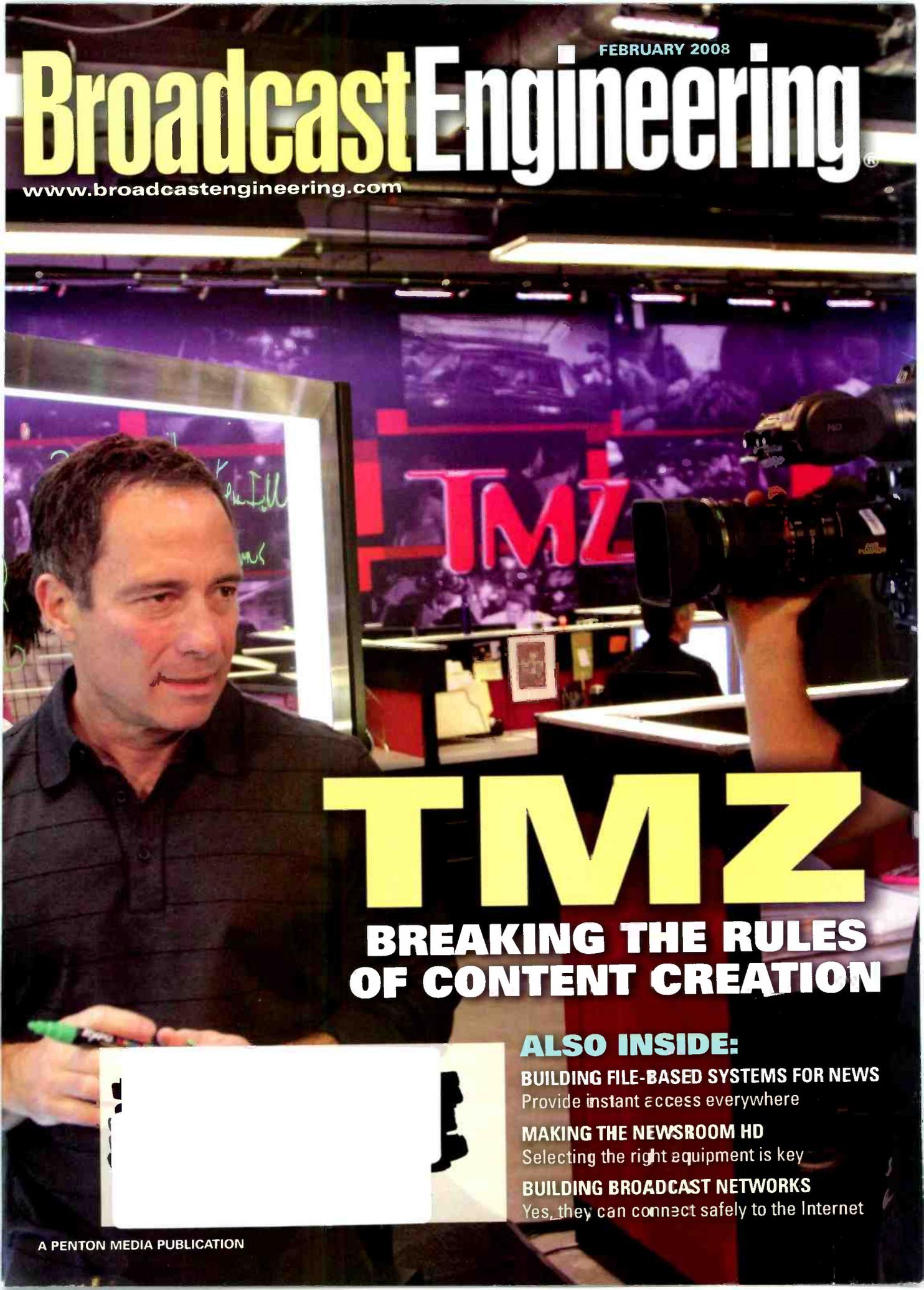


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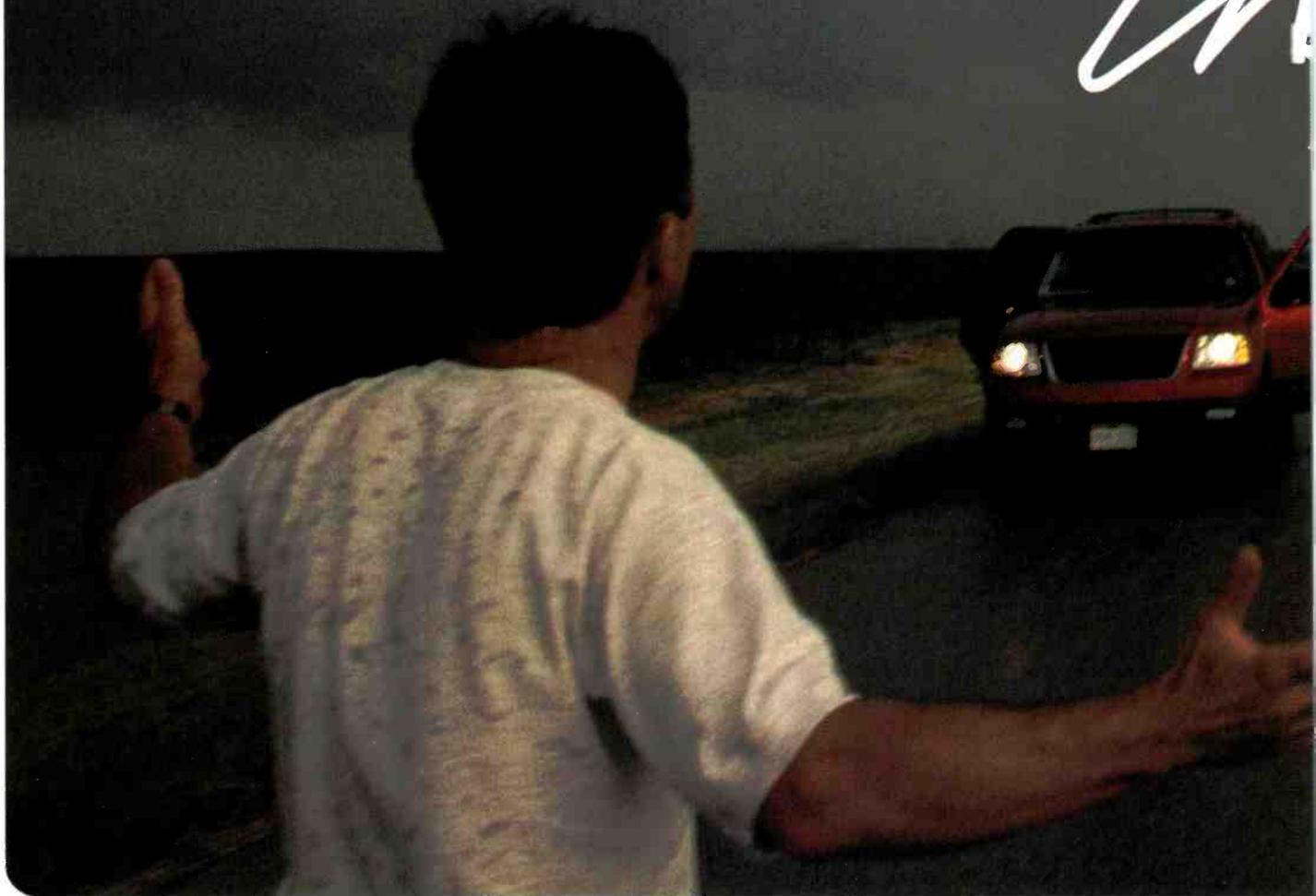
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Select cable for maximum bandwidth.

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## THIS MONTH'S FREEZEFRAME QUESTION

Certain characteristics of LCD displays have until recently made them unsuitable for high-quality monitoring. Which of the following characteristics have kept most LCD displays from being used as quality broadcast and production control monitors?

- 1) Low resolution and low pixel count
- 2) Motion blur and lag
- 3) Gamma characteristics and details in black
- 4) Incorrect aspect ratios
- 5) Low brightness levels
- 6) Video processing delay

*The answer is on page 8.*

80



84



113



38





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The entertainment news show uses all modern technology to get stories on-air and online fast.

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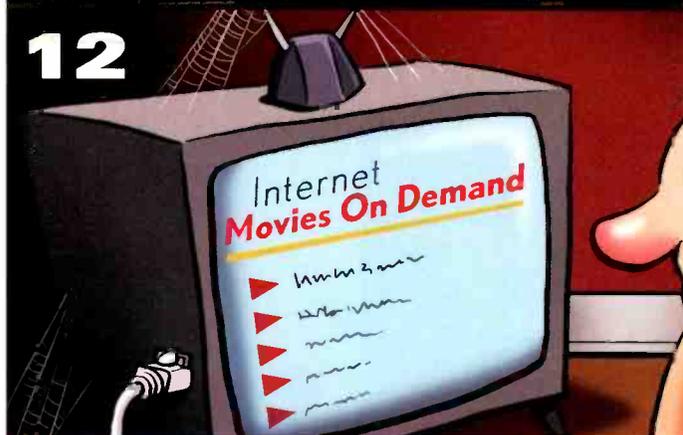
### ON THE COVER:

TMZ's fast-paced on-air look is enabled by a tapeless workflow. At the core of the show's daily broadcasts is a transparent white board, which is constantly updated to determine the playout order of segments.

# 116



# 12



### THIS MONTH'S FREEZEFRAME ANSWER

The answer is:

- 2) Motion blur and lag
- 3) Gamma characteristics and details in black
- 5) Video processing delay

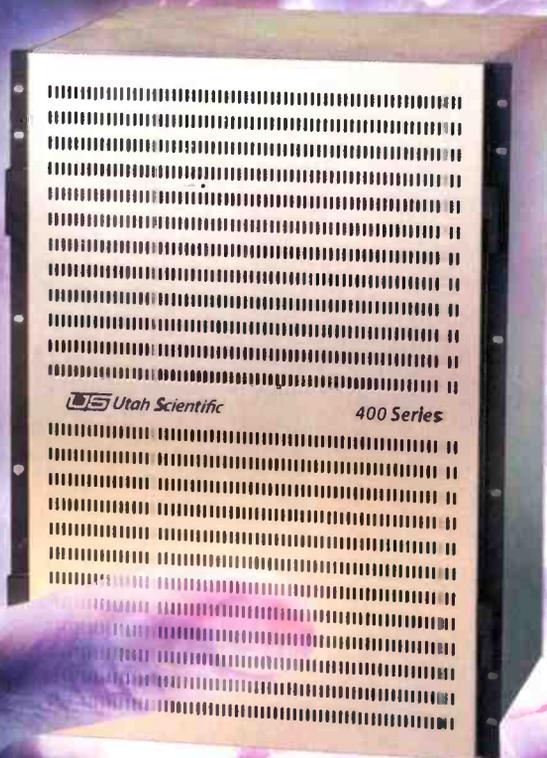
### DECEMBER'S FREEZEFRAME ANSWER

Q. At this year's NAB convention, the association's engineering department released the tenth edition of the "NAB Engineering Handbook." How many sections does the handbook contain, and how much does the record-setting book weigh?

A. The book has nine sections and weighs 9.95lbs.

#### READERS WHO ANSWERED CORRECTLY:

There were no correct submissions.



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# Plug-and-play television sets

**D**evelopments in high-speed Internet and low-cost local storage, in addition to an increasing supply of companies willing to deliver video over IP, are giving viewers other ways to access content. With all the Internet-provided video, I expect to see an RJ45 on my next TV set.

Because of January's CES, my inbox was filled with press releases from companies touting their products. Several of these products were focused on moving video from the Internet directly to your TV set.

The question then becomes: Is the Internet a competitor? The answer is both yes and no. Plenty of companies claim to offer services that provide TV viewers with

have all those movies on its server ready for access. The FAQ asked, "What if I cannot find what I'm looking for?" The site's answer, "If you can't find your files, you should try again in an hour or two. Users are connecting and disconnecting constantly, and it's likely that a user with what you want will connect sooner or later. Just keep trying!"

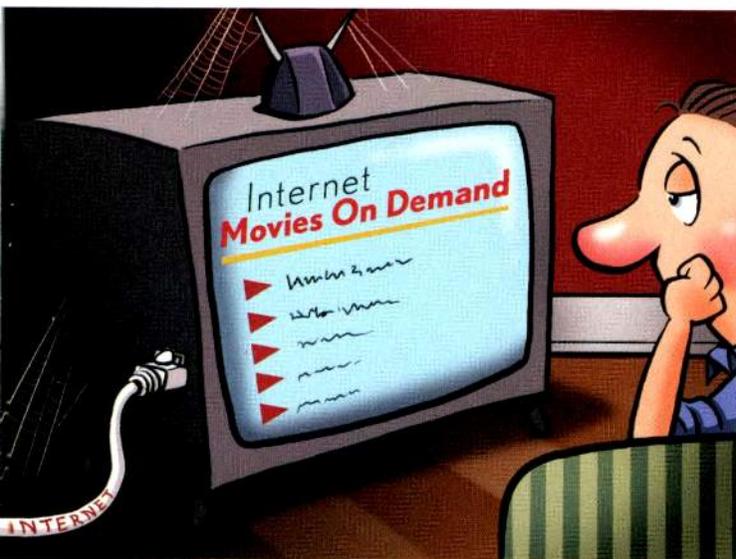
Whoa, "... a user with what you want ..." Why would I need a "user" to supply my movie? Does this look like an illegal BitTorrent file transfer to you?

Even so, as content developers and broadcasters, we need to remember that viewers really don't care how programs get to their display screens. They don't care if "The Tonight Show" is delivered by NBC, moviesRus.com or the local broadcaster. Your fancy and expensive local HD newscast could fall from outer space as far as they're concerned. Consumers want choices, and they will go to where they can get them.

So, is the Internet a competitor? Yes, because content is available — both legal and otherwise. But the Internet is not yet a full competitor because connectivity and rights issues have yet to be solved.

Research shows that the first wave of video over the Internet has been focused on streaming video technology and small files. Companies like YouTube, Fotigo, Flickr, Facebook and hundreds of others combined to bring Internet video into the mainstream. The U.S. market for online video will reach 157 million viewers by 2010, just two years from now.

If we think this Internet video wave was big, just wait. The second one will be a tsunami. **BE**



video through the Internet. One vendor claims to have 80 million movies for download and viewing. That's a lot of movies!

A quick examination shows that most of these firms are far from legitimate, and they probably can't deliver on their promises. One reason is that not-so-small issue of rights.

Looking through the FAQs on one company's site reveals why these guys might not be fans of the MPAA. One FAQ asked why the viewer had to pay for the movies. The corporate answer was, "The software is completely free of charge. What you pay goes towards supporting our technical team and paying for the creation of more user guides. If you're unsatisfied, you can always cancel your membership and keep the software."

Another FAQ hinted that the vendor might not really

*Bruce Dick*

EDITORIAL DIRECTOR

Send comments to: [editor@broadcastengineering.com](mailto:editor@broadcastengineering.com)

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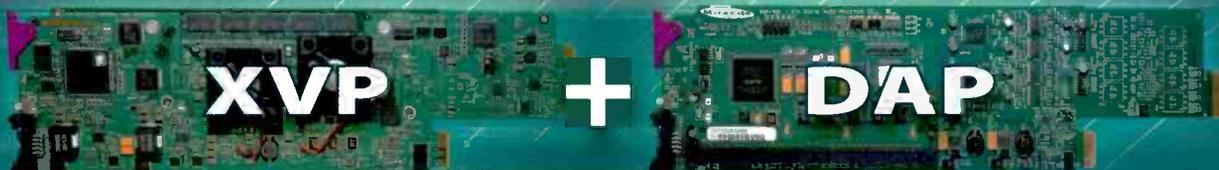
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| AFD ASPECT RATIO CONTROL     | [ ✓ ] |
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| SIGNAL PROCESSING            | [ ✓ ] |
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## AUDIO: DAP-1781

- 
- |                                |       |
|--------------------------------|-------|
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| DOLBY E ENCODING / DECODING    | [ ✓ ] |
| DOLBY AC-3 ENCODING / DECODING | [ ✓ ] |
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## Tier 2, 3 IPTV deployment – What’s the problem?

Dear editor:

With all due respect to Manish Matta, director of marketing for UT-Starcom, I’m not sure he has the pulse on Tier 2 and 3 operators. (See “Lack of broadband critical mass, content aggregation plague Tier 2, 3 IPTV deployment” in the Jan. 22 edition of the “IPTV Update” e-newsletter.)

Matta points out the lack of broadband critical mass as a stumbling block, but he uses the term in a way that suggests he has confused the IPTV market with Internet TV. Many ITCs have built out ADSL2+ and BPON/GPON networks in both their urban and rural areas precisely for video, but they haven’t been able to launch their video platform due to reasons other than what Matta describes. That said, Tier 2 and 3 operators know that their customer bases are small, so they try to leverage the hardware volumes of the Tier 1 vendors to drive down prices, and depend on consultants and cookie-cutter installations to keep startup and operational costs at a minimum.

Content is a challenge, but not an impossible one. Third parties have done much of the hard work in negotiating agreements. So what is the problem? Matta needs to point the finger at those who make the middleware and other hardware components. The woes of IPTV middleware vendors have not been well documented, but they’ve missed pretty well every self-imposed milestone, and many promises have been broken. The added complexity of the MPEG-4 ecosystem, at a time when these IPTV middleware vendors were just starting to sell, didn’t do favors for anybody. I wouldn’t call MPEG-2 a false start, but the resources the middleware vendors had to apply to MPEG-4 to get HD (not to speak of PVR functionality) meant that MPEG-2 software development crawled along.

The reality is that despite the hardware vendors’ best intentions, MPEG-4 encoding and decoding is not as commoditized as they would make you to believe, and set-top box and middleware integration is



**Manish Matta, director of marketing for UT-Starcom**

an arduous affair. Toss conditional access (CA) into the mix, and it’s a nightmare. Until groups come out with standards and vendors develop and ship products to that standard, the middleware/STB/CA integration challenges will remain the most significant stumbling block for North American Tier 2 and 3 operators.

**Frank Bulk**  
Tech. and product dev. mgr.  
Premier Communications

## Color space evolution

Dear editor:

When the color space changed from SMPTE-C to ITU-709 for HD signals, the basic formula to compose the Y signal changed as well. The explanation came from the complex formula from which these values originate. These are derived from equations made from the D65 CIE x, y chromaticity coordinates and the chromaticity coordinates for the RGB primaries used for LCD monitors. (See SMPTE RP 177-1993). Because it is the same formula, with the same D65 reference point, the other parameters have changed. With a change of the RGB primary values, it would not be possible to exactly match a SMPTE-C CRT monitor with an LCD or anything else made for HD imaging. The saturated colors show small differences in tint and are a little more deep in color. Professionals and colorists will never

be able to have something exactly similar to the CRT. Because of the change in primary colors, the intention was to open the limitation of the SMPTE-C color rendering. We need to stop using CRT as the reference and adopt the LCD monitor as the new reference. To continue product evolution, we have to change our minds and adopt the bigger range and the difference in some color rendition, accept these differences and use these new tools as the reference.

**Denis Armand**  
Le Groupe AFP

*Aldo Cuginini responds:*

Denis Armand makes some valid points about color space evolution, but the motivation for it was not LCD monitors. The change has to do with the problem of constant luminance, wherein the color difference signals

contribute to the luminance signal and cause errors in the displayed brightness of high-frequency signals. This is due to the wrong order of gamma and matrix operations in the display (together with color-difference signal band-limiting), necessitated by the fact that the CRT performs the inverse gamma function. ITU-709 introduces a smaller error than CCIR-601, but it is still there. As LCD monitors require a different gamma correction, there is a potential for improving the situation, but this would require a hardware-intensive 3 x 3 matrix multiplication for each pixel, and most monitor manufacturers would rather leave this out.

**BE**

**Test Your Knowledge!**

See the FreezeFrame question of the month on page 6.

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# Unintended consequences

Will analog TV broadcasts really end next year?

BY CRAIG BIRKMAIER

The countdown clock is ticking, but will the era of analog television broadcasting really end Feb. 17, 2009?

Millions of viewers who still depend on free-to-air analog TV signals have already applied for DTV converter box coupons that are being issued by the National Telecommunications and Information Administration (NTIA). These boxes were scheduled to become available on Feb. 17, 2008. The coupons, worth \$40 toward the purchase of an NTIA-approved DTV converter box, are valid for 90 days. (See "Web links" on page 20.)

Those visiting the DTV coupon program Web site, and virtually all of the other government and industry sponsored Web sites intended to educate the public about the DTV transition and the end of analog broadcasting, will find statements to the effect: "Analog television sets receiving free TV using an antenna will not work after February 17, 2009. Television viewers with these sets that are not

connected to a pay TV service will need to take action before February 17, 2009, to ensure their TV sets continue to work."

Unfortunately, the Law of Unintended Consequences has once again reared its ugly head. In the rulemaking process, the government overlooked some key details, including the fact that there are 2600 LPTV and Class A stations that will continue to broadcast in analog after the February 2009 cutoff. In addition, let's not forget the 4400 TV translators that will continue to rebroadcast full-power stations in analog, perhaps for years to come.

How can that be? Because there are no current FCC regulations to make these translators go digital.

These oversights have members of the Community Broadcasters Association (CBA) up in arms. The association, which represents the LPTV industry, has filed a complaint with the FCC and is trying to get the NTIA to rework the DTV converter box program to deal with several short-

comings that threaten to eliminate its audience. If the agencies overseeing the DTV transition refuse to take corrective action, the CBA says it will sue. This is likely to catch the attention of some legislators who believe that the DTV transition has not been handled properly, and it could lead to another delay in the analog cutoff.

## Where's the beef?

You may be asking yourself how we got this far into the transition only to find that the agencies that are responsible for this transition have overlooked a few things. Those who understand why we are going through this transition know that analog TVs are not going to stop working next year. The cable industry is telling subscribers that they don't need to do anything; their analog tiers will still be there when full-power broadcasters pull the plugs on those analog transmitters. And DBS subscribers, who already have digital set-top boxes, have nothing to worry about.

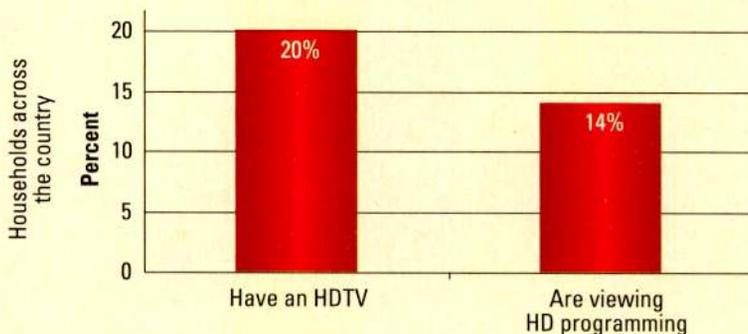
Even the politicians seemed to understand the issues when they crafted the legislation enabling the DTV converter box program. The legislation set aside about \$10 million to equip TV translators with digital-to-analog converters so that they could receive the DTV broadcasts and retransmit them as analog signals. On Oct. 29, 2007, the NTIA announced the start of the LPTV digital-to-analog conversion grant program to help low-power television stations continue analog broadcasts. (See "Web links.")

Also in October, the FCC issued a consumer advisory about the effect of the DTV transition on Class A and LPTV stations and TV translators. (See "Web links.") Yet somehow, both

## FRAME GRAB *A look at the issues driving today's technology*

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- Automated broadcast media file QC and loudness correction
- Pay-per-view (PPV) file analysis and loudness correction

the NTIA and FCC failed to take the continued operation of these facilities into consideration in their DTV education programs.

So, if the analog tuners in existing TV sets will still be able to receive the signals from LPTV stations and translators, why is the CBA so upset?

There are two main issues:

1. You have to dig fairly deep into the government Web sites about the DTV transition to learn that LPTV stations and translators will continue to broadcast in analog. And the promotional spots that full-power TV stations are running simply state that your old TV won't work after "their" analog transmitters are shut down.

2. The DTV converter boxes could have been designed properly to deal with this problem, but the NTIA claims that it did not require the necessary feature because it would have

added cost to these boxes.

There are two ways in which these low-cost boxes can be redesigned to deal with the problem:

1. Provide an analog RF pass-through capability with an A/B switch for the converter.

2. Provide an integrated NTSC tuner that would allow analog stations to be tuned directly.

The analog pass-through feature is included in some of the boxes that the NTIA has approved, including the \$39.95 box announced at CES by EchoStar and Sling Media.

Ironically, many of the NTSC-approved STBs have disabled NTSC tuners inside. Virtually all of the tuner chips used in new DTV-capable displays include an NTSC/cable tuner as well as ATSC and QAM tuners for digital signals. In fact, it is hard to find a new TV that does not include both analog and digital tuners.

The FCC used the all-channel receiver act as the basis for requiring ATSC tuners in every new TV set. A strict interpretation of the law suggests that deleting the NTSC tuner capability may even be a violation of that law. At a more practical level, however, the reality is that the NTIA decision to remove this capability from the boxes approved for the DTV coupon program was seriously flawed. The agency now says that it would have added significant cost to these boxes. In reality, this capability would have had little impact on the price and might even have been cheaper than the analog pass-through capability.

To make things even more troublesome, the millions of viewers that have already requested DTV converter coupons may not even be able to buy STBs with pass-through capability, as the coupons expire in 90 days.

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Several of the announced products with pass-through will not be available until June or later.

## Web links

- FCC DTV information and countdown clock; [www.dtv.gov](http://www.dtv.gov)
- NTIA DTV converter box coupon program; [www.dtv2009.gov](http://www.dtv2009.gov)
- NTIA low-power TV and translator conversion program; [www.ntia.doc.gov/lptv/index.html](http://www.ntia.doc.gov/lptv/index.html)
- Community Broadcasters Association DTV transition; [www.Keepuson.com](http://www.Keepuson.com)
- FCC Consumer Advisory on "The DTV Transition and LPTV/Class A/Translator Stations" [www.fcc.gov/cgb/consumerfacts/DTVandLPTV.html](http://www.fcc.gov/cgb/consumerfacts/DTVandLPTV.html)
- NTIA DTV converter box specifications; [www.ntia.doc.gov/dtvcoupon/DTVmanufacturers.pdf](http://www.ntia.doc.gov/dtvcoupon/DTVmanufacturers.pdf)

## This is a fine mess ...

One criticism of the CBA effort is that it did not make the government agencies involved with the transition aware of its concerns soon enough. The association filed its complaint with the FCC on Dec. 6, 2007. The NTIA published the manufacturer specifications for the converter boxes in March 2007. The specifications state that analog pass-through is an allowable option. The wording on what is prohibited is less clear. Finally, the NTIA did not release an approved list of converter boxes until January of this year.

So now what happens? Getting a bunch of bureaucrats to move quickly to address these issues may be difficult. But action is needed immediately, and a lawsuit could create an even larger mess.

Auctions for the 700MHz spectrum that is to be recovered from

TV broadcasters when the analog transmitters are shut down are taking place now. If these auctions raise the amount of money that the politicians expect, it may be difficult to change the deadline.

It is an election year, and politicians need to raise more than \$3 billion to pay for the 2008 elections. A lot could happen on the legislative front during the run-up to the elections. Full-powered broadcasters will receive a large part of that \$3 billion for campaign ads. Perhaps the politicians could run a few ads on LPTV and Class A stations to help compensate them for the audience loss that may result from this unintended consequence of the DTV transition.

**BE**

*Craig Birkmaier is a technology consultant at Pcube Labs.*



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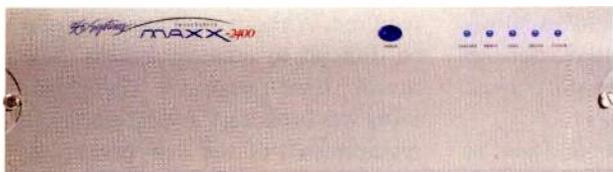
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# FCC promotes localism

## The commission wants licensees to establish and meet with advisory boards about community needs.

BY HARRY C. MARTIN

In December 2007, the FCC issued its long-awaited localism report. With it came rule proposals that, if adopted, would impose new regulatory burdens on broadcasters to ensure they provide programs geared to local needs and interests.

### Localism report

The localism report is based on the record developed in an FCC proceeding that began in 2004. The proceed-

ing, which was moribund for several years, was resuscitated by the current FCC chairman Kevin Martin.

Because the proceeding was initiated with a notice of inquiry rather than a notice of proposed rulemaking, the commission was not in a position to adopt new rules at this

community of license. Licensees should consult with such boards periodically regarding community needs and issues.

- Qualified LPTV stations should be granted Class A status, which would require them to provide three hours per week of locally produced programming.
- Licensees should establish permanent advisory boards that include representatives from “underserved community segments” in each com-

down version of the ascertainment record-keeping and reporting scheme. This includes “processing guidelines,” which were in place until the 1980s, in an effort to foster locally responsive programming.

For example, the commission refers to renewal processing guidelines that will ensure locally oriented programming. Precisely what role the advisory board might have in programming decisions is not clear. Nevertheless, the commission is moving toward implementing a new community ascertainment scheme two decades after the deregulation wave of the 1980s swept aside that regulatory program.

### Is program logging in the future?

Also unanswered at this point is whether broadcasters can expect some form of program logging to be required. Without such logs, it would be difficult to quantify exactly how much issue-responsive programming was broadcast in relation to the requirements of the new processing guidelines. And even without logging, the reporting requirement will entail standardized definitions of genres of programming, definitions that the FCC will have to develop. **BE**

*Harry C. Martin is a past president of the Federal Communications Bar Association and a member of Fletcher, Heald and Hildreth, PLC.*

**The FCC committed to better educate the public as to the obligations of broadcasters so that the audience can become more actively involved in ensuring that stations offer locally oriented programming.**

### Dateline

- April 1 is the deadline for TV stations in Texas to file their biennial ownership reports.
- In the following states, April 1 also is the deadline for TV, Class A and LPTV stations that originate programming to place their annual EEO reports in their public files and place them on their Web sites: Delaware, Indiana, Kentucky, Pennsylvania, Tennessee and Texas.

• The commission should adopt renewal application processing guidelines that will ensure that all broadcasters provide some locally oriented programming.

In addition, the FCC committed to “better educate” the public as to the “obligations of broadcasters” so that the audience can become “more actively involved in ensuring that stations offer locally oriented programming.”

### A new ascertainment scheme

While the localism report and notice of proposed rulemaking were not available at press time, all indications are that the current commission is committed to return to a watered-

**?** Send questions and comments to: [harry.martin@penton.com](mailto:harry.martin@penton.com)

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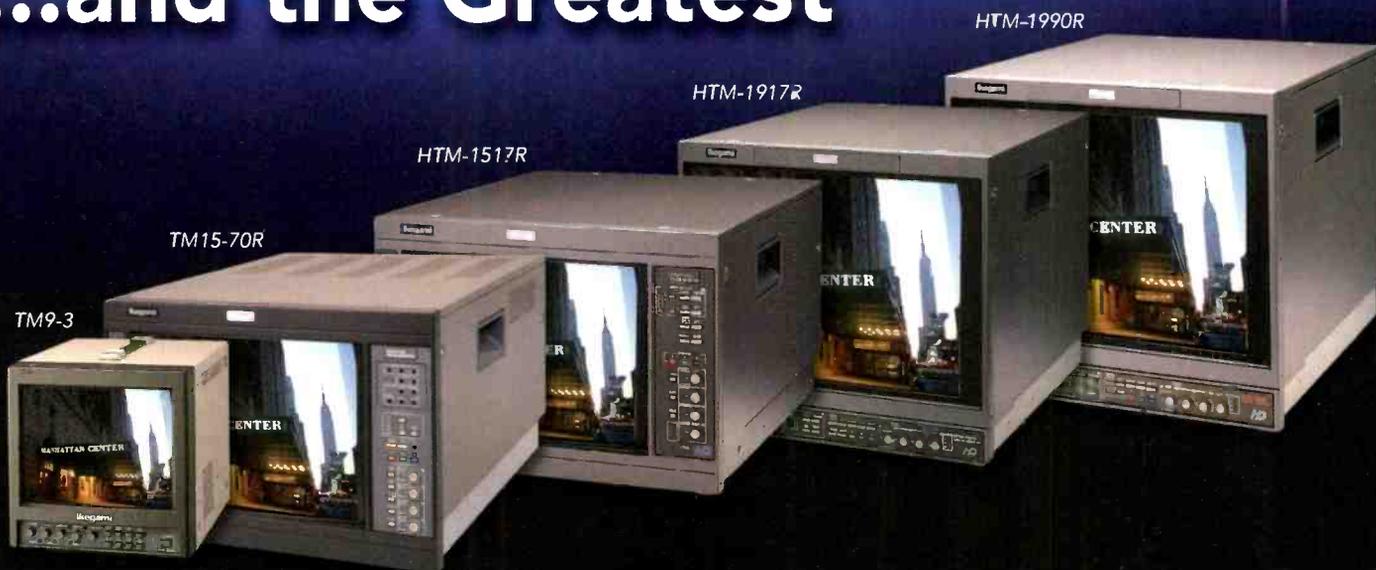
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# Compression tech

Learn the not-so-obvious splicing requirements.

BY ALDO CUGNINI

The ubiquity of compressed video brings some interesting challenges to broadcasters transmitting video programs. One of these is an increasing tendency to handle bit streams in compressed form, minimizing the need for quality-compromising decompressing and recompression stages. This has brought about the notion of bit stream splicing, where two compressed bit streams are concatenated — or spliced — either at playout or during some production phase. As we'll see here, the requirements for doing this seamlessly are not obvious.

## Managing VBV

In order to provide for seamless splicing, certain constraints must be met in an MPEG bit stream. In addition to the proper synchronization of video frames and frame types (covered in previous columns), the video decoder buffer (video buffer verifier, or VBV) must be managed carefully at the splice points so it doesn't create

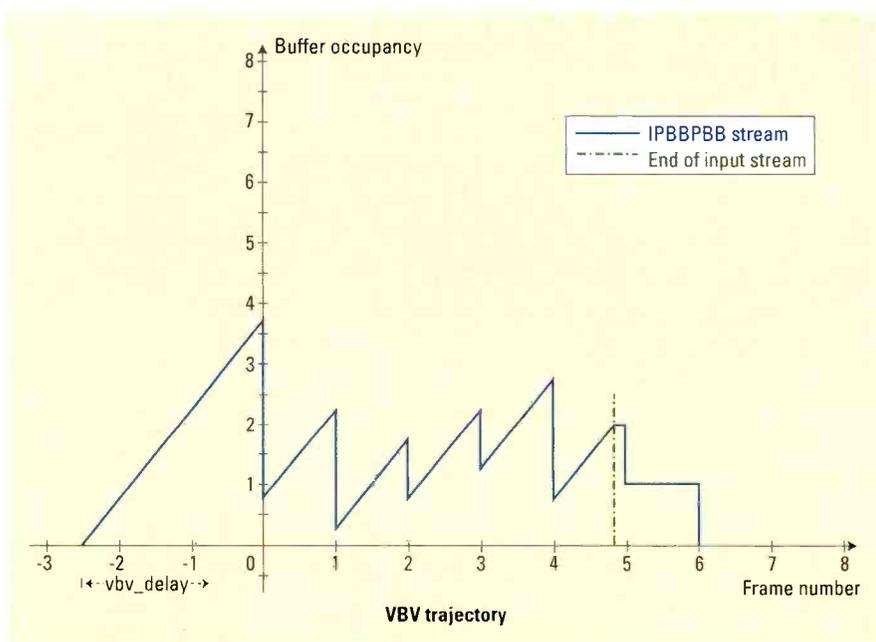


Figure 1. The video buffer verifier (VBV) provides a model to describe the instantaneous bit rate.

an overflow or underflow condition. While compressed video will typically have a constant bit rate, this is actually a long-term average metric. The number

of bits per frame (or even GOP) is anything but constant. This is easily seen in Figure 1, which shows the fullness of the decoding video buffer as a function of time. The parameters of this closed-GOP sequence produce a transmission sequence of frames: IPBBPBB, where the relative sizes of the frames in this example are 3, 2, 1, 1, 2, 1 and 1, respectively. The parameter “vbv\_delay” specifies the duration of time that the first byte of coded video data remains in the video buffer, and can be specified in the bit stream. In this example, vbv\_delay is 2.5 frames (the period to the left of “0”), and the video rate is 1.5 arbitrary units per frame.

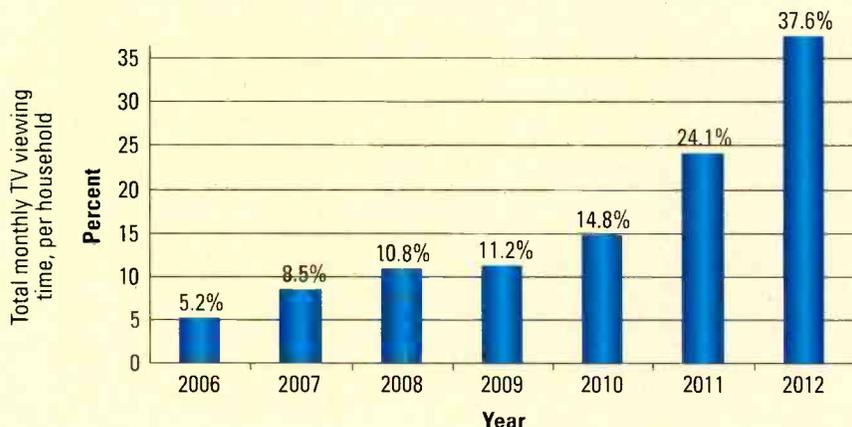
The diagonal slope of the sections describes the rate at which the buffer fills, essentially the channel bit rate. The vertical sections describe the action of the video decoder removing frames from the buffer for subsequent decoding. Because intra-frames need more bits than predictive or bidirectional coded frames, the I-frames will

## FRAME GRAB

*A look at tomorrow's technology*

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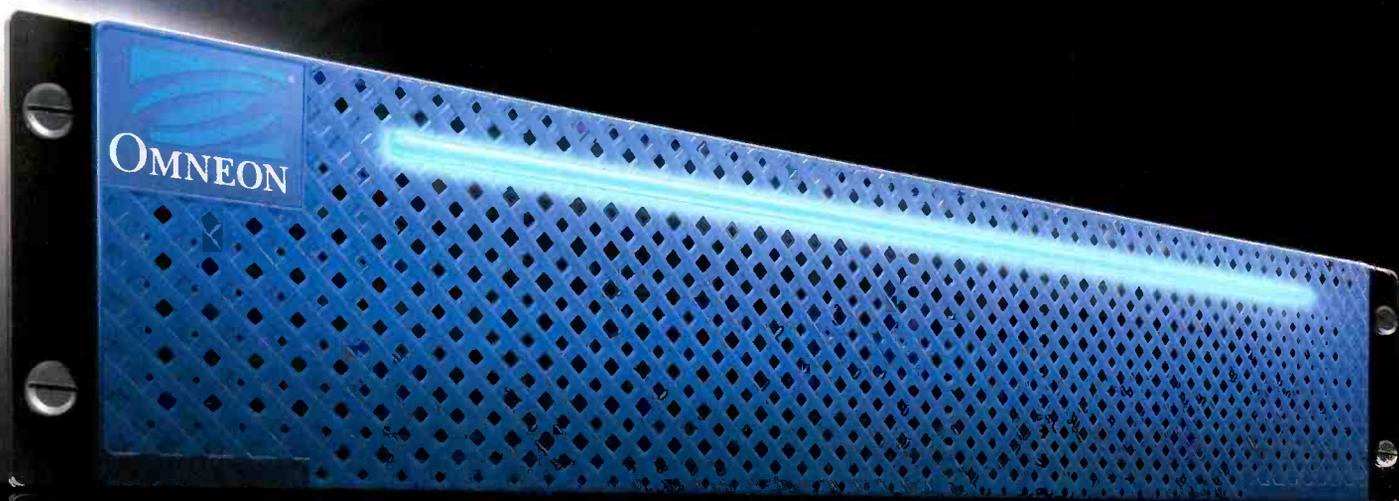
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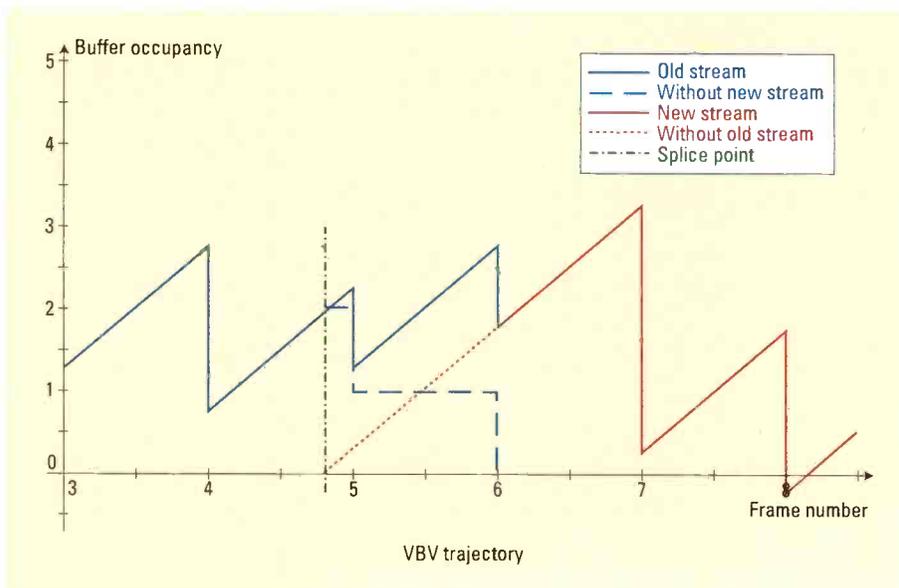


Figure 2. VBV at splice point (incorrect splice)

take up more space in the buffer and show a larger vertical section, as at Frame 0 in Figure 1. When a finite bit stream is stored in a file, it will have an end to the stream, and this is modeled by the section after “Frame” 4.8 in our example.

