

July 14, 2005

VIA ELECTRONIC FILING

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
236 Massachusetts Ave., NE, Suite 110
Washington, DC 20002-4980

Re: DA 05-1661, Comments on National Radio Systems Committee's "In-Band/On-Channel Digital Radio Broadcasting Standard NRSC-5," MM Docket No. 99-325

To Whom It May Concern:

Thank you for the opportunity to comment on the National Radio Systems Committee's (NRSC's) document entitled "In-band/On-channel Digital Radio Broadcasting Standard NRSC-5" ("NRSC-5").¹ My name is Jonathan Hardis, and I submit these comments as an individual.

SUMMARY:

The private-sector standard NRSC-5 contains much useful information for those interested in certain technical aspects of the proprietary IBOC digital broadcasting system developed by iBiquity Digital Corporation ("iBiquity"). However, it is substantially incomplete and, as such, not suitable by itself for either engineering or regulatory purposes.

Most significantly, NRSC-5 lacks detail required at the core of this proceeding, documentation of the system codec. In their voluntary *Petition for Rulemaking* dated October 7, 1998 (RM-9395), iBiquity (nee, USA Digital Radio ("USADR")) inextricably linked a standard containing "[all] necessary technical elements" to their request for market exclusivity. While the Commission accepted their offer and granted iBiquity the market exclusivity that they requested, iBiquity has defaulted on their obligation to disclose the information that they themselves had volunteered to provide.

This puts the Commission in an untenable position. Not only does NRSC-5 fail to provide the "substantial public benefits" laid out by iBiquity in great detail in their *Petition*, much more seriously, iBiquity's evasion dares the Commission to violate a basic tenet of the U.S. Constitution, which requires full technical disclosure in this circumstance.

Accordingly, the Commission has little choice but to reject NRSC-5 in its present form and to order rescission of all temporary and interim authorizations for IBOC radio broadcasting—an order that may be stayed for 60 days to give iBiquity one final opportunity to honor their commitment.

¹ The NRSC-5 document and the documents it incorporates by reference are available electronically at <http://www.nrscstandards.org/Standards/NRSC-5/NRSC-5.asp>.

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I. Background to the Standard

A. USADR *Petition for Rulemaking*

The role of standards in this proceeding derives from the *Petition for Rulemaking* (the “*Petition*”) which was filed on October 7, 1998 by USA Digital Radio Partners, L.P. (“USADR”), and which was placed on public notice on November 6, 1998 (Docket RM-9395).² The Executive Summary of the *Petition* laid out the matter clearly:³

The USADR Petition urges the Commission to immediately initiate a rulemaking proceeding to develop rules for DAB. This rulemaking should culminate with the adoption of rules that allow for the introduction of IBOC DAB in the United States, including the establishment of a DAB transmission standard. More specifically, USADR requests that the Commission take the following regulatory steps to implement IBOC DAB in the United States.

First, the Commission should make a finding that the public interest would be served by the introduction of DAB and that IBOC is the most appropriate means to implement DAB In the United States. ...

Second, the Commission should establish interference protection criteria to insure the compatibility of analog and digital radio stations. ...

Third, the Commission should establish *ab initio* a transition plan that provides appropriate protection for analog radio

Fourth, the Commission should make a finding that it will adopt a DAB transmission standard that will insure that all DAB radios are compatible with all DAB transmitters, enabling the continuation of the current structure of radio In the United States. A government-mandated single standard is required by virtue of the ubiquitous nature of radio, the technical characteristics of IBOC DAB systems, as well as the non-integrated structure of the U.S. radio market. It is only through a standard that the public interest in the development of new digital radio services and maintenance of the universally available existing radio service can be achieved. ...

Fifth, the Commission should establish criteria for evaluating IBOC systems and a timetable for the submission of IBOC system information to the Commission for evaluation. ...

Finally, the Commission will need to select a single IBOC system to be implemented in the United States and adopt a transmission standard that will allow implementation of the selected system. ... USADR believes that its system should be the U.S. DAB transmission standard.

² Docket RM-9395 is available for public inspection via the Commission’s Electronic Comments Filing System at http://gullfoss2.fcc.gov/cgi-bin/websql/prod/ecfs/comsrch_v2.hts?ws_mode=retrieve_list&id_proceeding=RM-9395&start=1&end=70&first_time=N.

³ I thank the Commission for its indulgence in accepting these comments even though they contain long block quotes. My intent is twofold—first, it may be convenient to bring together relevant reference material spanning almost seven years, two dockets, and 10,000 page images. But more importantly, the older material consists of scanned paper images that are not electronically searchable. These comments will be the first on file that will enable full-text searching of relevant history.

