Achieving full redundancy in automated control room installations

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Broadcast engineers tend to be a risk-averse bunch ...

No one wants to be the person who has to explain to the CEO why your station went off air!

Reliability and redundancy planning is a fundamental part of broadcast engineering
The traditional way to have a fully redundant control room ...

Is to have two of them!
But that’s not very efficient

• Double cost of all the equipment
• The space itself is expensive
• Keeping all hardware and software revisions synchronized is a pain
• If the backup control room is true “hot standby”, then everything needs to be powered on – so add in extra power and A/C costs
• Moving all the people from one control room to the other is a bit of a fire-drill
• And there’s a good chance that the problem with the main room will be resolved before everyone gets situated in the backup room!
• In general, modern broadcast equipment is more reliable than it was in years past

• The move to Newsroom Automation presents some challenges
  • One central system that controls everything can be a single point of failure
  • Very risky if not done right

• But, if the system is architected properly, it can actually provide higher reliability than a non-automated control room!
First off ... power

• Dual power supplies aren’t only to protect against failure in the power supply itself

• The secondary power supply for each piece of equipment should be on a completely separate circuit
  • Maybe even a completely separate feed from the power company
  • Coming in on the opposite side of the building (in case of a rogue backhoe operator ...)

• Ideally, the secondary circuit should be on a battery/generator backup
  • Battery should have capacity to last long enough to bring generator on-line
Implementing a Fully Redundant Control Room Using Automation

• The automation system needs to be designed from the ground up with a fully fault-tolerant architecture in mind

• Here is an example of one way to do this ...
Automation Clients:

Automation Servers, Main and Backup:

Devices under automation control, such as:

- Video Clip Playback Server
- Video Switcher
- Audio Mixer

Newsroom Computer System Main and Backup
IP connected devices

Automation Servers
Main and Backup:

Network Switches:

Devices with two Ethernet ports:
RS232/422 connected devices

Automation Servers
Main and Backup:

If the device has two serial ports, one connects to the main Automation Server and one connects to the backup.
RS232/422 connected devices through IP

Automation Servers
Main and Backup:

Network Switches:

MOXA CN2650:
Moxa CN2650, IP to RS422 terminal server (supports dual network/dual power supply)

Usage:
- If device only has one serial port
- If device is a long distance from servers
- Great for Virtual Server installations
MIDI connected devices

• Lighting desks and Yamaha audio mixers use MIDI control

• MIDI card or USB to MIDI converter cable for both Main and Backup automation server
  • MIDI MERGE for redundancy
  • Limited to short distances

• Better solution: Terminal Server for TCP/IP to MIDI
  • KISSBOX MIDI2TR is a good choice
  • Long distance solution
  • Again, works great with Virtual Servers
If properly implemented, the system should be able to “hot switch” between the main and backup automation server very quickly

• Ideally in less than one second
• Full control over all equipment transferred in less than three seconds

But you are still at-risk from a failure within each device:

• Video server
• Graphics engine
• The video switcher itself

Here’s how you can handle that ...
Video Servers

• Of all the devices, video servers are probably most failure prone

• The automation system should be able to “mirror” server channels for playback
  • Not just A/B/C/D roll but A2/B2/C2/D2 roll as well
    • Preferably with server channels on different chassis
    • Bonus points if it can mix and match video servers from different manufacturers

• A good automation system can “scrub” through a clip in preview to ensure that the right clip is cued up and ready to go
  • Can’t rely on seeing just the first frame (which might be black)
  • Switching to the backup server group should be near instantaneous
  • The operator should be able to spot any issue and select the backup channel BEFORE the clip goes on-air

• The automation system should re-map audio faders and video crosspoints on the fly, so the operator doesn’t have to do anything different in running the show
Video Switcher

• Modern video switchers are very reliable – but failures do happen occasionally

• The automation system should be able to “shadow switch” crosspoints on the router
  • Every time you take a source on the switcher, the same source is selected on the router backup output
You don’t get chroma keys, transitions, or DVE 2-Boxes on the backup ...

But you stay on air!
Backup for Automation Client UI

Automation Clients:

- Main and Backup client PC
- Two stations in control room, or good KVM
- Additional client PC’s can run in engineering, or even out with journalists
  (browse mode, but able to take over operation at any time)

Network Switches:

Automation Servers, Main and Backup:
This type of installation provides

• A fully redundant control room with a true “zero point of failure” architecture
• A smaller footprint than even a traditional/non-redundant control room
• A control room that can run any size/type of show with one to two people, rather than five to ten
• A higher quality/more consistent newscast with less on-air errors
• Far lower operational costs