The buffer has a finite size (dictated by practical hardware

and delay time considerations). So the buffer must be managed in order to prevent overflow, where there is not enough memory to store the data, and underflow, where the data runs out as it’s needed by the decoder and display. It is the duty of the encoder to make sure this never happens by predicting the action of the decoder buffer. Hence, the VBV is a prediction that is carried out by the encoder, which can modify the number of bits from frame to frame to ensure buffer stability.

### The wrong way

The result of blindly appending a new sequence is apparent in Figure 2. In fact, if the original sequence is appended to itself, there is an undesired effect

— the buffer underflows at Frame 8. In the region around the splice point, the buffer continues to fill at the video rate (as the size of each frame is unchanged from the previous example). However, the first frame of the new sequence must be removed at time  $t = 7$ . This requirement causes the buffer to fill for a time less than that originally specified for the first frame of the new sequence. In this example, the buffer fills for roughly 2.2 frames (in red), whereas the original sequence called for a  $vbv\_delay$  of 2.5 frames.

The consequence is that, upon the removal of the frame at time  $t = 8$ , the buffer underflows, i.e., not enough data has entered the buffer to ensure it is ready to be removed at the next picture access time. Since the new stream was encoded with the expectation of a specific VBV trajectory, this condition must not be violated in the decoder. In addition, the  $vbv\_delay$ , the bit rate and the size of the new frames can only be modified if the resultant stream maintains VBV compliance. Thus, the simplest solution is to present the new sequence to the buffer at a time in advance of the decode time, equal to the amount specified in the  $vbv\_delay$  for the first frame of the new sequence. In other words, the last bit of the outgoing stream should remain in the buffer for a time equal to the  $vbv\_delay$  parameter of the first frame of the new stream, minus the display time of the last frame of the outgoing stream.

### The right way

In order to present the new bit stream to the buffer at this earlier point in time, some bits must be removed from the old bit stream. This is shown in Figure 3 on page 28. The size of the frame at time  $t = 4$  was reduced from 2 to 1.5. (Note that, for ease of illustration, we used a P-frame. In reality, a good splicer would give priority to removing bits from the B-frames first, so that any induced artifacts would not propagate to other frames.) This causes the old stream to end sooner and allows the new stream to enter the buffer

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at the appropriate time,  $t = 4.5$ . The specific solution depends on the conditions at the splice point. If the outgoing stream terminates before the new stream should start, then null padding can be used to extend the life of the old stream in the buffer. If the outgoing stream would otherwise terminate after the new stream should start, then the last few frames of the old stream can be recoded with fewer bits.

### General advice

In general, when splicing into or out of streams that have been independently encoded, matching of the

accumulation of these errors. Assuming that we correctly modify the bit streams to ensure proper buffer management, this means that the splicer must have the ability to re-code the streams on the fly, by adding or subtracting bits when needed. A good processor will do this gradually in anticipation of the splice so a visible change in picture quality is not perceived.

When setting up encoders, there may be a temptation to limit the maximum and minimum buffer levels to a small range in the middle of the VBV so that any splicing errors will have a

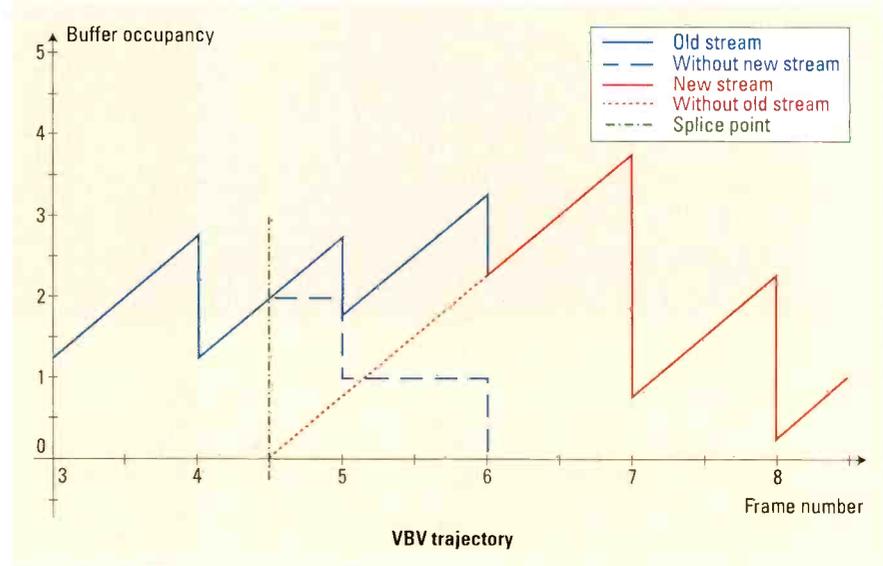


Figure 3. Successful splicing requires timing adherence to the VBV model.

expected  $vbv\_delay$  parameter must be accomplished in order to avoid buffer overflow or underflow. If this condition is not met, an error will be created in the buffer level, which is the difference between the actual buffer level and the buffer level anticipated by the encoder. Contrary to what some may believe, such an error will persist indefinitely in the video decoder unless a stream device repairs the error. This is due to the fact that the timing of the entry of bits is affected by the splice error, and that timing error will persist even after an indefinite period of time.

In addition, each subsequent splice can introduce its own error, so the long-term result will depend on the

lower probability of hitting the top or bottom of the buffer. This is not a good idea, however, because it limits the actual bit allocation per frame, and thus has a large negative impact on picture quality.

Bit stream splicers will find increasing utility in situations where multiple precompressed bit streams are delivered to a transmission point. Knowledge of these splicing issues can yield a better understanding of how your video may be affected by these processes.

BE

Aldo Cugini is a consultant in the digital television industry.

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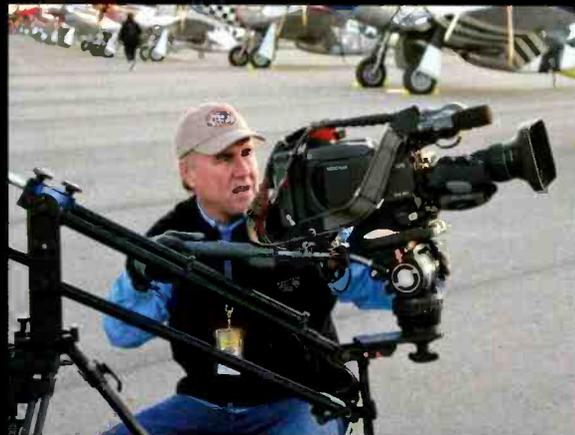
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# Broadcast networking

Part II of this networking tutorial compares video and office networks.

BY BRAD GILMER

Last month's column covered networking basics. This month, I'll discuss networking for professional video for someone who is new to broadcasting but has experience working with networking technology.

Any of the things you already know about networking are useful, as the broadcast industry employs the same basic networking technology and topology as used in other industries. The broadcast industry includes special applications, though, such as video servers, graphics design workstations and video editors. For the most part, however, these devices use networking technology in the same way as office systems do. Traditional office networks provide all of the support that any business would require.

## Learning the lingo

Broadcast networking is frequently deployed as an overlay on top of a traditional office network, with limited connectivity between the two. As Figure 1 shows, broadcast facilities have all of the typical office requirements, but it is common to find another high-speed network associated with specialized broadcast equipment.

One reason for this is because the broadcast operation is the mission-critical core of the business. Therefore, broadcast networks are kept separate from office networks to prevent a problem on the office network from affecting on-air operations. Another reason for this arrangement is because the servers, graphic design stations and editors probably don't exchange e-mail traffic and Word documents. Instead, they frequently interchange essence and metadata about a commercial, a graphic or an edit session.

In the broadcast environment, es-

sence refers to the pictures, sound, closed captions and other things that are transmitted to the end viewer. All of these are essence, but more specifically, pictures are referred to as video essence, audio as audio essence and closed captions as data essence.

Metadata is information about the essence itself. For example, a commercial has video, audio and data essence, but it also has information about what the commercial contains.

Much of this information is on the slate, which is text that is inserted for 10 seconds before the beginning of the commercial. Usually the slate contains the name of the commercial, the length, identifying code and other information. This metadata

is not only conveyed as video at the beginning of the commercial, but it may also be sent as data along with the essence.

Different computer systems can make use of this data as part of their normal operations. Some manufacturers send the essence and metadata in separate files. Usually in this case, the video and audio are sent in a common file, and the metadata is exchanged in an XML file or another metadata format. Other manufacturers send the essence and metadata in one file. When this is done, the file format is known as a wrapper. The most common wrapper format for broadcast content is the Material eXchange Format (MXF).

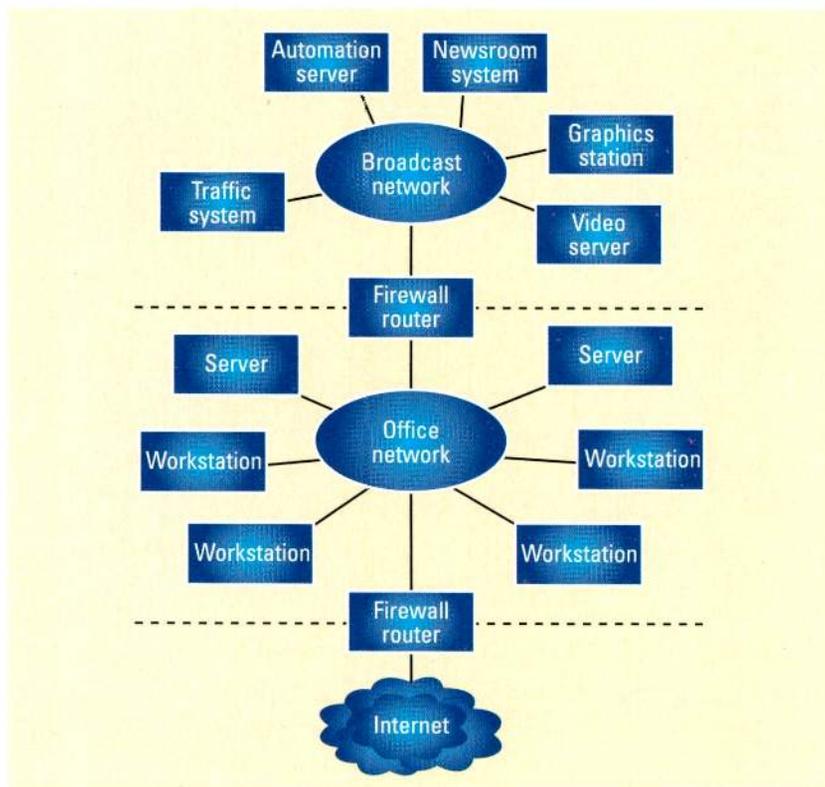
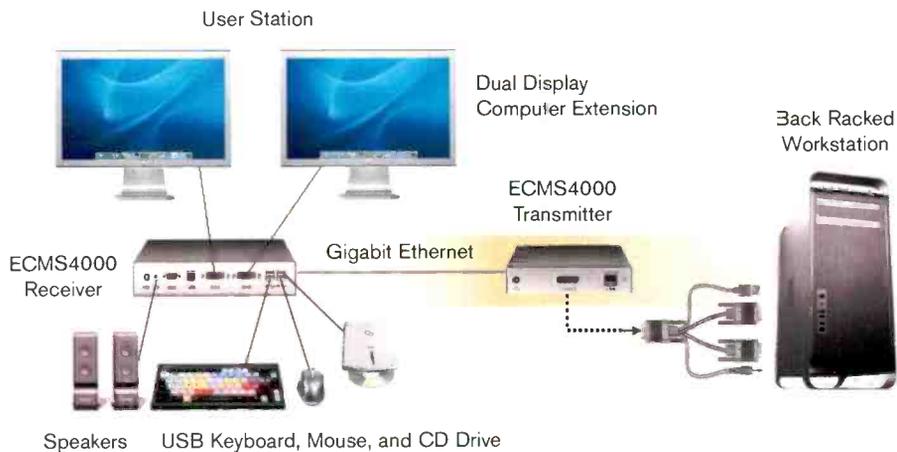


Figure 1. Broadcast networking is frequently deployed as an overlay on top of a traditional office network.

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## COMPUTERS & NETWORKS

DIGITAL HANDBOOK

### Identifying video networks

The characteristics are driven by what flows over the networks. Video files can be large, exceeding 1TB for feature-length movies in high resolution. Transferring these files usually requires special protocols because normal FTP limits file transfer size to 2GB. These transfers can quickly saturate your network. They can also make the peak-to-average traffic on the network high compared with office networks, where traffic is more sporadic.

Video networks handle two types of traffic: file transfer and streaming. The difference between conventional network streams and broadcast network streams is the bandwidth. Broadcasters use many low-resolution (conventional) streams on their networks. But sometimes they move high-bandwidth, high-quality video streams on these networks as well. Again, the peak-to-average network traffic can be severely affected by these streams. In some cases, other office-based protocols depend on gaps in network traffic. It is not uncommon to see time-out errors when the protocols and the applications they serve do not anticipate high-network usage applications.

Broadcast facilities frequently include news applications. If the news workflow supports server-based editing and collaborative workflow, then the network requirements can be demanding. Not only will you face the challenges of moving large files and dense streams, but these networks also need to support messaging, e-mail, printing and other conventional office applications.

Server-based editing is where workstations connect to a central repository to access essence for editing. This approach allows users to work collaboratively. Depending on the implementation, however, it may require high-bandwidth connections between the workstations and the repository.

Engineers who design video networks for broadcast should start with a list of requirements for their facility. With some of these categories, the considerations are identical to those in office networks. But there are a few areas where special considerations apply. Those categories are the mix of clients and servers, video application types and the criticality of the network.

### Mix of clients and servers

It is important to know the mix of clients and servers. In conventional networks, there are many clients and a few servers. Broadcast networks may have more servers depending on the environment, and as described above, the bandwidth occupied by these servers can be substantial.

It is essential to understand the ratio of clients to servers because servers require high-bandwidth connections to the network. The placement of central servers in the network topology is critical to avoid bandwidth bottlenecks.

### Video application types

Fortunately, there are a wide variety of network-aware video applications available today. Many of these

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applications do not significantly affect network performance. Sending a low-resolution image by e-mail, for example, can be handled by most networks without a problem. However, if a post-production department wants to do effects rendering across the network, or a news department wants to use a centralized storage facility with network editing, then you must consider the extra demand these applications will place on the network.

Study the applications to understand what sort of load they are likely to put on the network. Remember that opening video files across a network for editing requires a huge amount of bandwidth, especially if multiple clients are involved. You may be better off keeping the content local and only exchanging edit information across the network.

### Criticality of network

When building a video network for broadcast, one of the most important issues to address is the criticality of the network. It is easy to say, "Of course this network is critical; it serves my broadcast facility." But are you willing to pay 10 or 20 times more for your network? This is not fanciful thinking. Off-the-shelf consumer networking hardware costs can be extremely low. The cost of enterprise hardware from top-of-the-line manufacturers can be staggering.

### The Internet is a necessity

An increasingly important component of any video broadcast network is Internet connectivity. I have found that people are of two minds on the subject, and the issue seems to be driven by user requirements.

On the one hand, there are many times when people need access to the

Internet as part of their normal work processes in a broadcast facility. On the other hand, broadcasters are justifiably worried about security issues that come with an Internet connection.

It might be easy to say that Internet connections should never be permitted on video networks for broadcast. But with the advent of commercial and program delivery over the Internet, the increasing use of the Internet in group station environments through virtual private networks and the general ubiquity of the Internet in everyday workflows, outlawing Internet connectivity may not be practical. **BE**

*Brad Gilmer is the executive director of the Video Services Forum and the Advanced Media Workflow Association. He is also the president of Gilmer & Associates, a consulting firm.*

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VIDEO SYSTEMS

# HD video coax

Select cable for maximum bandwidth.

BY SCOTT FEHL

**C**oaxial cable is the backbone of the video interconnect system. Although it has been in existence for more than 100 years, coax cable for high data-rate video applications is obviously a more recent development within this technology. As video formats have evolved from analog to SD digital and now HD formats, coaxial cable performance for broadcast applications has also advanced.

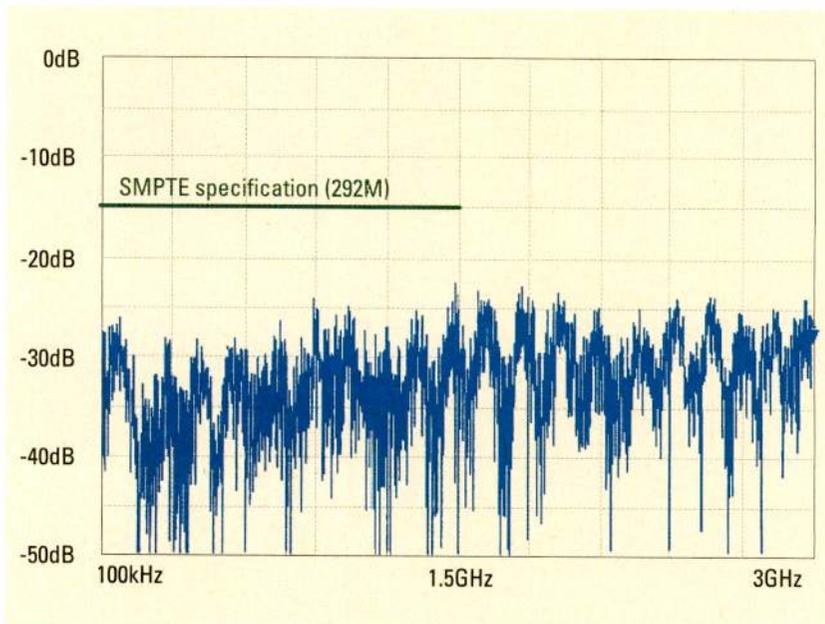
## Cable classifications

Common designations for coaxial cable types are the RG type or wire gauge size. These designations, however, do nothing to determine whether a coax is suitable for digital video transmission. They are only categorizations of the size of the conductor and outer diameter. Any given RG type can come in a variety of constructions, such as closed-circuit TV (CCTV), master antenna TV (MATV), RF, analog and HD-SDI.



**Video coax for HD requires a higher level of manufacturing precision than does coax for analog applications.**

The measure of the quality of the cable, and thus its appropriate applications, is determined by the performance and precision of its electrical



**Figure 1. Structural return loss (SRL) is a measure of the back reflection of energy from and through the transmission line (cable) (measured in dB). The minimum SMPTE 292M and 424M requirement for return loss is 15dB.**

and mechanical specifications. In fact, the design of the cable is built to the requirements of the video signal. For example, cable designed for baseband analog video and close-circuit security applications typically have a reduced bandwidth, a single shield and less stringent tolerances. Accordingly, uncompressed HD formats that operate at high data rates have their own specific set of requirements. Uncompressed SMPTE 292M HD serial digital video operates at 1.485Gb/s, while the new SMPTE 424M HD standard operates at 3Gb/s.

To ensure minimal pulse rounding, back reflections and jitter, the interconnecting cable must be rated to a bandwidth that is equal to or exceeds three times the clock rate (which is one-half of the data rate). For SMPTE 292M formats, this works out to be 2.23GHz. For 424M formats, it's 4.5GHz.

To achieve the performance required of coaxial cables used in HD

broadcast standards, the cable must be made to an exceptionally high degree of precision up to 3GHz or 4.5GHz. Each element that makes up the coaxial cable — conductor, dielectric, shield and jacket — plays an important part in the performance and needs to be carefully controlled in the manufacturing process.

## Bandwidth and the measure of precision

Bandwidth is a buzzword that is often used in consumer and professional applications, but what does it really mean? Bandwidth refers to the measure of performance wherein all relevant electrical characteristics are compliant with the manufacturer's specifications or relevant industry standards at all frequencies between the high and low points of the rated bandwidth spectrum. Critical specifications relevant to bandwidth typically include characteristic impedance, attenuation and structural return loss

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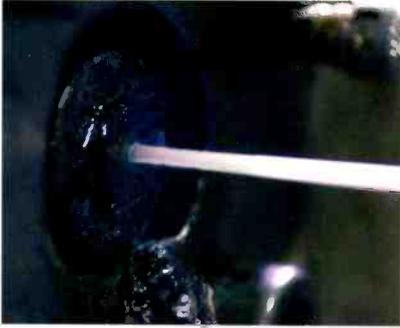
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(SRL), all three of which are measured over the defined frequency range of the bandwidth.

The most important measurement of these is SRL. (See Figure 1 on page 38.) SRL is a measure of the back



Shown here is a gas-injected dielectric expanding as it is extruded.

reflection of energy from and through the transmission line (cable). Any periodic variation, structural flaw, major

impedance variation or attenuation anomaly can manifest itself as a back reflection at some specific frequency within the return loss measurements. These reflections, often referred to as spikes, will typically correspond to an attenuation, impedance and/or mechanical defect at that frequency. The minimum SMPTE 292M and 424M requirement for return loss is 15dB, although manufacturer tolerances often exceed this.

### Consistency, consistency, consistency

We have defined what the bandwidth of the cable needs to be, but how is that accomplished from a mechanical and manufacturing perspective? In one word: consistency.

Any mechanical variation will manifest itself as an electrical deviation. A theoretically perfect coax cable is per-

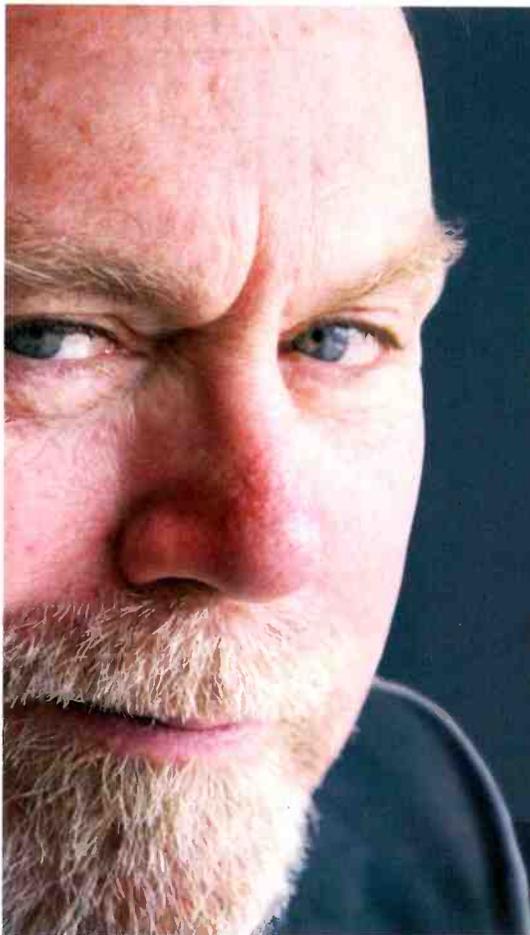
fectly round, with a perfectly smooth center conductor, which is perfectly centered in a dielectric. The dielectric itself should also be perfectly formed.

Of course, in reality, perfect geometrical dimensions do not exist. The goal in manufacturing HD coax is to minimize the ovality of the dielectric, create a precision diameter conductor that is ideally centered, and make a dielectric that has a consistent cell structure within the foam dielectric.

### The center conductor

The heart of the cable is the center conductor. Copper conductors are drawn down from copper rod material into the long thin strands. Unlike the conductor for power and audio applications, a video cable conductor requires a higher level of precision during production.

For video cable, the conductor is



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initially drawn down to a diameter that is slightly larger than the desired finished diameter. After the initial drawing process, the copper is reduced to its final diameter by other methods to achieve a diameter that is extremely precise, a tolerance within one-half of one-thousandth of an inch. The copper conductor must not only have a precision diameter, but it must also be devoid of surface irregularities (nicks, roughness, chatter, etc.). The precision diameter conductor is the foundation of the consistency of the finished cable.

### The dielectric

Just outside the conductor is the second element of the cable, the dielectric. The dielectric insulates the conductor from the shield and determines the capacitance and impedance of the coaxial cable. The exact

specifications are affected by the type and amount of plastic used (wall thickness). For HD video coax, a gas-injected dielectric is typically used because it has a lower dielectric constant than a solid compound, which allows for less compound to be used with better high-frequency performance. A gas-injected dielectric typically consists of a mixture of polyethylene and gas nitrogen.

While a solid dielectric has a high degree of structural consistency, gas-injected dielectrics require a carefully controlled process to achieve the consistency required for HD coax. If the gas bubbles (or cells) in the dielectric are not uniform in size, if its shape is not round, or if the ratio of plastic-to-gas density changes, the dielectric may become structurally variant. This variation can result in poor return loss and impedance specifications.

The higher the bandwidth of the cable, the more sensitive the signal becomes to smaller periodic variations in a cable. Thus, making cables to a higher bandwidth requires more than just testing the cable to a higher stop point. Periodic variations that change at higher frequencies must also be minimized or eliminated.

### The shield and jacket

Although the conductor and dielectric are the most critical elements to be controlled in manufacturing coaxial cables for high-bandwidth applications, the precision of the shielding and jacketing process is also crucial. Any periodic change in the physical structure of the braid can also cause return loss and bandwidth issues. It is important that the lay, angle and thickness of the foil and braid shield all remain constant.

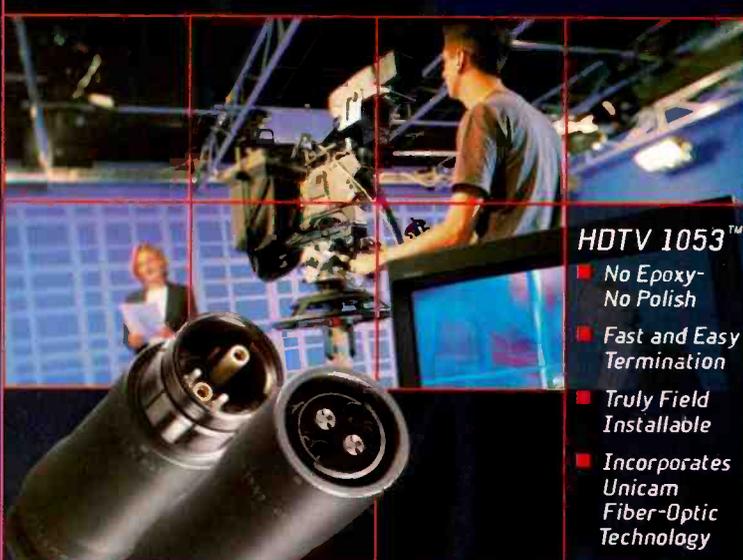
Although the function of the outer jacket is to protect the cable and does not determine the electrical properties, it is important that the extrusion process of the jacket does not deform the inner components as to create or induce structural flaws. This can be caused by excessive heat, pressure or over handling.

### Conclusion

All elements within HD coaxial cables must be precisely controlled to achieve the performance required for high data-rate standards. Although often unseen or immeasurable by the user, the microscopic consistency achieved by cable manufacturers delivers the measurable performance and transmission reliability that broadcast engineers rely on for dependable interconnect systems in broadcast HD applications. **BE**

Scott Fehl is product manager for Gepeco International.

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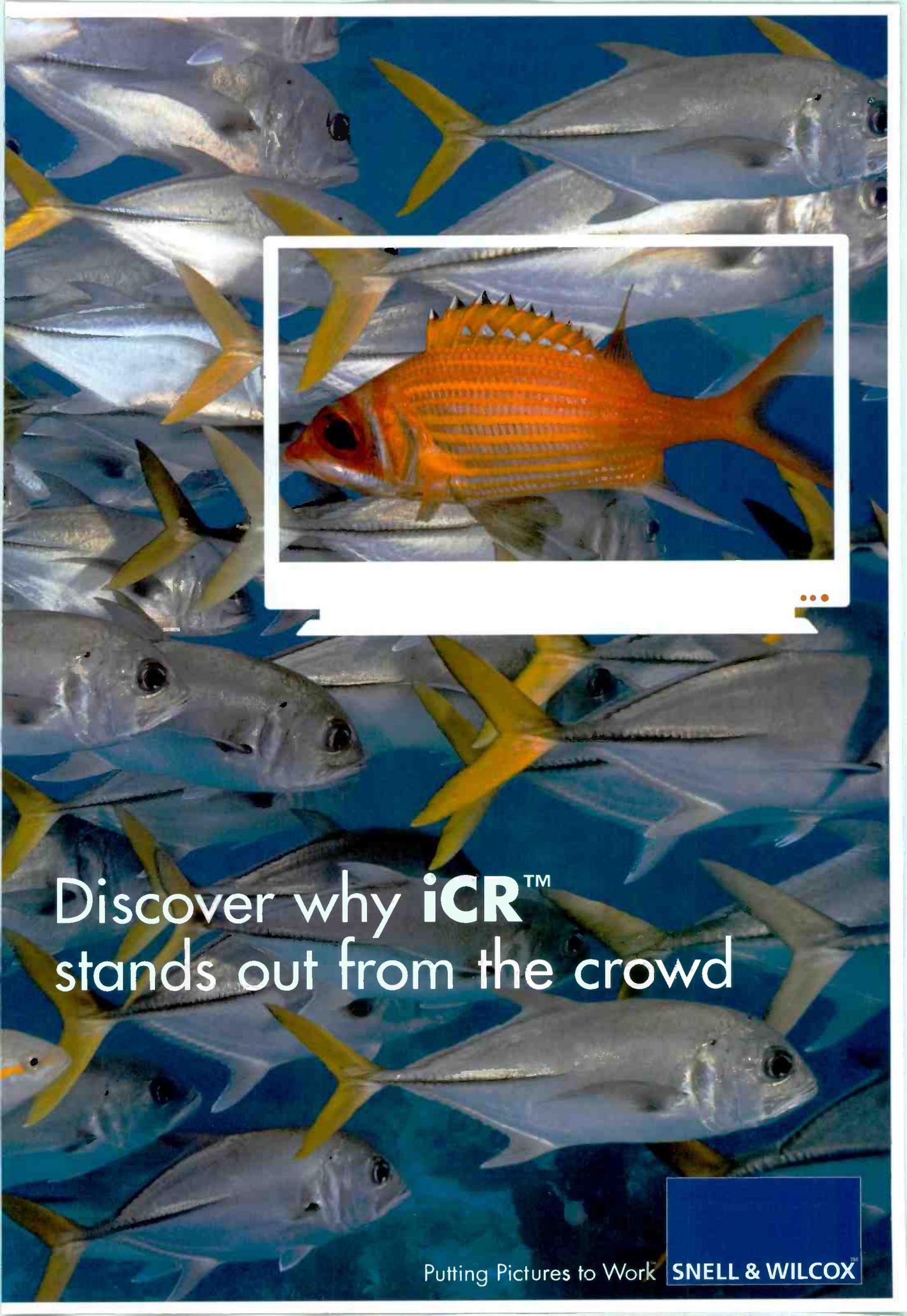
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# TMZ

## pioneers instant TV production

BY MICHAEL GROTTICELLI

The syndicated TMZ TV program (currently airing on FOX affiliates across the country) is a prime example of the new generation of television newsgathering that borrows heavily from the Internet culture. The entertainment news show — which was created as an extension of the Web site [www.tnz.com](http://www.tnz.com) — uses all of the latest technology to get a celebrity story simultaneously on the air and online with amazing speed. In an age when news comes fast and from a va-

riety of sources and viewers' attention spans are shorter than ever, segments on the TMZ show are 90 seconds or less. The show's producers, who are used to working on short items for the Web, jokingly refer to a two-minute clip as a documentary.

The same team that produces content for the Web site is now feeding the broadcast show as well, so stories

might wind up on the Web, TV or both places in the same day.

Chuck Dages, executive vice president of emerging technology for Warner Bros. technical operations, said one of the challenges of designing and installing the system to produce the TV show was to leverage the same fast, flexible production processes used to gather content for the Web

---

**TMZ's fast-paced on-air look is enabled by a tapeless workflow. Central to the show's broadcasts is a transparent white board, at which executive producer Harvey Levin runs his daily production meetings and determines that day's content.**

site. The team wanted to make sure the TV show had the look, feel and immediacy of the Web site, but with the enhanced broadcast production values of HD to give viewers a sense of being on the celebrity scene.

The system design goal was to implement a newsgathering environment that could not only get content to air quickly, but also accommodate high volumes of content and an increased number of stories on a half-hour show. To do this, TMZ needed to seamlessly share content between the television program and automatic low-resolution proxy generation for the Web site.

**Cutting-edge ENG and tapeless production**

Even the systems integration was fast-paced, with veteran systems integrator National TeleConsultants (NTC) overseeing the buildout. In



ATMZ producer/editor sits at one of the facility's 89 workstations and reviews content using low-resolution clips and script metadata prior to air.

addition to its traditional role of handling the engineering and integration of the many hardware components, NTC also coordinated the IT and software systems implementation. This included development of custom software by the systems integrator's staff. The facility was built in four

months after NAB2007, where the equipment was purchased. The staff did several weeks of practice shows in August and went on-air on Sept. 10.

Working with TMZ staff, NTC installed a Dalet NewsPlus News Suite newsroom computer system (NRCS) that supports ingest control, media

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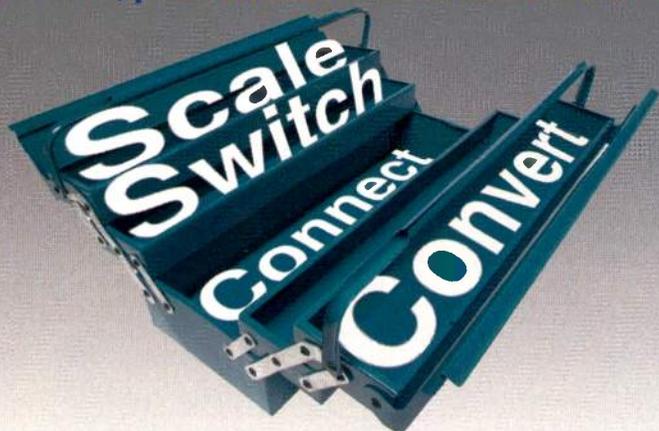
er integration, automated ingest control, FIFO recording and rundown control of play-to-air servers. With it, the staff can reorder its rundown to accommodate late-breaking stories and regional updates.

TMZ uses cutting-edge news-gathering techniques to air segments,



Supervising producer Gillian Sheldon (center) manages the TMZ Web site. The Dalet NewsPlus News Suite system includes features that facilitate publishing content to both TMZ.com and the server for the on-air TV broadcast.

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era-mounted Focus Enhancements FireStore hard drive recorders. This enables material to be immediately ingested as a QuickTime file and processed for both TV and the Internet. It also allows the producers to use the HDV tape for backup and as an archive media.

The TMZ franchise has made a name for itself by breaking scoops on celebrity mishaps, and the IT

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infrastructure at the main production facility in Hollywood, CA, enables it to do just that. All of the production systems, and its staff of 120 people, are installed on a single floor.

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Once content comes into the building, usually between the hours

of 12 a.m. and 3 a.m., it's ingested, and metadata is assigned to it. Rough edits are then instantly created by the producers and editors working on the shared storage NRCS. Early the next morning, show executive producer Harvey Levin holds a meeting with the producers to select stories for that night's broadcast. This meeting, with

Levin at a transparent white board, is so lively that it is sometimes taped, and parts are inserted into the show so that viewers can see how the show is put together.

Once a story has been approved for air, the EDL is sent to a group of eight editors, who finish the pieces from the full-resolution material and



Traffic coordinator Kerry Moynahan works in the master control suite, where the recording of all incoming feeds and automated playout of TMZ programming occurs. The suite also handles production control and transmission operations via an NVISION 64 x 64 router.



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Omneon  
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Multiport 4100 series playback  
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Spectrum server  
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Sony  
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HVR1500 HDV VTR  
MSW-M2100 multiformat VTR  
TASCAM FW-1082 edit room MIDI controller  
Tektronix WFM-7000 waveform monitor  
Wohler audio monitors  
Xendata archive management  
Yamaha 01V96V2 digital audio mixer

send them along for insertion into the main show. Some of these finished segments are also immediately posted on the Web site, complete with still frame grabs and short videos.

The staff produces one TV show per day, but content is continually updated before, during and after airtime. Editors fix or update the second segment of the show while the first segment is playing out. Using their laptops, producers in the field file breaking stories directly to the facility via wireless hotspots. That's an example of today's ENG professional in action, and it's exactly what the TMZ

**Implementing this cross-platform environment was not easy, but it worked seamlessly for the production staff. It is fully HD-capable.**

franchise is all about.

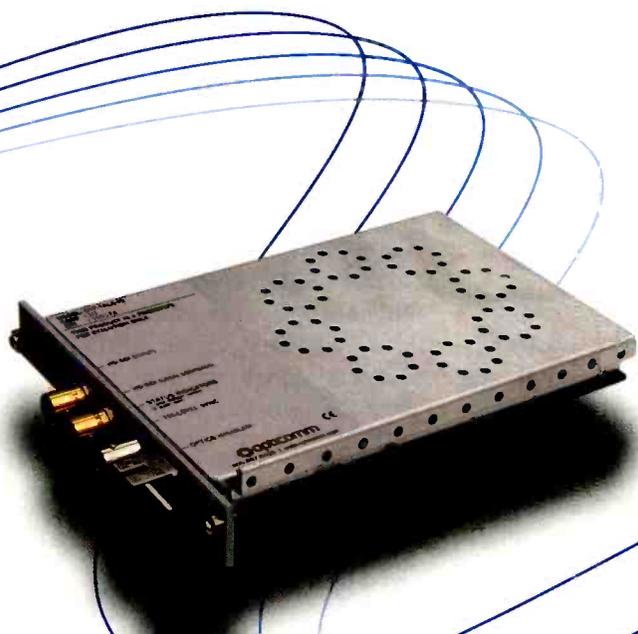
The producers work with low-res proxies on PC workstations connected to a GigE network. The full-res (25Mb/s) HDV material is edited and finished on Apple Final Cut Pro HD systems connected via fiber to a Hewlett-Packard SAN with 32TB of capacity. The NRCS is also used to manage the playout of segments from an Omneon Spectrum server storing the content assets, making them available as low-res proxies and full-res files to anyone in the facility.