USADR was very specific with respect to the standard they were advocating. They wrote:⁴

1. A standard is required to ensure the development of a DAB system in the United States.

The characteristics of radio broadcasting make the selection of a required broadcast standard critical, because it will foster the necessary coordination between broadcasters' decisions to purchase transmitters and listeners' decisions to purchase receivers. Failure to coordinate these purchasing decisions will cripple the development of DAB and broadcasters' ability to provide the ubiquitous service expected by listeners. *The purpose of a transmission standard is to ensure seamless compatibility between transmitters and receivers.* [Emphasis added.] The CRA Report notes that radio is characterized as an "open" system, where the respective decisions to purchase transmission equipment and receivers are made by different entities.⁹⁴ This is in contrast to a subscription service that involves service providers that control both transmission and reception equipment. Where systems are open as is the case with radio, standards are required to ensure system compatibility. Otherwise, DAB receivers will not be able to decipher DAB transmissions.

In order to obtain this compatibility, broadcasters, consumer electronics equipment manufacturers, retailers and consumers must coordinate their DAB technology decisions. As the CRA Report notes, broadcasters must transmit signals that are compatible with receivers manufacturers are willing to produce, retailers are willing to carry and consumers are willing to purchase.⁹⁵ Absent coordination among all of these groups, no one will have an incentive to purchase and install the equipment necessary to establish a DAB system in the United States. Broadcasters will be concerned that an insufficient number of listeners will purchase receivers that are compatible with the broadcasters' transmissions. Likewise, manufacturers will not produce and listeners will not purchase digital receivers unless they can be assured that broadcasters will offer compatible transmissions. Coordination among these groups is necessary if a DAB system is to develop in the United States. A digital radio standard is required to achieve this coordination.

2. A DAB transmission standard should include necessary technical elements to ensure compatibility.

An IBOC DAB transmission standard is required in order to ensure the necessary universal compatibility between DAB transmitters and receivers. The IBOC DAB standard should therefore include all technical elements to ensure system compatibility. First, the standard must include an audio compression or source coding (the "codec") standard.⁹⁶ The audio encoder and decoder are vital elements of an IBOC DAB system. If a broadcaster transmits information that has been encoded, it cannot be received unless the receiver has a decoder based on the same system. Second, the transmission standard should include specifications for forward error correction and interleaving codes. Like the codec, the codes embedded in the transmitter for forward error correction and interleaving must match the codes in the receiver. Finally, a modulation standard is required which will assemble the digital bits on carriers, determine how the carriers relate to each other, and determine how the carriers are placed in the channel. The

⁴ USA Digital Radio, *Petition for Rulemaking*, October 7, 1998 (RM-9395), at IX.D (pp. 94–96); available electronically at http://gullfoss2.fcc.gov/cgi-bin/websql/prod/ecfs/comsrch_v2.hts?ws_mode=retrieve_list&id_proceeding=RM-9395&id_submission_type=PU, more specifically, http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=2170270005.

benefits of IBOC DAB can only be realized if the transmitter modulated signal can be deciphered by the receiver.

⁹⁶ A detailed description of the USADR codec appears in Appendix J.

Further, USADR argued at length about the importance of such a standard:⁵

3. An IBOC DAB transmission standard will confer substantial public benefits

The principal public benefit stemming from a single standard is the preservation of the ubiquitous properties of radio; a single standard will ensure compatibility between transmission and reception enabling a listener to travel anywhere in the country and be assured of being able to receive the transmissions of all licensed radio stations. An additional benefit is that a single standard will give direction as well as certainty to all interested parties: equipment manufacturers, broadcasters, content providers, and the public. Specifically, a single standard will reduce the risk that equipment manufacturers, broadcasters and consumers may hesitate to invest in a new system for fear of being stranded with an unusable technology. A single standard also increases demand for equipment, which leads to economies of scale for equipment manufacturers and lower costs and increased choice for consumers.

By ensuring compatibility through a transmission standard, radio broadcasting will remain ubiquitous, which is necessary to preserve the radio system as it currently exists in the United States. Radio is an essential communications medium relied upon by virtually all Americans in their daily lives. The CRA Report discusses the two features of radio that consumers expect from radio broadcasting: (1) portability: consumers expect that their radio receiver will receive signals from any station as long as they are within that station's geographical contour; and (2) universal reception: consumers expect to receive all broadcasts within the area in which they live.⁹⁷ Without a single standard, consumers cannot be confident that their receiver will be able to receive all signals across the country, or all broadcasts within a defined area. The existence of multiple, incompatible standards would obstruct this primary customer expectation. A listener traveling from Baltimore to Washington, for example, could suddenly be denied digital radio reception. Likewise, within that listener's primary listening area, an individual listener could potentially acquire only a small percentage of local broadcasts.

