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Practical Notes on Digital Migration

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Tom Hallewell
Radio Free Asia
Washington, DC

David M. Baden
Radio Free Asia
Washington, DC

You've heard all the digital buzzwords : the Internet, multicasting, non-linear editing, tapeless production. At this point, there is no question of whether you will migrate your operation to digital, it's when and how.

As an Information Technology specialist at an all-digital facility, I would like to share some suggestions and caveats from which you might be able to benefit. Please keep in mind that I work in an audio production environment, so some of my comments may not apply to video and transmission.

First off, a lot of the hype is true-with some important qualifications.

Digital offers you:

- **Non-linear editing**-the ability to splice with our having to rewind or fast-forward a tape and to be able to split a screen and see multiple segments simultaneously.
- **No generational loss**-every copy you make will be exactly the same as the original. This raises some disturbing copyright issues, though. It means that anyone who has a digital copy of your transmission has a broadcast-quality "master".
- **Compression technologies**-You can choose to compress your data for easier archiving both for the Internet and for internal use. At Radio Free Asia, we encode every program into mp3's. Using an admittedly radical compression rate (14 kbps, 12 bps mono), an hour of programming takes up only 5.8 Megabytes of disk space. This bitrate is adequate for talk radio and theoretically allows anyone with a 14.4 Baud modem or better to stream our archived program in real time. Even for broadcast-quality archives, you will gain at least 5 to one using mp3 over straight digital audio. Now that DVD

is also a recordable format, you should be able to use it as a video archive as well.

- **Indexing**-It is much easier to index, search for and retrieve archives when they are in digital format. Keep in mind, however, that archives do not index themselves-you must still develop and implement a cataloging system!
- **Cost efficiency**-This is simply NOT TRUE. On the surface, digital equipment is cheaper than its analog counterpart, but the lifecycle is 2 to 3 years as opposed to 10-15 years for professional analog gear. To your Technical Department, it's obsolete, to your Financial Department, it's still brand new. The upgrade path is constant. The cost of maintenance will also rise, because your production and IT staff will tend to converge and require more marketable Information Systems skills. Good technical help will be harder to find and more expensive to keep.

Another point worth mentioning is that digital equipment is very volatile and must be kept in a controlled environment. Power surges and spikes both in the AC and the phone lines, as well as excessive heat or dampness, can interrupt your broadcasts. This has to be the first area of consideration in developing countries where such matters can't be taken for granted. You'll need to have some sort of regulated backup power supply and possibly even retain some of your analog equipment as an emergency backup.

When deciding to go digital, set some basic goals. In moving to digital at Radio Free Asia, we hoped to:

Offer all applications at every workstation. Every PC at RFA has digital audio editing, Cable TV, e-mail, multi-lingual word processing, in-house audio monitoring and newswires.

A 100% digital audio signal path. This was achieved.

The ability to share files across multiple systems without conversion. Two years later, we're getting close!

You can deploy a digital audio system Good, Cheap or Fast -pick two! You will have to choose your own compromise between the three.

Here are a few digital shopping tips:

There are basically two ways to go-integrated systems and component systems.

An **integrated system** is basically a one-vendor solution. The advantages are that you have a single system that you can reasonably assume will work right out of the box. There should be no compatibility issues, and you have one point of contact for technical support. On the down side, you also may have to replace or

upgrade the entire system when you want to improve it, and expanding the system may be very cost-intensive as well. Generally systems of this nature are proprietary, so it will be difficult to modify the system and documentation and support may be very pricey, if it exists.

A **component system** is one which you assemble from various pieces which you feel are selected to your own particular environment. One huge advantage of this is that it enables you to improve and expand your system incrementally, rather than all at once. You can replace a component relatively easily if you find that you made a big mistake somewhere and it's also better for testing new gear. You also don't pay for a bunch of features you'll never need. If you go this route, focus on compatibility-get gear that will work together. Avoid non-compatible standards and solutions wherever possible so you have options when you upgrade. On the downside, it can be harder to get support and it takes more time and effort to keep up with upgrades and maintenance.