### Avoiding bottlenecks in a cross-platform environment

Spencer Stephens, vice president and general manager of Warner Bros. motion picture imaging, technical operations, said implementing this cross-platform environment was not easy, but it worked seamlessly for the production staff. It is fully HD-capable, with 25Mb/s files being

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passed around without bottlenecks on the network. Cell phone videos, which sometimes have to be cleaned up using tools within Final Cut Pro, are also regularly added to the show when appropriate.

The syndicated show, with all of its finished HDV pieces — complete with stereo audio elements mixed on a Yamaha 01V96V2 console — are downconverted to SD resolution before being sent via satellite to the participating FOX stations. Other smaller affiliates pick up the show as well.

## Design team

### National TeleConsultants

Ethan Bush, senior project director

David Potter, director of software systems engineering

Peter Mason, principal consultant and lead engineer

### Warner Bros.

Chuck Dages, executive VP of emerging technologies, technical operations

Spencer Stephens, VP and GM of motion picture imaging, technical operations

The entire program is shot in the newsroom, making the facility not only tapeless but also one without a traditional control room. All of the stand-ups are shot from desks situated on a platform in the middle of the

**The entire program is shot in the newsroom, making the facility not only tapeless but also one without a traditional control room.**

newsroom, with Levin overlooking the numerous cubicles while serving as the central figure in the situation room. Using an IFB headset system, a director instructs two Panasonic AJ-HDX900 camera operators sit-com-style on what angles to shoot. A box-style camera, or flash cam, is set up in the newsroom and used for live interview segments. “Anderson Cooper 360°” and other programs have interviewed Levin from there. An NVISION 5128 64 x 64 SD/HD video

router with an NV5218-MC master control system helps move signals around the facility.

In keeping with the show’s non-traditional TV production workflow, the flash cam does not go through a control room or video production switcher. Instead, it is connected directly to the facility’s AT&T switch, where a live feed can be broadcast at a moment’s notice.

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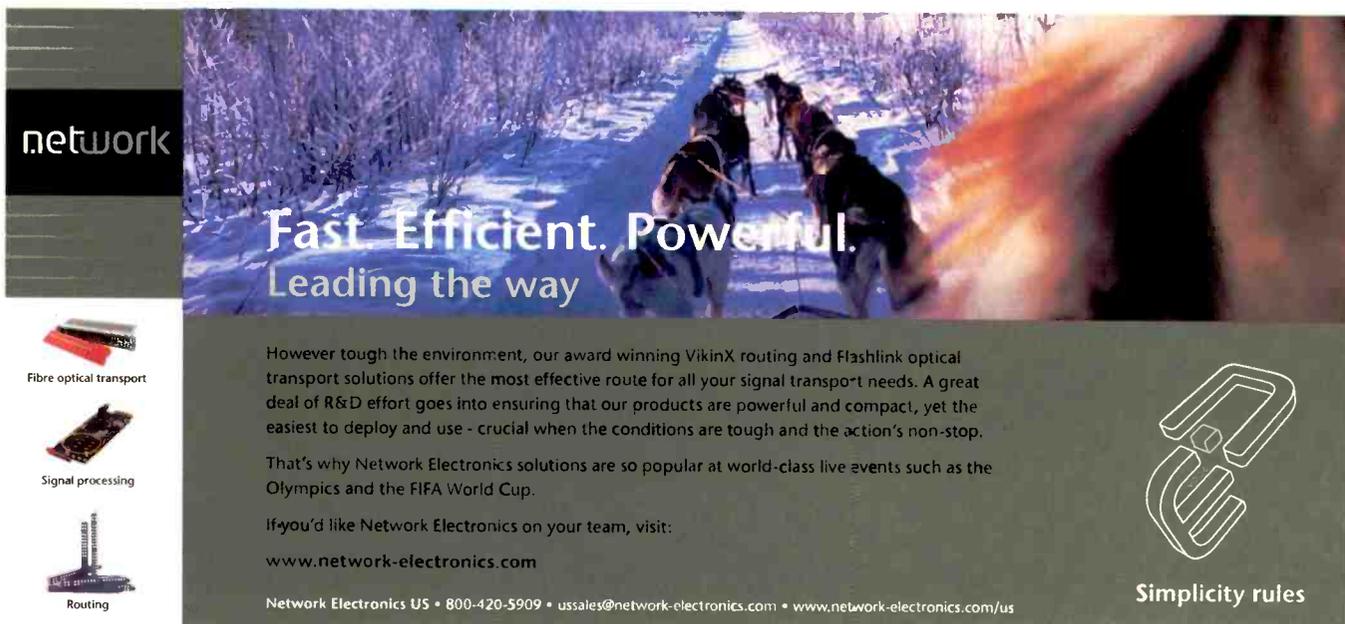
*Michael Grotticelli regularly reports on professional video and broadcast technology industries.*



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# Video over IP

When designing a network that supports video over IP, consider the bandwidth needs.

BY CIPRIAN POPOVICIU

**D**elivering high-quality video content is one of the latest and most demanding challenges faced by the Internet Protocol (IP). The combination of time-sensitive delivery, low loss transport and wide ranging bandwidth demand requirements make video over IP seem like an intractable problem for a connectionless, best-effort protocol.

IP and its networks have evolved to support more than basic data transfers. The first foray into supporting time-sensitive communications was with the deployment of voice over IP (VoIP) services, and this was very successful. At the same time, the rapid evolution of underlying technologies provided large amounts of bandwidth in all areas of IP infrastructures, from 10Gb/s Ethernet links in the core to multiple megabits per second in the broadband access layer. These steps created the conditions for the consolidation of communications needs, the so-called triple-play (data, voice and video), over the IP networks. IP is now pushing the service paradigm into a

fourth dimension: mobility. Quad-play opens the door to new means of delivering video content as well.

Packaging video with voice and data services provides benefits beyond the cost reduction of using a common infrastructure. New features and capabilities can be implemented through the interaction between these three services. Ads customized for the user or region can be inserted in a subscriber's preferred video content. Incoming voice call information can be delivered on-screen, while the video transport capabilities of the environment can be leveraged for video telephony.

IP has already been a catalyst for new ways in which video content is delivered. Over-the-top video would not exist without the Internet and IP. While it is not entertainment-grade, over-the-top video has rapidly grown in popularity. In the end, however, regardless of service models and delivery methods, video represents a new and demanding playing field with specific requirements. Video over IP brings both opportunities and a wide

range of technical and business challenges for the IP networks and for service providers. The next-generation networks (NGN), either enterprise or service provider, must be designed to support video services over IP alongside data and voice.

## General concepts and service requirements

There are several service types and service models for delivering video content over IP. It can be delivered on-demand (VOD), unicasted to the subscriber, or it can be a broadcast program multicasted to a group of subscribers. It can be sent by service providers over their own infrastructure and in full control of the networking resources, or it can be delivered over the Internet, crossing multiple administrative domains.

In all these service models, users demand a high quality of experience (QoE), which is a multifaceted metric of the service quality. The QoE is related to the quality of the image, which depends on encoding, delay variations and packet loss during transport. It is also connected to the impact of failures and the speed of changing channels. Thus, it is important to understand some of the common factors influencing the QoE.

Regardless of the service model, a common challenge for video content delivery is the large amount of information being delivered, which translates in significant bandwidth needs. To make this challenge more manageable, several encoding mechanisms have been developed, primarily within the ISO/IEC Moving Picture Experts Group (MPEG) and ITU-T Video Coding Experts Group (VCEG), to reduce the bandwidth requirements and to deal with data loss. Different

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Encoding	Bandwidth	Quality	Use
MPEG-1	0.5Mb/s-1.5Mb/s	VCR	Business services
MPEG-2	3Mb/s-20Mb/s	Studio	Broadcast/HDTV services
H.261/H.263	64K-2Mb/s	Video	VOD services
MPEG-4(p10)/H.264	<64K-4Mb/s	Video	Internet and business services

Table 1. Video encoding mechanisms

encoding mechanisms are best suited for each service model. (See Table 1.)

The most popular encoding mechanisms today are MPEG-2 for managed video services and MPEG-4 Part 10/H.264 for over-the-top and business services. Even with the help of encoding, video services will con-

sume significant network resources, up to almost 20Mb/s for an HDTV, MPEG-2 encoded channel.

While high compression reduces the bandwidth use, it increases the stringency of packet loss requirements. Dropping a single IP packet carrying an MPEG I-frame can lead to pixila-

tion, macro-blocking or loss of picture frame, thus significantly degrading the viewing experience. For this reason, video service providers demand a maximum loss of one packet in a million from their networks.

The encoded video content can be transported over IP directly via User Datagram Protocol (UDP) or via Real-time Transport Protocol (RTP). Single programs can be transported in a single-program transport stream (SPTS) or, for efficiency reasons, multiple programs can be multiplexed into a multiple-program transport stream (MPTS). For a good viewing experience, these streams should experience delay variations of no more than

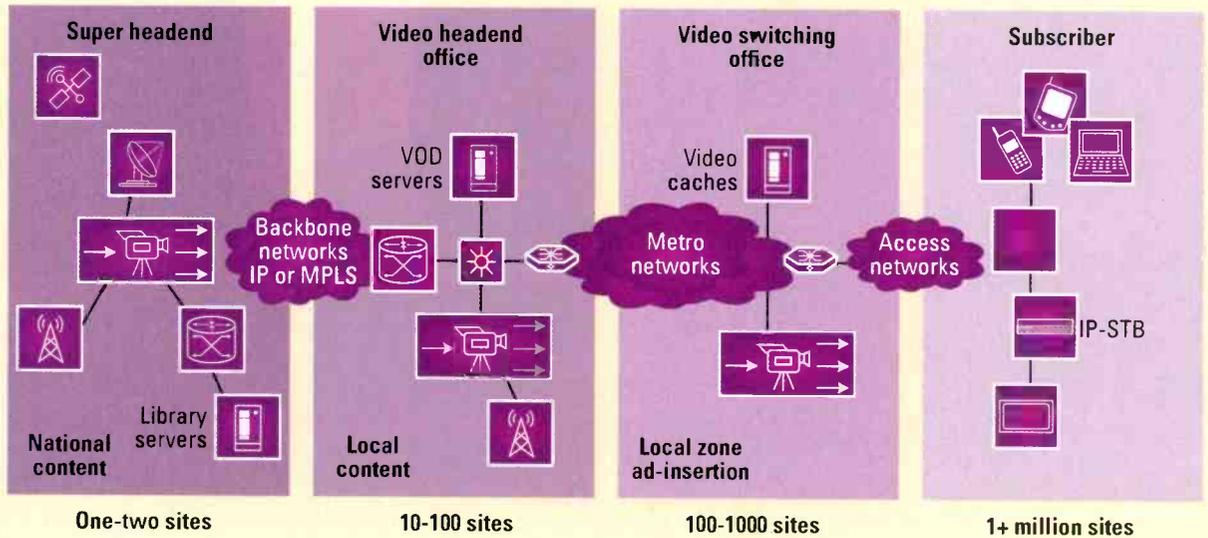


Figure 1. IP next-generation network (NGN) architecture for optimal delivery of video services

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150ms, above which packets are considered dropped. The control plane protocols leveraged in the delivery of the video content, either unicast- or multicast-based, should also experience minimal delays, and the channel setup time should be less than 500ms.

Quantitatively, the goal for a good viewing experience is to have subscribers experience less than one artifact over a two-hour long movie. To achieve this goal, it is important to understand all the factors affecting QoE as well as their probability of occurrence in real networks. For example, some claim that an important requirement in designing networks for video services is to have a recovery time of less than 50ms on link failure. While this is indeed a factor affecting QoE, experience shows that in real networks, it only causes 7 percent of the service outages. Designing IP networks for video services requires a comprehen-

sive analysis of the impact and weight of all factors affecting QoE.

### IP network architectures for delivering video service

From an IP network design perspective, the most interesting case is that of video services offered by a service provider over its own infrastructure. In this situation, all the elements participating in the service delivery can be designed and deployed in a way that optimally supports video content distribution. By contrast, in the case of over-the-top service, the means available to offer the best service across multiple administrative domains are limited. For this reason, we will focus on the end-to-end network design considerations for the infrastructure of a service provider offering video to its subscribers.

As highlighted earlier, out of all the service types in triple-play, video is the

most demanding on a network's resources. For this reason, new networks supporting video content delivery are designed based on the requirements of this service. This typically ensures readiness for the additional voice and data services. The future service provider network must support flexible, interactive, content-rich video services across a wide range of access technologies with a superior quality of experience. Moreover, in the context of quad-play, service providers must be able to extend the service to mobile devices and support roaming.

The key components of the video over IP architecture include:

- *Super headend (SHE)*. Live video feeds and real-time encoding of video broadcasts typically originate from one or two SHEs, where asset distribution systems are also located for on-demand services along with back-end systems.



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- *Video hub office (VHO)*. Operators typically maintain a few dozen regional VHOs, usually in metropolitan areas, serving 100,000 to 500,000 homes. VHOs often contain real-time encoders for local television stations, as well as the network routers that connect the distribution network to the network core. They also typically house most content servers used for VOD services.
- *Central office and video switching office (VSO)*. Central offices and VSOs house aggregation routers that combine traffic to and from subscriber homes.

A schematic representation of this generic architecture is shown in Figure 1 on page 62. This architecture can be implemented in both a centralized and a distributed fashion to address scalability concerns.

The implementation of this architecture requires, among other things:

- thorough bandwidth budgeting;
- high capacity, high forwarding performance routers handling both unicast and multicast traffic;
- fast converging IP unicast routing design for VOD;
- fast converging source-specific multicast-based (SSM-based) design for broadcast video service with special design considerations for channel zapping;
- QoS design based on rigorous differentiated service

(DiffServ) or integrated service (IntServ);

- redundancy and channel setup time improvements, typically achieved by sending the video content over two different paths to a point as close as possible to the subscriber; and
- a set of tools and systems that facilitate the process of operating and monitoring the services.

The details of the implementation reflect the characteristics of the access layer technologies, the topology type (ring vs. multipoint) and the bandwidth availability at various points in the network. Nevertheless, in the end, service challenges still occur from things such as the bandwidth bottlenecks in the access layer or scalability limitations. Additional tweaks can be made based on the traffic profiles. IP networks can be tailored to the asymmetry between the upstream and downstream traffic of triple-play users and have more resources allocated to the downstream traffic.

In the case of the bandwidth-demanding video services, it is easy to oversubscribe the access layer. A subscriber browsing through multiple broadcast HDTV channels can quickly draw sufficient multicast streams into the access layer. This will saturate the bandwidth available to a group of aggregated subscribers. For this reason, call admission control (CAC) is an important tool in the IP infrastructures shared by multiple subscribers and multiplexing several other services besides video.

Finally, the expansion of the IP-based environment into quad-play services creates the challenge of offering video content to mobile devices. Regardless of how well-tuned the network is to support the service, new operational circumstances simply require new concepts and mechanisms for content delivery. How will a mobile device that is receiving a broadcasted program while it is briefly going through a tunnel affect the viewing experience? In these new situations, the IP network might enlist the help of new delivery concepts, such as those where a small amount of redundant information can hide the packet dropped while in a tunnel without signal.

### Summary

Video delivery over IP presents multiple business and service opportunities. Its deployment, however, is not a trivial matter. Of the three services in triple-play, video demands the most from the networks, so it greatly affects the design of the NGNs. In a well-designed IP network and with the help of appropriate service management tools, several service providers successfully deployed and operate large-scale video over IP services offering HDTV content. At an ever improving viewing experience, over-the-top content providers are reaching the growing Internet population not only as viewers but also as content producers. And all these services are running over IP. **BE**

*Ciprian Popoviciu, PhD, CCIE, is a technical leader within the Networked Solutions Integration Test Engineering group at Cisco Systems. He is also a senior member of the IEEE.*

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# Interoperability

The complexity and connectedness of today's world make interoperability a hot topic.

BY STAN MOOTE

In the most basic terms, interoperability is the ability of a system or a product to work with other systems or products — with no special effort required on the part of the user.

Standards only define a certain level or a basis for interoperability. For example, let's take a look at ANSI/SMPTE-259M, the serial digital video interface standard. Companies interpret the document in different ways. For example, for finding vertical sync, some companies lock on the line counter, others on the raising edge of V-blanking, some on the falling edge, and a few even use the field bit. When manufacturers don't use the same logic to determine the start of vertical sync, the result is often a vertical picture shift.

The industry has more or less addressed these discrepancies now, but from time to time, service labs run into difficulty, mainly with new players that have not dealt with this interoperability issue before. Speak with any broadcaster that has a lab, and you are bound to hear lots of interoperability war stories.

While manufacturers met the specifications, it often comes down to how they interpreted the spec. Embedded audio is another nightmare, with two people able to discern two very different meanings within a single paragraph of a standards document. While the standards bodies spend hours — often days and weeks — on a single concept to clearly articulate the meaning, it's just not always possible to cover every angle.

## The cause of interoperability issues

It seems that in the single-channel analog world, interoperability “just

happened.” Certainly, analog linear workflow had significantly fewer interconnections. Also, the signal paths were typically limited to twisted pair audio, NTSC/PAL video and machine control running over broadcast RS-422 (SMPTE-207M). Other controls for products such as routers, satellite dishes, talk-back intercoms, transmit-

squeezed and the constant increase in on-air channels, broadcasters are demanding SNMP, and it is emerging as an important interoperability protocol for the broadcast as well the networking community.

However, it's not enough for manufacturers to simply support a standard version of the SNMP protocol

**It's not enough for manufacturers to simply support a standard version of the SNMP protocol natively at their devices.**

ters and STLs, editing systems, and even graphic systems were all proprietary.

In this more simplistic world, manufacturers would seek out and align with the market leader in any given area to ensure compatibility. If there was no clear market leader, manufacturers invested R&D into protocol converters, providing customers with the advantage of not being married to a single manufacturer's proprietary system.

The switch to digital suddenly gave broadcasters the flexibility to add more channels, but at the price of complexity. While equipment costs dramatically decreased, the digital revolution brought many more standards and interconnection issues. With flexibility comes complexity — and the only path back to simpler times is via interoperability.

## “True” interoperability

Although Simple Network Management Protocol (SNMP) has been an established protocol for network management within the network community for many years, broadcasters insisted they would never use such an expensive, complex solution. Today, however, with budgets being

natively at their devices. Device interfaces for SNMP (MIBS) also need to be structured correctly and comply with the ASN specification. Without this important interoperability step, some manufacturers' equipment may only be accessible by their own control system, even though SNMP has been used as the underlying control protocol. For true interoperability, all device interface MIBS need to be validated for compliancy to a broad range of control clients, not just the ones sold by that manufacturer.

So as a customer, it's not enough to expect that checking the box on SNMP will provide the level of interoperability you will need. Manufacturers should offer you proof that their systems comply with the full standard. Ideally, this should be validated by a third-party's compliancy test suite. For this reason, some manufacturers employ a third-party SNMP partner that regularly validates their SNMP solutions for full compliance. Again, be cautious here: Don't accept the “we are using a third-party” story; it needs to be a compliant third party.

The broadcast world is now dependent on a file-based workflow. Program

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content (assets) contains an increasing amount of information. The essence is now just one part of the information transported via broadcast distribution.

The actual transport between two entities — whether servers, switches, routers, encoders, etc. — is accomplished using a data model. This data

model defines the means by which various entities handle, or process, relevant information. It defines their interoperability.

To better understand interoperability, it is easier to break it down into smaller pieces, similar to what the computer geeks do with seven Open Systems Interconnection (OSI) layers. (See Figure 1.)

However, even this breakdown was too complex and has been simplified into a three-layer model. (See Figure 2 on page 78.) For broadcast users, this three-layer structure is ideal for representing different workflow areas, and it helps them to better understand where and why they need interoperability.

OSI			
	Data unit	Layer	Function
Host layers	Data	Application	Network process to application
		Presentation	Data representation and encryption
		Session	Interhost communication
	Segments	Transport	End-to-end connections and reliability (TCP)
Media layers	Packets	Network	Path determination and logical addressing (IP)
	Frames	Data link	Physical address (MAC and LLC)
	Bits	Physical	Media, signal and binary transmission

Figure 1. OSI divides telecommunication into seven layers. The upper four layers are used whenever a message passes from or to a user. The lower three layers (up to the network layer) are used when any message passes through the host computer.

### Checklist

Figure 3 on page 78 provides an interoperability checklist, mapping out typical products used in the broadcast environment. For

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simplicity purposes, cameras, monitors and test and measurement equipment are not shown on this chart. As a new addition in the digital world, IP

routing has been added to the mix.

When purchasing a routing switch matrix, for example, be aware of “the plumbing.” Are you routing around

SDI or PAL/NTSC? Is the audio on coax or twisted pair? Do you want the router controlled with control panels or automation, or perhaps both?

How does the router find vertical? How is audio switched? Is that different for digital? Are tallies needed? What is the automation protocol? The complexity soon builds.

### Solving interoperability problems

The software side of broadcasting has traditionally been even more of a mess when it comes to standardization. Traditionally, vendors created point-to-point interfaces when common customers came along, and each interface was normally specific to a pair of systems. This resulted in hundreds

Layer	Includes	Purposes	OSI layers	Broadcaster's world
One	NIC firmware, NIC driver	Package data, present to media	Physical, datalink	The plumbing, i.e., coax, SDI, twisted pair
Two	Protocols (TCP/IP, IPS/SPX)	Route and correct	Network, transport	The wrappers, i.e., MXF, AES
Three	OS functions	Connect, format, present to applications	Session, presentation, application	The media, i.e., audio, video, metadata

Figure 2. This three-layer structure represents different workflow areas for broadcasters and shows where interoperability is needed.

Interoperability check list								
Product	Physical, i.e., the plumbing			Interface, i.e., the wrappers		The media		
	Video	Audio	Control data	Transport	Control	Video	Audio	Metadata
	PAL, NISTC, SDI, HD-SDI	Analog, SPDIF, AES	GPI, Serial, IP	Analog, digital, MXF, AAF, BXF	Transcode, playout, ingest	Uncompressed, MPEG-2, MPEG-4, GOP structure	Uncompressed, MP3	ODBC, AFD
	Coax, fiber	Coax, fiber, twisted pair	Twisted pair, fiber, Cat 5	FTP, baseband, VACP	VDCP, BVW, SNMP	SD, HD, sample rate, bit depth	Sample rate, bit depth, surround sound	Retrieve, SQL, Oracle
Routing					X			
Distribution/compression						X	X	X
Server				X	X	X	X	X
Automation				X	X	X	X	X
Traffic and billing				X		X	X	X
NLE				X	X	X	X	X
Asset management				X	X	X	X	X
Graphics				X	X	X	X	X
Processing						X	X	X
Mixing/switching				X	X	X	X	X
IP routing				X	X			

Figure 3. Use this checklist to ensure that product interoperability exists.

of interfaces floating around, certainly not something that lends itself to easy interoperability.

SMPTE recognized this problem and initiated the S22-10 effort, bringing together more than 70 broadcast vendors to find a solution. The group came up with the Broadcast Exchange Format (BXF), a single protocol that can be used by a variety of broadcast systems — including traffic, automation, program management, listing services and content distribution services. The protocol helps to achieve dynamic interoperability, further simplifying and streamlining broadcast operations. There are real savings to be realized by implementing BXF, from reduced manual day-to-day processes to reduced software development and implementation complexity. In addition, there are clear revenue opportunities surrounding day-of-air sales and the ability to easily manipulate content and schedules.

Another example of interoperability being achieved using an industry standard is in the PSIP area. Many systems existed that were capable of managing PSIP data, but this data was trapped within these diverse systems. The ATSC created the Programming Metadata Communications Protocol (PMCP) to enable systems that manage PSIP data to also exchange it. PMCP allowed traffic, automation, program management and PSIP systems to exchange program listing data, overcoming the challenges of multiple data sources, and ultimately shifting ownership of the data over time. This enabled broadcasters to leverage PSIP and to avoid fines already levied by the FCC in this area.

### Testing

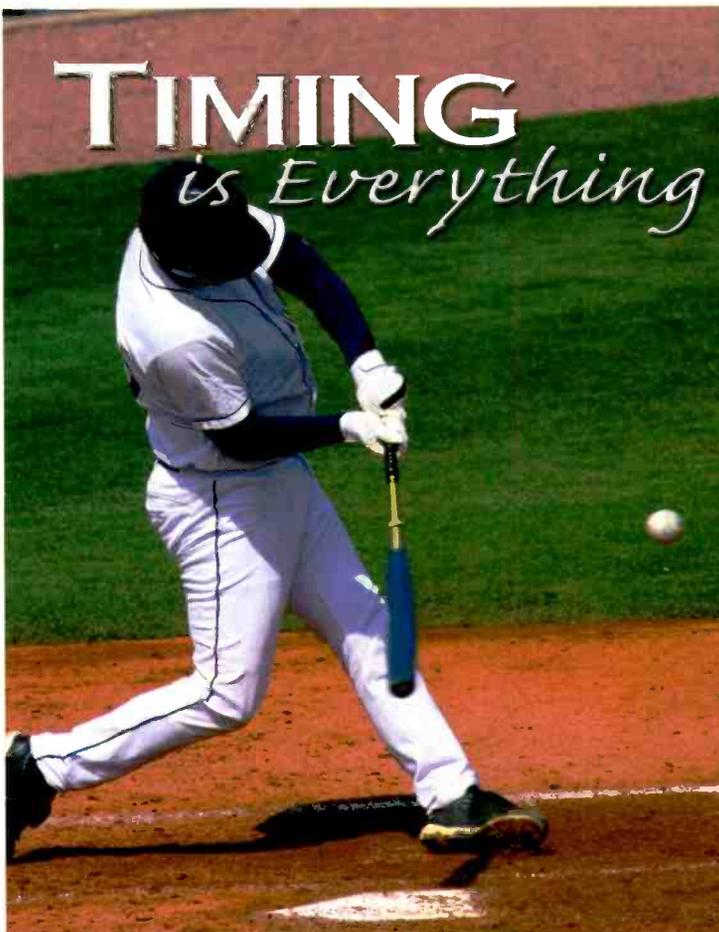
Some manufacturers have testing environments for the integration of various products. There is a huge difference between integration and interoperabil-

ity testing. Integration testing ensures that various products work together for a specific requirement and during the development process. Interoperability testing continually verifies various product and software revisions to assure upgrade compatibility.

### Conclusion

Both manufacturers and customers must ensure product interoperability exists and that products function properly within a broadcast facility. What can you do? Be aware of the products you are buying, use the interoperability checklist, understand what is required, and don't hesitate to ask your suppliers about interoperability. Don't accept the answer of "we meet industry standards." Ask *how* this was verified. **BE**

*Stan Moots is vice president of corporate development at Harris Broadcast Communications.*

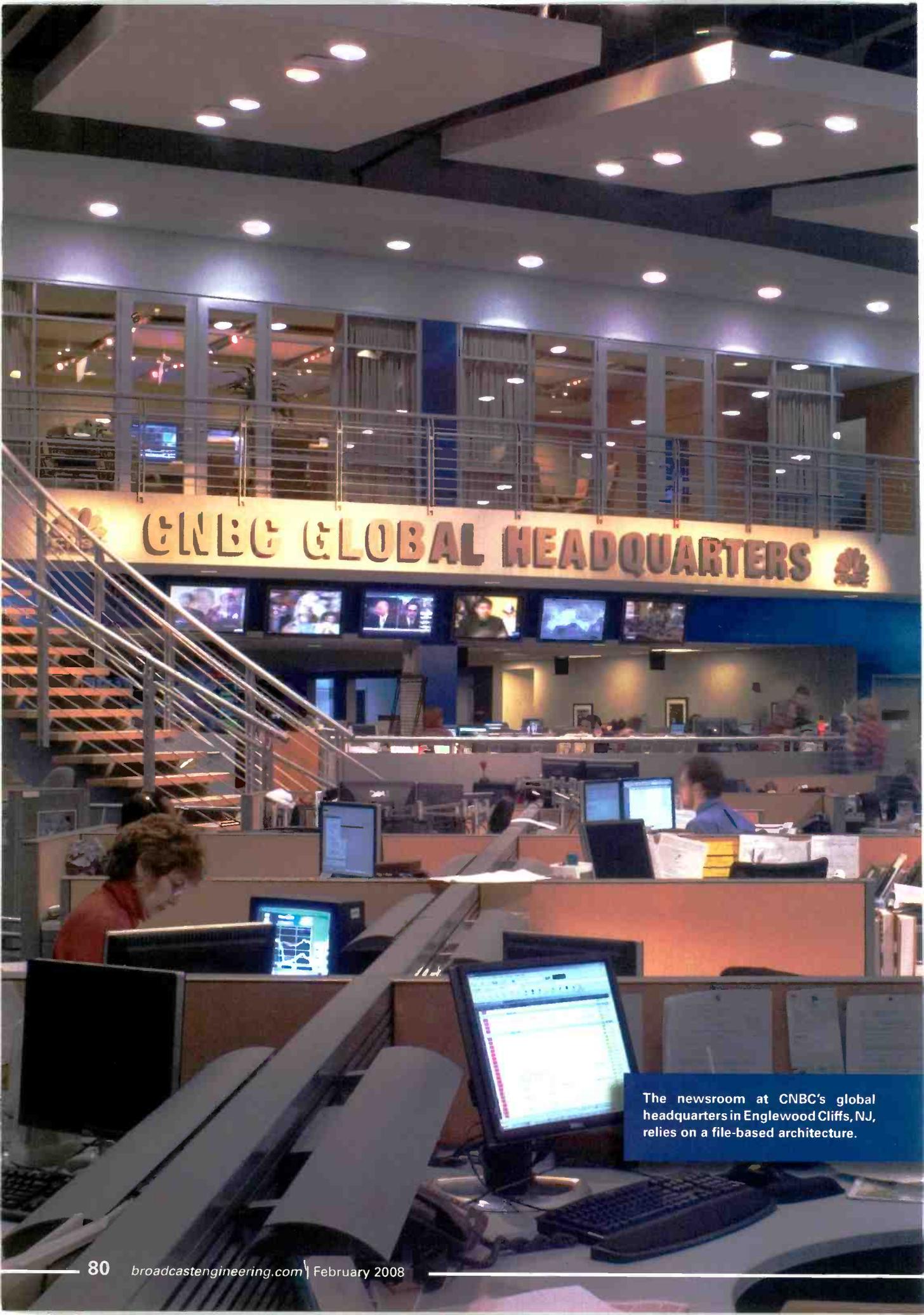


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# CNBC GLOBAL HEADQUARTERS

The newsroom at CNBC's global headquarters in Englewood Cliffs, NJ, relies on a file-based architecture.

# Understanding AND implementing

## file-based architectures for news

BY ED CASACCIA

**T**oday, news directors and engineers are increasingly focused on building, developing and installing file-based workflows. The advantages are video and audio elements that are handled as computer files, which can be easily stored, manipulated and distributed in a variety of formats. Tasks like editing can begin as soon as content is ingested. As broadcasters transition to HD, these benefits become even more important.

### The benefits

Broadcasters can benefit from file-based workflows in many ways, including:

- *Random access.* Significant time is lost by moving around tapes. In a tapeless system, editors move instantly to any frame or content and begin work.
- *Instant access.* Journalists can start working on footage upon ingest. With tapeless systems, frames are available for use throughout the system within a few seconds, even if the feed is still recording.
- *Multiple access.* In a tape-based newsroom, only one person can work on the content at a time. In a prop-

erly configured tapeless environment, everyone can access content simultaneously.

- *Easy revision and repurposing.* Making changes is easier. A promo can be quickly made by clipping the in and out points and adding a voice-over on an upcoming story. Operators never have to start from scratch. Jobs can be reopened, and changes can be made and then pushed to air almost instantly. These benefits are especially important when creating material suitable for alternate distribution channels like the Web or mobile applications.

- *Management oversight.* It's impossible for a producer or news director to visit every edit room and preview each story before it goes to air. A tapeless system can bring the stories to the desktops of essential decision-makers.

### Planning your system

There are many different ways to build a file-based infrastructure, each with its own unique performance and content availability capabilities. Although these IT-centric system designs allow users to pick and choose best-in-class applications and sys-

tems, it is important that disparate systems be compatible in order to create the desired seamless workflow.

The goal should be complete and unlimited interoperability. The solution requires a well-matched sampling strategy and a data rate based on a house compression format and a common file wrapper. This wrapper needs to be identifiable by all of the facility's systems and devices. Also, don't forget the importance of having standardized physical connections, like-minded transfer protocols that are supported by all applications and an integrated metadata dictionary.

### Storage architectures

Start by considering storage needs. File-based architectures must have an adequate amount of storage. The storage platform must accommodate multiple users who carry out a task or series of tasks on a daily basis. The content should be simultaneously available to editors, producers, journalists and others involved with the production process.

Storage area network (SAN) and network attached storage (NAS) are two common types of storage

## FEATURE

### UNDERSTANDING AND IMPLEMENTING FILE-BASED ARCHITECTURES

platforms used in broadcast news facilities. When properly implemented, both can support a seamless two-way SD/HD signal flow and multiformat/multichannel outputs. Both enable multiple users to access media files simultaneously, thereby taking full advantage of a tapeless environment.

In newsroom applications, the key

difference between a SAN and a NAS is how the storage system appears to the local workstation. A NAS appears as a networked drive with reads and writes managed on a file basis. This is similar to sharing files across a home network. A SAN, whether connected to the client by Fibre Channel (FC) or iSCSI over Ethernet, behaves like a lo-

cal drive. Reads and writes take place on a block (as opposed to a file) basis. This allows software developers to implement deterministic performance for nonlinear editors. Deterministic performance is not a given. Nonlinear editing software must contain a specific code to take advantage of the SAN's read/write characteristics. A SAN, along with properly developed and configured NLE software, can ensure that editing applications perform optimally all the time.

A SAN production system uses a ring of storage devices linked together via FC. This allows users to share the storage arrays as if they were one

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Editors at CNBC's global headquarters use Thomson Grass Valley's Aurora Edit nonlinear editor.

device. If an editor needs capacity from server A, but server A is busy, the SAN system will automatically redirect the user's talk to server B or C.

Using high-speed FC technology, a SAN system can service dozens or even hundreds of audio and video channels through a shared, RAID-protected storage network. And, it can be configured to offer both deterministic real-time capabilities as well as open Common Internet File System (CIFS) connectivity at the same time.

A NAS architecture also uses multiple networked media servers, RAID storage, Ethernet connectivity and

off-the-shelf components. It provides deterministic total server and client channel bandwidth, but may not guarantee that any editor or server will get bandwidth at a given time.

Like SANs, NAS can accommodate multiple video formats (including DV at 50Mb/s), scales to 14.6TB and provides open support for any CIFS-based program.

### House compression format

All digital news field acquisition in SD or HD involves compressing the audio and video data. HD video starts out at 1.3Gb/s but is compressed to rates between 35Mb/s and 100Mb/s.

Compression technology enables files to be stored more efficiently and moved around a facility quickly and easily, especially where bandwidth is limited. In many cases, the compression format has a significant effect on the rest of the production workflow.

Often choosing a compression format is based on that of the primary video coming into the facility. Determine which compression is used by your ENG camcorders. Is it MPEG-2 long-GOP, MPEG-2 short-GOP, DV-based compression, JPEG2000 or AVC? Each format and ratio needs to be tested to ensure that it works best for your specific application.

### Metadata dictionary

It is important that a facility develop a metadata dictionary that will accommodate past, present and future information. It should detail all of the criteria a facility needs to identify a specific piece of media.

The dictionary must match the common language developed in the newsroom over the years. In addition, it should describe where the content came from, how it can be used and what elements make up the entire

media file. Many of these items are technical or operational, and journalists may not be responsible for filling in the data. However, someone will need to do so, and the dictionary's language must be understood by all.

This dictionary is also helpful when logging incoming clips. With the proper descriptors, many tasks can be accomplished and devices can be made to operate automatically, with little human intervention.

With careful planning, a file-based infrastructure can be leveraged to support a variety of business models and workflows. The key is how it's implemented. The challenge is getting all of the systems to interoperate and work together reliably. Fortunately, there is now technology available to get the job done.

BE

*Ed Casaccia is the director of product management and marketing for digital news production at Thomson Grass Valley.*

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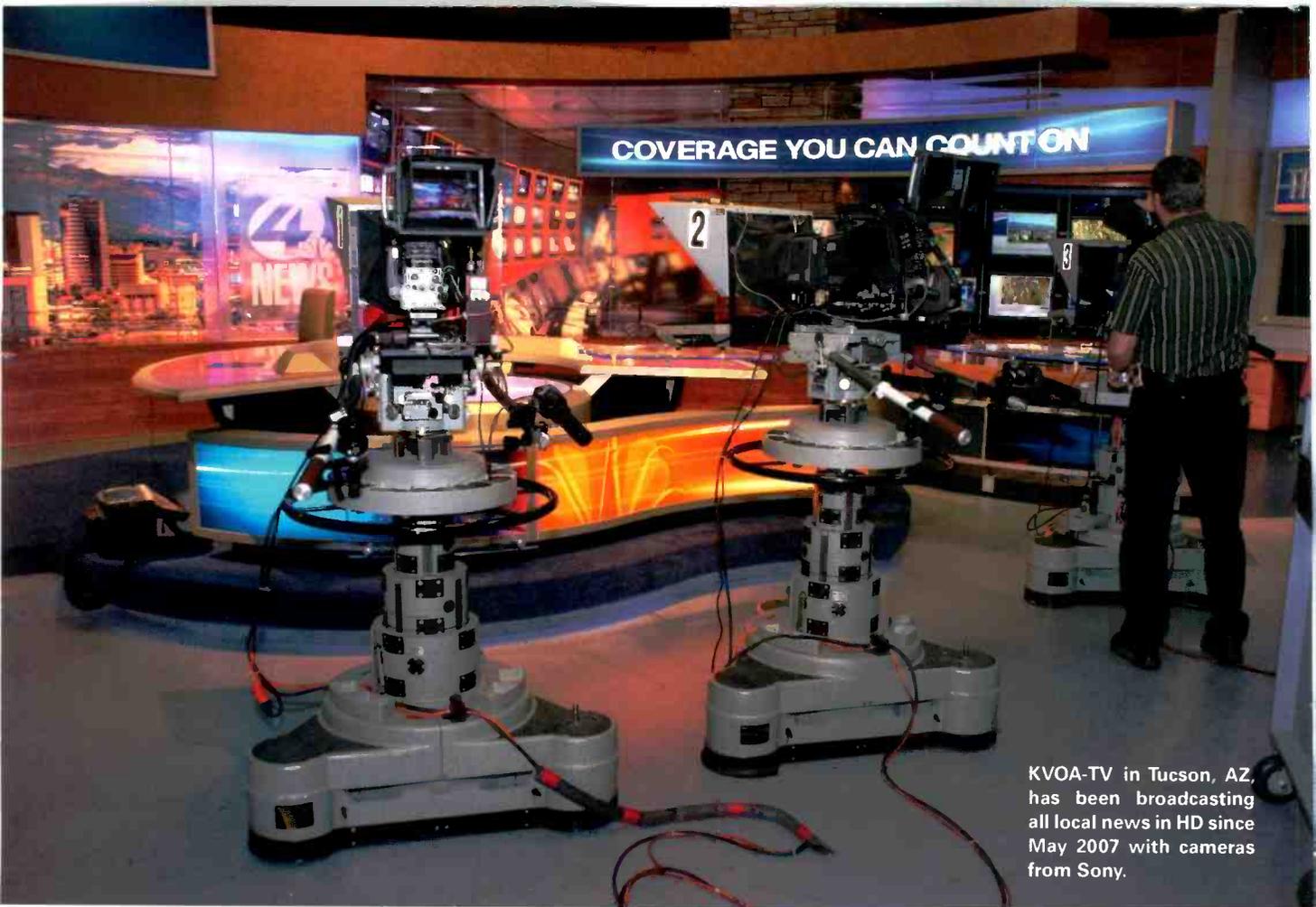
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KVOA-TV in Tucson, AZ, has been broadcasting all local news in HD since May 2007 with cameras from Sony.

