

# PRACTICAL STRATEGIES FOR EFFECTIVE REMOTE PPM™ MONITORING

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## ABSTRACT

As the Arbitron® PPM rollout continues, more engineers are considering the problem of remote encoder monitoring. If the PPM encoding monitor detects a failure, who will find out? What corrective action can be taken? And will stations be able to accurately report the duration of any encoding failures? This paper discusses advantages and disadvantages to the most common approaches for monitoring PPM encoding. It outlines industry best practices for monitoring encoders, preempting failure, and notifying response personnel of all activity. Engineers, managers and program directors can use this knowledge to not only avoid encoding loss, but also to minimize both the upfront and hidden costs of implementing a remote monitoring plan.

## WORSE THAN SILENCE

In an Arbitron PPM market, silence is no longer the station's number one enemy. A loss of PPM encoding can spell ratings disaster for a station unequipped to detect and recover from the failure. And to make matters worse, the failure is silent. Your on-air product sounds great whether it carries your station's PPM code or not, so your phones won't light up with upset listeners when encoding is dropped. Nonetheless, as far as the PPM system is concerned, your station has just signed off.

The front panel LEDs on the Arbitron encoders and on the encoding monitors provide a good visual cue to station personnel should an encoding failure occur, but in the case of unattended studios, it is unlikely these LEDs will prompt quick action. The encoders have key-controlled switches so the units may be manually placed in bypass mode, but often the encoders reside at the transmitter location, where access can be a problem.

This predicament is familiar to just about anyone tackling a PPM rollout. Less obvious, however, are the options available to monitor the PPM encoders remotely and make sure your backup encoder comes on at a moment's notice.

## MONITORING AND CONTROL BASICS

Let's start with the first part of the problem: monitoring the encoders. For each encoded program, Arbitron supplies an encoding monitor that, when supplied with a source of off-air audio, will indicate whether the program is encoded. The rear-panel alarm output is the most direct way to avail the encoding status to a remote monitoring system. The D-connector breaks out easily to a standard remote control input, so any remote control will indicate whether we're encoding.

Separate from the encoding monitor, the PPM encoders themselves have the ability to self-monitor. If an internal error occurs, the unit will switch to bypass mode on its own, and the rear panel bypass monitor output will let a remote monitoring system know what happened. Used in tandem, the outputs on the encoder and the monitor provide redundant alerts to let us know when we're not encoding. Keep in mind that the encoding monitor, since it's connected to off-air audio, is the more informative of the two alerting mechanisms.

When devising a means to supply off-air audio to the encoding monitor, keep in mind one very important caution: inadvertently changing the audio source channel selection will cripple the PPM monitoring system. The most insidious scenario occurs when the newly selection station happens to be one that you are also encoding. Depending on whether the monitor is programmed for multiple stations, it may not report an encoding error in this case. This results in a false-positive indication that the monitored station is encoded. Proper labeling of equipment and good training practices are the best prevention against this outcome.

Now for the hard part: once we know there's been an encoding failure, what do we do about it? If we've connected both the monitor and the encoders to our remote control, now we can get a phone call or email to tell us we're no longer encoding. That helps, but it still means someone must drive out to the encoder boxes to switch over to the backup encoder. In the meantime, your station is silent when it comes to ratings measurement.

Devising a means to automatically toggle from the primary to the backup encoder is the solution here.

However, the encoder does not accept a contact closure to switch into or out of bypass mode. A simple approach would be to use a remote control relay to cut power to the primary encoder and energize the mains on the backup encoder. Depending on the remote control, this may not work if the encoders aren't co-located with the encoding monitor. More significantly, though, the 120V circuits exposed on the remote control interface panels could make for an unwelcome surprise down the road.

Fig. 1 shows a way around this problem. Instead of deploying a primary encoder that runs in encode mode and a backup encoder that runs in bypass mode, consider feeding audio to both encoders and running them both in the encode mode. Then, downstream from the encoders, install an audio switch to govern which encoder's audio output goes to air. Most remote controls have programmable logic so that you can program the unit to monitor the encoder status and control the audio feed as appropriate.