The Commission noted in the DTV proceeding that a single standard was important because the vast majority of Americans rely upon TV as their primary source of news and information.⁹⁸ Radio broadcasting serves a similar primary function, and is indeed more ubiquitous than television because of its mobility.⁹⁹ A standard is required to preserve this essential characteristic and the role of radio.

The Commission has consistently supported standards that promote the rapid development of broadcast technology equipment. The Commission noted in the DTV proceeding, for example, that a single standard provides certainty to consumers, licensees and equipment manufacturers, thereby protecting equipment manufacturers and consumers alike against losses resulting from obsolete equipment.¹⁰⁰ Equipment manufacturers themselves have demanded such certainty in digital broadcast devices, as they have indicated that a single standard is a necessary precondition to their investment in the development of digital radio transmitters or receivers.¹⁰¹ Similarly, consumers are less likely to purchase digital radio receivers if there is no DAB standard.

⁵ *ibid*, pp. 96–98.

The CRA Report notes that the initial absence of a transmission standard and the resulting lack of universal AM stereo reception likely were instrumental in retarding the growth of AM stereo.¹⁰² The Commission should not permit the same result for DAB.

The Commission noted in the DTV proceeding that a single standard would increase competition in price, service, and product features.¹⁰³ This rationale for a standard is also present in this instance. The lower costs associated with a single standard will give numerous entities the ability and the incentive to introduce new products and to respond to consumer demand. In return, consumers will have greater access to technology with new features and functions.

Given the critical role of radio, the risk posed by a multitude of incompatible digital transmission standards would be too great, and therefore, the government must take an active role in the development of a DAB transmission standard.

B. Comments on the *Petition*

I focus on comments pertaining to USADR's central point regarding standards, that the purpose of a transmission standard is to insure universal compatibility:⁶

In its *Petition*, USADR requested that the Commission make a finding that it will adopt a DAB transmission standard that will insure that all DAB radios are compatible with all DAB transmitters, thereby enabling the continuation of the current structure of radio in the United States. USADR argued that a government-mandated single standard is required by virtue of the ubiquitous nature of radio, the technical characteristics of IBOC DAB systems, as well as the non-integrated structure of the U.S. radio market.

These aspects of the *Petition* were uncontroversial and widely supported. In particular, Lucent Digital Radio, which later merged with USADR to create iBiquity, was supportive:⁷

V. MANDATED STANDARDS ARE LIKELY TO BE NECESSARY AFTER ADEQUATE FIELD TESTING

Lucent agrees with USADR that, because radio is an "open" system, mandated standards are likely to prove necessary after adequate field testing of the various competing technologies. While Lucent believes that *de facto* or voluntary standards generally best serve the public and affected industries, the circumstances of broadcast radio lead to the conclusion that, in all probability, *de jure* standards will be required in this instance. There are substantial issues with regard to legacy transmitters and receivers, and a need for coordinated action by broadcasters and consumers in deploying new transmitters and receivers. Also, consumers have a well-developed set of expectations about the quality of broadcast transmission. There is a very substantial commercial interest in meeting these expectations. Our society relies heavily on radio to make markets and bring together buyers and sellers. The \$13.6 billion of radio advertising revenue reported for 1997 is only a small fraction of the value of the overall benefit of radio to the nation's economy.

⁶ Reply Comments of USA Digital Radio, Inc., January 25, 1999, at III (p. 7); available electronically at http://gulfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6006141995.

⁷ Comments of Lucent Technologies Inc., December 23, 1998, at V (pp. 22-23); available electronically at http://gulfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6005940314.

The Commission recognized the unique position of free, over-the-air broadcasting with respect to the need for standards setting when it adopted the digital television standard. The Commission found that more than one sustainable transmission standard:

might result is [sic] compatibility problems and increase the risk that consumer DTV equipment purchased in one city would not work in another city; that a receiver would not display all the broadcast channels in a city; or that a digital television set purchased one year might not work several years later. *Such results would hurt consumers and make it more difficult to preserve a universally available broadcast television service.* (Emphasis added.)^{16/}

Broadcast radio is similar to broadcast television in the relevant aspects, and very different from subscription-based wireless services. While input during the regulatory process is essential from all affected parties and consensus should be encouraged, the unique universality of advertiser-supported broadcasting and the reliance that most Americans place on receiving news, information, and entertainment through broadcasting indicate that adopting a digital standard for radio broadcasting, as the Commission did for television broadcasting, would benefit the public.