# Transitioning to HD news

BY ANDREW SUK

**A**fter the introduction of digital television, many broadcasters searched for the killer app for their new digital broadcast spectrum. High-speed data or multiple-channel broadcasting were just two of the more popular choices. While new encoder technologies allow for multicasting with minimal impact on the HD signal, the early encoders did not provide enough horsepower to allow additional services within the ATSC stream without seriously affecting the HD signal. This was particularly noticeable with high-action video such as NASCAR racing or stadium pans during sporting events.

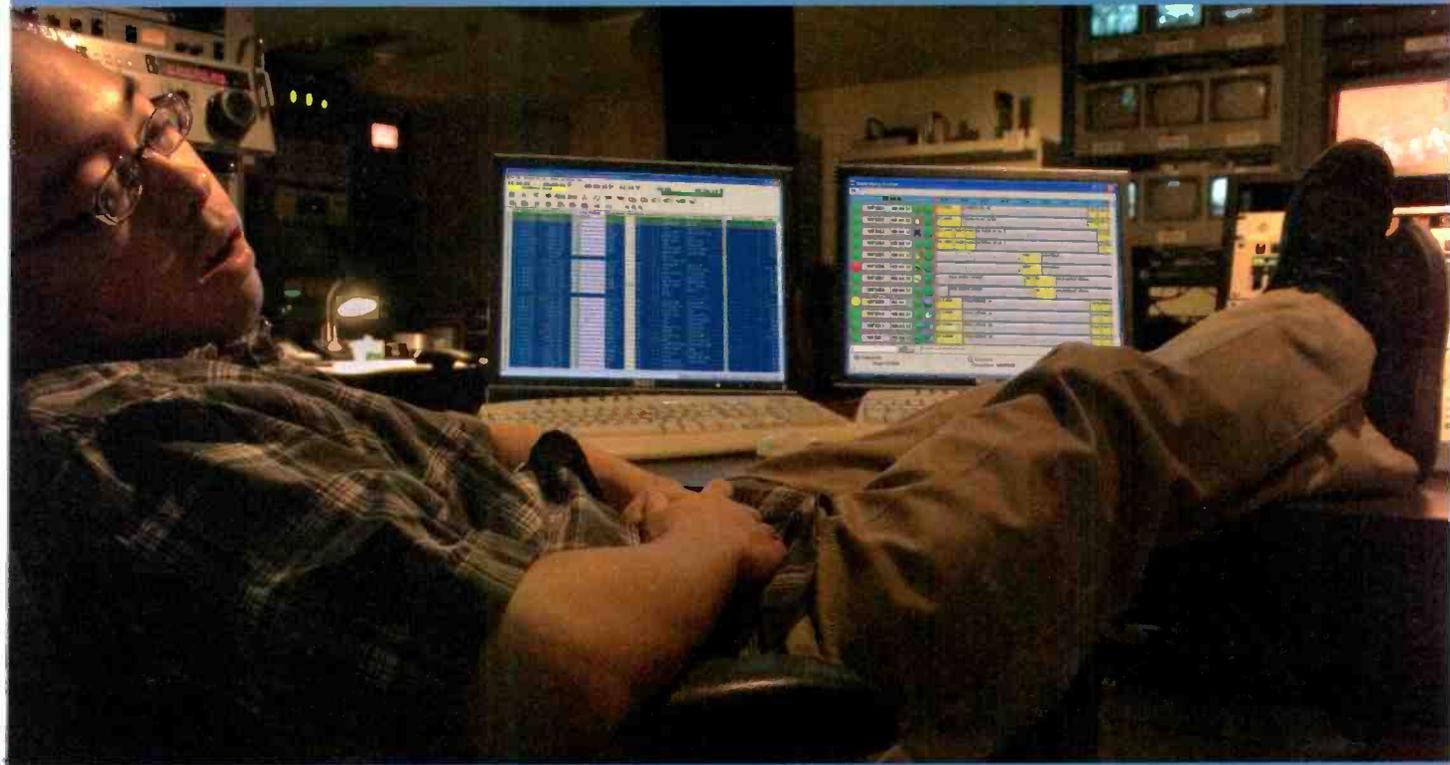
Remember that the objective of

finding the killer app is to maximize revenue and acquire or maintain leadership in the market. In early 2003, Cordillera Communications decided that for our group, high definition was the killer app. During the DTV buildout of all 11 Cordillera stations, we consistently passed through any network HD programming and built out even our smallest system with the design intent to eventually transition to local HD production. In January 2007, we decided to transition our two largest stations — WLEX-TV in Lexington, KY, and KVOA-TV in Tucson, AZ — to local HD news. Our goal was to be HD for the May rating period.

The transition to HD news is nei-

ther a news nor an engineering project, but rather a system upgrade that involves the entire station. An engineering manager might tend to think in terms of switchers, servers and cameras, while the news manager will be considering the news set, graphics packages and upgrades to the weather system. Obviously, all of these are key elements of a successful transition. Like any major project, planning, communication and the involvement of all affected parties are critical for a successful launch. As much as we want to avoid the bleeding edge of technology, the transition to HD is almost by definition in that arena. Every station will be different, and every station will have its own distinct

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challenges. Putting together all of the required parts for a given facility is the real challenge. Areas you'll need to address include:

- an HD production switcher;
- nonlinear editing;
- studio cameras;
- field cameras;
- HD lenses;
- character generation;
- weather graphics;
- station graphics;
- news set;
- HD master control;
- HD servers; and
- conversion equipment.

Manufacturers have designed their equipment to work within a specific set of parameters. Unfortunately, those parameters may not meet the needs of the station.

As an example, manufacturer "A" may have a beautiful interface from its HD production switcher to its newsroom edit system. But your station may use an edit system from manufacturer "B," and perhaps your character generator is from manufacturer "C."

Getting all of the pieces of equipment to talk to each other is probably the most daunting challenge. As an end user, you'll spend a significant amount of time working with the

various manufacturers and getting them to talk with each other. Our experience has shown that manufacturers welcome those opportunities, but require an end user as a catalyst for those discussions.

### Software issues

Electronic newsroom systems and MOS interfaces certainly seem to provide all of the needed requirements for a very streamlined operation — that is, until you actually try

to implement those systems and their associated interfaces. Software revisions come quickly, and while the latest revision may fix one issue, it often creates others. Check the update carefully before you commit.

These are extremely complicated strings of software code, and you will most likely be trying to get several different manufacturers to comply with your specific application. Keep the lines of communication open with all of your vendors.



In the field, KVOA-TV photographers use Panasonic SPX800s to shoot 16:9 SD video, which is upconverted to HD at the output of the news payout server.

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## Field acquisition

Field acquisition is another challenge. We chose to initially record 16:9 SD video and upconvert to HD at the output of the news playout server. The quality was sufficient enough for our first foray into HD, and it allowed us the needed time to concentrate on the studio side of the conversion.

We are currently moving toward HD field acquisition, and starting with the 16:9 upconversion allowed

process. The little features like bug insertion can wreak havoc if they are not considered in advance.

The requirements will vary from station to station, and certainly the network feeds will also affect how you handle your signals. Is closed captioning provided on your network's HD feed, or is it only available on the analog feed? Does your network provide a different signal for digital 16:9 and analog 4:3 feeds?



WLEX-TV in Lexington, KY, has been bringing viewers its newscasts in HD since May 2007. The station uses the Harris Leitch Icon for master control.

us greater flexibility for the studio build-out. It also gave us the time to hold for a more robust HD field technology.

Live ENG microwave is yet another issue. While the technology is there, the small to medium market budgets may not be. It may make more sense to step your transition across two or three budget cycles as opposed to taking one big bite in a single year.

## Master control

The daily routines of master control must also be taken into account. How will you handle EAS, school closings and any sponsored L frame squeezebacks? We chose to use a single master control feed and center-cut the 16:9 HD signal to feed the 4:3 SD analog signal. That is not a simple

## Aspect ratio

Aspect ratio changes for either dealing with archival video or new third-party news video also needs to be considered. These issues will affect the equipment users the most, and training and familiarity with how to handle various circumstances will need to be addressed.

Mixing archival 4:3 information in a new 16:9 HD story can be done successfully, but it takes a new thought process. Simply having the hardware tools won't help if the equipment users aren't trained in their use. Equipment training can add weeks to system implementation schedules, but is well worth the time.

## Graphics

Remember that the conversion to

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HD requires a complete rework of the station's visual image. This includes weather systems, Doppler radar and a new graphics package for opens, closes and promotional purposes. All of these items have significant costs that can't be dismissed during the budgeting process.

You may choose to implement a new news set during your kickoff campaign. What are the logistics involved with keeping your news product on the air while your studio is being torn apart for the new set? Remember, at the same time you may also be installing new edit stations and perhaps a new newsroom computer system.

### Cameras

Many stations have long used a grid camera or a newsroom camera, which in smaller markets might simply have been repurposing an older field cam. These too must be addressed. The good news is that there are some relatively inexpensive box cameras that can be equipped with remote control units and provide excellent HD images.

Other good news is that many of the HD production switchers have multiple DVEs and clip servers as

options. Character generators can be configured for multiple channels with still store and clip server options, and many of the former post-production "bells and whistles" can now be

**There is no one way to transition to HD. Each station will have its own requirements and its own challenges.**

included in the finished news stories from within the nonlinear edit bay.

### Conclusion

While this may sound obvious, we chose to block diagram everything from day one. We were able to use those block diagrams as a planning and communication tool for both the vendors and ourselves. I've often been asked how best to prepare for the conversion to HD. My answer has consistently been to realize that things will not go perfectly. Don't dwell on it, get over the hurdle, and move on. Whether we like it or not,

we're all still on that bleeding edge. Getting equipment to work as advertised or function within a system built of equipment from multiple vendors is not a sure thing. Be prepared to use work-arounds until a permanent solution can be developed. Use your block diagrams, but don't be afraid to go back and use an eraser and redraw the lines.

There is no one way to transition to HD. Each station will have its own requirements and its own challenges. Preplanning and keeping an eye on the long term will be the keys to success. We'll be living in this HD world for quite a while, and cutting corners now will impact us for many years. Certainly technology is changing, but how long can you afford to wait if your objective is to acquire or maintain leadership in the market? **BE**

*Andrew Suk is the vice president of engineering and operations for Cordillera Communications.*

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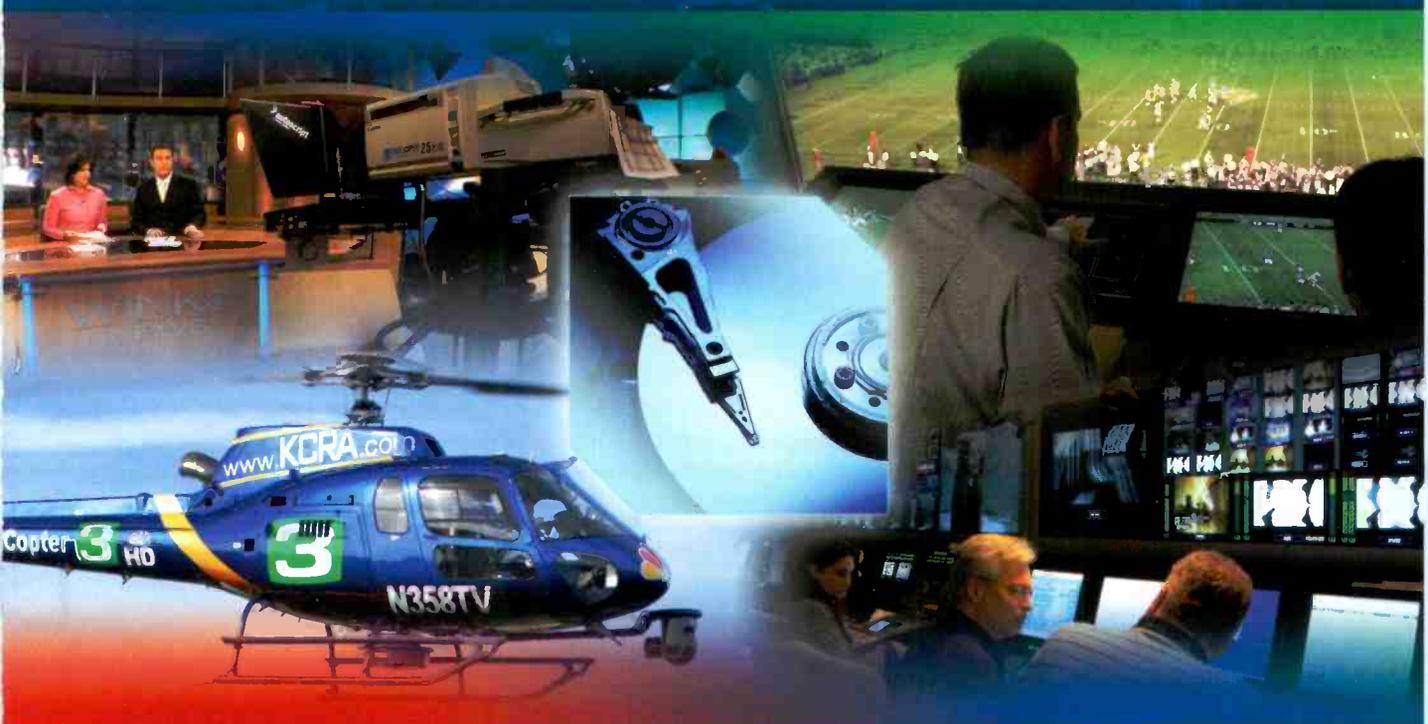
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# Twelve months and ticking

**B**roadcasters have one year until the final curtain falls on full-power analog broadcasting. In that time, some station executives will be singularly focused on getting the RF system in place. But other managers and engineers will be working hard to build new services and markets that will take advantage of their new digital OTA platform.

America's ATSC digital format supports the transmission of HD, SD, multiple program channels or a combination of these signals. Stations now can offer viewers multiple programs, all from the same transmitter. And, with multiple programs can come additional revenue.

Even more exciting is the ongoing work that may permit stations to transmit content directly to handheld and portable devices. With luck, broadcasters may soon be able to send their local news, weather and other content directly to viewers' cell phones and other mobile devices.

While all these new potential revenue channels are exciting, it takes a new broadcast infrastructure to support these opportunities. Because the workflow within a digital facility is different, incorporating the right combination of capabilities can be challenging.

That's why *Broadcast Engineering* and *Broadcasting & Cable* magazines have joined to develop a series of exclusive seminars to help broadcast executives make intelligent choices about new technology. Our goal is to assemble industry and vendor experts to help explain the options and capabilities, and then help managers and engineers work towards their own best choices.

This year's Competitive Summit will present a wide-ranging discussion on several new technology platforms and solutions. We'll look at mobile video, on-demand broadcasting, local HD and converged distribution models.

For leading stations, the *Broadcast Engineering* and *Broadcasting & Cable* Competitive Summit in Orlando, FL, is the place to be. We look forward to participating with you in this exciting summit.

Regards,

**Jonathan Chalon**

Vice President,  
Entertainment Technology Division  
Group Publisher,  
*Broadcast Engineering* and *Radio*

**Larry Dunn**

Publisher,  
*Broadcasting & Cable*  
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## The DTV dance

In one year, the nation's hundreds of full-power television stations will partake in an elaborate RF dance, swapping frequencies and maximizing their service

About one year from now, the day the television industry, federal regulators, the U.S. Treasury, emergency first responders and spectrum-hungry wireless telecommunications companies have long-awaited is due to arrive.

On Feb. 17, 2009, full-power television stations in the United States will discontinue analog television transmission, consolidate onto a narrower swath of the spectrum allotted for television and free up channels

52 through 69, clearing the way for a massive spectrum auction that will generate billions in revenue for the U.S. Treasury, as well as advancing the goal of establishing an interoperable wireless communications system for police, firefighters and other emergency first responders.

To pull this off, hundreds of television stations across the country will vacate temporary DTV channel assignments and reclaim their existing analog channel assignment for digital operations. Others will move to new digital channels, giving up their current DTV assignment, as well as

The final push is on to prepare for the DTV transition, but an important question remains unanswered, says MSTV president David Donovan. Will FCC decisions on whether or not to grant stations waivers on transmission-related rules come fast enough to allow tower rigging crews and RF manufacturers to complete what must be done? Photos courtesy Dielectric.

## Open Mobile Video Coalition to conduct consumer trials

The coalition formed to promote development of an ATSC-compatible transmission system that will let television broadcasters transmit directly to viewers on the go announced last month it will conduct consumer trials of two competing technologies this year.

The Open Mobile Video Coalition (OMVC) plans to test Mobile-Fedestrian-Handheld (MPH), jointly developed by LG Electronics and Harris,



Inside a bus traveling around Las Vegas, Harris and LG Electronics demonstrate the MPH system during NAB2007.

and A-VSB, developed by Samsung Electronics and Rohde & Schwarz, to learn additional technical details about the systems and to gauge consumer acceptance, behavior and preferences.

Unlike video content distribution via wireless telecom providers, both MPH and A-VSB offer broadcasters a means to exert direct control over mobile content distribution and will allow them to develop business models based specifically on their own interests.

OMVC and the leaders of each set of trials will select several test markets. A sample of consumers will be chosen to receive and test mobile video content that will be broadcast to mobile and portable receiver devices, such as cell phones, personal media players and laptop computers.

Consumer test participants will be able to watch a selection of local and national content and access interactive services. Usage will be tracked to monitor and better understand consumer preferences. At the end of the trial, the OMVC and its partners will be able to predict consumer usage patterns and system performance to support the launch of mobile digital television services targeted for 2009.

Certain broadcasters among the 800 OMVC member stations will be selected to provide the transmission infrastructure and local content for the trials in each market. As one of the content sources for the OMVC's consumer trials, SES AMERICOM will provide mobile broadcast network platform services and aggregate and distribute national content via its IP-FIME satellite service.

In MPH trial markets, Harris will provide MPH in-band digital television transmission equipment, and LG Electronics will provide MPH consumer receiver devices. In A-VSB trial markets, Samsung's partner, Rohde & Schwarz, will provide transmission equipment based on the A-VSB in-band mobile digital television system, and Samsung will provide A-VSB consumer devices.

their analog service. About 65 percent of the 1812 stations that will broadcast DTV following the transition will stay on their current digital channel assignment, maximize power and relinquish their analog channel assignment.

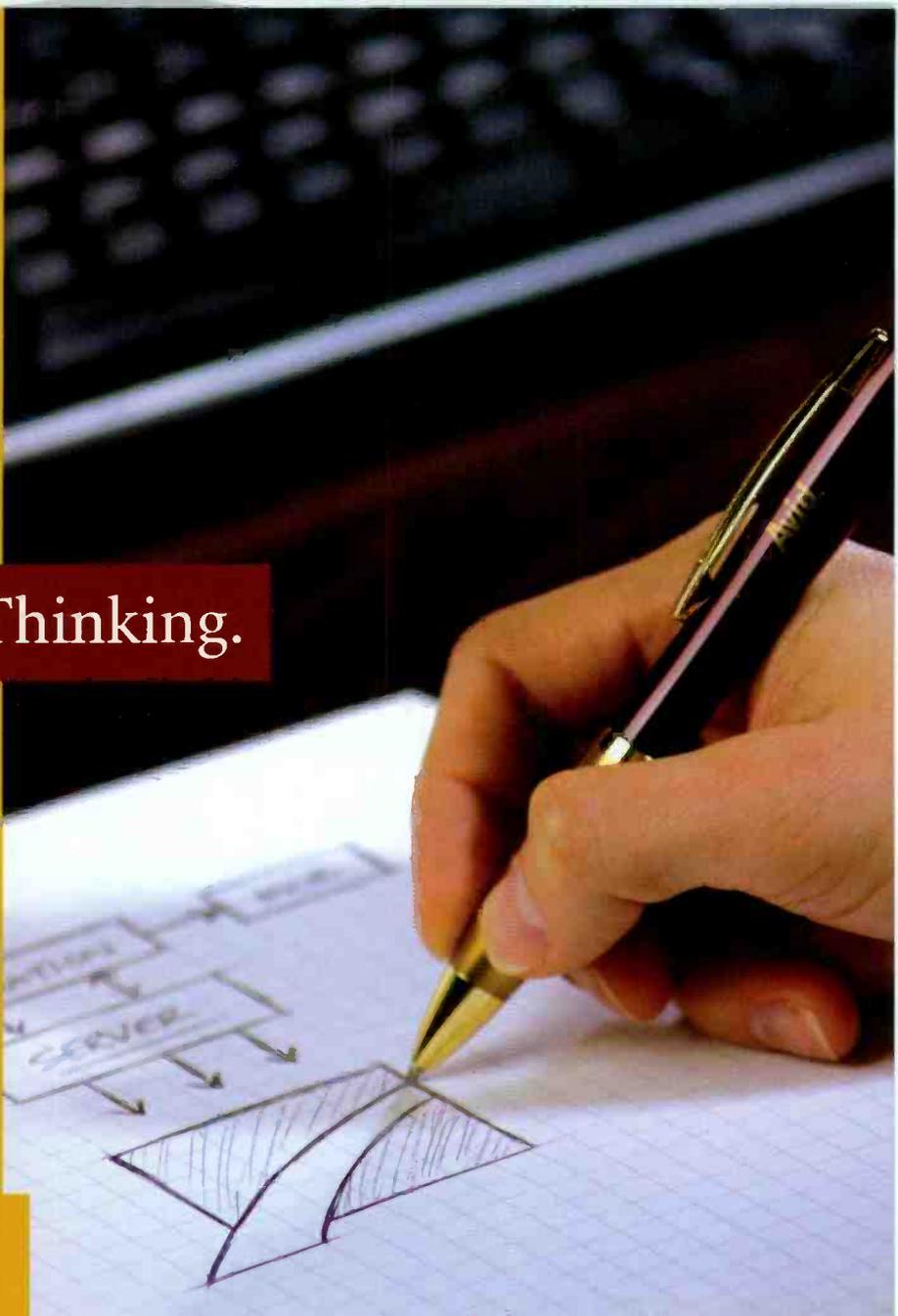
Looked at another way, this DTV spectrum dance means 600 television stations will partake in what the Association for Maximum Service Television has dubbed "significant channel movement" next February.

Last March, the FCC, the NAB, the Association of Public Television Stations and MSTV shifted into



If all goes as planned, when the DTV transition is complete in February 2009, 1812 full-power TV stations nationwide will be transmitting digital signals.

high gear to spell out for television stations the scope of the task that lay ahead and to build a sense of urgency among the TV engineering and management community about getting it done. Kicking off the final push was a joint webcast for the television community in which the industry groups and the agency illustrated how the daisy-



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The FCC Office of Engineering and Technology is conducting lab tests of white space devices at the FCC Laboratory in Columbia, MD, to be followed by field tests. Photo courtesy FCC.

## FCC kicks off 'Phase II' white space device testing

The FCC's Office of Engineering and Technology (OET) kicked off second-round testing of prototype personal/portable TV white space devices as part of the commission's proceeding examining their authorization. Central to the tests, as well as the issue of whether or not the white space devices can coexist with DTV stations, is their ability to sense the presence of television transmissions and select a channel for operation that will not create co-channel or adjacent channel interference.

Initial OET test results released in July 2007 found the prototypes submitted for evaluation generally failed to detect the presence of DTV transmissions as well as that of Part 74 wireless mics, which share the TV band.

The OET is conducting the current round in two parts, lab and field testing. Both sets are open to interested parties, and each is expected to take four to six weeks to complete. After compiling and analyzing the results, the OET's findings will become part of the record in the commission's proceedings on the matter. The commission recently received several prototypes for this round of testing, including devices from Adaptrum, Microsoft, Motorola and Philips.

The issue of allowing unlicensed wireless devices to operate in the DTV band has been highly contentious. Broadcast groups such as the NAB and Association for Maximum Service Television point out that the sensing technology has never been proven to work. They fear that without absolute certainty that the devices will detect DTV transmission, any authorization to allow them to reach consumers would create wide-scale harmful interference to DTV reception and essentially squander the billions of dollars already spent by consumers and the television industry on the DTV transition.

On the other side of the issue are groups like the Wireless Innovation Alliance (WIA), consisting of prominent high-tech companies. The WIA contends TV spectrum is underused and can be harnessed for new applications for consumers, students and emergency personnel.

chained channel swaps could produce harmful interference to stations in the same service area and nearby markets if steps were not taken to coordinate this dance into the digital broadcasting era. To pull off the transition without a hitch, individual stations could not simply decide for themselves when to move, but rather needed to recognize that they may need to wait for another station in their service area or adjacent market to move first.

The other message the group conveyed was that stations could no longer delay purchasing their ticket

**To pull off the transition without a hitch, stations may need to wait for another station in their service area or adjacent market to move first.**

to this elaborate digital dance. Orders for transmitters, antennas, and waveguide and tower rigging services needed to be expedited because of finite production capacity and a limited number of tower crews.

Within weeks of the event, MSTV president David Donovan was finalizing plans for a nationwide tour last summer to meet with local broadcasters and deliver those key messages face to face. Rather than finding stations behind the curve in their preparations, Donovan discovered the situation was far better than he'd imagined.

"I have been to many states over the summer, and I was pleasantly surprised by the number of stations that had actually taken the initiative, understood and were really moving the process," he says.

While acknowledging some had not, the vast majority were diligently preparing, he says.

From what he observed, stations



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also were aware of and pursuing the coordination needed for a successful transition.

"I think the message has gotten out among the stations that if you are changing channels, your ability to do that may depend on another station," Donovan says. "For the most part, the stations have been in discussions so that they know who they have to coordinate with. A year ago, I wanted to make sure these guys understood the daisy-chain pieces, and it's clear to me now that they do."

### Third Periodic Review

In December, the FCC approved its Third Periodic Review on the DTV transition in which it approved adjustments to its policies and rules to give broadcasters more flexibility in completing their transition. The commission also set up two interim deadlines before February 2009 for broadcasters to file progress reports on the build-out of their digital facilities. With the reports due in February and October, the commission hopes to make any adjustments necessary to hit the statutory deadline.

At the time of the commission's review, more than 800 stations had completed construction of their digital broadcast facilities and were ready to transmit on their final channel assignment. According to Donovan, last summer he found that many of the stations waiting to proceed were delaying until the commission had completed its work on the review.

To provide the flexibility stations will need, the commission plans to rely on the waiver process. While pleased that the commission acted, Donovan says reliance on waivers has the potential to delay progress.

"I think one of the great unknowns is because everything is now going to be done by waiver, a station still won't know until the commission makes a decision," he says. "In other words,

not all of this is just black and white."

Of particular concern are the rules related to stations wishing to migrate their digital transmission back to their existing analog antenna.

"If the commission says, 'Yes, fine,' but if they say, 'No,' you are going to have to go out there and get a top-mount digital antenna fairly quickly," Donovan says. "Then the question is if you can put it up in the winter."

Commissioner Jonathan Adelstein, commenting on the periodic



**As of December 2007, more than 800 stations had completed the build-out of their digital transmission facilities and were ready to maximize service on their final DTV channel assignment.**

review, acknowledges that the commission had "lost valuable time" working on "more tangential aspects of the transition" rather than "clarifying urgent demands on broadcasters to get a huge job done in short order." He too cited winter as a major concern because "important technical work on towers and antennae cannot be accomplished" in much of the country because of inclement weather.

While individual stations will work diligently to overcome these and other obstacles before Feb. 17, 2009, focusing only on what each station must accomplish or even the DTV spectrum dance doesn't fully portray the enormity of what must happen within the next year.

In commenting on the review, commissioner Michael Copps suggests a more expeditious process not only would have given broadcasters time to complete their build-out, but also allow adequate time to conduct trial runs in limited areas to discover and iron out unanticipated problems.

"Pulling the switch on stations all across the land at once and the same time in February 2009 is going to be a real throw of the dice," he says. "It is unfathomable to me that we are planning to turn off every full-power analog signal in the country on a single day without running at least one test market first."

Regardless, the Congressionally mandated deadline leaves no wiggle room. Short of a change in the law, the DTV transition of full-power TV will go ahead as planned. While broadcasters will work to make that painless for viewers, Copps is not so sure the public won't experience problems.

"Not every consumer will have access to all of their analog broadcast channels on Feb. 17, 2009, and then wake up happily the next morning to those same stations in digital," Copps said in comments released after approval of the review. "There will be some period of time — perhaps before the transition date and almost certainly after — in which some stations may not be able to provide service to all of their viewers."

If the commissioner's pessimistic view comes to pass, however, it won't be for lack of effort on the part of the nation's broadcast community.

Phil Kurz authors several Broadcast Engineering e-newsletters, including "RF Update."

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## DTV derailment?

Under the program that grants households up to two \$40 coupons towards the purchase of approved digital-to-analog converters for use with NTSC TV sets, not a single one has an NTSC tuner, and only a handful have the ability to pass an NTSC signal through to a set. Designed to the specifications of the National Telecommunications & Information Administration, these converter boxes have been regarded as the silver bullet that will prevent over-the-air viewers who don't buy a new DTV set from becoming disenfranchised when full-power stations turn off their analog transmitters next year.

However, without an NTSC tuner in the converter, viewers who exchange a government-issued coupon for a converter and connect it to their TVs and antennas will simply find that many of the stations they're accustomed to viewing will go away. If they take the trouble to disconnect the converter and once again connect their antenna to their set, those stations will magically reappear.

A cursory look at the FCC database of TV station licensees by market reveals that within about a 50-mile radius of the top 10 Nielsen DMAs, there are no fewer than 64 analog LPTV, Class A and translator stations. For community broadcasters, who rely nearly exclusively on an audience that depends on off-air reception, the situation is intolerable.

"Distribution of the boxes, in our opinion, may well be illegal," says Greg Herman, Community

Broadcasters Association (CBA) VP of technology and owner of Wabotv, a Portland, OR, low-power television broadcaster.

The CBA contends the All Channel Receiver Act requires all television receivers to receive all television channels allocated to broadcasting.

"When the FCC ordered television and TV device manufacturers to include digital tuners in all of their devices, it said that reception of all channels means not only channels 2 through 69, but all of the stations that are broadcast on those channels," says association legal counsel Peter Tannerwald.

While the act doesn't spell out that analog tuners are required, Tannerwald contends that to be logically consistent, NTSC tuners are necessary.

"The thing that the FCC has explicitly stated is to receive all channels during the transition, you must have a digital tuner," Tannerwald says. "It's my application of that logic to say that if you receive all channels during the transition, you must have an analog tuner as well."

An issue is interpretation of the Deficit Reduction Act of 2005 that defined the characteristics of the type of converter that would be authorized for coupons. The NTIA has interpreted the act to mean that a converter can only have the ability to receive ATSC digital television signals and make them available to an analog television.

On Jan. 25 the FCC met with Herman and other representatives of the association to discuss how to proceed. With the first converter boxes expected



**Greg Herman, Community Broadcasters Association VP of technology, says the sale of NTIA-coupon-qualified DTV converter boxes may be illegal.**

on retailers' shelves in mid-February, the meeting took on added urgency.

According to Herman, the CBA sought six things:

- a requirement for all converter boxes produced after those initially shipped to include an NTSC tuner;
  - a label on those first converter boxes to warn consumers that they will block reception of some federally licensed television stations;
  - point-of-purchase displays at retailers with the same warning;
  - the right for consumers to return the initial boxes without penalty for converter boxes with analog tuners;
  - an extension of the NTIA coupon program to six months; and
  - a redirected DTV public education effort to inform Americans that only a minority of all TV stations will make the digital conversion in February 2009.
- "We have never desired to shut down the digital transition; we just want to make it fair," Herman says.

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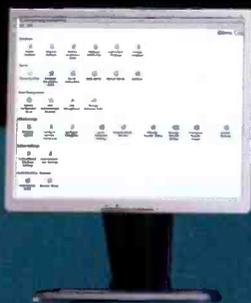
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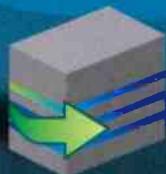
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# DTV multicasting

The head of national advertising rep firm Petry Media sees digital multicasting multiplying broadcasters' opportunities for success.

To Earl Jones, chairman and CEO of national advertising rep firm Petry Media, the relevance of next year's DTV transition is the opportunity for broadcasters to pursue new business strategies as a result of maximizing their digital multicast service. If chosen wisely, these new game plans could dramatically expand the economic base of television by introducing an entirely new pool of businesses to the idea that television advertising is effective and affordable.

"The new digital channels are fairly inexpensive and therefore, provide a golden opportunity for our industry to introduce people to advertising, which heretofore they could not afford," he says.

Jones, who is delivering one of the keynote speeches during the Broadcast Engineering/Broadcasting & Cable co-produced Competitive Television Summit Feb. 5-6 in Orlando, FL, likens this opportunity to attract more advertisers with lower prices for commercials on digital multicast channels to what transpired following the FCC's decision to authorize UHF service and the rapid growth of independent stations there.

In those days, Jones was a broadcaster who built several successful independent UHF channels that eventually were purchased by large corporate owners. The secret of his success was the same thing today's broadcasters must employ to



**Earl Jones, chairman and CEO of Petry Media, envisions digital multicasting making TV advertising affordable to a larger base of businesses.**

make their digital multicast channels a success: namely, bringing new advertisers to the medium of television.

"The thing that makes broadcasting so uniquely viable is that the Fifth Estate, solely among competing television media, is in a position that when we serve out local communities effectively and maintain our fiduciary trust the FCC has placed in the licensees, we succeed," Jones says. "When we try to get down to the lowest common denominator and grovel, we abrogate a very real part of the competitiveness that we should be bringing to the marketplace."

For example, in Jones' UHF days, he broke the 7-11 convenience store chain as first-time television advertisers by building what at the time was a unique campaign — enticing viewers to visit the stores to pick up a

free pair of 3-D glasses so they could enjoy the old 3-D creature features he ran on his stations.

"We extracted \$1 million in those days from a new client," Jones says. "7-11 hadn't done anything prior to that. What I am espousing is an idea that older line group broadcasters — particularly the newspaper-based ones — may find fairly heretic. Everyone has to operate a little bit more like an independent, especially with the new digital channels. We have to be nimble and get back to basics."

More than 20 years ago, Jones outlined those basics in the first of several Monday Memo columns he wrote over the years for Broadcasting magazine (Broadcasting & Cable's predecessor). "Jones' Five Rules for Running a Successful Television Station" are as applicable today as they were when he first wrote them in 1984.

Those rules include buying the best technology and being on the cutting edge of it; making sure you set up achievable expectations for your people; hiring the best salespeople and maximizing and focusing on the best training available to serve your communities and your markets.

But what about the fifth rule?

"Five was actually selecting the right rep," he says with a chuckle, "but I'm obviously not going to do anything that tells everybody to switch to Petry." ■

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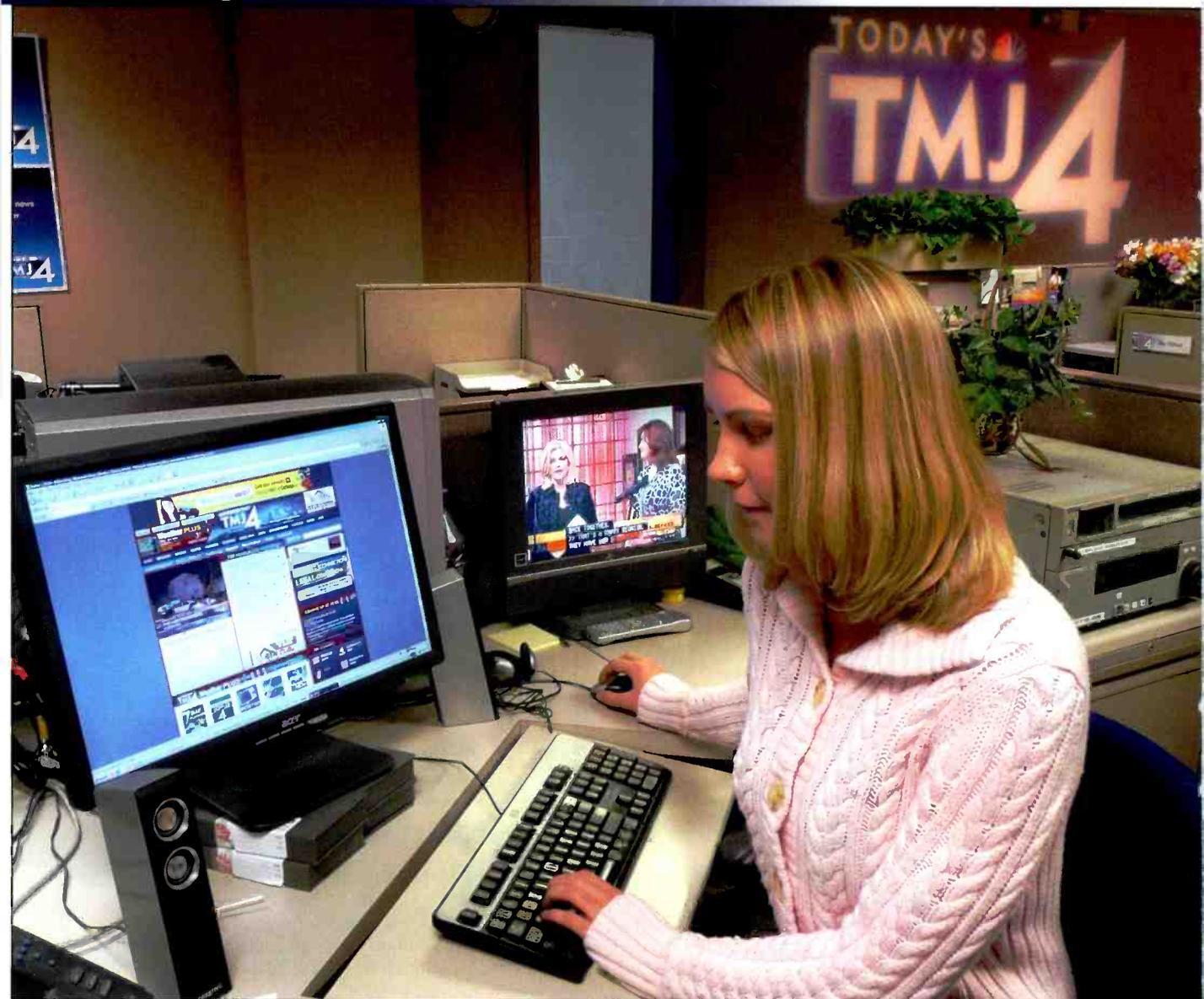
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Local online advertising will be worth \$8.9 billion in 2012," Search Engine Land (Jan. 16, 2008); "Internet to dominate ad spend growth in next 12 years," BrandRepublic (Jan. 21, 2008); "Burgeoning online ad spend will pass TV next year, says WPP" (in the UK), Independent (Jan. 3, 2008).