A final recovery option is to consider using Ethernet-controllable power outlets to manually or automatically switch power from one encoder to the other. These are available as stand-alone products with embedded web servers, or as devices that integrate with traditional remote control. If using a stand-alone controller for this approach, a significant drawback is that coordination with the remote control system – if it's even possible – adds a level of complexity and a new point of failure that can invite a breakdown of the system.

## TRADITIONAL REMOTE CONTROL

So far, we've discussed how traditional transmitter remote control interfaces with the Arbitron PPM equipment. It can be tempting to look at the handful of spare remote control channels at the transmitter site and sketch out a monitoring scheme that will work within the confines of that extra capacity. But when it comes to engineering a PPM monitoring and recovery system that truly protects the station's encoding, the back of

your remote control relay panel isn't an ideal place to start.

Indeed, there are advantages to using transmitter remote control equipment to monitor the PPM system. For one thing, the technology is familiar to just about any broadcaster. An experienced engineer could connect the Arbitron equipment to an off-the-shelf remote control system without even cracking the manual.

Today's remote control systems also offer a great deal of flexibility in terms of alarm notification options, including email, SMS and telephone notification. Selective alarm dialout can be employed to make sure PPM alarms are directed to designated individuals, while RF or facility alarms are pointed elsewhere. In fact, it's not out of the question that email alerts and mobile web access could replace the urgency of a telephone interface. With an automatic recovery system in place, telephone notifications may not even be desirable.

Finally, installing remote control equipment for PPM monitoring opens the door to additional remote management applications at the studio. Studio facilities, despite most of them running unattended for some significant portion of each day, are surprisingly underrepresented in the realm of broadcast remote control. If PPM monitoring will involve a remote control system at the studio, this is an ideal opportunity to add temperature and security monitoring to rack rooms, server closets and other critical spaces, or to enhance the station's means to remotely recover from a failed automation PC or other interruption.

## Working With Logic

Despite these obvious benefits, utilizing a transmitter remote control system to monitor PPM encoding has significant drawbacks that must be weighed. A significant amount of logic programming is needed to automatically manage the primary and backup encoders for each audio path. This alone shouldn't close the books on using remote control for PPM, but it is critical

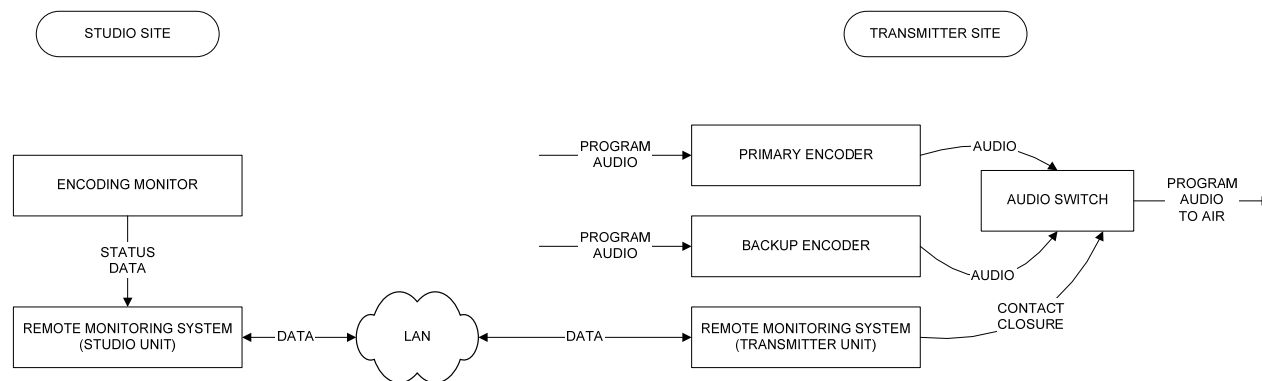


Fig. 1. To circumvent controlling the encoder mains with 120V relays, consider running in "hot standby," where program audio is fed to both encoders and the remote monitoring system works in concert with an audio switch to determine which encoder's audio path goes to air. It is also possible to connect the encoder units' status data to the remote control for redundancy.

that all possible modes of operation are considered before going live. After switching from a primary encoder to a backup encoder, what must transpire in order for the system to switch back to the primary? Will the remote control test the backup encoder state first, or will it switch blind? Are there scenarios that might cause a logic loop, where the remote control indefinitely jogs from one encoder to the other? What happens if both encoders report an alarm condition? Programming a remote control to manage PPM encoders requires foresight to plan for the unexpected.

