Application Note

Routing and Master Control Integration

Introduction

This document presents many of the advantages of router and master control integration.

This document describes a system that is installed in a network master control center. The center feeds the network from the west coast and provides disaster recovery relief protection for the east coast network operation. This installation has two master control processors configured with identical inputs. One channel provides redundancy for the other. The two channels can also operate in parallel but with different commercial inserts.

Many of the integration features presented here show the flexibility of Miranda products. This system may have items of interest for your new master control and routing system. (The system illustrates just one of many ways to build a master control system.)

The System

The system centers around two NV5128-MC Master Control switchers (with SD processors), coupled with an NVISION series multi-format router.

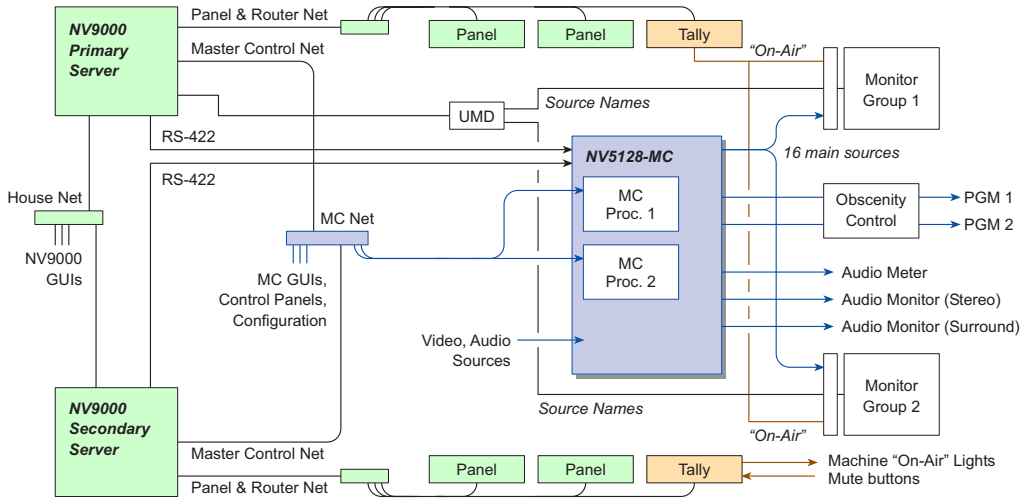

Figure 1. Overall System View

The master control processors are installed in a single NV5128 frame. An NV5128 frame may contain a 128×128 router, master control processors, or both. All of the 128 inputs on the frame are available as inputs to the master control processors and to routing. The 128 outputs are available to the router.

In general, audio for each input can be AES, analog, or disembedded from the input video. This system uses embedded audio in all main sources.

In addition to the 2 master control processors (2 slots each), the NV5128 frame uses 5 SD input cards, 2 SD output cards, 2 AES input cards, 2 AES output cards. Each card provides either 16 inputs or 16 outputs. The NV5128 frame also has 2 router control cards for redundancy.