Or, look at some of the underlying facts, figures and forecasts. By 2011, online advertising in the United States will produce \$50.3 billion in revenue, according to a forecast released last month from the Yankee Group, a research and analysis firm in Boston, MA. In the

**While production of Journal Broadcast Group Web sites such as TMJ4 in Milwaukee, WI, leverage existing newsroom content and resources, dedicated Web producers take charge of the process.**

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UK, media planning and purchasing agency Group M predicts that at the end of this year, the amount spent on Internet advertising will be nipping at the heels of television advertising spending in Great Britain, and will surpass what's spent on TV advertising next year.

This year's Competitive Technology Summit, co-produced by *Broadcast Engineering* and *Broadcasting & Cable* magazines, features a panel discussion by broadcasters who are responsible for steering their companies' online and mobile efforts to claim a piece of the digital media action. Panelists include Paul King, corporate director of Internet sales for Raycom Media; Carl Gardner, executive VP television radio operations and digital interactive media for the Journal Broadcast Group; and Bri-

an Bauer, VP and general manager - interactive for Barrington Broadcasting Company. While each offers a unique perspective on how to get that done, they all agree that

**It's no secret many television stations have built their identities largely based on their on-air and off-air involvement in their communities.**

doing so takes the right combination of people and technology, as well as recognition on the part of management of the importance of new media to the success of the entire enterprise.

## The Web and localism

It's no secret many television stations have built their identities in their local markets largely based on their on-air and off-air involvement in their communities. The Internet gives them a chance to take that relationship a step further.

"The Web is an unlimited opportunity to expand the idea of localism to the umpteenth degree," Bauer says. "Whereas we have a 30-minute newscast in which to provide compelling news and information, on a Web site, we're not restricted by time."

How best to take advantage of that virtually limitless potential involves elements with which stations are quite familiar.

"People are looking for a lot of the same things that they come to



WTOL-TV in Toledo, OH, like the other Web sites of Raycom Media, keeps its content fresh, which increases page views and ultimately leads to success in monetizing the site, says Paul King, corporate director of Internet sales.

the television station's over-the-air newscast for," Gardner says.

Adds King, "The two primary reasons individuals go to local TV Web sites are local news and weather. So it's imperative that high-quality and deep and breaking news and weather stories/updates are posted to the site frequently during the day."

Visiting a station Web site for content like news and weather is

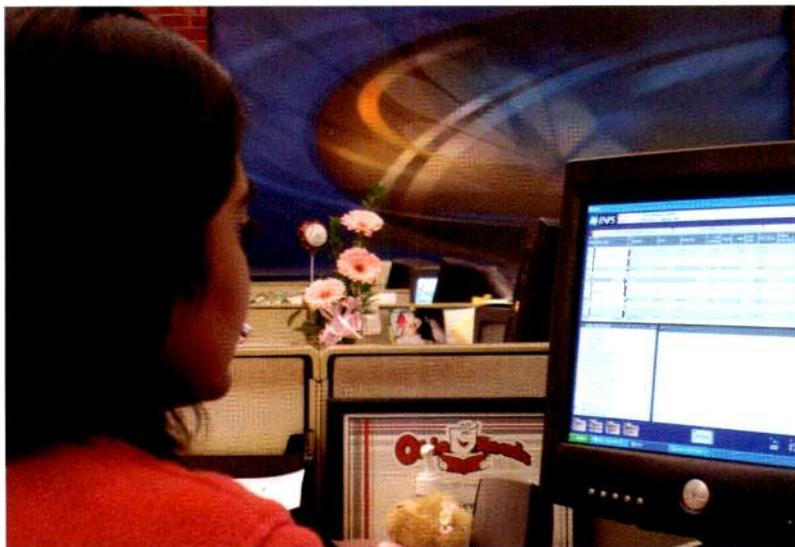
ogy to a file-based workflow can seamlessly augment content creation for a station Web site, there's a lot more than that involved in order to be successful, Gardner says.

"It's not realistic to think that you're going to have a first-rate Web site by just asking everybody else in the newsroom to sort of do it as their part-time job," he says. "You do have to have some people

Web personnel are essential if stations are to succeed in keeping their online content fresh and avoiding the trap of simply just encoding stories that ran on the evening newscast for Web distribution.

"We fully understand you can't just repurpose a TV story and expect to develop strong viewership on our Web sites," King says. "There needs to be additional information to the story viewers saw on air — more detail, greater depth, things they wouldn't see on the story on TV."

Doing so will reap significant benefits for the station, including increasing page views, which translates to increased ad impression, King says. More ad impressions increases inventory, which "allows us to monetize our sites at a high-level," he adds.



**Given the growing importance of a station's Web presence to its overall financial success, many stations — such as WNWO-TV in Toledo, OH — are asserting greater control over third-party service providers and content, says Brian Bauer, VP and general manager of Barrington Broadcasting Company.**

changing the expectations of the public, Gardner says.

"We are aware that our viewers' habits are morphing into a new place where they haven't been in the past — where they are becoming accustomed to being able to get at content that they choose at a time that they choose on a device that they choose," he says. "So our job is to make sure we're prepared for that when they come to us."

However, delivering that online experience places new demands on station technology, budgets and personnel, particularly in newsrooms where most of this content will be produced. While the transformation of a newsroom from a linear tape-based news production methodol-

whose primary focus is there. But if everybody's contributing at some level, it sure carries it a lot farther."

Gardner likens the process of creating fresh, compelling content for the Web to a mason who must move a pile of bricks.

"Our philosophy has been that if everybody carries one brick, you can move a lot of bricks," he says. "If you have 100 people in the newsroom, and everybody carries one brick, you can move 100 bricks as opposed to having one person try to move 100 bricks."

However, it's mandatory to have personnel whose primary focus is the Web site. Leveraging existing news production resources coupled with the involvement of dedicated

## Taking control

According to Bauer, Barrington Broadcasting and many other stations and groups are becoming far more proactive in charting their own online destinies.

"Broadcast companies are taking back control of their Web sites. I'm seeing a lot more people unwinding or adapting relationships with third-party platform providers and bringing that technology or aspects of that service in-house," he says. "The other trend that I'm seeing is taking back control of our Web site content. What I mean by that is at least for Barrington — and I think a lot of Web operators are the same way — we're asking for the ability to take the online content of a syndicated show like 'Entertainment Tonight' and reformat it into a layout, into specific design standards that are harmonious with the rest of the layouts of our Web sites."

In fact, the first question Bauer asks about any project crossing his desk is whether Barrington Broadcasting will have the ability to integrate the content online in a manner that's consistent with the overall look and feel of its stations'

Web sites. Recently, he even turned down online content from “Entertainment Tonight” — content he was quite interested in — because it was an as-is module that he says wasn’t “terribly flexible.”

“We ended up passing on the initial opportunity because I wasn’t able to incorporate that module into my Web site,” Bauer says. “So, we lost out on the opportunity.”

Given the growing importance of a station’s Web presence to its overall financial success, asserting greater control over third-party service providers and content is easy to understand.

“We’re looking at the 5- to 10-percent range in the foreseeable future

interactive platforms, and just like us, they’re trying to gain some experience with it to see what works.”

As with content creation, what works in actually selling online advertising seems to be a combination of leveraging existing personnel and augmenting those efforts with digital media sales specialists.

“In terms of how we are getting it out to the marketplace, we’re taking a hybrid approach where we are adding people to our sales force whose job it is to specialize in interactive media solutions,” Gardner says. “But we also are actively training and trying to involve our traditional media salespeople and working with these tools and solutions.”

ties we have to monetize our 40-plus Web sites. I like to say were only limited by our own imaginations.”

Is it realistic to imagine the Web opening up an entirely new pool of advertisers to stations, specifically those who don’t have the media budget to afford TV spots but have the desire to promote their products and services with a station? After all, Google and other Web giants are transforming the advertising business in just that way.

“We certainly have used the new interactive platforms to attract some new categories of advertisers that have not done business with us in the past,” Gardner says, “but I would not say it’s people who cannot afford what we have to offer. I just think that it’s some categories where the use of a platform like a Web site, as an example, is a better fit for them because they may have the need to get deeper and more complex content out there, and that doesn’t really lend itself to a 30-second commercial over the air. We haven’t gone to that model of getting hundreds of new little, tiny advertisers involved the station. That’s not to say we won’t get there at some point.”

Regardless of the particulars in monetizing digital media, stations and groups will only realize success if they can adapt their methods, thinking and attitudes about online and mobile media to reflect the importance of new media to the overall mission of the enterprise, King says.

“All of these things are really meaningless unless the culture of the company has evolved to the point where it understands the importance of new media and the effect that it will have on the growth and future of the individuals in that company,” he says, “as well as the value to consumers and ultimately to the success of the company itself.”

Phil Kurz authors several Broadcast Engineering e-newsletters, including “IPTV Update.”



**Journal Broadcast Group is finding customers have “a tremendous appetite” for involvement with its interactive platforms, such as the TMJ4 Web site, says Carl Gardner, the company’s executive VP television radio operations and digital interactive media.**

(as digital media’s percentage of overall revenue),” King says. “As we continue to roll out new technologies and techniques of selling, and as we develop stand-alone products and as the Internet gets stronger and our products improve, we certainly believe it goes up from there.”

At Journal Broadcast, new digital media are contributing to the bottom line as well.

“We are experiencing very rapid growth in our interactive media revenues. That speaks for itself,” Gardner says. “We’re finding a tremendous appetite on the part of our customers to get involved with the

The approach is similar at Raycom Media, King says.

“We also engage the existing broadcast sales force in the process, but the key is they have someone they can turn to to assist them in selling the Internet packages,” he says.

Monetizing a station Web site takes many forms, King says.

“A lot of them (ways to generate revenue for the Web) are in areas like sponsorships, vertical selling, contesting, banner ad campaigns, e-mail blasts, mobile sponsorships and directories,” he says. “So it’s just endless — the different tactics and capabili-

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# Next-gen audio coding

## Part 2: A look at broadcast quality, tandem coding losses and their effect on perceived quality

BY JEFFREY C. RIEDMILLER

Last month's article discussed two international standards for assessing audio coding systems. The second half of this series will define broadcast quality and tandem coding losses, and look at their effect on perceived quality. (To read part one of this article series on understanding the theory behind high-end audio coding, go to [http://broadcastengineering.com/audio/next\\_gen\\_audio\\_coding\\_801](http://broadcastengineering.com/audio/next_gen_audio_coding_801).)

### Broadcast quality

Being familiar with standardized test methodologies and knowing how to interpret their results will significantly aid in understanding broadcast quality. Unknown to many, there is an ITU recommendation that defines the requirements for audio coding systems in digital broadcasting. ITU-R BS.1548-1 (User Requirements for Audio Coding Systems for Digital

Broadcasting, Annex 2) states that an audio codec (and the bit rate chosen) requires mean values consistently higher than 4.0 on the BS.1116-1 five-grade scale at the reference listening position. (See Table 1.)

Remember, a score of 4.0 on the BS.1116-1 scale is also equivalent to a diffgrade score of -1.0. Hence, looking at the results of the two audio coding systems discussed in the previous article (at the data rates tested), only the first system met the ITU-R criteria for broadcast quality.

For a familiar example of what broadcast quality sounds like, consider that most Region 1 SD Hollywood DVD movies provide a decent benchmark for a codec being operated at a data rate that yields broadcast quality. However, high-definition DVDs typically use audio data rates at least two times higher than the rate of standard-definition DVDs, and some even use a lossless audio co-

dec. Therefore, with many broadcasters and next-generation service providers under increasing pressure to lower audio bit rates, the perceived quality between some next-generation broadcast systems, services and disc-based media (such as HD DVD, for example) may be quite different in the near future.

Here are a few further items to look for with a properly administered and documented listening test:

- a graphical presentation of the test results (as shown in Figures 1 and 2 on page 114.);
- general information about the audio coding system used to process the test material;
- a specification for selecting test subjects as well as test materials;
- physical specifications of the listening environment, equipment, room dimensions, acoustic properties of the listening environment and transducer types/placement;
- detail regarding the analysis of the processed data;
- a detailed basis for all conclusions; and
- details of the test design, as well as the training process (instruction to test subjects).

Be wary if the test administrator, test facility, research facility or codec manufacturer cannot provide a

Impairment	Grade
Imperceptible	5.0
Perceptible, but not annoying	4.0
Slightly annoying	3.0
Annoying	2.0
Very annoying	1.0

Table 1. ITU-R BS.1116-1 grading scale

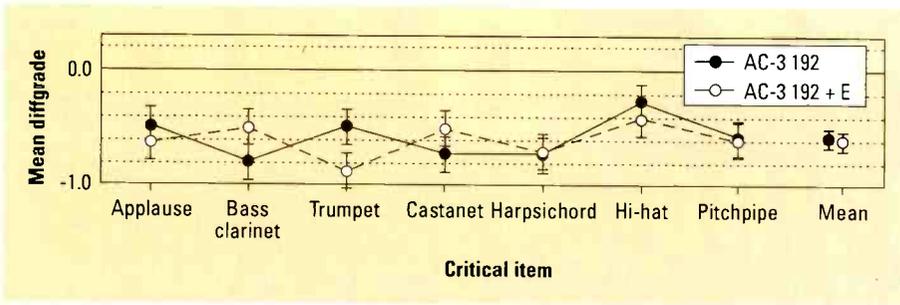


Figure 1. ITU-R BS.1116-1 test results

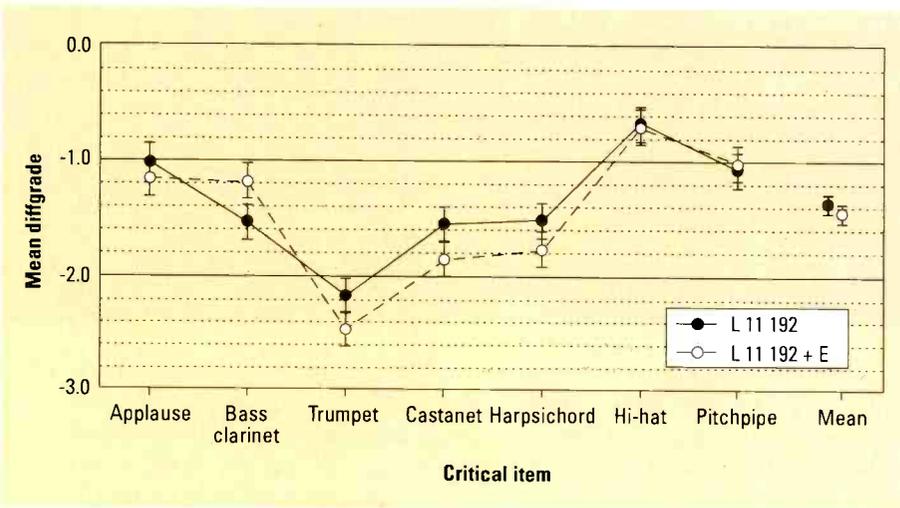


Figure 2. ITU-R BS.1116-1 test results

complete set of supporting documentation regarding the details of its test and the basis for its results.

### What to listen for

Here is a high-level overview of what to listen for when evaluating a new coding system at a number of data rates.

The first thing to listen for is pre-echo, which is a type of impairment that affects (dampens) the sharpness and clarity of signals that are transient in nature. (As a side note, castanets are typically used to determine a codec's ability to handle transient signals across a number of data rates.)

Another type of common coding artifact is related to changes in timbre at higher frequencies and can sound similar to birds chirping (sometimes called birdies). This is most often caused by running a codec at too low of a data rate for spectrally demanding content.

Listen for a gritty or grainy sound quality, loss of bandwidth (typically in the high frequency region) — as many coding systems limit the coded audio

bandwidth at aggressive (low) data rates — and image shifts with stereo or multichannel material. Many modern audio coding systems have a mechanism for synthesizing high-frequency energy in the decoder from information that was generated and carried in the bit stream from the encoder.

### Tandem coding losses

Tandem coding losses, which affect perceived quality, occur when the coding errors in each system (used in tandem) combine to generate larger errors — that is, new errors created in addition to the old ones. These types of errors occur for several reasons, including:

- quantization levels in one audio coding system do not map to the same levels in another;
- the use of different filter banks among the systems;
- time delays between the systems;
- changes in signal amplitude between the systems; and
- different perceptual models used among the systems.

To demonstrate the effect tandem coding losses have on perceived quality, consider Figures 3 and 4, which are both based on analysis performed in the lab with critical material. The results provide an approximation of the magnitude tandem coding losses have on perceived quality. Figure 3 shows a comparison between data rate and audio quality/relative coding error for two next-generation audio codecs available today. The x-axis indicates the data rate as a percentage of the data rate required for codec A to be at broadcast quality (as per ITU-R BS.1548-1). Codec B is more efficient where broadcast quality is about 80 percent of the data rate of codec A. If you were to operate codec B

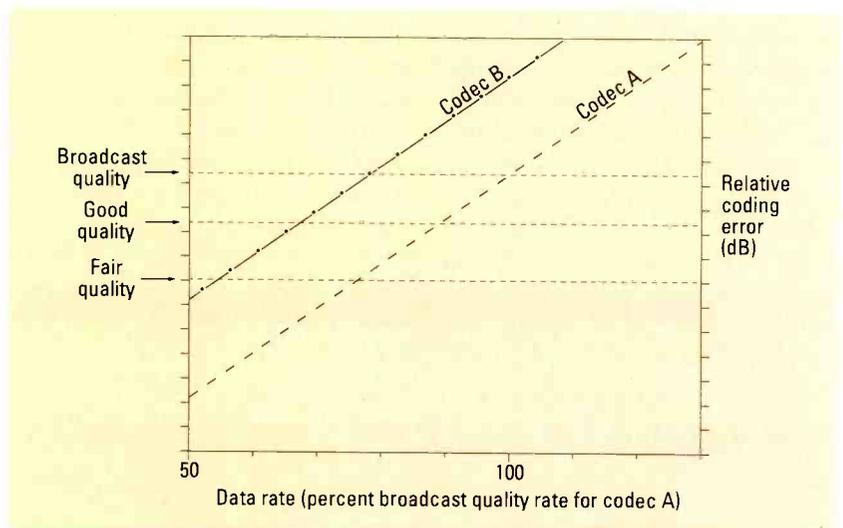


Figure 3. Data rate vs. audio quality for two next-generation codecs

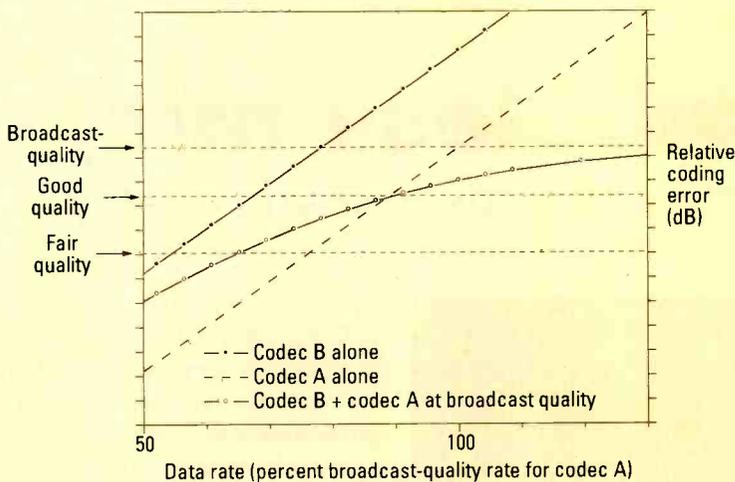


Figure 4. Data rate vs. audio quality for two next-generation codecs in tandem

at a data rate 50 percent below the data rate required for broadcast quality with codec A, the quality would drop significantly to between "poor" and "fair."

Many new codecs are designed for emission applications requiring the highest quality at the lowest data rate for only a single generation of encoding and decoding (that is, from the emission point to a viewer's home). These codecs are not designed for applications where different coding systems are operating in tandem (cascade) with each other (which is becoming commonplace throughout today's broadcast chain).

Figure 4 shows the effect of cascading the two different codecs versus single-generation performance. By placing the more efficient codec B in tandem with codec A (where A is being operated at a rate that is considered to be broadcast quality), the decrease in quality is significant (as shown by the curve with open circles). This is true even when both codecs are independently operating at data rates that yield broadcast quality.

As a real-world application example, consider an IPTV operator that is required to decode a broadcaster's signal that was originally encoded at a data rate that yields broadcast quality (codec A). The operator then needs to re-encode it into a more efficient format (codec B) for carriage to subscribers. Also assume that the IPTV operator chooses a bit rate (codec B) that yields broadcast quality when codec B is in a standalone application (i.e. the source audio has never been through an au-

dio coding system). This data rate offers a 20 percent increase in efficiency over the bit rate that codec A needs to achieve broadcast quality.

Note where each codec intersects the broadcast-quality threshold in Figure 4; codec B intersects at just below 80 percent of data rate required for codec A. However, the result of both of these codecs operating in tandem with each other is described by the open circle curve in Figure 4. When codec B is operated as just described (20 percent lower bit rate than A), the net quality of both systems in tandem drops to between "good" and "fair." Hence, true broadcast quality is no longer achievable in an application like this.

Furthermore, many next-generation systems are looking to take the more efficient codecs' bit rates down to 50 percent of the data rate of codec A. Figure 4 shows that the tandem net quality when the bit rate of the more efficient codec (codec B) has been dropped to operate around 50 percent below the rate of the other codec (codec A). In this combination, yet a further drop in quality takes place to between "poor" and "fair."

Before deciding on a target bit rate for a next-generation audio coder, consider that the realized efficiency gains of any new audio codec may be reduced in practice and will vary widely based on the application. This stems from the fact that in most cases, if not all, the new codec will be used in some portion of the distribution path to at least a portion of (or even all) of the viewers and will be in tandem with

one or several different audio codecs. The advertised efficiency gains and quality some of these next-generation audio coding systems promise on paper will be different from what happens in real-world applications.

### Concluding thoughts

Before implementing any new coding system, audit the signal paths to quantify the number of codecs in tandem. (Don't forget that some broadcast servers use an audio codec too.) Ask the experts lots of questions about steps to minimize tandem coding loss, and ask for suggestions on bit rates to minimize quality loss. The key: There is no substitute to the human ear. Listen carefully, consider the level of quality your service requires, and identify possible compatibility issues of the new system.

BE

Jeffrey C. Riedmiller is senior broadcast product manager for Dolby Laboratories.

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# Sony's wireless mic

## Digital audio technology improves sound quality.

BY KARL KASSMAUL

Today's growth of HD content creation and digital audio recording/transmission has generated the need for large-scale, multichannel wireless microphone systems with improved sound quality. To meet this challenge, Sony developed a new digital audio wireless transmission technology.

### Why digital?

In a conventional analog wireless microphone system, a compander (compressor/expander) system allows for wide dynamic range transmission. A compander is composed of complex analog circuits that provide high-quality sound and response characteristics. However, an analog system requires use of advanced techniques to keep performance levels constant, because analog circuits are subject to variable performance.

In contrast, a digital audio wireless transmission system doesn't use a compander system, and it avoids such fluctuations. In short, digital audio wireless transmission offers significant advancements in high-quality audio signal transmission.

### Digital wireless transmitter

An analog audio signal is first amplified and then digitized in the A/D converter. In the DSP, three types of processing are performed: digital encoding, channel coding and modulated signal generation. In the codec, data reduction has been applied to the digital audio signal input from the A/D converter, and it is converted into a low transfer rate digital stream. Subsequently, the channel coder adds the synchronization and error-handling data necessary for wireless transmission and then encrypts the data. Next, the digital modulator generates a  $\Pi/4$ -QPSK modulation signal for digital wireless transmission from the channel-coded digital stream. The



Sony's new digital audio transmission technology allows for a variety of transmitter settings to be wirelessly controlled from the receiver.

modulation signal is converted to analog through the D/A converter and carried to the RF block. In the RF block, the modulated carrier wave is amplified to the adequate transmission power level and transmitted to the receiver.

### Digital wireless receiver

In the RF block, the received signal is digitized through the A/D converter. Similar to the transmitter, three main processes are performed in the digital signal processor: digital demodulation, channel decoding and

digital decoding. After receiving the A/D-converted RF signal, the digital demodulator reproduces the digital stream that was channel-coded at the transmitter. The channel decoder then performs synchronization, decryption and audio data abstraction.

Consequently, the codec decompresses the low transfer rate audio signal that was data reduced in the transmitter and regenerates the digital audio signal. Finally, the digital audio signal is output, either as an analog or digital audio signal.

### Audio codec

In a wireless system, audio signals must be transmitted within a limited wireless bandwidth. Transmitting the highest quality audio in this limited bandwidth is a major issue for wireless microphone development. Low-latency audio transmission is equally critical for microphone applications. To transmit high-quality audio within limited bandwidth, Sony developed a digital audio codec with good sound quality and low latency. (See Figure 1.)

### Digital modulation

The new one-chip digital modulator and demodulator enables up to 12 channels of simultaneous multichannel operation in a 6MHz bandwidth.

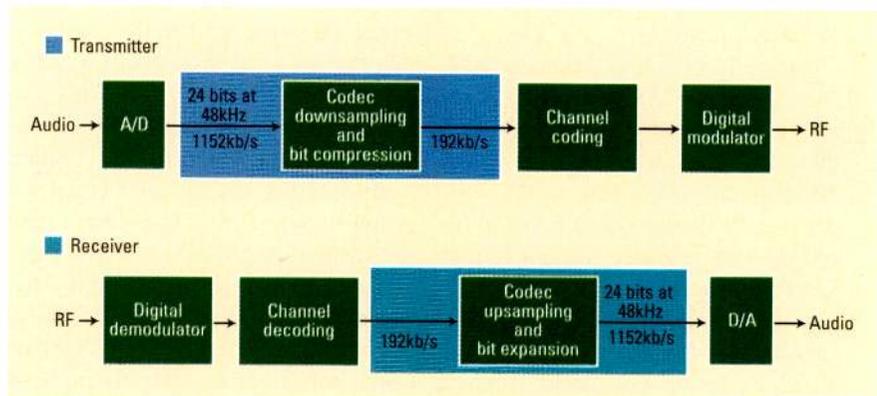


Figure 1. The audio codec

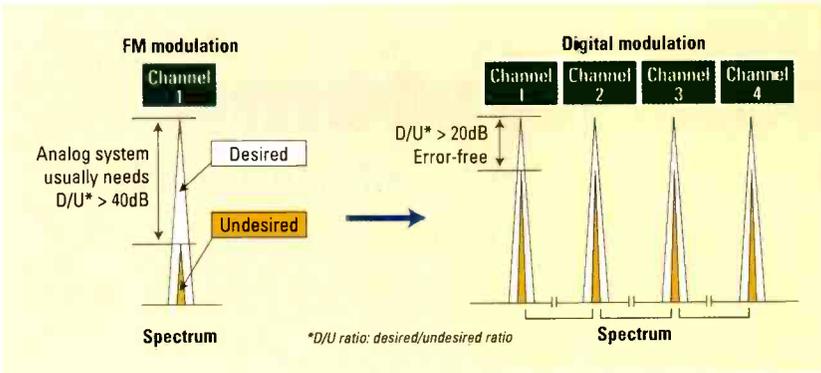


Figure 2. The Sony digital wireless system (shown on the right) is more tolerant of the undesired signal of the analog transmission system (shown on the left) by more than 20dB.

The left side of Figure 2 shows an analog system. In analog systems, the desired/undesired (D/U) signal ratio becomes the SNR of the demodulated audio signal. The higher the undesired signal level, the higher the noise will be in the modulated signal. Typically, an analog wireless system requires a 40dB D/U signal ratio.

In the Sony digital wireless system (on the right side of Figure 2), trans-

mission errors won't occur as long as the D/U signal ratio reaches 20dB. For this reason, the digital system is far more tolerant of the undesired signal of the analog transmission system (by more than 20dB) and has an advantage compared with the potential risk of intermodulation interference.

**Innovative remote control**

A variety of transmitter settings

can be wirelessly controlled from the receiver. This is convenient because transmitter setting changes can be made easily, even after the transmitters are attached to on-camera talent.

When the receiver is used with the Sony PDW-700 XDCAM HD camcorder, users can monitor the status of the digital wireless microphone through the camera's viewfinder. They can also wirelessly control the settings of the transmitter via the camcorder menu. This wireless remote control makes use of 2.4GHz IEEE 802.15.4 communication technology.

**Future implications**

With the development of these and plans for future technologies, Sony continues to enhance the digital audio wireless transmission system. **BE**

*Karl Kussmaul is pro audio senior product manager for the broadcast and production systems division of Sony Electronics.*

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## Intercom systems

White-space devices threaten to interfere with broadcast and sports communications.

BY JOHN LUFF

**T**here are three types of communication that can convey complex information: written, visual (i.e. video) and spoken. In complex tasks, such as managing real-time operations in a broadcast production, the first two are pretty impractical.

Annotated scripts provide a basis for managing the planned flow of a production. When things change, the

behind a carbon microphone is quite simple, with carbon granules placed between two metal plates. Sound waves cause compaction of the carbon, changing the resistance and thus converting sound waves to voltage fluctuations. We have all seen pictures of phone operators with uncomfortable headsets, which remarkably were still in wide use in our industry well into the later part of the 20<sup>th</sup> century.

By connecting a microphone and a small speaker, the audio is propagated over an indeterminate distance, perhaps to the professional sitting next to us, or at a considerable distance. In simple intercom systems, all parties speak and listen on one circuit, not surprisingly like early telephone systems.

Often called PL, for party line or private line, intercom systems evolved little until complex productions required multiple lines with selectable talk and listen capability for all participants. For example, in the 1970s when RTS Systems, now a part of Telex, introduced sophisticated four-wire and two-wire systems such as the 802 Master Station, it raised the bar considerably. But as much as things changed, they remain the same in many ways today.

In Europe, four-wire communication has been prevalent for many years. When I first worked with the European Broadcasting Union (EBU) in 1980, it was already operating a multinational intercom system of four-wire circuits connecting control rooms in every Western European television station. I remember marveling at the ability to speak to London and Moscow from Detroit during the Republican Convention. This was no small feat, considering it was built using analog audio circuits de-

ployed on multiple national carriers' systems, which of course used varying audio levels.

In the United States, you had to order two pairs individually to accomplish this, one for send and one for receive. Then you had to manage the levels and connections yourself.

The EBU still maintains complex communications systems, though now they are digital.

### Modern intercom systems

Lately, much of the world's intercom systems have evolved into complex amalgams of both two-wire and matrix four-wire systems. A two-wire intercom is appealing because of its simplicity, with the power supplied

**A two-wire intercom is appealing because of its simplicity, with the power supplied across the pair that also carries send and receive audio.**

across the pair that also carries send and receive audio. Local side-tone cancelling keeps the system from becoming an effective feedback loop. Often, two-wire systems are built on standard audio cabling, with the third wire carrying a second channel. Of course if mistakes are made, you can fry a microphone by plugging it into intercom circuits, which requires some thoughtful selection of connector sex and labeling.

Four-wire matrix intercom systems



In carbon microphones, carbon granules are placed between two metal plates. Sound waves cause the carbon to compact, which changes the resistance. This converts sound waves to voltage fluctuations.

first thing we do after analyzing the steps needed to keep things on track is speak to the rest of the production team. How we do that is an interesting topic.

### The history of voice communication

Voice communication was enabled largely by the invention, about 130 years ago, of the carbon microphone. The invention was claimed by both Thomas Edison in March 1878 and Emile Berliner, who separately filed related patent applications in June 1877 and August 1879. The premise

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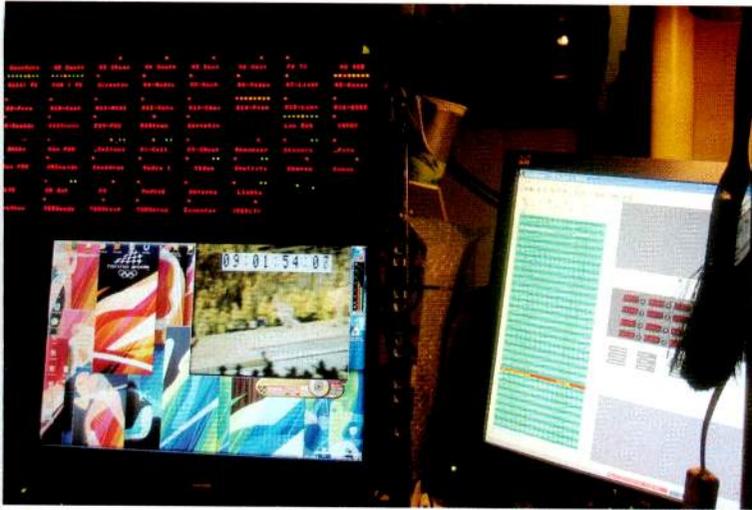
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are mostly digital today. This allows complex programming and control over the volume in each crosspoint combination. It also allows setup and teardown of circuits with alacrity, or the capriciousness of the head of produc-

tion. The ability to store setups, including the keys available on individual control panels, is critical to making a system flexible.

A normal newscast might require only six to 10 personnel, who could all use one circuit. But on election night, the number of private circuits and personnel explode. As individual remotes are set up, they can be added to existing circuits and later dropped off when finished from a setup station that often has graphical representations of the system configuration.

Modern systems include remote user stations with active buttons and displays connected to a complex matrix. In many manufacturers' implementations, individual matrices can be connected together over extended distances to expand systems to multiple studios, or even multiple cities. With VoIP, MADI and proprietary interconnection schemes, almost any size system can be accommodated. Major news organizations have extended studio intercom systems to transportable earth stations using satellite deployment of communications systems, including IFB, telephone and data services. By doing so, they integrate field operations — often from primitive conditions — into the production as if they were simply down the hall.



The communications control team at the 2006 Olympic Games in Torino, Italy, used Riedel intercom panels and software to communicate.

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### White-space dilemma

There are times when using a wired intercom does not work. We have become accustomed to using cell phones with Bluetooth headsets, which in no small measure achieves the same level of sophisticated communications that complex intercom systems provide in the closed loop. Any wireless communication comes with the propagation challenge. Four-wire systems extended by radio enable roving cameras, floor directors and other production assistants to do their tasks untethered.

These communications channels are threatened by the momentum behind white-space devices, which the FCC seeks to authorize on unused television channels. This is the same space that wireless microphones and intercom systems use. Many people are not convinced that these digital communications systems, which self-test spectrum use before transmitting, will actually work.

At the very least, the potential to affect field and studio wireless communications systems is real. The SBE and manufacturers of systems used for broadcast and sports pushed hard to have prototypes tested during the 2007 and 2008 NFL season in the harsh environment of live football games. The FCC did not organize tests, but keep looking for information. A lack of effective spectrum management could make wireless intercom and IFB much more difficult to manage.

**BE**

*John Luff is a broadcast technology consultant.*



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# Schedule at a Glance

## Monday, March 31, 2008

IEEE WCNC 2008

**Registration**

**CTIA Golf Championship\*\***

MOBILE ENTERTAINMENT LIVE! 2008

ANDREW SEYBOLD WIRELESS UNIVERSITY

Converged Services Summit

**Marketing—The Mobile Channel**

SmartPhone Summit 2008

March 31–April 3, 2008

**7:30AM – 5:00PM**

**8:00AM – 3:00PM**

8:00AM – 6:30PM

9:00AM – 5:00PM

9:00AM – 5:00PM

**9:00AM – 5:30PM**

9:00AM – 6:00PM

IEEE Registration Required

**Hall C2**

**Bali Hai Golf Club**

Barron Room, Las Vegas Hilton

N109

N256

**N107**

N115

## Tuesday, April 1, 2008

Tower Technology Summit

**Registration**

**CTIA Smart Pass VIP Club**

**Day One Keynote**

PEOPLE & PROFITS in Wireless Retailing

**Exhibit Floor Open**

2008 Credit Suisse Wireless Investor Forum\*

Fast Track with MOTODEV\*

M2M Carrier Strategies: The New Rules

Mobile VoIP

**CTIA Educational Sessions**

April 1–3, 2008

**7:30AM – 5:00PM**

**7:30AM – 5:00PM**

**9:00AM – 11:00AM**

10:00AM – 5:00PM

**11:00AM – 5:00PM**

11:00AM – 5:00PM

11:00AM – 5:00PM

12:00PM – 5:00PM

11:00AM – 12:30PM

**1:00PM – 5:00PM**

Tower Tech Summit Registration Required

**Hall C2**

**Hall C2**

**Barron Room, Las Vegas Hilton**

N259

**Hall C2**

N254

N256

N103

N252

**N101, 107, 111, 113, 115, 119**

## Wednesday, April 2, 2008

**Registration**

**CTIA Smart Pass VIP Club**

Next Gen Backhaul: 3G, 4G and Beyond

**Day Two Keynote**

**Exhibit Floor Open**

Fierce Wireless Presents: The Path to 4G

Fixed Mobile Convergence

2008 Credit Suisse Wireless Investor Forum\*

Latin American Conference

**CTIA Educational Sessions**

Opportunities & Obstacles Implementing Wireless Apps

NAVTEQ Global LBS Awards Ceremony

**CTIA E-Tech Awards Ceremony**

**The Wireless GALA\*\***

**8:00AM – 5:00PM**

**8:00AM – 5:00PM**

8:00AM – 5:00PM

**9:00AM – 11:00AM**

**11:00AM – 5:00PM**

11:00AM – 5:00PM

11:00AM – 12:30PM

11:00AM – 5:00PM

11:00AM – 5:00PM

**1:00PM – 5:00PM**

1:30PM – 3:00PM

3:00PM

**3:00PM – 4:00PM**

**5:00PM**

**Hall C2**

**Hall C2**

N253

**Barron Room, Las Vegas Hilton**

N252

N103

N254

N256

**N101, 107, 111, 113, 115, 119**

N103

N258

**Mobile Entertainment eXpo Stage**

**Wynn Las Vegas - Grail Theater**

## Thursday, April 3, 2008

**Registration**

**CTIA Smart Pass VIP Club**

**Day Three Keynote**

**Exhibit Floor Open**

**8:00AM – 3:00PM**

**8:00AM – 3:00PM**

**9:30AM – 10:30AM**

**10:30AM – 3:00PM**

**Hall C2**

**Hall C2**

**Barron Room, Las Vegas Hilton**

KEY: ● Smart Pass, ● CTIA Conference Pass, ● CTIA Daily Pass, ● CTIA Exhibits Pass, ● Purchased SIS. CTIA events in **Bold**.

\*Invitation Only \*\*Ticket Purchase Required Note: Schedule subject to change.

# Wireless & YOU

CTIA WIRELESS 2008, produced by CTIA—The Wireless Association®, will be the most important global technology event of the year. Join us April 1–3, 2008 in Las Vegas, Nevada with pre-conference events and partner conferences beginning March 31.

This global marketplace for all things wireless will help each attendee find their own unique solution to the question, "What innovation will enhance business between Wireless & You?"

CTIA WIRELESS 2008 is...

- >> *Over 40,000 Attendees*
- >> *A \$646 Billion Marketplace*
- >> *Representation from 125 Countries*
- >> *1,200+ Exhibitors*



## CTIA WIRELESS 2008 goes green



For many years now CTIA has undergone efforts to reduce the amount of waste that our events produce by delivering exhibitor and attendee materials electronically, reusing exhibit materials and graphics whenever possible; and working with our host facilities to utilize biodegradable products in the concession areas when possible.