### Multi-Site Coordination

Another hurdle in managing PPM with traditional remote control is the likely need for multi-site coordination. While most remote control platforms are billed as “multi-site,” this generally means that the accompanying PC software can display multiple locations on the same computer at once. If a PPM installation involves an encoding monitor at the studio location and encoders at one or more transmitter sites, what we really need is a site-to-site remote control platform: a system that can monitor conditions at one location (i.e. the encoding status at the studio) and issue commands to a remote location (i.e. the encoders at the transmitter site).

Even if all equipment is co-located, the distances between each Arbitron unit may render a single-site remote control inadequate, regardless of its channel capacity. IP-based remote control systems can help to mitigate this limitation. Ethernet-based I/O modules are now on the market, allowing a remote control system to collect telemetry via IP in lieu of running remote control wiring throughout the plant. This makes it much easier to manage equipment in widely segregated areas of the facility.

### A DEDICATED SOLUTION

While there certainly are viable means to use typical transmitter remote control for PPM monitoring, the inherent limitations point to the need for a dedicated solution. Such a solution must handle status inputs from the Arbitron boxes but also toggle between primary and backup encoders without wiring 120V circuits. It must also offer an effective means to log and report on encoding conditions.

The technology at play in a dedicated solution brings several advantages to the table. In a single-purpose box, status from the encoders and monitors can directly drive built-in 120V outlets, effectively toggling primary and backup encoder selection. This is the Arbitron-recommended method to manage encoders, shown in Fig. 2. For installations where “hot” standby encoders are in use, however, control over the encoder mains is unnecessary. Encoder selection is instead driven by a latching relay connected to an audio switch. Again, a dedicated PPM solution unites encoding status with primary/backup selection in a far more efficient way than using separate remote control units or manual switching.

Deploying a dedicated solution also diminishes any geographical issues. In our approach, we chose to separate the monitoring functions from the control functions, developing a two-box, Ethernet-based package. This makes it simple to install the monitoring portion at a studio or other monitoring point, and the control portion at the encoding location.

We were also able to incorporate the RS-232 port on the Arbitron monitor so that we know whether the encoders are configured with the correct station information. A typical remote control system will be unable to make use of this data, while a dedicated PPM monitoring solution can use it to assure broadcasters,