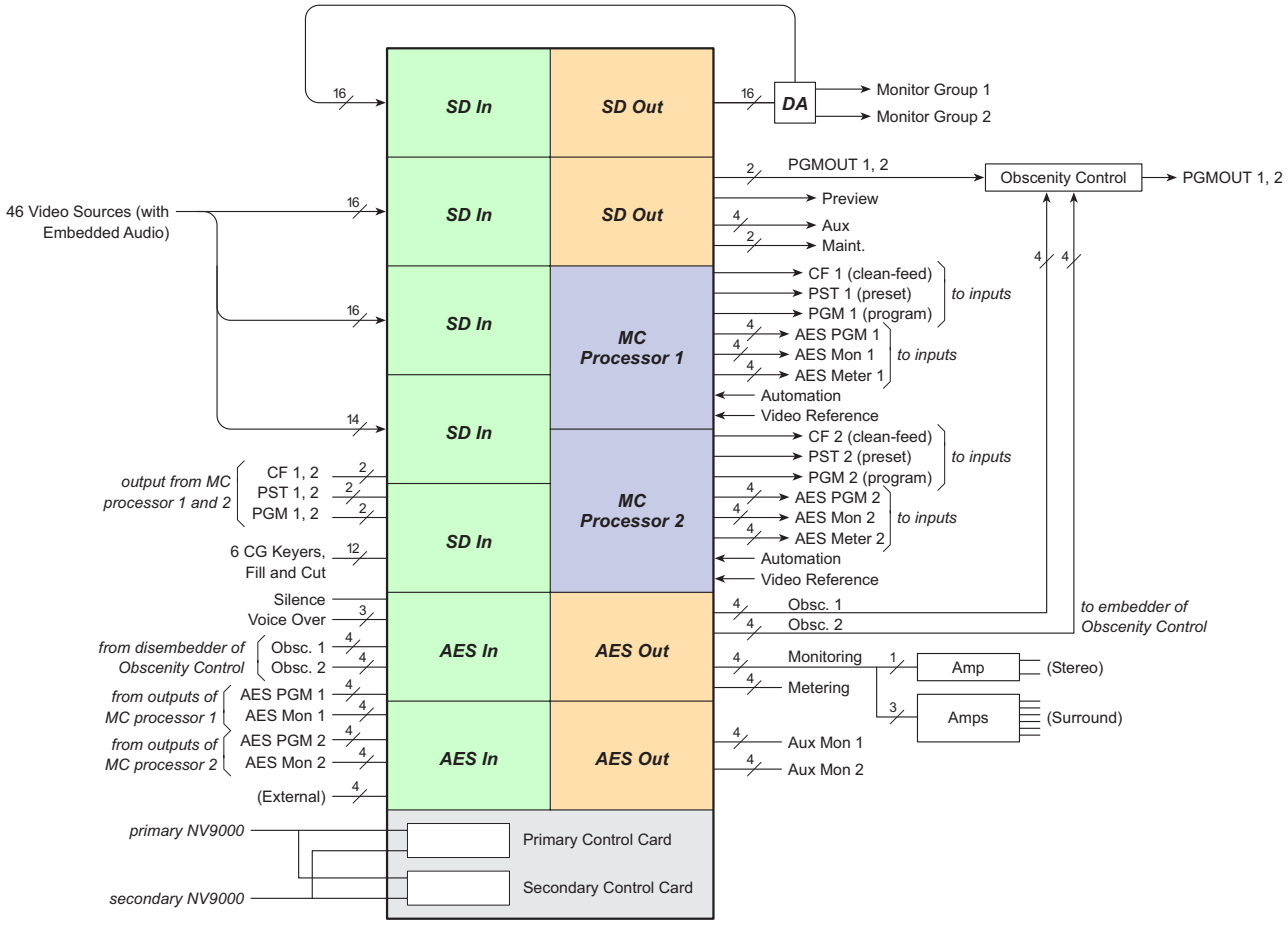

Figure 2. NV5128 Utilization

Pre-Selection Routing

The system uses a 46×16 SDI router matrix installed in the same frame as the master control processors. This allows pre-selection of 46 sources into 16 master control (MC) inputs, which are mapped to the 16 buttons on the MC control panel. The 16 SD router outputs are connected back into 16 additional SD inputs on the same frame. The advantage of such re-entry is that a video DA feeds the signal back into the router and into the monitors at the same time. Whenever a signal is routed into a MC main source (i.e., an MC button), the corresponding monitor also receives the routed signal. The MC operator becomes accustomed to the relationship between the picture position on the monitor, button position on the panel, and the UMD and button source naming matching. The monitoring system drives two large multiplex monitors used as the monitor wall. Each of the 16 master control inputs has a corresponding display in each of the multiplex monitors. The multiplex monitors also have 2 larger displays for program and preset video.