CTIA is now pleased to be doing even more to become more carbon neutral. Aside from pre-show initiatives such as replacing print pieces with virtual brochures and printing on recycled paper, there will be several ways you can assist us in this effort while onsite at CTIA WIRELESS 2008.

Look for:

**Recycling Bins for your Plastic Badges—**

*CTIA reduced what used to be a three-part badge (paper badge, plastic e-Business card and badge holder) to a single badge that can be recycled. At the end of your visit with us, please place your badge in a recycling bin!*

**Ways to Recycle Your Retired Phones—**

*Bring your retired cell phones and accessories to CTIA WIRELESS 2008 for recycling and support the CALL TO PROTECT® program. Look for recycling stations throughout the convention center where you may recycle your old phones, or take a postage-paid envelope home with you and send your phone for recycling, for free.*

**Recycling—***CTIA is working with the Las Vegas Convention Center to ensure that paper, plastic, cardboard, glass, wood and aluminum products, as well as carpet padding, are being sorted and recycled off-site by their local trash company.*

**Thank you for supporting us in this important effort and stay tuned for more information and details to come!**

# The Road to 4G

What does the future look like for Wireless & You? CTIA explores the Road to 4G—ubiquitous broadband wireless connectivity anytime, anywhere. Learn more about innovative solutions such as 3G, WiMAX and LTE in the Central Lobby of the Las Vegas Convention Center. Immerse yourself in the 4G experience.

Powered by **ERICSSON**   
**TAKING YOU FORWARD**

## Smart Pass Registration



**The ideal registration package for the overbooked and time-challenged executive attending CTIA WIRELESS 2008.**

All Smart Pass registrants will have access to the VIP Club which will be fully equipped with private meeting space, business equipment and catered with coffee, lunch and refreshments every day. While at CTIA WIRELESS 2008, the VIP Club serves as the perfect satellite office:

- >> with the ability to bring two guests into the Club with you at one time, it provides an excellent venue for small private meetings;
- >> a large lounge area with computers, fax machines, copiers and WiFi access—this is the place to catch-up on business back at the office and;
- >> catered daily with refreshments and lunch—saves you from standing in concession lines with 40,000 other attendees!

VIP Club Sponsor **PRICEWATERHOUSECOOPERS** 

**Also, included in the Smart Pass is access to:**

- >> All CTIA educational sessions
- >> Exhibit Floor
- >> Keynote Sessions
- >> Complimentary Partner Seminars

**Truly the SMART choice when registering for CTIA WIRELESS 2008!**

### **CTIA Smart Pass Package\***

Member \$1,175      Non-Member \$1,475

\*The Smart Pass Package includes admission to, CTIA VIP Club with Executive Amenities, all CTIA Educational Sessions, Complimentary Seminars, Exhibit Floor, and CTIA Keynote Sessions.

# CTIA Keynotes

April 1, 2 & 3, 2008 Barron Room Las Vegas Hilton



**KEYNOTE HOST**  
**Steve Largent**  
*President & CEO*  
CTIA—The Wireless Association

Every year, CTIA WIRELESS brings a star-studded list of speakers to the keynote stage. Join us April 1–3, 2008 in the Barron Room of the Las Vegas Hilton to learn from the experience of these industry leaders.

## Infrastructure Roundtable: The Path to 4G

**Robert Bach**  
*President, Entertainment & Devices Division*  
Microsoft Corporation



**Marco Boerries**  
*President*  
Yahoo! Mobile

**Simon Beresford-Wylie**  
*Chief Executive Officer*  
Nokia Siemens Networks



**Dan Hesse**  
*President and Chief Executive Officer*  
Sprint Nextel Corporation



**Patricia Russo**  
*CEO*  
Alcatel Lucent



**Lowell McAdam**  
*CTIA Chairman*  
*President & CEO*  
Verizon Wireless

**Carl-Henric Svanberg**  
*President & CEO*  
Ericsson



**Mike Zafirovski**  
*CEO*  
Nortel

**Arun Sarin**  
*Chief Executive Officer*  
Vodafone Group Plc



Media Sponsor



**Additional keynote announcements  
are available at  
[www.ctia.org/ctiawireless](http://www.ctia.org/ctiawireless)**



# The Mobile Entertainment eXpo

Mobile Entertainment eXpo

This "show within a show" is dedicated entirely to the dynamic and exciting world of mobile entertainment. In an age where content is king and consumers can't get enough of personalized and enhanced services ranging from ringtones to mobile video—this is a must-see area.

## Featured Exhibits

### Accessories Pavilion

The Accessories Pavilion showcases the hottest wireless accessories available today. The newest and latest carrying cases, handsets, chargers and much more will be on display.

### M-ertainment Pavilion

Showcasing the hottest mobile trends for downloading music, movie trailers, cutting edge video games, and much more! The mobile entertainment market is surging with new and untapped revenues and CTIA has created a place for up and coming companies to spotlight their services. This is a one-stop shop so you can stay on top of your game.

## Special Events

### 2008 CTIA Emerging Technology (E-Tech) Awards

— more information on page 9



### Fashion in Motion

— more information on page 8



## Interactive Mobile Applications for CTIA WIRELESS 2008 Attendees

### Booth Finder

Make contact with every company you came to visit. Keep your calendar full by making the best use of your time at this year's show.

Text the "first three letters" of the company name to 346337 (FINDER). Booth location and other contact details returned to your phone.

### Wireless Alerts

Stay connected at the show. Don't get left out of the loop.

Subscribe to WIRELESS ALERTS: stay aware of the biggest events. Text "Buzz" to 97577 (WRLSS) to receive updates during the show.

Sponsored by  

### CTIA Exhibits Package \*

Member \$135

Non-Member \$150

\*Includes admission to Exhibit Floor, CTIA Keynote Sessions, and Complimentary Seminars



# The 15th Annual CTIA WIRELESS Gala

Wednesday, April 2, 2008 5:00 PM  
Wynn Las Vegas – Grail Theater

The 15th Annual CTIA WIRELESS Gala will begin with an elegant reception and dinner at the Wynn Las Vegas, followed by a private showing of "SPAMALOT."

"Lovingly ripped off" from the film comedy "Monty Python and the Holy Grail," Tony Award winner "SPAMALOT" is sure to entertain CTIA WIRELESS Gala goers with its lyrical wit. This show is performed at the Grail Theater in the Wynn Las Vegas. Sponsorship of the CTIA WIRELESS Gala will give you and your premier clients access to one of the funniest shows in Las Vegas. Seating is limited, so ACT NOW!

Platinum Sponsors **QUALCOMM** **tellabs** Media Sponsor **RCR Wireless News**



**Sponsorships are still available for the WIRELESS Gala.**

## Platinum Sponsorship \$30,000

- Three VIP tables of 10 for dinner and show tickets.*
- Logo recognition on the Gala Event Tent Cards placed at each of your sponsored tables.*
- Logo recognition in the Official CTIA WIRELESS 2008 Show Program & Directory*
- Logo recognition on the Gala Event Tent Cards placed at every general admission table.*
- Logo recognition on the "WIRELESS Gala" page on the Official CTIA WIRELESS 2008 website.*

## Gold Sponsorship \$20,000

- Two VIP tables of 10 for dinner and show tickets.*
- Logo recognition on the Gala Event Tent Cards placed at each of your sponsored tables.*
- Company recognition in the Official CTIA WIRELESS 2008 Show Program & Directory*
- Logo recognition on the Gala Event Tent Cards placed at every general admission table.*
- Company recognition on the "WIRELESS Gala" page on the Official CTIA WIRELESS 2008 website.*

## Silver Sponsorship \$15,000

- One VIP table of 10 for dinner and show tickets.*
- Logo recognition on the Gala Event Tent Cards placed at each of your sponsored tables.*
- Company recognition in the Official CTIA WIRELESS 2008 Show Program & Directory*
- Logo recognition on the Gala Event Tent Cards placed at every general admission table.*
- Company recognition on the "WIRELESS Gala" page on the Official CTIA WIRELESS 2008 website.*

**Individual tickets and tables are available in addition to these sponsorship opportunities. For more information, please contact Bonnie Knight at [bknight@ctia.org](mailto:bknight@ctia.org).**



# Fashion in Motion

HIGH-TECH MEETS HIGH FASHION

Tuesday–Thursday, April 1-3, 2008 Mobile Entertainment eXpo Stage



CTIA's technology fashion show, Fashion in Motion, is a collection of the most innovative and creative products and prototypes in the wearable wireless arena. This couture style fashion show features the latest wireless devices, accessories, technical textiles, smart fabrics, and fashions available today, along with the futuristic visions of tomorrow.

This high profile show is a MUST SEE for media outlets around the world. Don't miss an opportunity to showcase your company at this high profile show!

**For sponsorship opportunities and information, contact Bonnie Knight at [bknight@ctia.org](mailto:bknight@ctia.org).**

***Attention Technology and Fashion University and College Students!***

## The Fashion in Motion Scholarship Program

CTIA is proud to announce the 3rd Annual Fashion in Motion Scholarship Program is open to students in Technology and Fashion colleges and universities. The focus of this project is to combine wireless technology & fashion and produce visions of the future in wearable wireless technology.

Students/Schools will be asked to submit existing or prototype products that will be judged by leaders in both the technology and fashion industries. Selected products will be showcased in the fashion show, with the winner appearing as the show finale.

A \$10,000 scholarship will be awarded to the student with the winning submission.



# The 2008 CTIA Emerging Technology (E-Tech) Awards



**Wednesday, April 2, 2008 3:00PM – 4:00PM Mobile Entertainment eXpo Stage**

Thanks to all who submitted entries for the 2008 CTIA Emerging Technology (E-Tech) Awards, show attendees will have a unique opportunity to see the best that the industry has to offer, all in one place! See the newest and most innovative products and applications in wireless today at the CTIA WIRELESS 2008 Emerging Technology Awards.

## **Mobile CE (Consumer Electronics)**

- >> *Accessory*
- >> *Phone/Smartphone*
- >> *Fashion & Lifestyle Products*

## **Consumer Mobile Applications**

- >> *Mobile Entertainment/Social Networking*
- >> *Healthcare/Public Safety/Transportation/Public Services*
- >> *Messaging (SMS/MMS)/Mobile Marketing*

## **Enterprise Solutions**

- >> *Solution for increasing productivity, efficiency, and profitability*

## **Mobile Widgets**

- >> *Enterprise*
- >> *Consumer*
- >> *Entertainment*

## **Network Infrastructure**

- >> *In-Building/Local Area Network Solution*
- >> *Wide Area Network*

## **4G**

- >> *Software Ecosystem*
- >> *Service Creation & Development*
- >> *Service Management*



## Announcing the CTIA Widget Contest!

CTIA challenges you to create a unique and innovative mobile widget that will allow users to have easy access to and dynamic interaction with CTIA information and resources. This contest is open and limited to all E-Tech entrants. For more information, please visit [www.ctia.org/ctiawireless](http://www.ctia.org/ctiawireless) and go to the CTIA E-Tech Awards page under Show Information.

# CTIA Golf Championship

**Monday, March 31, 2008 8:00AM – 3:00PM**

Presented by



**Registration Fee: \$250/player, \$1,000/foursome.**

Kick off your visit to CTIA WIRELESS 2008 in style by registering now to participate in the CTIA Golf Championship presented by Syniverse.

The event (handicapped gross/net divisions) is scheduled the morning of March 31st, 2008. The venue, Bali Hai Golf Club is located directly on the Las Vegas Strip and was voted "Best Places to Play" by Golf Digest in 2004.

The par-71 layout plays to 7,002 yards from the tips and gives new meaning to the word "lush." From the smooth bunkers to the endless foliage, a trip around Bali Hai is riveting. Transition and out-of-play areas are accented with Augusta white sand and black volcanic rock outcroppings. Palm trees and seven acres of water features—including the 16th, a par 3 with an island green—will tantalize golfers' senses. Bali Hai truly is a worthy namesake of the famous Indonesian land of enchantment. It's the kind of golf course you could play day after day and never tire of its charm.

**Sponsorship opportunities for as little as \$3,500 are now available.**

**Please contact [Jerry.Easom@Syniverse.com](mailto:Jerry.Easom@Syniverse.com) or [JSimmons@CTIA.org](mailto:JSimmons@CTIA.org) for additional information.**

@Road, Inc.	7119	Brightsoft	1457	eAgency	738	HTC America	1624
2001 Technology Incorporated	210	Brilliant Telecommunications	5545	EarthCam, Inc.	7230	HTX Corp	7015
3Gmetalwork Inc	6000	BRL Test, Inc	5417	East Penn Mfg. Co., Inc	2018	HTMICROWAVE Co., Ltd	219
3J Tech Co., Ltd	318	Butler Telecom	160	E-Blisk	6133	Huawei Technologies	1061
411 SMS	4427-P	C&S Companies	6170	ECCEL Corporation	5438	Huber + Suhner, Inc	6235
4DK Technologies, Inc.	1359	Cadex Electronics Inc	5375	Echovox Inc	2864	HWA YAO Technologies Co., Ltd.	2336
7 Layers	5620	CalAmp	5233	Eccomer inc	6646	ICBS	5966
724 Solutions	711	Call Capture	4010	Econo Inc	6002	ICEX	6073
ABBY USA Software House, Inc	5676	Call-in-Europe	4605	Eder-Rock Communications	1918	IdaTech	6865
Able Planet, Inc	6739	Calwada Surviving, Inc	6252	EDX Wireless, LLC	4949	Loop Mobile, Inc.	3158
Above All Advertising, Inc	3265	Canada Business Development & Investment	6505-11	eLeader Smartphone Solutions	5866	Image One Cellular	5911
AC Oeta Solutions	6254	Capstone Turbine	6155	Electro Mechanical Industries, Inc	5056	Image One Cellular	5903
Acacia Technologies Group	3758	Cardo Systems, Inc	131	Elektrobit	2902	Impetus Technologies, Inc.	3502
Accuris Networks	627-A	Caster Tray Inc.	1058	Eliacoya	6541	InComm	1633
Ace Technologies Corp	3644	CCH, a Wolters Kluwer business	5111	Eltek Valere	5927	INCOMTEL	4115
Acision	3515	CCI - Communication Components, Inc	6707	EMC	3853	Infinite Peripherals, Inc.	7277
Acme Packet	3241	CDMA Certification Forum (CCF)	5618	Emergent Electronics	5848	info Directions, Inc	3250
Actimagine	4518	CDMI	4953	Emerson Network Power	403	INFONXX	1915
Action Engine	3264	Celvo Corp	4953	End2End - Part of MACH Group	6909	Informa Telecoms & Media	1345
Adax	3000	Cell Care L.L.C.	5711	Entirex Ltd.	2850	Information and Communications Technology Council	6505-SA
ADC	1041	Cell Gate USA	1921	Enterprise Ireland	627-1	InfoUSA	152
Adec Tech-System Inc.	2137	Cell Keeper	138	Enviro Buildings	3106	Innovorks	1557
Adshandy.com - Kaufcom GmbH	4427-G	Cell Trees Inc	5747	Envivo, Inc	7223	InnoPath Software	3650
ADTRAN	1253	Cellular & Alcatel Mobile	6626	Ericsson Inc	2024	Innovative Plastech Inc.	3902
ADVA Optical Networking, Inc	4209	Cellcom Wireless Distributors	3841	ERM	5754	Integrative Solutions Private Ltd	5844
Advance Tec Industries	125	Cellbrite USA Corp	3606	ESPI	4208	Intel Corp.	242
Advantage Wireless Inc	4508	Cellfire Inc	740	eSecuritel Holdings LLC	2031	Intellect Corporation	5871
ADVANTECH	6274	Cellphone Mate	4428	ESPII	5909	Intelligent Mechatronic Systems	6505-20
AeroVoice	148	CellPoint Connect (Canada) Inc	4628	E-Trend	5419	InterBrands Co	2906
AFL Network Services	2806	CellRunners Distribution	3658	ETS - Lindgren	6959	InterBrands Co	202
AFP North America	4427-F	CellSeal Systems International	6909	European Antennas Ltd.	6959	Interbuy Cellular Corp.	3501
Agilent Technologies, Inc.	3110	Cellucom Group	406	EuroStar Int'l Corp	3850	International Wireless	4656
AGL	6172	Cellular Force, Inc.	3659	Evercom Communication	313	Interop Technologies	5917
AIRMD WIRELESS INC	4555	Cellular Next LLC	4310	eWireless	4865	Interstat PowerCare	5827
AirWeb	6965	Cellular Parts, Inc. (CSI)	5913	Excedia	6505-4A	Intertek ETL SEMKO	3518
AIRCOM International Inc.	2015	Cellular-Specialty Com	3801	ExpoCredit Corp	3530	Intrado, Inc	838
Airspan Networks	5475	Cellvive	5755	Expway	4449	Intrinsiq Software	6505-3D
Airvana	3321	CellKion LLC	2944	FS Networks	4649	Intra-Mobile Co., Ltd.	4018
AirWalk Communications	7261	CellPlan Technologies, Inc	2517	Fashion Electronics	4034	InVive Security Products	4018
Albentia Systems	6970	Ceragon Networks, Inc	2317	Fashion In Motion - High Tech meets High Fashion	4026	IP Unity Glenayre	2631
Alcatel-Lucent	2613	Cetecom, Inc	5612	Fashion In Motion Sponsor Display Area	5569	IPgallery	7129
All Pro Distributing, Inc	2800	Ceterus Networks	6165	Fast Track Pte Ltd	355	iQmetrix Intelligent Retail	3621
Allroyd Brands	7207	Changing Worlds	627-E	Federal Communications Commission	6071	ITS Telecom	6640
Altai Technologies Ltd.	5655	China Tech Faith Wireless Communication Technology	315	Fibergate Composite Structures	2321	itsmy.com//GDFRESH GmbH	4427-F
AltoBridge	627-H	CIC Media Ltd.	6701	Fibrebond Corporation	4449	I-Voice Inc	213
Aluma-Form	6332	CIENA Corporation	6347	FieldWorker Mobile Technologies	6071	Jabra (GN US, Inc.)	3709
Alvarion	165	Cisco Systems, Inc	5674	Fi-Hi	240	Janus Remote Communications	5538
AmberSAFE International GPS Solutions for Life	6505 p-3b	Clarity	5156	Finland Pavilion	7175	Japan Radio Co - JRC	1612
American Express	7227	Clickatell	4438	First Look	4229	Jasper Wireless	5432
American Roamer	619	Clough, Harbour & Associates LLP	3008	Flarcomm Technologies Inc.	3463-A	JAYBEAM Wireless	6143
Amigo Telecom Co., Ltd	7256	CLS Group	6175	FLD Forum	3700	JBT INTL, INC	5151
Amico Mobile Technology Corp.	2333	CMP - Tower Technology Summit	6177	foneGEAR, LLC	6864	JD Mobile LLC	1916
Amistar Telecom Inc	733	CMK	6234	Fonex USA	639	JDSU	3202
Amsson	627-B	Coding Technologies	4427-UU	FORSK	639	jNetX	7131
Amphenol Intel, Inc	443	Com One	7053	Foshan Shenghuade Communication Equipment Co., Ltd	5470	Joynycle Precise Hardware Accessory LTD.	3463-Z
ANAM Mobile Ltd.	627-C	Comarc Inc	1558	Foxda Technology (H.K.) Co., Ltd.	109	JOT Automation Inc, USA	5513
Anchor Graphics Inc. & Labels More	2908	Comarco Wireless Test Solutions	1621	Franklin Wireless	4911	JumpTag	4419
Andrew Corporation	2644	Comba Telecom	4511	Fred A. Nudd Corp.	6134	Juni America, Inc.	6265
Anite Finland	4965	ComScope	2833	Free-Plus Int'l (Holding) Limited	1611	Juniper Networks	3653
Anisou Electronics Limited	2135	Comtech Telecommunications Corporation	3700	F-Secure Corporation	236	JWIN Electronics Corp.	5064
Anisou Company	157	CommBridge	2653	Fujitsu Network Communications Inc.	286	Katrain Inc., Scala Division	3737
Anisite Mobile	4315	Communication Infrastructure Corporation	3700	Fulcrum Technologies, Inc.	1709	Katolight Corp.	6370
ANYDATA Corporation	509	ComPRION GmbH	5250	Fuli Weibin (Hong Kong) Ltd.	316	K-Best Technology Inc.	302
AO, LLC	2857	ComputaMaps	5664	Funambol, Inc.	3800	Kerobong Communications Ltd	5748
Apertio	6665	Comstar Interactive	1258	FusionOne	5307	Kenova Systems	5275
Aperto	5677	Converse	1644	FuturLink	6867	Kineto Wireless	1712
APT Ltd	4427-H	Convergencia - Latina Magazine	1158	FWT, Inc.	6149	Kingston Technology Co., Inc.	3638
Arantech	627-D	Copernic Inc	4427-E	Garmin International	6639	Kinsun Industries Inc	211
Arcadian Networks	5348	Copernic Inc	4427-E	GCI - Global Consultants, Inc	7226	Kirusa Inc	6758
Argus Technologies	4618	Copernic Inc	4427-E	Gemalto	2810	Kitmaker	7281
ARICENT	6963	Copernic Inc	4427-E	GENBAND Inc.	7135	KMW Communications Inc	1656
Aries Manufacturing	4443	CrossStoppers	5664	Generac Power Systems, Inc.	515	Kodiak Networks	1665
Ariso, Inc	1057	CrossBridge Solutions	5337	General Dynamics Wireless Services	6151	Koepffel Direct, Inc.	3838
ArrayComm LLC	3244	Crown Castle International Corp	5525	GEOIMAGE	6033	Kohler Power Systems	5043
Aspects Tools Limited	5567	CSI Shelter Technologies	6049	GeoMicro, Inc.	5152	Kooltronic, Inc.	6148
Astellia	641	CT Miami	7026	GestureTek Inc.	4549	KDRE Telematics	5427
AT&T Mobility	3428	Cummins Power Generation	4969	Giesecke & Devrient	1933	Kroo USA	4051
ATC Logistics & Electronics	3050	CWTA	6505-1B	GL Communications, Inc	5806	Krusell International AB	7075
ATI	114	CWTA	6505-1C	Glen Martin Engineering	6036	Kullman	5845
Atlantic Scientific Corp.	6070	CWTA	6505-2A	Global Information Inc	2017	Kwicor Equipment Inc.	7267
Audex Telecom Industrial Co., Ltd	3463-I	Cyphermt, Inc.	6505-3A	Global Wireless Entertainment/Skinit	5153	Kyocera Wireless Corporation	5435
Audience	4020	OAA-SHEEN Technology Co., Ltd	5469	Globalstar Technology Corporation	2337	Kyocera Wireless Corporation	6007
AuthenTec, Inc.	5059	Qantherm Air Handling, Inc	412	Globecom Systems Inc	3400	L2 Cell	4872
Axera Networks, Inc.	3451	DataOnline LLC	6233	GNB Industrial Power	3006	Laird Technologies	717
Axesstel, Inc	4943	DataTrail Inc	5132	GO Networks	5249	LG Electronics MobileComm USA, Inc.	449
BandRich Inc	312	Datatronics	5117	Goin Mobile	4557	Lighthouse Communications	645
Bangio	4214	Datavind Inc.	6771	Goodman Networks, Inc.	112	Lightspeed International Co.	105
Baran Telecom	5942	DAX Technologies	6505-6D	Gore & Associates	5651	Linxoft Solutions Inc	6505-1B
Bard Manufacturing Company	5533	DCT - Digital Communications Technologies	3761	Goyal Brothers & Sons Inc	5471	Live Wire Distributing	4773
BCA International Corp	4349	deCarta	3247	GPS Networking	5565	Lleida Networks Servets Telematics, S.L	5885
BCI Communications Inc	6027	DIGL Group Ltd	1315	Great Wall Electronic Ltd.	2133	LogMeIn, Inc.	6715
Bechtel Communications, Inc	2121	Dial2Do	627-G	GndPoint Systems	4015	LPC Technology Co., Ltd.	307
Berkeley Varitronics Systems	7127	Dialog Incorporated	3865	GTS	5467	Lynn Products Inc	2117
Better Than DEM, Inc	4454	Diasspark	4427-AA	Haier America	3235	M2M Zone	5338
Beyond Cellular Int'l	4257	Dielectric	5970	Haining Sunparl Information Technology Co., Ltd.	7049	MACTEC Engineering and Consulting, Inc	6037
Big Apple Accessories	4777	Digicell International, Inc.	703	Handmark	6538	Magnadyne Corp.	4843
BitSoft, Inc.	5208	Digital Wireless	742	Hands Off the Internet	7228	Martin Dawes Systems	7056
BitWave Semiconductor, Inc	3861	Digital Antenna, Inc.	2827	Harris Stratex Networks	6249	Manvar	3601
Black & Veatch	6336	Digital Globe	840	Hatters Networks	5636	Master Merchant Systems Software Ltd.	2118
Black Star Networks	6010	Digital Receiver Technology	3001	Head Acoustics, Inc.	5513	Mavin Technology Inc	2736
BlackLine GPS Inc	6505-4D	Ditech Networks	255	Highgrades Ltd	627-F	Maxton Tech	6900
BlueAnt Wireless	3824	divdat	7255	Hitachi Ltd.	6914	mBox, Inc.	3628
Boboto Telecom Instrument Factory	5365	Dozier Internet Law, PC	1458	Hoffman	5355	Media Excel Inc	4229
Boston Amplifier, Inc.	4016	DragonWave, Inc	5852	Hoffman	6777	MEGAACCY Corp	4806
Bravo Tech, Inc.	4808	Dream Wireless, Inc	4257	Honeywell Aeronautics	4305	MemoryLink	6150
Bridgewater Systems	3402	Dupont Building, Inc.	2433	Hot Concepts	4876	Mentum	3656
Brightpoint	2624	Oynetic Mobile Solutions, Inc	4430	Houdinsoft, LLC	4552	Mery Electronics (USA) Co Ltd	4453
				HP	380	MCT Laboratories, Inc.	5512

Metrico Wireless	729	PaceButler Corporation	4058	Shenglu Telecommunication Tech Co., Ltd	6038	Touchstone Wireless	5727
Metro Ethernet Forum (MEF)	4119	Pacific Cellular Supply	4456	Shenzhen Hongdian Technologies Corp	7043	Tructa Inc	140
Mformation Technologies Inc	5075	Pack America Corp (The)	4542	Shenzhen Kingsignal Cable Tech Co Ltd	2234	Triango Broadband Wireless	6076
Miami Cell Corp	5157	PacketVideo Corp	3024	Shenzhen Wavetramp Technologies Inc	3463.3	Triango Broadband Wireless	6152
Microelectronics Technology Inc	2237	Pactolus Communications Software	6652	Shyam Telecom Inc	5831	TransAmerican Power Products	5948
Microsoft Corp	1515	Palmer Distributors, Inc	4157	Siemens Wireless Modules	5327	Transector Systems	4586
Midway Distributing	4411	Pama and Company Ltd	5506	Siena Wireless, Inc	249	Transystem Inc	111
Midwest Systems & Technology, LLC	7157	Panda International Inc	4548	SIMCom	5443	Trek Equipment	739
Miller Building Systems, Inc	6164	ParkTel USA	4975	SIRF Technology, Inc	409	Trimble	1961
Mi-Mobile	6236	Parrot Inc	4057	Site Pro 1, Inc	5946	Triple 7 Cellular Inc	4550
Mitec Telecom	4205	Parsons	6248	Siterra Corporation	5743	Trolltech, Inc	5716
Mitsubishi Electric & Electronics, USA	5712	PB Telecom, Inc	6055	SJD Technology Limited	311	TRS-Rentelco	3108
Mobanners.com	3855	Peabody Engineering	5933	Skinit	4343	TRICDM International Co., Ltd.	2335
Mobiground	4554	Perfect Connection	3457	SkyBitz	5031	TruePosition, Inc	1045
Mobile Candy Dish	6870	Perfect Tech Co., Ltd	103	SkyCross, Inc	5268	Trutap Limited	7054
Mobile Complete	7205	Performance Technologies	176	SkyPatrol LLC	136	tu chie	4353
Mobile Data Now	4110	PH Cellular, Inc	3846	Skyway Towers	5976	Turn Networks	6039
Mobile Enterprise Magazine	4852	Pharos Science & Applications, Inc	5207	Skywire Communications	5274	Turtle Wireless	3953
Mobile Future	5255	Phazar Antenna Corp	6132	Skyworks Solutions, Inc	3206	TUV Product Service Ltd	5064
Mobile Glove	4917	Phoenix Wireless	4742	SLK Global	4451	TW Lighting Inc	5539
Mobile Line Communications	4319	Phone Labs	5248	Smith Micro Software Inc	602	u-blox America	3827
Mobile Mark, Inc	6313	Pitney Bowes Map Info	8001	SNAPn Software	4019	UCELLX	5474
Mobile Messenger	725	Planet Cellular Inc	3844	SnapTel, Inc	4427-NN	UIEvolution, Inc	6853
Mobile Metrics	4335	Plantronics, Inc	334	Snell & Wilcox	4519	UK Group Hospitality - Tradefair Support	7054
Mobile Payments World	5514	Plasma Computing Group, Inc	3301	Sol Wireless	5206	UK/US Partner Pavilion	6355
Mobile Satellite Ventures LP	5713	Platinum Wireless	7107	Sol Electronics Ltd	7058	Ulticom, Inc	6753
Mobile Tomado plc	162	PlayPhone, Inc	4427-GG	SolovotSoft, Inc	4427-B	Unique Wireless, Inc	5810
MobileComm Professionals, Inc	826	Plug Power, Inc	5243	Sonic Telecom	7272	Universal Protective Packaging Inc	4455
Mobivt, Inc	4852	Plurifute	4427-J	Sonic Networks, Inc	3429	University of Denver	3802
MOBO USA Corp	4251	Pro Mobile Gear	5142	Sony Ericsson Mobile Communications	1827	Uniksoft Advergaming	6866
Mocoolo Accessories Wholesale, Inc	4251	PolyPhaser Corporation	402	SouthWind	6872	UrbanWorld Wireless	7274
modu	4339	Pontis	6903	Space Data Corporation	5068	uReach Technologies	3803
modu	6801	Portman Security Systems	4009	Specialty Tower Lighting Ltd	5749	US Title Solutions	5957
Modware	7101	Powder River Development Services, LLC	6232	SprintVox	6853	USA Wireless Solutions	2600
Monitec Americas	4050	Powerwave Technologies, Inc	1000	Sprint Communications	609	USTarcom Inc	1015
Motorola	5149	Pointing Antennas (Pty) Ltd	5570	Sprint	1648	USTarcom Personal Communications	1106
Motorola - M2M Wireless Modules	1806	PQI Corporation	4227	SRG	1459	U-Turn Media Group	5868
Motricity	5127	PreCash, Inc	5617	SRS Labs, Inc	4427-00	Valmont Structures	6653
Mpathx	4836	Precision Quincy	5243	Stahlin Enclosures	3900	Vakar Communication Inc	4655
M Solutions	3248	Prince & Associates	6239	Starline Networks Corp	1053	Vanillaphox & Stream Magazines	7265
M Solutions	6972	Pro Mobile Gear	4848	Starhome	7134	Vantrix Corporation	7153
MTI Wireless Edge, Ltd	6064	ProClip USA, Inc	1711	Stars Navigation Technologies Ltd	208	Vanu, Inc	2217
Multi-Tech Systems, Inc	5343	Prolix Solutions	4011	STATS LLC	4427-00	Vezima Networks	108
MX Telecom	4327	Pson Teklogix	5033	STEALTH Concealment Solutions, Inc	5527	Vetly S A	4315
MyWireless.org	5169	PTCRB	5517	STEP Communications	3453	VFP, Inc	2315
N E M Electronics Corp	4151	PTS Corp	2316	Stratus Technologies	6549	Viktor	4434
NAL Worldwide LLC	4112	PulseWave RF	1563	Streamzeo	5377	Visibility Solutions Inc	3861
National Cellular Owners Association	824	Purcell Systems Inc	6127	StreamVerse, Inc	4427-RR	Vlingo	4105
National Cellular U S A	4355	Pyramid Network Services, LLC	5865	Sumitek Instruments	5865	Voice Cloud	4427-X
National Electronics, Inc	3445	Pyax Mobile	4952	Suntec Enterprise Co., Ltd	410	Voice on the Go	4520
NAVTEQ	4161	Qimonda	5972	Suntra Telecom Inc	3958	Voice on the Go	5306
NEC Corporation of America, Inc	5949	Qpay Inc	3100	Suntech Technologies Co., Ltd	3463-B	VoiceAge Corporation	4427-A
Neel Enterprises, Inc	4559	QSound Labs, Inc	4427-EE	Sunwave Communication Co., Ltd	2235-	VoIP Pavilion	6644
Nello Corporation	5964	QUALCOMM	5237	Sunwatec Co. Ltd	5853-	Volt Telecom Group Inc	5842
Nellymoser	4331	QUALCOMM, Inc	1948	Super Fair Cellular	570E	VRB Power Systems Inc	6505-1D
NeoMedia Technologies	1259	Qualcomm Innovations Inc	5113	Superconductor Technologies Inc	6565-	Vringo	4056
Neonode Inc	6557	Quality One Wireless	5185	Superconductor Technologies Inc	657F	Walker and Associates Inc	6201
NetNumber, Inc	7201	Quality One Wireless	6827	Superior Communications	324	Wap Online USA, LLC	4427-SS
NetProSys, Inc	1157	Quartzlock	6957	Surf Communication Solutions, Inc.,	5907	Wavecell B V	4215
Network Innovations	4211	Quartex - Asia	6971	Susteen, Inc	1565	Wavecom, Inc	5135
Networks in Motion, Inc	1963	QuicPlay Media Inc	4544	Sybase 365	3712	Wi-Fi Alliance	4507
Nextar, Inc	6301	RACD Industries, Inc	5130	Symbian	485E	Wi-Fi Exchange	741
New On the Charts	7276	Radio Frequency Systems	415	Syniverse Technologies, Inc	260E	Wiltek Communications Inc	5406
New Times Overseas Exhibition Co., Ltd	7045	RadioFrame Networks	5017	Systems & Technology Corp	31E	Wilson Electronics	1451
New Way International Ltd	6953	Radware Inc	7268	Talley Communications Corp	144E-	WitNetworks	1559
NewBay Software Inc	4427-Q	Radwin Ltd	1465	Tango Networks	6747	Wmner Wireless	4650
Newfield Wireless, Inc	5537	RCC Consultants Inc	4404	Tatara Systems	330A	Wmner Wireless	4652
NEXAGE, Inc.	4427-Y	RCR Wireless News	3224	TecArt Industries, Inc	211A	Wireless Applications Corp	5543
Nexlink Communications	5910	RCS Communications	3759	Technoel	1115	Wireless Business Owner's Consortium	7169
Nextlink Wireless, Inc	5606	Reagan Wireless	3641	Tecore Networks	164	Wireless Center of New York, Inc	3848
NextWave Wireless Inc	5205	RealCom Associates, LLC	5977	Tecore Engineering	5949	Wireless CRAZE Catalog	4052
Nihon Wireless Inc -ICT	4561	RealNetworks, Inc	4617	TeleKey	2657	Wireless Dealer Magazine	4326
Nite Lite, Inc	2901	ReCellular, Inc	3833	TEKeyStems	493E	Wireless Dealer Magazine	4428
NLU Products	4556	Rechargeable Battery Recycling Corp	1609	Telcorda Technologies	543	Wireless Dealer Magazine	6008
Nokia	2635	Red Dot Trading	5666	Tele Atlas	1337	Wireless Essentials, Inc	4457
Nokia Siemens Networks	3026	RedKnee Inc.	4407	TeleBright	41CB	Wireless Industry Partnership (WIP)	4014
Noran Tel Communications	5519	Reiko Wireless Inc	4609	Telecom Logistics	6035	Wireless One, Inc	4926
Nortel	1938	ReliOn	5943	Telecommunication Systems (TCS)	1341	Wireless Source Supply, Inc	154
Northstar Communications Group, Inc	5843	Research in Motion Corp.	425	Telecommunications Industry Association	137	Wireless Toyz	5813
Novarra Inc	3602	REVSHARE	5573	Telecommunications/M2M Zone	522E	Wireless Wasp	4775
Novatel Wireless	2515	RipCode	4452	Telephony Magazine	7113	Wireless Week	1608
Novatec Technologies Corp	5333	RMS Communications Group, Inc	349	TeleSuccess	52K	Wireless Works	1653
Nosoro LLC	7065	Rocco Software Ltd	627-G	TeleSoft International, Inc	119G	Wireless Accessories Group	4448
NSTL, Inc	3600	Rohde & Schwarz, Inc	3716	Telestone Technologies Corp	1403	Wireless ZT	6964
NTS Corp	5616	Rohn Products, Div of Radian	5935	TeleTracker	501*	WIT Software	6547
NTT DoCoMo, Inc	6327	RomanceIT Technology Co., Ltd.	303	Telit Wireless Solutions	5544	Wuhan Dianna Telecom Accessory Co., Ltd	2136
Nuance Communications, Inc	5717	Rosenberger LEONI Site Solutions	6364	Telemat Ltd	3061	Wyless	5344
Numerex	5227	Roxtec, Inc	5549	Teimar Network Technology, Inc	7009	Xceed Technologies, Inc	3102
OceanLake Commerce	6505-CC	RSI Corp	5753	TelTech Systems Pte	4427-D	XCome Technology Inc	1257
OffWare	5257	RTC Group	134	Tellur Corporation	265D	X-DO, Inc	2434
Olivette Precast	8032	S3 Interactive Ltd	7052	Tempest Telecom Solutions, LLC	5175	Xentris, LLC	6337
Omission	3665	Sabre Towers & Poles	6136	Teragram Corporation	7071	XILS-beg (A Division of Megasoft Ltd)	6543
OnePIN, Inc	3762	Sage Instruments, Inc.	2215	Terracon	5071	Xohm by Sprint Nextel	5213
OnPoint Digital, Inc	1059	Sagem Orga	5707	TESSCO Technologies	1636	Xstra, Inc	340
Ontronics / SSM Holdings	3756	Samsung Telecommunications America	1023	TESSCO Technologies	1536	Xtreme Mobile	156
Opal Manufacturing	6505-1A	San Jose Navigation, Inc	203	Testing Technologies IST GmbH	1268	xyzo USA LLC	1357
OpenMarket	7003	SanDisk Corp	5817	Texas Instruments	1048	Yahoo! Inc	1019
Openwave Systems, Inc.	3153	Sandvine	7267	The Associated Press	4427-H	Yangzhou Jingcheng Electronics Co., Ltd.	5369
Optichron, Inc	4826	SaskTel International	6505-6A	The Gold Star Wireless	3640	Yangzhou Jingcheng Electronics Co., Ltd	5649
Opticon Inc	4008	SAT Co. Ltd (Wani)	3662	The Sports Network	4427-PP	YOLYCOM GROUPS Co., Ltd	4571
Optium Corporation	5507	SATMO	5814	The Wireless Source	510	Yulong Computer Telecommunication Scientific Co	4261
ORBComm	5027	Saxa Mobile	5407	The Wireless Workforce	4114	Zebra Technologies International, LLC	4054
Original Soundtrack Inc	4449	Schema	844	THETW Service Center	264	Zed	8765
Ortiva Wireless Inc	3302	Scosche Industries, Inc	4328	Thin Multimedia Co Ltd	4427-VV	Zenith International Fze	4113
OSG Billing Services	2219	Sena Cases	4878	T-Mobile	5241	Zhen Jang Lan Jian Electron Co., Ltd	205
OSP Networks	4308	SensorLogic	5335	Tongyu Communication Equipment Co	5057	ZTE Inc (USA)	3509
OSP Networks	7275	SEQUANS Communications	6902	Toshiba America Electronic Components, Inc	5065	Zumobi	4427-II
OtterBox	4719	SGS Consumer Testing Services	5413	Total Telecom	4012	As of 2/1/08	

# Keynotes



Path to Keynotes

98% Sold Out

Taxi drop-off

Shuttle buses

Outdoor exhibits



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CTIA Emerging Technology Awards

Entrance

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Mobile Entertainment expo

More information  
on Page 6

CTIA  
Emerging  
Technology Awards

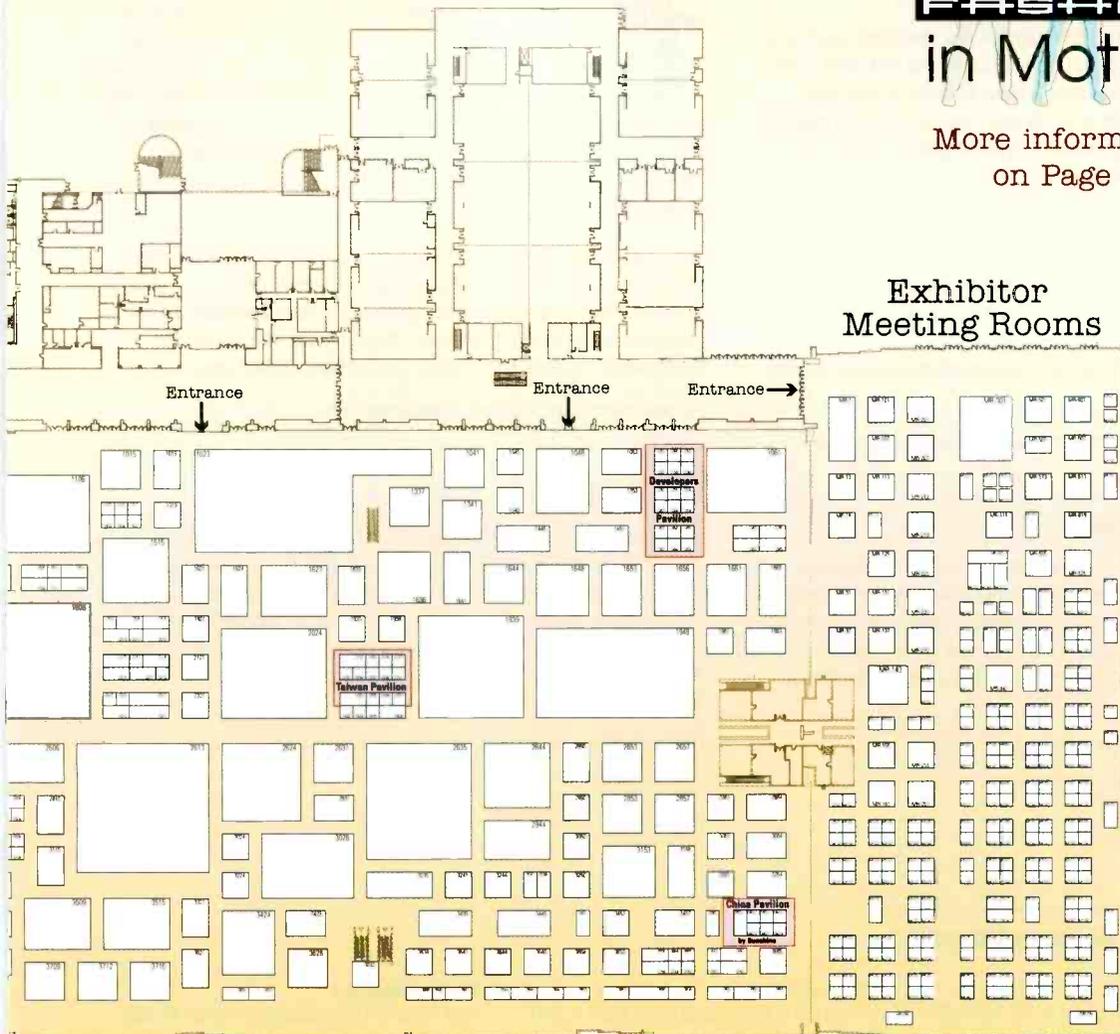


More information  
on Page 9



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on Page 8

Exhibitor  
Meeting Rooms



## Enterprise Mobility Pavilion



The Smartphone Summit is proud to again present their Enterprise Mobility Pavilion. Featuring cutting-edge innovators in the mobility and wireless industries, this pavilion marks the 10th collaboration with CTIA, bringing you exhibits from the leaders in handheld and wireless devices, with a focus in 2008 on Smartphone enterprise solutions and innovations.