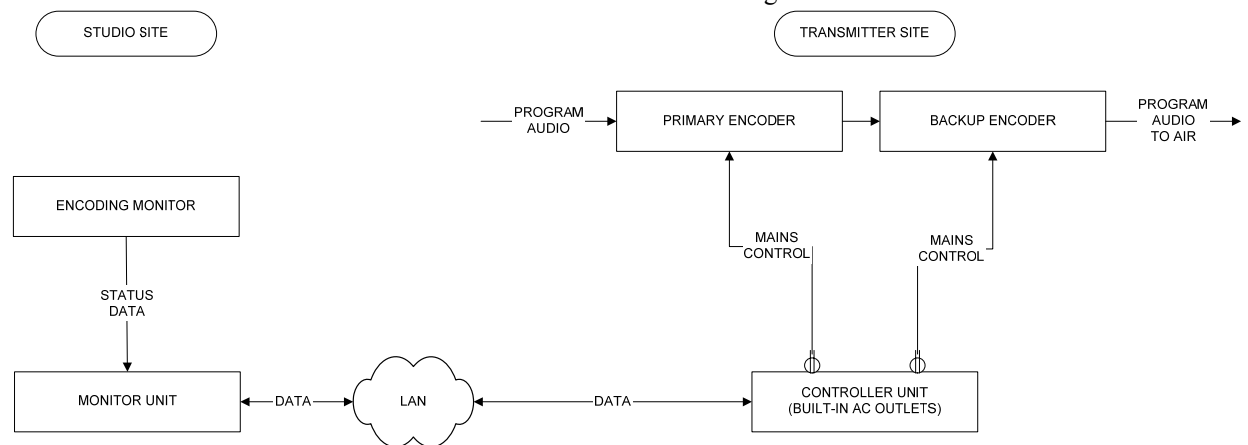


Fig. 2. A dedicated PPM monitoring solution can be configured to operate encoders in “hot standby” mode or, as shown in the diagram, using direct control of the encoder mains. Built-in AC outlets avoid the problems associated with 120V relay wiring. Encoder status data may also be brought into the controller for redundancy.

especially in consolidated studios, that the correct encoders are attached to each program's air chain.

The bottom line is that broadcasters must evaluate options carefully. Home-brew solutions that adequately account for the particular challenges of PPM monitoring may be appropriate for some broadcasters. On the other hand, the hidden costs of supporting and maintaining such a solution may be a decisively negative factor. Deploying new technology, such as the dedicated PPM monitoring solution described here, imposes some degree of learning curve, but may result in a more complete solution to the problem at hand.

## **BEST PRACTICES**

To help broadcasters start the planning process, we've outlined a few best practices for remote PPM monitoring.

### **Emphasize Recovery, Not Monitoring**

It's fairly straightforward to link the PPM encoding monitor to a remote control, but the value in monitoring in the first place is so that an encoding error can be quickly resolved. Start by considering the method by which you will recover from an encoding error, and this will help define the status data needed to activate that recovery plan.

### **Use Remote Control Logic Carefully**

Modern remote controls boast powerful onboard processing, but it is critical to think through every scenario. Open up Visio or use pen and paper to draw a logic map. Each possible equipment state should be accounted for, and there must always be some means to end a loop condition. A dedicated PPM monitoring solution will have built-in logic that has already sidestepped the pitfalls.

### **Integrate Silence Monitoring**

The importance of monitoring silence along with PPM encoder status cannot be overstated. If you're broadcasting silence, then you are not encoding. But more to the point, a silence alarm accompanied by a PPM alarm will help response personnel know where to begin troubleshooting. Our technology takes this into account so that a loss of program audio unrelated to PPM will not result in errant backup encoder activation.

### **Use Appropriate PPM Triage**

Take care when configuring alarm delays and fault tolerances so that the system's response is commensurate with the PPM equipment situation. Ask yourself whether you really want that 3AM phone call to tell you that the backup encoder successfully came online. On the other hand, make sure that incidents like this do get reported. Automatic email alerts are the best

way to keep PPM stakeholders advised of any equipment problems.

### **Establish PPM Accountability**

PPM responsibilities straddle engineering, programming, sales and management. While everyone should be kept apprised of significant problems, it is vital to communicate who is ultimately accountable for proper encoder operation. Engineers implementing and maintaining remote monitoring systems can help themselves in this regard by explaining to others, very basically, how the system works, to which types of failures it will respond, and how any alarm notifications are propagated.

### **Expect Upgrades and Modifications**

Because each program path is eligible for PPM encoding, a monitoring system must be adaptive to new encoders and monitors. Take the case of a broadcaster who adds one station to a consolidated studio. If that new station broadcasts in analog and HD Radio and also has a web stream, that's at least nine new Arbitron boxes from the addition of a single property. Keep these future needs in mind when designing a PPM monitoring solution. Especially when an existing remote control system handled the initial PPM rollout, be sure that any plans for expansion give proper budget consideration to new PPM monitoring demands.

Arbitron has taken a thoughtful approach to the hardware requirements for PPM encoding. Nonetheless, it's always a challenge to assimilate new equipment into existing infrastructure. Remote monitoring and control considerations are a significant part of that challenge. However, when the available options for PPM monitoring and control are applied within the context of the best practices outlined here, broadcasters can be confident that this critical portion of the broadcast operation will remain well under control.

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