Additional comments echoed a common theme that a key value of a standard would be its assurance that all digital radios would be able to utilize signals from all digital broadcasting stations.

ABC commented:⁸

The public is accustomed to being able to receive all radio broadcasts on standard receiving equipment. If different broadcasters utilize different transmission systems, not only will the public be unable to recognize and appreciate the full benefits of this promising new technology, the universal nature of radio itself will be eroded.

Greater Media commented:⁹

In the case of IBOC DAB, all parties--broadcasters, manufacturers and consumers--need certainty that every radio will work seamlessly on every station.

Cumulus Media commented:¹⁰

Cumulus strongly believes that in order to accomplish the successful implementation of IBOC DAB, it is critical for the Commission to adopt a standard which will assure compatibility among all transmitting and receiving equipment. Most radio listeners expect to be able to listen to a variety of radio stations. In the face of various competing and incompatible systems, it will be impossible for listeners to access all of them, and such a situation would discourage listeners from

⁸ Comments of the Walt Disney Company ("ABC"), December 23, 1998, at p. 4; available electronically at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6005940164.

⁹ Comments of Greater Media, Inc., December 23, 1998, at 15 (p. 9); available electronically at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6005940171.

¹⁰ Comments of Cumulus Media Inc., December 23, 1998, at IV (p. 7); available electronically at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6005940176.

purchasing digital receivers. Similarly, broadcasters would be reluctant to purchase digital transmitting equipment and to make the significant investments necessary to upgrade their stations to provide DAB service, if they were not assured that all listeners within the range of their broadcasts would be able to purchase a single receiver that is universally compatible.

CBS commented:¹¹

... because radio is a portable medium and the public spends increasing amounts of time in automobiles and away from their homes, Americans utilize their radios as a primary source of news and information while in the car, at work, and at other remote locations. Unless the Commission mandates a standard IBOC DAB format, a listener traveling in his or her automobile could be unexpectedly denied digital radio reception because the radio receiver is not compatible with the DAB format of a local broadcaster.

NAB commented:¹²

Furthermore, Besen & Gale point out that many characteristics of the radio industry argue strongly for government involvement in the standard setting process.⁹ One general area is the consumer expectation that no matter where one goes in the country, a radio receiver will work, both at fixed locations and when the listener is on the move. That universality assurance is a needed guarantee for consumers to purchase new receivers.

And the Consumer Electronics Manufacturers Association (now known as CEA) commented:¹³

... requiring use of a single standard guarantees compatibility. This assures consumers that the DAR [digital audio radio] equipment used to listen to one station can be used to listen to every other station.

Lucent summed up the matter well in their reply comments, abandoning the slight hesitation that they had previously shown in comments:¹⁴

... Indeed, every commenter addressing the FCC's role emphasized the need for the government to mandate appropriate standards in order to promote the widespread availability of free, over-the-air digital broadcasting to all Americans. The government has an indispensable role in assuring that the standards selected are optimal from a broad social perspective because of the unique role that broadcasting plays in providing not only entertainment, news, and public affairs

¹¹ Comments of CBS Corporation, December 23, 1998, at IV (p. 11); available electronically at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6005940179.

¹² Comments of the National Association of Broadcasters, December 23, 1998, at B.1 (p. 9); available electronically from the Electronic Comments Filing System at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6005940304.

¹³ Comments of the Consumer Electronics Manufacturers Association, December 23, 1998, at VI (p. 12); available electronically from the Electronic Comments Filing System at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6005940348.

¹⁴ Reply Comments of Lucent Technologies Inc., January 25, 1999, Executive Summary (p. i) and at II (p. 3); available electronically from the Electronic Comments Filing System at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6006142116.

programming, but also in providing the means of quickly informing the public of perilous weather conditions and other events that affect the public health and welfare. Radio especially is effective in this regard because it is present in almost all automobiles as well as homes, and easily reaches citizens who otherwise would be difficult to inform of impending perils.

...

While the record contains a variety of views on some distinct issues, there appears to be unanimous agreement on the need for a single standard. In fact, every Commenter addressing this issue supported the adoption of a single mandatory standard.⁵ Significantly, this support was uniform across affected industries, including broadcasters, manufacturers of broadcast transmission and reception equipment, and the three digital proponents. There appeared to be widespread recognition of the unique role that broadcasting plays in providing not only entertainment, news, and public affairs programming, but also in providing the means of quickly informing the public of perilous weather conditions and other events that affect the public health and welfare.