To reserve your Enterprise Mobility Pavilion exhibit space, please contact Darren Eng immediately at [DarrenEng@SmartPhoneSummit.com](mailto:DarrenEng@SmartPhoneSummit.com) or (310) 567-4844.

## M2M Zone™

### Machine-to-Machine Wireless Communications



The M2M Zone™ is where network operators, application designers, hardware manufacturers and end users come together to showcase wireless Machine-to-Machine communications products and services. The next evolution in communications, M2M represents a dynamic global market, which in North America is expected to grow 32% annually over the next 5 years, according to ABI Research. M2M solutions employ microchips to communicate location, status and other characteristics across Wide Area Networks. Applications include wireless remote control and monitoring of fixed and mobile devices for enterprise and consumer markets, in addition to sensors and RFID technologies. New services are emerging daily in Industrial, Manufacturing, Transportation and Medical fields as businesses realize the effect that device connectivity can have on their bottom line.

For more information, contact [info@m2mzone.com](mailto:info@m2mzone.com) or visit [m2mzone.com](http://m2mzone.com).

## M-ertainment Pavilion

This pavilion showcases the hottest mobile trends for downloading music, movie trailers, social networking, cutting-edge video games and much more! The mobile entertainment market is surging with new and untapped revenues and CTIA has created a place for up-and-coming companies to spotlight their services. This will be a one-stop shop to stay on top of your game.

For more information, contact your CTIA Account Executive.

## Testing Solutions Pavilion

The Testing Solutions Pavilion showcases the latest offerings from companies providing products and services for testing wireless technologies. Included within the pavilion will be test equipment providers, test software providers and test labs dedicated to providing solutions to test the increasingly complex products being offered today. Service providers, wireless device manufacturers and end-users will be able to see the latest offerings in one convenient location.

For more information, contact your CTIA Account Executive.

## Tower Technology Summit



Since 1997, the Tower Technology Summit has been the place for the wireless infrastructure community. We bring together network engineers, RF engineers, site development pros, zoning and permitting firms, tower owners and aggregators, suppliers of hardware, software and services, as well as wireless carriers, to exchange ideas on the critical infrastructure needed to support the world's increasing reliance on wireless communications.

Tower Technology Summit at CTIA offers a pavilion on the exhibit floor, showcasing 100+ vendors in the wireless infrastructure industry. And the Tower Technology Summit conference provides dedicated conference programming on emerging financial, technological, and regulatory developments in wireless infrastructure and around the tower.

For more information, visit [www.TowerSummit.com](http://www.TowerSummit.com).

## VoIP Pavilion

VoIP is revolutionizing the way people communicate as broadband connections become the status quo in every U.S. home. VoIP touches both the enterprise and consumer environment, making handset and infrastructure companies just a few of the industry segments looking for strategic partnerships to capitalize on the evolving and very profitable VoIP market. The VoIP Pavilion offers one-stop shopping on the show floor for all who are interested.

For more information, contact your CTIA Account Executive.

### Your CTIA Account Representatives:

#### Companies A-L:

Mike Greeson at [MGreeson@ctia.org](mailto:MGreeson@ctia.org) or 202-736-3682

#### Companies M-Z:

Karen Leon at [KLeon@ctia.org](mailto:KLeon@ctia.org) or 202-736-3887

#### General Inquiries:

Tripp Taylor at [TTaylor@ctia.org](mailto:TTaylor@ctia.org) or 202-736-3895

## Canada Pavilion



Companies within the Canada Pavilion are exhibiting a wide range of wireless communications, internet, computing and mobile solutions. These organizations are actively seeking strategic alliances, partnerships and investments in order to expand their presence in the United States and other international markets. Pavilion presentations will feature Canadian innovators demonstrating and discussing Canadian leading edge technologies. Senior government business development officers will be available to discuss how companies may establish themselves in Canada or help identify potential Canadian business partners.

*The Canada Pavilion is organized by Foreign Affairs and International Trade Canada.*

## China Pavilion



by New Times Overseas Exhibition Co., Ltd

The China Pavilion (by New Times) for CTIA WIRELESS 2008 will showcase wireless networking and communication equipment, internet, computing, cellular phone, cellular phone accessories, Wi-Fi, RF-related products, Bluetooth and GPS.

## China Pavilion



by Sunshine

Showcasing a wide range of wireless networking and communication equipment, internet, wireless entertainment, computing and mobile technology solutions, the China Pavilion brings visitors to one of the fastest growing markets in the world. The exhibitors are dedicated to developing partnerships and expanding international markets.

## China Pavilion



by THETW China

The China Pavilion for CTIA WIRELESS 2008 will have a strong focus in cellular phone, cellular phone accessories, Wi-Fi, RF-related products, Bluetooth and GPS.



*CTIA WIRELESS has been an active participant in the Department of Commerce's International Buyer Program (IBP) since 2001*

### CTIA Exhibits Package \*

Member \$135

Non-Member \$150

*\*Includes admission to Exhibit Floor, and CTIA Keynote Sessions and Complimentary Seminars.*

## Ireland Pavilion



The Ireland pavilion will include a number of leading Irish wireless and telecommunications companies. Ireland has become a source of innovation for emerging technologies in Europe. The most exciting Irish telecommunication and wireless companies, focusing on increasing international market share and global outreach by building partnerships, and a network of distributors and subsidiaries, will exhibit at the Ireland Pavilion. These companies will show a wide range of product, services and technologies in different sectors within the telecommunications industry.

*Organized by Enterprise Ireland and the Trade and Technology Board of the Irish Government.*

## Korea Pavilion



Korea Pavilion is a collection of wireless-focused companies with superb technologies that are facing difficulties in making inroads to overseas markets due to a lack of overseas marketing capability, experience or budget. The goal of the pavilion is to help lay the groundwork for promoting exports and contribute to overseas market diversification.

## Spain Pavilion



The Pavilion of Spain is organized by the Trade Commission of the Embassy of Spain in Los Angeles and the Spanish Institute for Foreign Trade (ICEX), two government organizations that develop and promote business relations between Spain and the United States.

## Taiwan Pavilion



by THETW

Visit a range of Taiwan's leading manufacturers in the Taiwan Pavilion. You'll find emerging brands and OEM/ODM specialists. On display for CTIA WIRELESS 2008 will be GPRS, GPS, Wi-Fi related applications, cellular repeaters and boosters, Bluetooth headsets and tracking products.

## UK Pavilion



Visit the UK Pavilion and find the business partners you are seeking. The UK exhibitors will be demonstrating a wide range of products, services and technologies.

*The companies on the UK Pavilion are sponsored by Intellect, supported by UK Trade & Investment and managed by Tradefair.*

## Track One

# Mobile Blueprint

The Technical Strategies for Building the Networks, Devices and Applications of the Future

### Open Networks:

*What Will They Be Like & When Will They Be Available?*

Any device, any application, any media, any time, any where, that's the promise of Open Networks. But are customers prepared to deal with the challenges of integration and interoperability that Open Networks are likely to bring (to say nothing of the loss of centralized customer service support or device subsidies)? This panel will provide a high-level review of the technical and business issues that providers and customers alike are likely to face as the Era of Open Networks begins.

### Defining 4G Technology

Confusion exists in the marketplace around 4G technologies. This panel will help dispel that confusion by separating the ITU definitions from marketing speak, looking at the hurdles to 4G implementation, including CAPEX, ecosystem development, and rate and royalty structures, and reviewing deployment issues, from timelines to markets to adoption rates, for LTE, WiMAX, and UMB.

### Questioning IMS:

*Where are We? What have We Learned? Where are We Going? And When Will We Get There?*

Does IMS continue to be the best opportunity for operators to take the complexity out of converging their existing networks as they move to a common network platform? This session provides a check-in moment for IMS: What is working and what is not? How overall uptake is going as per original promises and what does the future look like for IMS?

### Cell Site Backhaul:

*Addressing a Top Cost & Reliability Concern*

Cell site backhaul remains one of the top cost items in a wireless network. The shift to 3G and 4G services, with increased bandwidth requirements, will make backhaul among the fastest growing cost elements, as well as a cause of many services outages. This session will look for solutions to address the cost and reliability issues caused by Backhaul, including satellite, terrestrial microwave, fiberless optics and incremental growth of T1s, as well as address the question of whether or not fiber to the individual cell site is the only option, and if so, how it can be made cost effective.

### Addressing Network Security in the Era of Open Access & Fully Functional Mobile Multimedia Devices

As mobile handsets evolve into fully functional mobile multimedia centers delivering a wide range of Internet services, and mobile operators emerge as virtual ISPs, comprehensive network security becomes paramount. This panel will look at the methods and strategies mobile operators must consider to secure their mobile data networks, including whole architecture versus point product implementations, the role of various security appliances—such as firewalls, intrusion detection and prevention, and VPN—and the new security challenges presented by emerging trends and technologies such as FMC, WiFi access and IMS.

### Software as Services:

*Moving Beyond the Service Plan*

A growing number of companies are stepping forward to offer consumers a host of applications for wireless handsets. Many believe applications should not be dictated by service plan, but made available to customers through software instead. What are the likely technological and service implications across the ecosystem as applications become more prevalent via software and not through the services contract? This panel will address these questions and more as it confronts the issue of Software as Services.

The Track One Sessions are sponsored by **NORTEL**

### **Any Device:**

#### *The Panacea of Open Networks*

One of the panaceas evoked in the calls for open networks is the ability to have any device that technically can attach to the network be allowed to do so. Theoretically, this will enable a whole new class of devices without any voice capability to utilize wireless networks. This discussion with consumer electronics manufacturers and others will look at the types of devices beyond voice handsets that will be enabled by this new paradigm, what the associated services might look like, and how soon, and in what numbers, manufacturers might be providing them.

### **Operating Systems, User Interfaces and Browsers:**

#### *Where is the Technology Going?*

Mobile phones are plagued with interoperability issues, making it difficult for applications to run properly on all handsets, hurting both consumers—who find their handset incapable of running the desired application—and applications developers—who have to develop multiple versions of the same application. What are the pros and cons of open versus closed handheld operating systems? This panel will address the likely outcome of the openness rage should it move to the handset, including the long-term effects of this possible technology shift.

### **Handset Feature Set Road Map**

This panel comprises representatives from device manufacturers who will report on the outlook for handset feature sets including, messaging, imaging, audio, applications platforms, external memory, PANs, multi-mode (WLAN, WiMAX, etc.), positioning and location-based services.

### **Cameraphone Code Scanning Technologies:**

#### *A Survey*

This panel discussion will be focused on the devices, software, applications, etc., that enable code scanning via a mobile phone's camera functionality. While cameraphone code scanning has the potential to revolutionize the way users access information, content and advertising, questions still remain. What is the current state of the technologies? What are the main obstacles to mass adoption and what are the strategies to overcome them?

### **Applications Platforms and Key Trends in Mobile Software Development**

This panel will discuss the pros and cons of the various mobile applications platforms—mobile Java, BREW, Adobe Flash Lite, iPhone, etc.—and address the key trends and requirements driving mobile software development, including personalization, scalability, flexibility, and the ability to connect to services for a more interactive experience.

### **Phonetop Widgets:**

#### *The Next Gen Technology for User Interfaces*

What is the next generation phonetop and what are the key enablers? What are some of the pain points in today's mobile device user experience that mobile widgets and other new phonetop and browser technologies will help to alleviate? Will "mobile widgets" be significantly different than their online counterparts? Will new business models emerge? This discussion is intended to examine the opportunities and challenges posed by bringing widgets to the phonetop.

## Track Two

# Mobile Lifestyles

The Business Issues Behind Transforming the Wireless Device into a True Productivity Tool

### **Innovative Solutions for Commercializing Location Based Services**

LBS—it's not just Navigation anymore. LBS serve both Enterprise and Consumer needs, however they are not currently fully integrated in the Mobile Lifestyle. Applications seem to be developed to fit either the Enterprise or the Consumer need. Over time, utilization of these applications will become integral to fulfilling a wide range of the "Pro-Sumer's" information needs. This panel will address the application development and business trends behind filling this Mobile Lifestyle need.

### **Mobile Money:**

*Enabling Mobile Financial Services*

The integration of money and financial services into the mobile device has been on the horizon for years. But how can we make the mobile wallet a reality? This session will feature leaders in finance, credit institutions, transaction security and current payment application providers discussing their views on mobile financial services and when and how Money will be made Mobile. Panelists will identify the inhibitors and impediments that will need to be overcome before full scale adoption can take place.

### **mCommerce:**

*Leveraging New Technologies to Facilitate Mobile Shopping*

Shopping is not about the mall anymore. The mobile consumer can leverage cameraphones for bar code (2D) scanning, 3G (and 4G) networks, NFC and other technologies to allow them to achieve new levels of product research and discovery. But how can ecosystem players work together to jumpstart mobile shopping/browsing for both digital and physical goods and payment/purchase via the mobile device? This session will feature leaders in NFC, retail, consumer marketing and consumer goods detailing the steps the industry must take to transform the mobile device into an-always on/always-with-you shopping portal.

### **The Wireless Internet:**

*Enabling the Mobile 'Infotainment' Universe*

The mobile web has opened up a whole new platform for accessing information and entertainment services, but issues of discoverability, usability and delivery have slowed growth. This session will feature members of the new broadband media value chain who will share their current expectations for access and content distribution via wireless. Barriers to the mobile Internet's full potential will be identified along with methods for creating and leveraging a mass market for broadband media via the wireless channel.

### **Mobilizing Community and Social Networks:**

*Getting There From Here*

The social networking revolution has hit the mobile platform, but what strategies can be used to ease this sector's growing pains? This session will address the specific areas of growth on the horizon, advertising, the emerging privacy concerns, and how to leverage LBS in taking social networking applications to the next level.

### **Search:**

*Solutions to Discovering Content on a Mobile Device*

The more content that is available, the more difficult it is for consumers to find it. Discover-ability makes a huge revenue impact on content providers. Off portal case studies will be highlighted. This session will feature the leading Search companies sharing their insights and highlighting off-portal case studies.

## **Addressing Usability in the Wake of the iPhone**

This session will provide 'Best of Usability' solutions across a variety of applications, including messaging, content access—downloading, streaming, sharing—discoverability and input and output. The iPhone pointed the way. There are many variations, yet the theme is recurring: Make the phone simple; Make content easy to reach.

### **The 'Prosumer':**

*Leveraging the Overlap between Professional and Consumer Subscribers*

Mobile devices and wireless networks enable people to better integrate their personal and professional lives. Issues to be addressed by this set of panelists include unified messaging, mobile access to one's digital content and services, and who pays for what when the enterprise user goes home but continues to use the corporate device?

## Track Three

# Mobile “Customer-ization”

## Marketing Strategies for Tomorrow’s Cutting Edge Mobile Services

### **Mobile Video / TV / IPTV:**

*What are Subscribers’ Expectations and How do We Meet Them?*

There has been lots of buzz around mobile video with new deals and major players making daily headlines, but subscriber uptake continues to be spotty. This panel will feature industry leaders addressing the business and marketing issues related to expanding consumer adoption of mobile video, including the strategies for monetizing mobile video through synergizing ecosystem stakeholder efforts and improving the user experience.

### **Mobile Brand Advertising:**

*What are the Winning Campaigns?*

A multitude of companies are stepping forward with highly successful mobile advertising campaigns via technologies including text messaging. Some of the biggest brands in the world have embraced the mobile medium to compliment other traditional forms of advertising. This session will focus on how SMS and other mobile technologies can be leveraged to expand brand advertising.

### **Viral Marketing via the Mobile:**

*Advertising Meets Mobile Social Networking*

This session will discuss the point at which mobile advertising intersects with Mobile Social Networks and Mobile Gaming—Viral marketing in the mobile world. Facebook and MySpace broadcast your buying/video rental histories to your buddy list. Short code/mobile advertising campaigns with social networking twists. How will this work? What will be the Best Practices?

### **Managing Mobile Content Sales:**

*From Creation to Distribution*

As walled gardens are razed, more mobile content sales are taking place off-portal. While this trend offers consumers more choice, it creates new levels of complexity to the sale of mobile content. This panel will discuss all aspects of managing mobile content from creation to distribution and the steps in-between. Strategies for overcoming issues in consumer privacy, transparency in advertising, parental controls, billing and breakage, will be explored.

### **Selling Mobile Content:**

*Bundles or a la Carte?*

Mobile content sales are up, but still lag way behind where analysts predicted years ago. We need to Crack the Code behind packaging Digital Media and develop product structures that deliver maximum impact for digital media sales via the mobile. This session will look at what’s keeping consumers from driving mobile content sales higher and faster.

### **Mobile Demographics:**

*Finding Up and Coming Niche Markets*

Demographics have always been key to targeting marketing and advertising. This panel will describe the hot groups reachable via their mobile phone and focus on serving some of the smaller but growing demographic segments in the country. Is it all about the Urban Youth anymore? What are the opportunities in language specific (i.e. Hispanic) markets? College campuses? Sports Fans?

### **International Opportunity:**

*Prospects for Expanding Beyond Domestic Borders*

There is little doubt that the market for wireless services in the United States is a significant business opportunity. As mobile services proliferate around the globe, what opportunities exist for applications and service providers alike to expand beyond domestic borders and into additional markets? This panel will discuss trends in the international market place, with a focus on emerging and developing markets.

The Track Two Sessions are sponsored by



Media Sponsor



### **Emergency Messaging:**

#### *Leveraging Mobile Communications for Public Safety*

In the wake of tragic events occurring at public schools and universities around the nation, many experts have come together to discuss alternatives and provide solutions for wireless emergency alert services. Various alternatives seek to provide greater security and improved protection by initiating faster responsiveness in emergency settings. This panel will discuss the extent of these services and the trends in the development of additional mobile alert and emergency messaging.

### **Analyst Roundtable:**

#### *Benchmarking Mobile Content's Uptake*

This panel consists of industry analysts sharing their metrics, trends and predictions for the next 12 to 18 months. What will really occur with Mobile TV? What's next for Mobile Music? Is there still an opportunity to create a Billion Dollar Company in Mobile Content?

## Track Four

# State and Federal Policy

For those focused on the latest regulatory, legislative, and policy developments.

Plenary

### **Wireless Industry Policy Hot Topics**

**Tuesday, April 1, 2008 1:45PM – 2:45PM**

Key industry and government decision makers will discuss policy hot topics and will answer questions about what policies they think will best spur the wireless industry's growth, innovation and evolution.

Plenary

### **U.S. Wireless versus the World**

**Tuesday, April 1, 2008 3:00PM – 4:00PM**

U.S. and international policy makers will discuss the United States wireless marketplace in relation to the global market for wireless services, applications and devices.

### **The Policy and Economic Implications of Wireless Network Management**

**Tuesday, April 1, 2008 4:15PM – 5:15PM**

Regulators, consumer groups and industry representatives will discuss the trend toward "openness" in wireless telecommunications networks. This panel will address the role, if any, regulation should play in wireless network openness and management of network resources as the industry continues to evolve.

### **Wireless Innovation and its Meaning for Policy-Makers**

**Wednesday, April 2, 2008 10:30AM – 11:30AM**

Innovation at the network, device and application layers are driving U.S. wireless consumer use. On this panel, industry representatives will discuss the big picture of innovation in the United States wireless market. What innovations will continue to push the limits of wireless use and what challenges do carriers face as consumers demand more from wireless?

The Track Four Sessions are sponsored by



## **Market Realities**

**Wednesday, April 2, 2008 2:00PM – 3:00PM**

Key policymakers will discuss the impact of consumer behavior on a competitive landscape along with a review of the inherent differences and tensions in Federal and State oversight of competitive markets.

## **Taxation of Wireless in the Mobile Broadband Era**

**Wednesday, April 2, 2008 3:15PM – 4:15PM**

Representatives from industry, as well as key state policymakers, will discuss the economic impact of state, local and federal telecommunications taxes on wireless consumers and companies and how these taxes affect the delivery of communications service and continued deployment of mobile broadband services across America.

# WCNC 2008

IEEE Wireless Communications  
& Networking Conference

31 March - 3 April



## THE PREMIER WIRELESS EVENT

For Wireless Communications Researchers, Industry Professionals, and Academics

THE LATEST INFORMATION ON WIRELESS COMMUNICATIONS FROM LEADERS AND EXPERTS IN THE INDUSTRY

### KEYNOTE & PLENARY SPEAKERS



**Håkan Eriksson**  
Senior Vice President & CTO  
Ericsson



**Dr. Young Kyun Kim**  
Senior Vice President  
Samsung Electronics



**Dr. Roger Marks**  
Senior Vice President  
NextWave Broadband Inc.



**Dr. Joseph Mitola III**  
Consulting Scientist  
The MITRE Corporation

### PROGRAM HIGHLIGHTS

#### TECHNOLOGY/BUSINESS APPLICATION PANELS

Highlight cutting edge technologies, applications, market trends, and business implications.

#### TUTORIALS

- Dynamic Spectrum Access in Cognitive Radio Networks
- Emerging Technologies in Wireless LANs
- Location-based Services for Mobile
- Coding for MIMO Communication Systems
- IP-based Mobility Protocols and Optimization Framework
- Beyond 3G
- WiMAX
- Multi-User OFDM

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Registration includes access to CTIA Keynotes and exhibit floor.

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One Complimentary Tutorial Registration

Register Today at [www.ieee-wcnc.org/2008](http://www.ieee-wcnc.org/2008)



# Tower Technology Summit

Tuesday–Thursday, April 1–3, 2008 Rooms N109-110



## 11 Years Leading the Wireless Infrastructure Industry

### **Don't Climb the Tower alone! Let the Tower Technology Summit help you.**

The Tower Technology Summit will answer these key questions to lead you to the top of the Tower:

- >> What is the status of investment in the tower industry? Where is the tower industry growth headed and what are its potential challenges?
- >> Where are the current industry metrics for valuations, for leases, physical assets, and overall value to the tower owner?
- >> Who were the big winners in the 700 MHz spectrum auction? When will spectrum clearing issues be resolved? When can carriers begin actual tower lease operations?
- >> What are key issues that Distributed Antenna Systems present to owners and carriers, including government regulatory issues? What are the municipal challenges?
- >> How are new laws and regulations affecting the tower industry? Including FCC mandates on backup power, environmental hurdles, and more.

Please go to <http://www.towersummit.com/> for the most up to date schedule and program information!

### **Registration: \$499**

**PLEASE NOTE:** There is a separate registration fee for Tower Technology Summit and it is NOT included in the CTIA registration packages. The Tower Technology Summit fee also includes admission to all CTIA keynote sessions and access to the exhibit hall. Please see registration form for details.

# MOBILE ENTERTAINMENT LIVE!

Monday, March 31, 2008 8:00AM – 6:30PM Barron Room, Las Vegas Hilton

Don't miss your chance to participate in and profit from the mobile entertainment revolution!



\*\*SUBJECT TO CHANGE\*\*

## 9:15 – 9:45 Keynote

**Tero Ojanpera**

*EVP Entertainment & Communities*

Nokia

## 9:45 – 10:30 Plenary Session:

### State of the Industry Debate

Content owners, wireless operators and technology innovators will face off on a wide-range of topics including ease of use, customer control, pricing and availability.

## 11:00 – 11:30 Keynote



**Rob Glaser**

*CEO*

RealNetworks

## 11:30 – 12:15 Plenary Session:

### Creative Conundrum

This plenary panel will feature the producers, programmers and artists directly involved in creating the content you ultimately see and interact with on today's mobile phones.

## 1:15 – 1:45 Celebrity Q&A

MOBILE ENTERTAINMENT LIVE! always brings stars to CTIA who are heavily engaged in wireless content. Past participants include: rap pioneer Chuck D, the legendary Ray Manzarek of The Doors, entertainment icon Quincy Jones and Matchbox Twenty's Paul Doucette. Stay tuned for who will take part in this year's event!

## 1:45 – 2:30 Plenary Session: Mobile Advertising and Content Adoption – Who's Dropping the Ball?

In 2007, 21% of mobile data users recalled receiving an ad on their phone, but 67% thought the idea was unacceptable. Is this due to the reliance on the data plan subscription model? Will mobile advertising be more acceptable if

the trade-off means better and MORE content? In this session, Nielsen Mobile's Jeff Herrmann speaks with mobile marketing leaders about the need for an ad-supported mobile media model. Find out the gating factors that the mobile ad market faces and solutions for growth that simultaneously meets the needs of both marketers and consumers.

## 3:00 – 3:30 Keynote



**George Kliavkoff**

*Chief Digital Officer*

NBC Universal

## 3:45 – 4:30 Content

### SuperSessions

This intimate series will delve deep into the inner-workings of the entertainment industry's three primary contributions to mobile—music, gaming and video.

#### >> Room: A – Music

Ringtones are so two years ago. This music panel will focus solely on the future of mobile music including full-song downloads and subscription services.

#### >> Room: B – Games

Explore the solutions needed for the \$2 billion mobile game industry to realize its promise. This panel will cover carrier partnerships, casual vs. core gamers, handset innovations and distribution models.

#### >> Room: C – Video

It's time for mobile TV and video services to take center stage on mobile. But which model will dominate the experience? Broadcast TV? Downloadable mobiscodes? Sideloaded full-length movies? The top decision makers in the film, TV and video distribution business will debate these issues as well as details like merchandizing strategies, marketing, and the all-important

process of creating content for the mobile platform.

## 4:45 – 5:30 In Focus Sessions

The In Focus series will feature one-on-one in-depth conversations with key visionaries driving innovation in the most cutting edge areas of the mobile entertainment.

#### >> Room: A – Social Networking

Where does social networking fit into the mobile industry, and how can it be used as a force of content distribution?

#### >> Room: B – Money, Money, Money

What innovations, services and business models is investment capital flowing toward in the mobile entertainment space?

#### >> Room: C – Ad It Up

How do advertisers really view the mobile entertainment market? What metrics do they use to measure success?

## \*\*ALL MOBILE ENTERTAINMENT LIVE!

### Attendees Receive:

- >> Access to the CTIA Keynotes and Exhibit Floor
- >> A complimentary 6-month subscription to *Billboard* magazine
- >> A complimentary 6-month subscription to *The Hollywood Reporter*

## NETWORK WITH THE BEST AND BRIGHTEST IN THE MOBILE ENTERTAINMENT BUSINESS!

### Registration: \$449

**PLEASE NOTE:** There is a separate registration fee for MOBILE ENTERTAINMENT LIVE! and it is NOT included in the Conference Pass or Smart Pass registration packages. The MOBILE ENTERTAINMENT LIVE! fee also includes admission to all keynote sessions and access to the exhibit hall. Please see registration form for details.

# ANDREW SEYBOLD WIRELESS UNIVERSITY

Monday, March 31, 2008 9:00AM – 5:00PM Room N109

Presented by **ANDREW SEYBOLD WIRELESS UNIVERSITY**



Increase your Wireless IQ with ANDREW SEYBOLD WIRELESS UNIVERSITY

**Increase your wireless IQ by taking advantage of the industry's best wireless mobility educational course, presenting key research and analysis of current and future industry trends.**

For thirteen years, ANDREW SEYBOLD WIRELESS UNIVERSITY has provided an in-depth, unbiased view of wireless technologies and applications in a convenient one-day seminar at CTIA WIRELESS shows. Led by Andrew Seybold, a renowned wireless industry expert, this full-day educational course delves into complex wireless mobility issues and is designed for executives and entrepreneurs who want to make informed decisions based on solid facts and keen insights.

If you are involved in any aspect of the wireless industry, in virtually any capacity, you will want to join ANDREW SEYBOLD WIRELESS UNIVERSITY and discover all you ever wanted to know about wireless mobility including money-making opportunities.

## DESCRIPTION

ANDREW SEYBOLD WIRELESS UNIVERSITY is a full-day seminar divided into two sessions. The morning session delves into wireless technologies and operators within the United States and throughout the world. The afternoon session zeros in on the operating systems and applications fueling the demand for services that go well beyond voice.

In the morning you will learn about wide-area, local-area and personal-area wireless communications technologies, devices and technology advances that have been implemented as well as those waiting in the wings to be deployed.

In the afternoon you will explore the elements of wireless data from both the operators' and customers' vantage point as you review consumer and business applications, projections for applications of the future, content and technologies and the applications wireless operators believe will drive the increased adoption of wireless services.

## WHO SHOULD ATTEND?

- >> Industry executives and entrepreneurs focused on wireless convergence
- >> Leaders of companies migrating to wireless and workforce mobility
- >> Neophytes and business professionals new to wireless
- >> Technology evaluators and implementers
- >> Marketing and sales professionals

## WHAT YOU GET

- >> An intensive day long program with opportunities to network with the experts
- >> A well-rounded education in current technologies, applications and related services
- >> A global wireless industry perspective—historical, present and on the horizon
- >> Complex issues conveyed in plain language in an engaging style

## HOW YOU BENEFIT

- >> You will have solid, relevant facts and unbiased insights
- >> You will make more informed short- and long-term decisions
- >> You will put the power of wireless mobility to work for your company and your customers
- >> You will gain a competitive business advantage

**Registration: \$349**

**PLEASE NOTE:** There is a separate registration fee for ANDREW SEYBOLD WIRELESS UNIVERSITY and it is NOT included in the Conference Pass or Smart Pass registration packages. The ANDREW SEYBOLD WIRELESS UNIVERSITY fee also includes admission to all keynote sessions and access to the exhibit hall. Please see registration form for details.

# Converged Services Summit

Monday, March 31, 2008 9:00AM – 5:00PM Room N256

Presented by **informa**  
telecoms & media

## Three Screen Strategies for the Converging World

As the concept of convergence evolves, focus has shifted from fundamental technology issues to how carriers will package, market & implement converged services and their optimal strategies for delivering content anytime, anywhere and anyhow.

The vision of convergence that most carriers share is where customers will be using complex converged solutions that blend the most compelling aspect of media, communication, voice & data and are delivered across multiple delivery platforms.

The Converged Services Summit will feature carrier case studies and the most advanced market thinking from leading independent experts and practitioner. Topics to be covered include:

- >> Understanding the new services landscape—how will service providers position themselves in the converged environment?
- >> Strategies for Monetizing Convergence: Combating Short-Term Revenue
- >> Cannibalization of Revenues for Long-Term Gain
- >> Building Partnerships to harness opportunities in the Converged Environment
- >> Addressing the Marketing & Positioning challenges of Converged Services
- >> Strategies for Differentiating Bundled Offerings in an Increasingly Competitive Market
- >> Analyzing the Future Role of the Wireless Carrier in a Converged Environment
- >> The Battle for the Building: assessing how Femtocells, UMA will affect the Competitive Positions of Fixed and Wireless carriers and WLAN Providers
- >> Case Study: Implementing Femtocell Based Services
- >> Service platforms—how IMS (IP Multimedia Subsystem) and SDP (Service Delivery Platform) Underpin Converged Services
- >> Assessing Mass Market VoIP & WiFi: the impact of Dual-Mode Phones on Network Infrastructure
- >> Personalising Converged Services to form an Individual and Integrated Experience to Improve Interactivity, Increase Uptake and Reduce Churn
- >> FMC in the Enterprise—Are Business Customers the Most Attractive Initial Market?
- >> Equipping the Mobile Worker of the Future to Provide Cost and Productivity Benefits to the Enterprise

The Summit is organized by Informa Telecoms & Media ([www.informatm.com](http://www.informatm.com)), the leading supplier of information to the telecoms and media industries, and fully supported by the Fixed Mobile Convergence Alliance, whose global membership base of leading carriers, represents a customer base of over 850 million customers, or 1 in 3 of the world's telecoms users.

For speaking and sponsorship details contact: [gavin.whitechurch@informa.com](mailto:gavin.whitechurch@informa.com)



**Registration: \$349**

**PLEASE NOTE:** There is a separate registration fee for Converged Services Summit and it is NOT included in the Conference Pass or Smart Pass registration packages. The Converged Services Summit fee also includes admission to all keynote sessions and access to the exhibit hall. Please see registration form for details.

# Marketing—The Mobile Channel

Monday, March 31, 2008 9:00AM – 5:30PM Room N107

Presented by **CTIA**  
The Wireless Association\*

## 2008 – The Year for Mobile Marketing

**\*Keynote Address—Understanding Online Search - Preparing for the Mobile Internet, Its Impact on Consumer Behavior, and What this Means for Brands, Agencies, and Consumers.**



**Ms. Cary Tilds**

*Senior Vice President, Head of Digital Team Detroit*

Ms. Tilds provides thought leadership as well as technical specialty to lead Team Detroit's media planning, buying, optimization, and analytics functions. She is currently serving as Chairperson for the AAAA's Search Marketing Committee and is also a Council/Advisory Board Member for Google, Yahoo, MSN, and DoubleClick.

**Additional Panels include:**

- >> Rock the Vote: Winning the White House with Wireless
- >> Case Study - Ties that Bind: Linking Traditional Media Channels and Mobile
- >> What Do Your Friends Know? - The Power of Viral Marketing
- >> Mobile Marketing: Brand Recognition or Sales Opportunity?
- >> Increasing Engagement: Mobile Retailing/Coupons

**The Reality of Mobile Marketing:**

- >> The customer experience is now built upon the principle of engagement – the end of one-way mass communication – the emergence of dialog, sustainable conversation reaching consumers on their terms and within their comfort zone.
- >> Businesses are rethinking their marketing and communications strategy and brands that engage in genuine conversation with their consumers via these tools will gain competitive advantage.
- >> The mobile phone is capable of expanding the effectiveness of many other mediums and channels available to consumers including TV, radio, print, music, email, and voice.
- >> They are finding ways to reach over 250 million people in the United States through their wireless handset - always close, always on.

**Be part of the rise of mobile marketing and advertising.  
Plan now to attend Marketing – The Mobile Channel, March 31, 2008 in Las Vegas.  
This is CTIA WIRELESS 2008, the global marketplace for connecting wireless and YOU.**

Sponsors



**For sponsorship opportunities, please contact Jeff Simmons at [jsimmons@ctia.org](mailto:jsimmons@ctia.org).**

**Registration: \$349**

**PLEASE NOTE:** There is a separate registration fee for Marketing—The Mobile Channel and it is NOT included in the Conference Pass or Smart Pass registration packages. The Marketing—The Mobile Channel fee also includes admission to all keynote sessions and access to the exhibit hall. Please see registration form for details

Smartphone Summit 2008 presents

# 'Smartphone Solutions'

Monday, March 31, 2008 9:00AM – 6:00PM Room N115

Presented by 

Platinum Sponsor and Keynote 



**Nigel Clifford**  
CEO



**Jørgen Behrens**  
EVP Marketing

## **KEYNOTE: Convergence and Scalability – The Future of Smartphones**

Symbian, developer and licensor of Symbian OS™, the market-leading operating system for smartphones, will present the morning keynote that will set the tone for this Smartphone Summit conference.

In this, its 10th anniversary year, Symbian recently announced that over 30 million smartphones based on Symbian OS have shipped in Japan, and to date more than 165 million Symbian smartphones have shipped worldwide to over 250 major network operators. With its market leading position in the wireless industry, Symbian has gathered unique knowledge of the elements that make up an outstanding converged computing platform, an advantage that will help shape the future of the smartphone industry.