Whichever route you decide to take:

- **Talk to your vendors-** Many vendors, especially the smaller ones, value consumer input and will often fly out to help customize your installation and will add features you suggest in future versions.
- **Do it on a PC if you can-** Today's CPUs and busses are fast enough to do most editing in software. Proprietary hardware costs more to upgrade than PC's do, so avoid it if you can. In general, choose proprietary software over proprietary hardware where ever possible, even if it costs more. Software is upgraded much more frequently and is much easier to install and integrate than hardware. Open-source software is an even better yet. This is computer code that you can modify yourself and then share with others. Radio Free Asia is currently developing an open-source radio carting, editing and logging system. For information on this, see our website at <http://www.techweb.rfa.org>
- **Look at consumer software** such as CoolEdit and SoundForge. It is upgraded more frequently, the support is often better and it is cheaper than "Pro Radio" solutions by a factor of 10. Use it if you can!
- **Go digital decisively-** When you decide to deploy digital, set a date and stick with it! Like pregnancy, there's no such thing as half-digital! If you allow your staff to use the familiar old stuff, they invariable will and you'll be stuck with one person still editing analog for the next ten years. It won't be any easier to get him or her to change next year! If your budget allows, go digital all at once, not incrementally. Try to keep your systems as standard and cutting-edge as you can.

- **Buy the biggest and most cutting-edge system your budget allows!** The life cycle of digital audio gear is 3 years. By the time you have installed your system, the standard that will replace it has already been developed.
- **There is no such thing as too much RAM, too much disk space.** You'll use it! Buy as much as you can. Bigger is better and biggest is best!!!
- **Don't buy vaporware!!!** Only consider equipment that is shipping, no matter what the vendor promises you!
- **Research the upgrade cycle-**Many digital audio projects have memory chips (firmware) that can be upgraded. Find out how often your vendors upgrade theirs and if it is included in the maintenance contract-it can save you a bundle.
- **Don't miss a software upgrade-**generally, you get a price break if you upgrade every version. If you skip one, you have to re-purchase the package. This can get expensive.... On the other hand, never be the first to upgrade! Let someone else be the poster child! Wait until you know there isn't a major bug in the "upgrade"-check the vendors website for patches and bug reports.

Here are two things that can't be said enough:

- **Train Train Train!!!-**Don't wait until the system is in place to train-start planning your training program the moment you decide to deploy the digital system. Your staff are good at what they do now and are going to be suspicious and fearful of anything that changes how they do their job. Reassure them and help keep them at the top of their field by training them.
- You're building a new system from the ground up-isn't this the perfect time to document the entire system? Document your wiring, pin-outs, output levels, jumper and software settings. It will save you untold time and money when you need to do repairs.

I will conclude with three crucial technical details in the deployment of a digital system that you might not have considered:

- **Time synch-**All your sources of digital audio and/or video have to be synchronized to the same clock or there will be drop-outs and jitter. All workstations and servers will need to have to be syncopated to an atomic clock, be it onsite or via the internet.

- **Set a standard bitrate**-Bitrate conversions add steps and reduce quality-Set a standard bit and samplerate for your facility and stick with it through your entire signal flow. It really doesn't matter what you select, although, optimally, this should be the highest rate that all of your various systems are capable of.
- **Set an in-house mix level**-unlike analog, digital audio and video are unintelligible and unrecoverable if the levels are set too high. Give yourself lots of headroom. The calibrations of level meters on most digital components are not standard, so your best bet is to individually calibrate them using a tone which has been calibrated on an analog VU meter. This will ensure that the level remains the same throughout the signal flow and that you will have plenty of headroom.

It's an exciting time to go digital-there is a myriad of equipment to choose from, at a lower cost than ever before. I hope that these tips will help make the conversion a pleasant process for you. Good Luck!