
- A UMD system can display information about the router sources feeding master control switcher.
- On-air tally GPI contacts using NV9575-VF tally interface. One NV9575-VF can support several master control channels. The NV9575-VF also provides on-air tally for router sources.

Example 5. NV9000 Controlling a Third-Party Routing System

Example 5 is a variation of example 1 with the NV9000 interfacing to an existing third-party router control system.

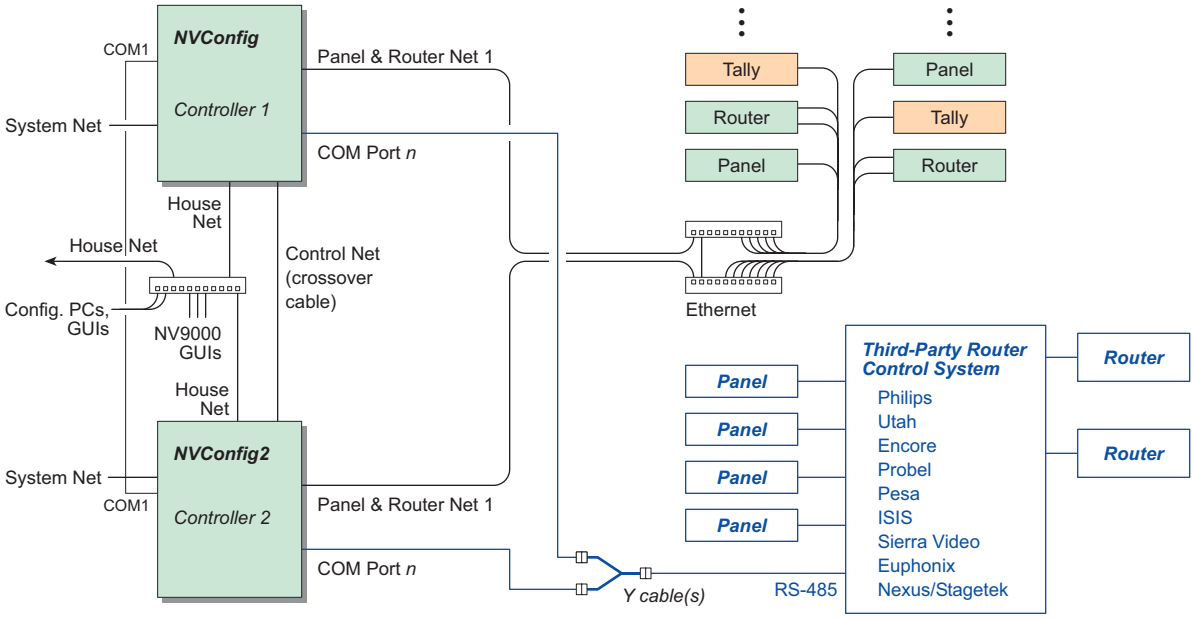

Figure 7. Third-Party Routing System

Miranda's NV96*xx* control panels control all routers. Third-party control panels control only routers connected to their router control system.

Figure 7 shows connections for automatic RS-485 switching between the main and backup NV9000 system controllers.

Conclusion

We have shown examples of the flexibility of our routers and master control system. Miranda can offer other system configurations to meet your requirements. Please contact your Miranda representative or Miranda system engineering directly for your detailed design.

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