In their keynote, Symbian's CEO, Nigel Clifford, and EVP Marketing, Jørgen Behrens, will outline where the smartphone market is headed and provide an overview of its future impact on the overall mobile phone industry. They will outline how convergence and scalable technologies are becoming crucial to smartphone development and demonstrate what Symbian is doing in these areas to help handset manufacturers design tomorrow's most desirable mobile phones today.

About the Smartphone Summit: Smartphone Summit 2008 Presents 'Smartphone Solutions' - An exclusive conference event dedicated to bringing you the top Smartphone based Enterprise Solutions from all Smartphone OS platforms including Symbian, Microsoft, RIM, Palm, and Linux.

The focused attendee demographic includes enterprise executives as well as wireless developers and I.T. professionals. The Smartphone Summit is additionally a symposium for wireless industry leaders, insiders, and analysts to network while experiencing the cutting edge future of Smartphone mobile devices and wireless solutions.

### **Registration: \$375**

**PLEASE NOTE:** There is a separate registration fee for Smartphone Summit and it is NOT included in the Conference Pass or Smart Pass registration packages. The Smartphone Summit fee also includes admission to all keynote sessions and access to the exhibit hall. Please see registration form for details.

# PEOPLE & PROFITS In Wireless Retailing Sessions & Expo

Tuesday, April 1, 2008 10:00AM – 5:00PM Room N259



How can you find, hire, retain, pay, train, and manage the top producers you need to run your wireless stores? Ed Legum, one of the wireless industry's most highly regarded consultants and instructional designers, will show you how.

**"If you own 1000 stores or one, Ed Legum's People & Profit Expo is a must see at CTIA WIRELESS 08. If you don't attend these sessions and your competitors do you are toast!"** – Andrew M. Seybold

**"Ed Legum knows wireless retailing better than anybody I've seen ... I recommend it heartily."**  
– Jim Cathcart, author of *Relationship Selling*



What can you learn from this man? Since 1991 Ed Legum has worked extensively within the wireless field, designing and implementing professional development programs for over 50 wireless companies including Alltel, US Cellular, Bell Mobility, T-Mobile, and AT&T, as well as hundreds of independent agents both large and small.

## Morning Sessions

**10:00 to 10:45**

### How to recruit top producers

- >> How to define the ideal candidate and opportunity
- >> How use seven sources to find your best candidates

**11:00 to 11:45**

### How to select the best

- >> How to interview over the phone and in person
- >> How to use 24 questions to determine aptitude
- >> How to use assessments to determine attitude
- >> How to use wireless retail Learning Agreements

**12:00 to 12:45**

### How to pay employees for keeps

- >> How the right compensation plan can drive profits
- >> How to calculate the impact of commission on cash flow

## Afternoon Sessions

**2:00 to 2:45**

### How to Stimulate New Sales & Profits

- >> How to define performance expectations
- >> How to train wireless retail employees
- >> How to assess training effectiveness

**3:00 to 3:45**

### How to Increase Productivity

- >> How to observe and measure performance
- >> How to publish and interpret results

**4:00 to 4:45**

### How to Coach Wireless Retail Salespeople

- >> How to reinforce performance expectations

**All attendees will receive the 159-page book, *New Profits in Wireless Retailing*.**

For more information and to register please go to [www.ctia.org/ctiawireless](http://www.ctia.org/ctiawireless).

Sponsors



**Registration (full day): \$250 Registration (morning or afternoon): \$150**

**PLEASE NOTE:** There is a separate registration fee for PEOPLE & PROFITS In Wireless Retailing and it is NOT included in the Conference Pass or Smart Pass registration packages. The PEOPLE & PROFITS In Wireless Retailing fee also includes admission to all keynote sessions and access to the exhibit hall. Please see registration form for details.

# Fast Track with MOTODEV

Tuesday, April 1, 2008 11:00AM – 5:00PM Room N256

Presented by



## OPEN TO ALL REGISTERED ATTENDEES!

Meet with Motorola's MOTODEV team and let our experienced staff help you get the most out of developing applications for the newest and hottest Motorola products. Discover the latest development tools and documentation resources and get tips directly from our on-site developer support engineers. MOTODEV program experts will be on hand to guide you to world-class business development, product development, marketing, and go-to-market programs that can fast track your development and maximize your market success. Don't miss this opportunity to tell Motorola about your solution and to make face-to-face connections with the Motorola team dedicated to your success, MOTODEV.

MOTODEV, the Motorola developer network, connects developers to a wide variety of Motorola platform opportunities, helping them create and deliver unique, highly-innovative experiences for customers worldwide.

# Mobile VoIP

Tuesday, April 1, 2008 11:00AM – 12:30PM Room N252

## OPEN TO ALL REGISTERED ATTENDEES!

Mobile Broadband capabilities are changing the nature of communications by creating interesting services and applications as well as challenges on how to compete, bill, and secure networks and content. Voice over IP is a key capability in the blueprint for Mobile Broadband success. Deploying and managing large scale wireless VoIP with end-to-end QoS is crucial.

Mobile VoIP Made Simple with CDMA 1xEV-DO Rev A.

This panel of key industry innovators invites you to participate in a discussion that provides a comprehensive analysis of the most important business and technical aspects of deploying Mobile VoIP. The panel consists of distinguished speakers from Sprint, Nortel, Ericsson, Motorola, Qualcomm and Camiant and provides in-depth analysis in these key areas.

- >> Business opportunities, technical challenges and solutions for Carrier Grade Mobile VoIP deployment
- >> Service and network benefits for Operators
- >> Benefit of standardization and multi-vendor solution delivery
- >> The role of Mobile VoIP in Fixed Mobile Convergence solutions

Don't miss this unique opportunity. Learn from the leaders and accelerate Mobile VoIP deployment in 2008.

Sponsors



# M2M Carrier Strategies: The New Rules

Tuesday, April 1, 2008 1:00PM – 4:30PM Room N103



the global connectivity experts

**OPEN TO ALL REGISTERED ATTENDEES!**

## Overview

The collision of broadband wireless networks and the Internet is changing the rules of the game for North American wireless operators. Technology innovation is accelerating. New companies are making bold moves. Regulations are falling. Networks are opening up. Business models are under threat. And wireless operators are redefining strategies. The changes afoot promise to bring untold growth and disruption.

Yet, what impact can the M2M industry expect from these changes? Where will growth take place and why? How can the cellular industry champion innovation and foster collaboration?

This half-day session asks these questions and more in an open dialog among panelists discussing the opportunities and challenges that lie ahead. Hosted by Marcus Torchia of the Yankee Group, attendees are part of a dialog among leading M2M company strategists, technologists and thought leaders.

**Registration: 12:30 – 1:00 PM**

## Conference Sessions:

### **1:00-1:20 PM Industry Research: Cellular M2M Services**

The success of the M2M industry is built on the focus, investments and innovations of the industry players. In this presentation, Marcus Torchia of the Yankee Group presents the latest findings from the field on recent developments and emerging strategies at leading companies.

### **1:30-2:20 PM Open Cellular Networks: Fact and Fiction**

Leading up to the recent 700 MHz auction, the industry witnessed the dawning of the open access wireless network. Its promise: innovation. In this session, experts will discuss what defines 'open' and the relevance of open access to the M2M industry in the context of business models, market segments and corporate policies.

### **2:30- 3:20 PM Evolving M2M Services Industry: Enterprise to consumer**

In this moderated panel session, industry leaders will discuss enterprise and consumer services by comparing and contrasting value propositions, service creation, best practices, and underlying dynamics that give rise to services in both markets.

### **3:30-4:30 PM M2M Darwinism: Global Wireless Operator**

This session explores the need for global wireless connectivity and the time frame to reach an inflection point of accelerated demand. The audience will learn the business models offering this capability today and the advantages and disadvantages to each.

# Credit Suisse Wireless Investor Forum

**Tuesday–Wednesday, April 1–2, 2008 11:00AM – 5:00PM Room N254**

Presented by  CREDIT SUISSE

## **THIS FORUM IS BY INVITATION ONLY!**

On behalf of Credit Suisse's Telecommunications Research Team and CTIA-The Wireless Association, we would like to invite you to the Fifth Annual Wireless Investor Forum.

The Forum will be a two-day event with top executives and thought-leaders from the wireless industry. The Forum will provide both investors and executives a unique and convenient opportunity to address issues and questions coincident with their attendance at CTIA. The Forum is being held on Tuesday, April 1st, and Wednesday, April 2nd, in Room N254 of the Las Vegas Convention Center in Las Vegas, Nevada. The Forum will begin each morning at 11:00 am following the conclusion of the morning keynote addresses for CTIA.

By holding the Forum in the Las Vegas Convention Center, you will be easily able to attend the Forum and access your other CTIA commitments.

Registering for the Credit Suisse Wireless Investor Forum will automatically register you for an exhibits pass to CTIA WIRELESS 2008. All registrants that sign up for the Forum by March 21, 2008, will be able to pick up their passes on-site at the convention. In registering through Credit Suisse, you will not be required to pay the CTIA registration fee. In order to access the web site for complimentary registration, you must either have received an invitation or you must speak to your Credit Suisse salesperson.

Thank you, and we look forward to seeing you in Las Vegas.

**PLEASE NOTE:** To register for the Credit Suisse event, you must either have received an invitation or you must speak to your Credit Suisse salesperson.

## Latin American Conference: Moving Toward 100% Mobile Density by 2011

**Wednesday, April 2, 2008 11:00AM – 4:30PM Room N256**



AHCIET, the Ibero-American Association of Research Centers and Telecommunication Companies, is an association with over 25 years in the market, representing more than 55 member companies in Latin America and Spain.

The goal of this year's seminar is not only to discuss the important topics of interest to the mobile community in Latin America, but to present executive perspectives from true industry insiders. We will give special attention to issues surrounding convergence and the excellent prospects for development and service extension in the region.

A keynote presentation from PYRAMID RESEARCH will address "WiMax Mobile and HSDPA." We will also hear from high-level panelists representing telecom operators, regulatory institutions, content and mobile applications providers and consultants. **See you in Las Vegas!**

**For further information, kindly contact:** *In Spanish:* Ms. Victoria Terleira (victoria.terleira@ahciet.es) *In English:* Ms. Tany García (magarcia@ahciet.es)

**Registration: \$395**

**PLEASE NOTE:** There is a separate registration fee for Latin American Conference and it is NOT included in the Conference Pass or Smart Pass registration packages. The Latin American Conference fee also includes admission to all keynote sessions and access to the exhibit hall. Please see registration form for details.

# FierceWireless Presents: The Path to 4G

Wednesday, April 2, 2008 10:30AM – 5:00 PM Room N252



Hosted by **FierceWireless**  
THE WIRELESS INDUSTRY'S DAILY MONITOR

What is 4G? Though the standards are still being determined, vendors are already marketing next-generation mobile broadband equipment. As is typical in the mobile world, competing technologies are already vying for a piece of the 4G pie. Qualcomm is pushing Ultra Mobile Broadband, or UMB. Those in the GSM community are advocating LTE, or Long Term Evolution. And then of course there's WiMAX, which is being endorsed by several major players in the industry.

This event will examine all angles of the mobile broadband equation and educate both carriers and others in the wireless industry on the current and proposed next-generation mobile broadband options. Our in-depth panel sessions will delve into WiMAX, HSPA, LTE and UMB. Leading experts in the field will help operators dissect all the technology options and determine the pros and cons of deployment.

Join the editors of *FierceWireless* to learn everything you need to know about the constantly evolving 4G marketplace.

## Agenda

- 10:30AM Registration**
- 11:00AM Welcome: Chairman's Opening Remarks**
- 11:05AM – 11:45AM Opening Keynote Presentation**
- 11:45AM – 12:30PM Panel Session: What is 4G?**  
The 4G standard has not been ratified yet many operators are calling their next step in the technology roadmap as their "4G" network. Where does 4G stand in the standards process? What do experts believe will ultimately be the 4G standard?
- 12:30PM – 1:30PM Break for Lunch**
- 1:30PM – 2:15PM Panel Session: Monetizing 4G**  
Vendors are pushing operators to put their stake in the ground and select a 4G technology path. But with 3G networks still far from capacity, how will carriers justify the expense of a 4G network? What applications will make 4G economical and viable for operators?
- 2:15PM – 3:00PM Panel Session: The Open Networks Promise**  
What does open network mean? In the U.S. operators have typically had a closed network, meaning that without operator approval a device or application had little chance of becoming a reality. But that dynamic is changing. Sprint's Xohm WiMAX network promises to be open to all devices that are WiMAX certified. Verizon Wireless says that it will soon open its network to all devices and applications. AT&T also says its network is open. But what does "open" really mean?
- 3:00PM – 3:15PM Networking Break**
- 3:15PM – 4:00PM Panel Session: The 4G Device Promise: Connectivity anywhere.**  
Part of the vision for open mobile broadband networks is that all types of devices (digital cameras, navigation devices, handheld gaming units and more) would have wireless connectivity. Most believe that the first devices will likely be laptops but the possibilities are endless. Hear from some of the top device makers on their vision for the 4G world.
- 4:00PM – 4:45PM Closing Keynote Presentation**
- 4:45PM – 5:00PM Conclusion: Chairman's Remarks, and Show Recap**

### Sponsored by



**Registration: \$349**

**PLEASE NOTE:** There is a separate registration fee for FierceWireless Presents: The Path to 4G and it is NOT included in the Conference Pass or Smart Pass registration packages. The FierceWireless Presents: The Path to 4G fee also includes admission to all keynote sessions and access to the exhibit hall. Please see registration form for details.

# Fixed-Mobile Convergence:

## An International CTO Perspective

Wednesday, April 2, 2008

11:00AM – 12:30PM

Room N103

Presented by



### OPEN TO ALL REGISTERED ATTENDEES!

A panel of Chief Technology Officers from leading European and Asian international service providers will tackle the issues of the convergence of fixed and mobile networks and the implications this convergence has for traditional operators, specialized carriers, equipment vendors, application developers and content providers.

For network operators, fixed, mobile or both fixed and mobile, strategic decisions are required today to determine the best solutions for growing business and retaining customers. The promise of fixed-mobile convergence will provide a high-level of personalization and mobility for the end user, with easy access to services irrespective of location and device - bringing new opportunities to enhance voice services, reduce OPEX, and introduce new multimedia applications.

This has created a more challenging and complex competitive landscape than ever before. Fixed-mobile convergence is about creating new value for operators and their customers, as well as minimizing operational costs. This distinguished panel will share their experiences, vision, and discuss the future challenges in capitalizing on the fixed-mobile convergent world.

# Opportunities and Obstacles

## Implementing Wireless Applications for Medium and Large Organizations

Wednesday, April 2, 2008

1:30PM – 3:00PM

Room N103

Presented by



### OPEN TO ALL REGISTERED ATTENDEES!

How can wireless applications benefit your business, increase your productivity, and provide new opportunities for success. The session will include the means of using wireless, including office, factory and warehouse WiFi, a mobile workforce, and wireless sales support. We will also discuss security considerations, and the process of planning and implementing such a wireless application. The information will include case studies from the panelists. We will have a Q&A Session at the end of the session.

Moderators: **Eric Lundquist** and **Wayne Rash** of *eWeek*

# NAVTEQ Global LBS Challenge® Awards Ceremony – The Americas

Wednesday, April 2, 2008 3:00 PM Room N258



**OPEN TO ALL REGISTERED ATTENDEES!**

## DREAM. DEVELOP. WIN.

Watch the drama and excitement unfold at the industry's premier event—the 2008 NAVTEQ Global LBS Challenge® Awards Ceremony! Get an inside look at the competing applications that will help drive tomorrow's location-based solutions—then find out who will walk away as this year's Grand Prize Winner!

The Global LBS Challenge invites application developers around the world to build innovative location-based services (LBS) that work with mobile phones and/or wireless handheld devices using dynamic positioning technology and NAVTEQ® maps. Now in its fifth year, the Global LBS Challenge is focused on driving the development and visibility of innovative navigation solutions for wireless devices and is a global symbol of LBS innovation and opportunity.

The NAVTEQ Global LBS Challenge has become a motivating force for hundreds of application developers competing for cash and prizes and the invaluable exposure that comes with winning. Eight previous Global LBS Challenge participants have received venture capital funding, and nine past Global LBS Challenge winners have launched commercial applications on major wireless carriers, including Verizon Wireless and Sprint.

Location-enhanced applications were submitted in the categories of Enterprise, Entertainment & Leisure, Navigation, Social Networking and Content.

This year's winning Global LBS Challenge applications will receive cash, map data licenses, sponsor licenses and services from NAVTEQ, along with sponsors Autodesk, deCarta, ESRI and WHERE, for a global prize pool valued at almost \$3 million (US)!

All CTIA attendees are welcome to attend. Be among the first to view the top entries, meet the sponsors and judges, and talk with the innovators who are developing the future of location-aware solutions.

**For more information about the annual NAVTEQ Global LBS Challenge, visit [www.LBSChallenge.com](http://www.LBSChallenge.com) or email [info@LBSChallenge.com](mailto:info@LBSChallenge.com).**

## 2008 NAVTEQ Global LBS Challenge Sponsors

*Global Sponsors*

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Location Services

**NOKIA**

*Platinum Sponsors*



*Gold Sponsors*



*Media Sponsor*

**GPS World**



# Next Gen Backhaul: 3G, 4G and Beyond

Wednesday, April 2, 2008 9:00AM – 5:00PM Room N253

Presented by



## OPEN TO ALL REGISTERED ATTENDEES!

Mobile operators inch closer to exceeding backhaul capacities as mobile traffic continues its ascent, driven by subscriber growth (2.6 billion in 2006 to 4.2 billion in 2010), new services, and mobile broadband. Alternatives to expensive traditional T1 and microwave solutions are maturing, but need to prove they can deliver future backhaul bandwidth needs and scale economically. Operators need to evaluate next generation backhaul solutions today to determine whether they can deliver the bandwidth demands of tomorrow.

This 1-day conference explores the latest technologies, products, business cases, and early mobile operator experiences with next generation solutions, as well as long term operator strategies for mobile backhaul. Topics include:

- >> Transitioning to all-IP mobile backhaul: business case and timeframe, 4G and LTE
- >> Combining 2G/3G and CDMA/UMTS at cell sites: converging backhaul
- >> RAN architectures of tomorrow: complexities and challenges
- >> Ethernet clock synchronization for mobile voice backhaul
- >> Extending in-building coverage with micro and pico cells: access and backhaul challenges
- >> Backhauling mobile WiMAX: new demands, comparison to cellular
- >> Operator experiences and plans

## Sessions

MC: **Sean Buckley**, *Executive Editor, Telecommunications*

<b>8:30–9:00AM</b>	<b>Registration</b>	<b>12:30–1:45PM</b>	<b>Scaling for the Future: Backhauling Mobile WiMAX</b> Moderator: <b>Richard Webb</b> , <i>Directing Analyst, WiMAX, WiFi, and Mobile Devices, Infonetics Research</i>
<b>9:00–9:30AM</b>	<b>Introduction: Re-Architecting Backhaul for Next Gen: 3G, 4G and Beyond</b> Speaker: <b>Michael Howard</b> , <i>Principal Analyst &amp; Co-Founder, Infonetics Research</i>	<b>1:45–2:00PM</b>	<b>Coffee break</b>
<b>9:30–10:45AM</b>	<b>All-IP Mobile Backhaul Business Cases and Timeframes</b> Moderator: <b>Michael Howard</b> , <i>Principal Analyst &amp; Co-Founder, Infonetics Research</i>	<b>2:00–3:15PM</b>	<b>Converging 2G/3G and UMTS/CDMA on Common Backhaul Infrastructure</b> Moderator: <b>Stéphane Téral</b> , <i>Principal Analyst, Service Provider VoIP, IMS, and Mobile Infrastructure, Infonetics Research</i>
<b>10:45–11:00PM</b>	<b>Coffee break</b>	<b>3:15–3:30PM</b>	<b>Break</b>
<b>11:00–12:15PM</b>	<b>Using Ethernet to Backhaul Mobile Voice with Clock Synchronization</b> Moderator: <b>Michael Howard</b> , <i>Principal Analyst &amp; Co-Founder, Infonetics Research</i>	<b>3:30–4:45PM</b>	<b>Street-Level Backhaul: Options for Microcells, Picocells and Beyond</b> Moderator: <b>Richard Webb</b> , <i>Directing Analyst, WiMAX, WiFi, and Mobile Devices, Infonetics Research</i>
<b>12:15–12:30PM</b>	<b>Break</b>		

<b>Hotel Name &amp; Address</b>	<b>Rates</b>	<b>Dis. to Conv. Ctr.</b>	<b>Business Center</b>	<b>High Speed Internet Access</b>	<b>Room Service</b>	<b>Bars/ Restaurants</b>	<b>Fitness Center</b>
<b>Planet Hollywood</b> 3667 Las Vegas Blvd South, Las Vegas, NV 89109	\$175	3 mi.	Y	Y	24 HRS	8/4	\$25/Day
<b>Bally's Las Vegas</b> 3645 Las Vegas Blvd South, Las Vegas, NV 89109	\$162	2.5 mi.	Y	Y	24 HRS	5/7	\$20/Day
<b>Bellagio</b> 3600 Las Vegas Blvd South, Las Vegas, NV 89109	\$265	3 mi.	Y	Y	24 HRS	20/5	\$25/Day
<b>Cesars Palace</b> 3570 Las Vegas Blvd South, Las Vegas, NV 89109	\$215	3 mi.	Y	Y	24 HRS	14/6	\$25/Day
<b>Courtyard by Marriott-Convention Center</b> 3275 Paradise Road, Las Vegas, NV 89109	\$184	Across Street	Y	Y	5:00 pm-10:00pm	1	Y
<b>Fairfield Inn by Marriott</b> 3850 S. Paradise Road, Las Vegas, NV 89169	\$164	1 mi.	Y	Y	N	0	N
<b>Flamingo Las Vegas</b> 3555 Las Vegas Blvd South, Las Vegas, NV 89109	\$145	2.5 mi.	Y	Y	24 HRS	9/3	\$20/Day
<b>Hard Rock Hotel</b> 4455 Paradise Road, Las Vegas, NV 89169	\$189	1.5 mi.	N	Y	24 HRS	5/5	\$20/Day
<b>Harrah's Las Vegas</b> 3475 Las Vegas Blvd South, Las Vegas, NV 89109	\$165	2.25 mi.	Y	Y	24 HRS	10/8	\$20/Day
<b>Hilton Grand Vacations Club at the Las Vegas Hilton</b> 455 Karen Avenue, Las Vegas, NV 89109	\$159	.75 mi.	Y	Y	6:00 am-10:00 pm	1	Y
<b>Hilton Grand Vacations Club at the Las Vegas Strip</b> 2650 Las Vegas Blvd South, Las Vegas, NV 89109	\$149	1.8 mi.	Y	Y	24 HRS	2/1	Y
<b>Las Vegas Hilton</b> 3000 Paradise Road, Las Vegas, NV 89109	\$164	Adjacent	Y	Y	24 HRS	14/3	\$20/Day
<b>Las Vegas Residence Inn Convention Center</b> 3225 Paradise Road, Las Vegas, NV 89109	\$194	Across Street	N	Y	N	1	N
<b>Mirage</b> 3400 S. Las Vegas Blvd, Las Vegas, NV 89109	\$219	2 mi.	Y	Y	24 HRS	9/5	\$20/Day
<b>Monte Carlo</b> 3770 Las Vegas Blvd. South, Las Vegas, NV 89109	\$129	3 mi.	Y	Y	24 HRS	7/3	\$20/Day
<b>New York New York</b> 3790 Las Vegas Blvd South, Las Vegas, NV 89109	\$165	3.25 mi.	Y	Y	24 HRS	15/6	\$20/Day
<b>The Palms Casino</b> 4321 West Flamingo Road, Las Vegas, NV 89103	\$179	3.75 mi.	Y	Y	24 HRS	7/8	\$20/Day
<b>The Palms Place Hotel</b> 4321 West Flamingo Road, Las Vegas, NV 89103	\$229	3.75 mi.	Y	Y	24 HRS	1/1	\$20/Day
<b>Paris Las Vegas</b> 3655 Las Vegas Blvd South, Las Vegas, NV 89109	\$187	2.5 mi.	Y	Y	24 HRS	11/6	\$25/Day
<b>Renaissance Las Vegas Hotel</b> 3400 Paradise Road, Las Vegas, NV 89169	\$219	Adjacent	Y	Y	24 HRS	1/1	Y
<b>Residence Inn Hughes Center</b> 370 Hughes Center Drive, Las Vegas, NV 89169	\$174	1 mi.	Y	Y	11:00 am-10:00 pm	1/1	Y
<b>Rio Las Vegas</b> 3700 West Flamingo Road, Las Vegas, NV 89103	\$179	3 mi.	Y	Y	24 HRS	16/10	\$20/Day
<b>Treasure Island</b> 3300 Las Vegas Blvd, South, Las Vegas, NV 89109	\$180	2 mi.	Y	Y	24 HRS	7/6	\$20/Day
<b>Venetian Casino Resort</b> 3355 Las Vegas Blvd South, Las Vegas, NV 89109	\$249	2 mi.	Y	Y	24 HRS	17/7	\$35/Day
<b>Westin Casaurina Las Vegas Hotel</b> 160 E. Flamingo Road, Las Vegas, NV 89109	\$185	1.75 mi.	Y	Y	24 HRS	1/1	\$20/Day
<b>Wynn</b> 3131 Las Vegas Blvd South, Las Vegas, NV 89109	\$289	2 mi.	Y	Y	24 HRS	15/5	\$25/Day

# CTIA WIRELESS 2008: Quick Reference Tool

CTIA WIRELESS 2008 is pleased to offer a provocative program of visionary and in-depth sessions, conferences and seminars on all aspects of wireless for the strategist, technologist and marketer covering all segments of the wireless world.

## CTIA Educational Sessions



**Mobile Blueprint—The Technical Strategies for Building the Networks, Devices and Applications of the Future**

More information on pages 16–17

**Mobile Lifestyles—The Business Issues Behind Transforming the Wireless Device into a True Productivity Tool**

More information on pages 18–19

**Mobile “Customer-ization”—Marketing Strategies for Tomorrow’s Cutting Edge Mobile Services**

More information on pages 20–21

## Co-Located Conferences

**IEEE Wireless Communications and Networking Conference 2008**

More information on page 24



**Tower Technology Summit**

More information on page 25



## Special Interest Seminars

**ANDREW SEYBOLD WIRELESS UNIVERSITY**

More information on page 27 **ANDREWSEYBOLD WIRELESS UNIVERSITY**

**Marketing—The Mobile Channel**

More information on page 29



**Converged Services Summit**

More information on page 28



**MOBILE ENTERTAINMENT LIVE!**

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**Credit Suisse Wireless Investor Forum**

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**Mobile VoIP**

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**Fast Track with MOTODEV**

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**NAVTEQ Global LBS Challenge®**

**Awards Ceremony—The Americas**

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**FierceWireless Presents:  
The Path to 4G**

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**Opportunities and Obstacles  
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**Latin American Conference:  
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**PEOPLE & PROFITS In Wireless Retailing Sessions & Expo**

More information on page 31



**M2M Carrier Strategies: The New Rules**

More information on page 33



**SmartPhone Summit 2008 Presents 'Smartphone Solutions'**

More information on page 30



### HDX-1500

### Avastor



SATA Quad interface drive provides connectivity for USB 2.0, FireWire 400 (via supplied 800-400 cable), FireWire 800 and eSATA ports in a single unit; maximizes the performance of a single-disk external storage solution with data transfer rates exceeding 90MB/s; supports the latest eSATAII drive technology with drive capacities of 160GB to 1TB; includes the Digidesign Pro Tools-compliant Oxford 924 FireWire chipset, internal power supply and cooling fan.

770-800-9714; [www.avastor.com](http://www.avastor.com)

### Revolver

### Blastwave FX



HD 5.1 surround-sound production elements library includes imaging elements, compositions, drones and trailers created in Blastwave, Radio Meltdown, Drones and Spoilers on six DVDs; features sounds recorded in 24-bit 96K and delivered as 24-bit 48K broadcast .WAV files with an MP3 for quick reference; can be clicked and dragged onto any hard drive and is cataloged with embedded metadata.

860-967-0973  
[www.blastwavefx.com](http://www.blastwavefx.com)

### Flip4Mac Image Server Component

### Telestream

The import/export component for Final Cut Pro provides IMX (MPEG-2) file compatibility and direct file transfer between 360 Systems' MAXX servers and Apple's Final Cut Pro editing systems; imports MPEG-2 IMX 30Mb, 40Mb and 50Mb SD video, uncompressed audio and metadata from the MAXX server directly into the Final Cut Pro project bin for editing; exports the MPEG project from Final Cut Pro for seamless Ethernet file transfer back to MAXX servers.

877-257-6245; [www.telestream.net](http://www.telestream.net)

### Power Distribution Units Electrorack

New line of RoHS-compliant basic and metered PDUs consists of 39 new models available in 120V, 208V and 208V three-phase configurations and in 15A, 20A, 30A, 50A and 60A; metered PDUs provide a quick visual reading of the load at the PDU for easy balancing when connecting equipment, and three-phase metered PDUs include an individual current meter for each phase.

800-433-6745; [www.electrorack.com](http://www.electrorack.com)

### Control cable kit BTX Technologies

Solderless control cable kit for projectors and cameras in female DB9 and male DB9 configurations eliminates the need to solder on a D-sub connector; consists of a 3ft cable with a male eight-pin, mini-din on one end and a blunt cut on the other, DB9 female/male to terminal block, the CD-MX915H MaxBlox hood and a spec sheet showing the conductor color code to each pin.

800-666-0996; [www.btx.com](http://www.btx.com)

### CCU-5

### Camera Corps



Camera control unit allows easy remote operation of many makes and models of broadcast cameras; features five programmable camera-select buttons on the 354mm x 102mm x 60mm controller and a variety of interface modules; panel controls include 12 foxed-operation buttons, two menu selection buttons and four menu display function adjusters, as well as six variable control knobs.

+44 1932 592 299  
[www.cameracorps.co.uk](http://www.cameracorps.co.uk)

### QVX 421

### Analog Way



High-res digital/analog, computer/video scaler and seamless switcher features four universal A/V inputs, including one DVI and three outputs: one analog, one DVI for the main and one analog for the preview; provides a high-quality image with a digital decoder, improved 3:2 and 2:2 pull-down circuitry, auto adaptive pixel by pixel 3-D motion compensation, time base corrector, frame rate converter and follower; includes dual RS-232 com port.

212-269-1902; [www.analogway.com](http://www.analogway.com)

### 7720AD8-DD-HD

### Evertz

Audio module automatically senses an HD or SD input signal and de-embeds eight AES, detects and decodes Dolby E or AC-3, provides handles for video and audio delay and re-embeds the decoded 5.1 audio into the video VANC signal; provides two slots, audio mixing options and serial metadata output; is SNMP-enabled.

201-337-0205; [www.evertz.com](http://www.evertz.com)

### K-CA

### K-Tek



Universal camera clamp adapter kit converts the existing camera microphone clamp to a standard 3/8in-16 thread; allows a user to better position the microphone away from the camera to better isolate it from the camera's sounds and vibrations; fits most DV camera microphone clamps; includes two rubber sleeves to accommodate clamps of different sizes.

760-727-0593  
[www.ktekboompoles.com](http://www.ktekboompoles.com)

### PACPC1

### Chief Manufacturing

Power filter kit integrates with Chief's flat-panel wall mounts, extension columns and in-wall accessories for fast installation; provides surge protection up to 1890J, overvoltage protection shutoff and noise filtering; includes two outlets and a 61cm power cord.

800-582-6480; [www.chiefmfg.com](http://www.chiefmfg.com)

# NEW PRODUCTS

## NEW PRODUCTS & REVIEWS

### SOOM



Multifunctional camera support system for range of Mini DV to HDV camcorders features tripod with 75mm cowl with single-stage legs for a vertical height range of 27in to 56in; transforms into HiPod capable of telescoping vertically to a variable lens height of more than 8ft; includes TriSpread midlevel spreader with its own 75mm bowl that becomes a single-stage baby tripod with a range of 8in to 19in; telescoping center column removes from the tripod to function as a monopod with a range of 34in to 62in.

845-268-0100; [www.sachtler.us](http://www.sachtler.us)

### LiveSet Generator

### NewTek

Free plug-in for any system compatible with the Aura paint and 2-D animation program allows users to generate real-time video scaling for virtual on-set monitors and video walls; enables users to layer live video in projects that support reflections, shadows, warping and more; lets users automatically generate and assign LiveSet preview icons.

800-847-6111; [www.newtek.com](http://www.newtek.com)

### AJ-HPM110

### Panasonic



Solid-state recorder offers recording and playback in a range of HD formats, including 1080p (native), 1080i and 720p as well as SD; records in independent frame DVCPRO HD/50/25 and DV formats, as well as 1920 x 1080 AVC-Intra; offers up/down/cross and aspect conversion; features eight 16-bit digital audio channels, including 5.1 channel surround sound with audio split/dubbing options.

800-528-8601

[www.panasonic.com/broadcast](http://www.panasonic.com/broadcast)

### Sachtler

### Orpheus

Multichannel 192KHz-capable FireWire computer interface offers eight simultaneous balanced analog inputs, four line-level jack ins and four autosensing mic/line Neutrik combination jacks; allows the signal at the mic-level inputs to be boosted by up to 60dB in single increments; includes a built-in mixer, a switchable SPDIF/AES-EBU stereo digital input and an eight-channel ADAT optical input.

973-983-9577; [www.prismsound.com](http://www.prismsound.com)

### Prism Sound

### Viz|Reporter

Software provides for easy upload of video from a mobile phone into an existing newsroom workflow without additional degradation of the content quality for transferring it over mobile networks; runs directly on a variety of mobile multimedia phones such as the Nokia, Sony Ericsson and Motorola models; allows users to employ a dedicated J2ME application or the phone's own browser (WAP or XHTML) to upload content; creates an image index on the phone sorted by time stamp; provides metadata templates.

212-560-0708; [www.vizrt.com](http://www.vizrt.com)

### Vizrt

### ProofPositive

Content delivery confirmation system deploys systems directly in consumer homes that can automatically capture aired programs in their entirety; server installed in the master broadcasting facility uses an algorithm to compare the stream for the consumer's location with the master broadcast stream; identifies anomalies that drop below the predefined threshold and automatically alerts the broadcaster.

877-967-2481; [www.xorbit.com](http://www.xorbit.com)

### XOrbit

### Deva Software 4.0

Includes the capability for simultaneous multidisk recording and background disk copying, which allows sound professionals to copy audio files to a common delivery media such as DVD-RAM while a live recording is in progress; features a full effects package that includes three-band EQ, two notch filters per channel, a soft knee compressor and delay.

973-835-5000; [www.zaxcom.com](http://www.zaxcom.com)

### Zaxcom

### Vision

### Ross Video



Series of production switcher control panels expands with 1M and 2M models, which offer 24 crosspoint buttons, and the 2X, which offers 32 crosspoint buttons; control up to four MEs of video processing and connect to the Ross MD and MD-X Live Production Engine chassis; features include OverDrive compatibility, a built-in hard drive, up to 96 inputs and 48 outputs, and 19 classes of external device control.

613-652-4886

[www.rossvideo.com](http://www.rossvideo.com)

### Baron Tornado Index

Tornado detection technology ranks on a scale 0-10 the likelihood of a tornado in any given storm; uses proprietary algorithms combined with high-res radar data and mesoscale models; displays results with color-coded shear marked; enables meteorologists to monitor the progression of a storm's development and focus on areas that are at the highest risk of a tornado outbreak.

256-881-8811

[www.baronservices.com](http://www.baronservices.com)

### Baron Services





Wants to ensure that his system can manage, protect and deliver her documentary.

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[www.nabshow.com](http://www.nabshow.com)



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# Changing fortunes

## Change is essential to surviving in this industry.

BY ANTHONY R. GARGANO

To say that the evolution of digital technology and computer-based applications in the broadcast industry has resulted in immense change is an understatement to the nth degree. We have all been challenged to keep up with new technology. And, if you do not adjust, you do not survive. Just look at some of the companies in our industry that did not make the necessary technology adjustments and, indeed, did not survive.

### Survival of the fittest

At one time, the big three suppliers in the broadcast industry were Ampex, Harris and RCA. They dominated the industry and were the behemoth exhibitors at NAB. Ampex was a studio equipment supplier. Harris' offerings were primarily transmitters and antennas, but it also had a small line of audio equipment and accessories. RCA, priding itself on being a total equipment provider, had offerings in both the studio and RF market segments. Sony and Matsushita were yet to be found in the broadcast equipment marketplace, as NAB attendees from Asia were rare in those days.

As a side note, Sony — at that time strictly a consumer products company — found that the U-matic VCR it had introduced for the home market was simply too expensive. An internal competing design called Betamax won out for the consumer market. Therefore, Sony developed a strategy to create an industrial and then a broadcast market for U-matic.

Now, back to the big three. Ampex and RCA battled, particularly in the 2in VTR market, and Harris marched happily along in its bread-and-butter RF market. As Ampex progressed tape technology to 1in, RCA lacked such a development and signed a badging deal with Sony for its early BVH 1in

product. Sony was never initially perceived by RCA to be a threat. When RCA branded Sony's BVH product, it quickly developed a reputation for high quality and reliability. RCA had unknowingly given Sony the stick to beat it with. With that stick, and in conjunction with the success of U-matic, Sony began to rise as a formidable competitor. In a move smacking of desperation, RCA, which had spent millions on the failed development of its own 1in machine, signed a resale deal with Ampex to sell its VPR 1in series.

The next development in broadcast VTR technology was the 1/2in size, with Sony's introduction of the first Betacam VTR. RCA, then at tenterhooks with Sony, approached Matsushita to essentially develop a broadcast version of VHS. With the consumer success of RCA and Matsushita's joint VHS activity, a strong relationship had developed, and Matsushita took on the challenge. Thus, the M format and subsequently MII were born to compete with Betacam SP. RCA, once the broadcast market's engineering, manufacturing and marketing leader, was then relegated to the resale of key bread-and-butter products — VTRs.

In October 1985, RCA announced its exit from the broadcast market. A decade later — after an initial foray into Matsushita's M format and then a complete reversal with the signing of an agreement to both manufacture and resell Betacam — Ampex also exited the broadcast industry.

Harris was still selling transmitters and antennas, a business without interest to Sony and Panasonic. Grass Valley and Tektronix were niche product players and thus began almost a decade of market dominance by companies with origins in the Far East. But ultimately, they too failed to heed one of George Santayana's most

famous admonishments: Those who cannot remember the past are condemned to repeat it.

### New competitors

The development and promotion of digital hardware and systems gave rise to a digital revolution in the broadcast industry, which opened the door to computer-based and software-driven processing technologies. Not truly recognizing the opportunity they were creating — and at that time lacking the software development expertise that existed in the United States and the UK — the Japanese hardware companies continued promoting their digital hardware. The rise then of a new generation of competitors, companies with a distinctive competence in software-based solutions, was thus unwittingly enabled.

A host of companies that either didn't exist or did not previously participate in the broadcast market suddenly appeared at NAB. Thus, the digital era for broadcast truly dawned. Harris — through both internal engineering investment and outside acquisitions — and Thomson — following the same path and through acquiring Grass Valley — also emerged as digital-era success stories.

### Lessons to be learned

The history of the broadcast market yields many lessons. Be careful of your bedfellows. Never give your competition the stick with which to beat you. And perhaps the most important: Be prepared to eat your young lest others do it for you. If you don't replace even your most successful product, rest assured someone else will.

**BE**

*Anthony R. Gargano is a consultant and former industry executive.*

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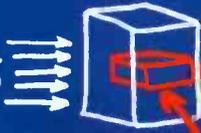
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