Router Source Naming

An NV9000 router control system is connected the MC switcher. The MC operator can control the 46×16 router matrix from the master control panel's touchscreen. The operator can route any of the 46 sources into

any of the 16 MC buttons. The video automatically appears on the monitor in the display system and the audio is reproduced on the audio meters and monitors.

The buttons on the master control panel have LCD readouts that display the source name. The source name is imported from the NV9000 when a route is made.

On-Air Tallies

The NV9000 provides extensive tally functions. Miranda's NV9575-VF tally interfaces provide relay outputs that drive the on-air inputs in the monitor system. (Small red "on-air" indicators light within each picture on the monitor system.)

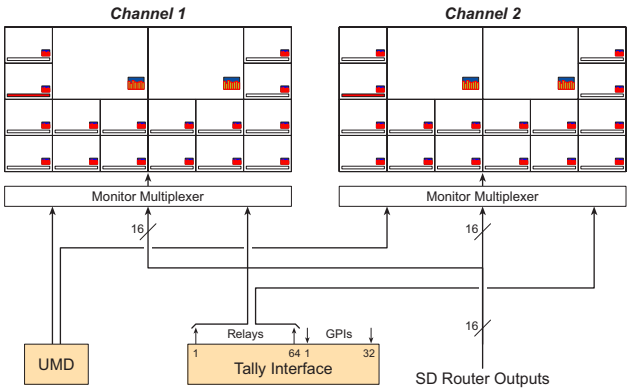

Figure 3. Monitor System with UMD and On-Air Tally

The system is dual: it has two master control channels, two control panels, and two monitors. The two channels are typically slaved together, but they can also operate independently. The NV9575-VF tally interface provides two sets of 16 outputs that interface to the two monitor systems. The first group of 16 outputs provides on-air tallies for the 16 buttons on channel 1. The other group of 16 tally outputs is for channel 2. Each channel's display system has the correct on-air tally for each on-air source.

Another level of the tally system provides an on-air tally that is lights at each source machine when the source is on-air on either channel. The machine operator knows that the machine is on-air, but doesn't know which channels the machine is feeding. The important thing: don't touch this machine!

UMD Source Naming

The multiplex monitor system supports under-monitor displays (UMDs). The monitor system interfaces to the NV9000, which provides the source name for the UMD.

Master Control Program Bypass Path

The program and preset outputs of the two MC processors feed back into the routing section of the frame. Two router outputs feed the final channel 1 and 2 outputs. The control panels for these destinations are configured with the 16 MC sources along with the program and preset outputs for each channel. This allows either MC processor to feed either or both of the channels as final program outputs. Alternatively, the outputs may be fed directly from the 16 MC primary inputs and completely bypass the master control processors within the frame.

Auxiliary and Maintenance Buses

Four additional router destinations feed the installation's auxiliary bus. The bus is configured to select any of the 16 inputs and MC processor outputs, 22 inputs in all.

Two maintenance buses are also configured to "see" all 80 video sources.

Keyer Source Routing

Each of the 2 MC processor has 3 keyer "layers," each having fill and cut inputs. The key inputs are taken from the overall input space on the frame. The installation has 6 character generators (CGs). The system routes any of the 6 CGs into any of the 6 keyers. (The maintenance buses can "see" the fill and cuts from all of the CGs.)

Summary of the System

Video Routing

This installed system has the following video features:

- 46×16 router pre-selection into the 16 master control main inputs.
- 22×3 program and preview switching.
- 22×4 aux buses that "see" the 16 main outputs and each channels' program and preset outputs.
- 80×2 switching for maintenance buses that "see" ***all*** of the inputs on the frame.

As a plus, there are 7 unused router destinations!

Audio Routing

This installed system has the following audio features:

- This system uses embedded audio. The monitor system supports in-picture metering of each of the 16 MC source inputs.
- The MC processors each provide 8 channels of audio processing and embed audio (in AES groups 1 and 2) on the program, preset, and clean-feed outputs. On-screen metering obtains audio from these outputs.
- Of the 8 audio channels used in this system, 2 channels are for stereo and 6 channels for surround sound. Two separate monitors support stereo and surround sound.

  The SD master control processors provide discrete AES outputs: 4 for program output and 4 for monitor output. These signals, from both channels, feed into an AES routing level within the frame to provide switching for monitor speakers and meters.
- The router control system maps AES 1/2 as a stereo level, and AES 3/4, 5/6, and 7/8 as a surround sound level. An NV9604 router control panel is configured to allow easy selection of the audio channels for monitoring and metering.

Audio Overs

Each MC processor has two audio-over (a.k.a. voice-over) inputs, taken from the overall 128 input space of the frame. Audio-over inputs are not embedded. This system includes 3 AES cart machines that deliver audio overs.

Obscenity Control

To protect the final program output from obscenities, or other malfunctions, a delay is provided downstream of the router. The system, as currently designed, protects only the audio with a mute operation. Video protection might now be available.

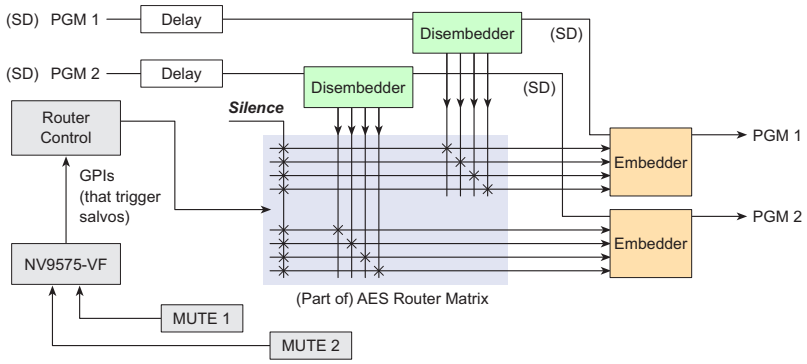

Figure 4. Obscenity Control

The embedded audio signals are delayed. A disembedder extracts the audio from the outgoing video signals. The facility's censor can press 'mute' buttons that are connected as inputs to the NV9575-VF tally interface. When a mute button is pressed, a salvo executes, and the router switches to silence. When the mute button is released, another salvo switches from silence back to the embedded audio.

An embedder embeds either the program audio or silence into the program output. The NVISION series' disembedders and embedders provide embedding for up to 16 channels. The disembedders and embedders maintain AES phase relationships, which is very important when using multiple audio channels for surround sound.

Control Panels

The system uses 2 MC control panels. Either panel may control either or both of the MC channels. The 2 channels may be ganged together and switched from one control panel. Two software control panels (GUIs) are used in the control room as channel status displays. A third GUI is located in the rack area for control of the system during setup or maintenance.

Ethernet connects router control panels to NV9000 servers, connects MC control panels and GUIs to MC processors, connects tally interfaces to the NV9000, and connects the NV9000 to MC processors. The router networks and the MC networks are isolated from other networks to ensure that system performance criteria are met.

System Redundancy

System redundancy and elimination of "single points of failure" should always be important considerations of system design. This system provides the following:

- Dual MC processors that operate independently or that can be slaved.
- Dual control panels with additional GUIs for redundancy.
- Each MC processor provides control isolation for both manual control and automated control.
- The router buses can bypass MC.
- Redundant NV9000 servers perform automatic switchover (failure protection).
- Redundant router frame controllers can perform automatic switchover.

The primary NV9000 server connects to the both internal router control cards and the secondary NV9000 server connects to the both internal router control cards.

- Router control panels are “split” across two networks with two hubs. A hub failure does not affect all of the control panels.
- Dual power supplies in the NV5128 frame. Dual power supplies in MC control panels.

Conclusion

We hope that this example provides some interesting ideas for you to use in your system. The heart of the system is one 8RU frame that includes: 2 master control channels, MC sources, key signals, bypass, monitoring and metering, and multi-format routing all in one frame.