⁵ See, e.g., Comments of ABC, Inc. at 4; Comments of CBS at 9-10; Comments of Clear Channel Communications, Inc. at 5; Comments of CEMA at 11-12; Comments of Cumulus Media, Inc. at 7; Comments of Digital Radio Express, Inc. at 3; Comments of Ford Motor Company at 2; Comments of Gannett Co., Inc. at 4-5; Comments of Greater Media, Inc. at 9; Comments of Heftel Broadcasting at 3; Comments of NAB at 3; Comments of Radio One, Inc. at 4; Comments of Radio Operators Caucus at 5; Comments of Susquehanna [sic] radio Corp. at 4.

Finally, in another respect, Lucent was amazingly prescient:¹⁵

A standard arrived at by a “majority” of industry participants, even if the overwhelming majority, may not achieve the best societal result.

C. Notice of Proposed Rulemaking

On November 1, 1999, the Commission issued a *Notice of Proposed Rule Making* (the “Notice,” or *NPRM*), which began MM Docket No. 99-325.¹⁶ With respect to standards, the Commission asked:¹⁷

50. In its *Petition*, USADR asked the Commission to adopt a DAB transmission standard, and submitted a report arguing both that there is a need for such a standard and that the radio broadcast industry is unlikely to be able to develop one on its own.¹⁰⁰ Most commenters agreed that a single standard is necessary and that the Commission has a critical role in

¹⁵ *ibid*, in Executive Summary (p. iii). This is in reference to material in the reply comments having to do with selection among competing technologies. Although that is not my focus in these comments, some of the forces described are apposite.

¹⁶ Notice of Proposed Rule Making in the Matter of *Digital Audio Broadcasting Systems And Their Impact On the Terrestrial Radio Broadcast Service* (FCC 99-327); available electronically at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6010350379.

¹⁷ *ibid*, at E.1 (pp. 19–21).

establishing one.¹⁰¹ Among other things, commenters argued that a single standard is necessary to provide the certainty that consumers, licensees and equipment manufacturers would need to justify their investment in DAB technology.¹⁰² They also predicted that industry attempts to reach a consensus on a voluntary standard would be impeded by the number of parties involved and their differing interests and agendas.¹⁰³ Several pointed to the AM stereo experience as an example where similar circumstances prevented the implementation of a single, voluntary standard.¹⁰⁴ In addition, a number of commenters cited the Commission's adoption of a DTV transmission standard as precedent for a similar action in this proceeding.

51. In the DTV proceeding, we observed that the traditional rationale for mandating a standard arises when two conditions are met: first, there would be a substantial public benefit from a standard; second, private industry either will not, or cannot, achieve a standard because the private costs of participating in the standard-setting process outweigh the private benefits, or a number of different standards have been developed and private industry cannot reach consensus on a single standard.¹⁰⁵ The Commission, in fact, did identify the same kind of considerations in support of adopting a mandatory DTV standard that commenters now argue support the adoption of a mandatory DAB transmission standard. We noted that mandated standards might provide needed certainty to consumers, licensees, and equipment manufacturers, particularly where the launch of a new technology is involved.¹⁰⁶ Moreover, we reasoned that standard-setting would help obviate the "chicken and egg" dilemma that can impede the introduction and acceptance of new technology and impose additional costs on consumers. We also recognized, however, that mandatory standards can have drawbacks, including potential deterrence of technical innovation—particularly where a technology is new and further development can reasonably be anticipated to occur—and curtailment of some forms of competition.¹⁰⁷

52. We tentatively conclude, as we previously found in the DTV proceeding, that the public interest compels a Commission role in the development of DAB transmission standards, "with the advice and involvement of all sectors of the industry."¹⁰⁸ We lack sufficient information at this time, however, to conclude that a Commission-mandated DAB transmission standard is necessary. With regard to the first of the above-stated conditions for establishing a standard, the Commission seeks further comment on the desirability of a single DAB transmission standard. For example, it may be the case that there is a high degree of compatibility among the several DAB systems. Thus, there may be little public benefit derived from a mandated standard. In addition, developments in digital signal processors ("DSPs") may have obviated the need for a DAB standard or may justify a voluntary or technically narrower approach. We seek comment on these matters. Is an "open architecture" approach feasible? What technical and economic impacts would such an approach have on the development and manufacture of DAB receivers? Have advances in DSP chip technology made a standard unnecessary?

53. With regard to the second of the above-stated conditions, it is too early to predict whether private industry can or will be able to achieve a voluntary DAB transmission standard. Nevertheless, this *Notice* identifies numerous public policy issues concerning both terrestrial DAB and its potential impact on our vital radio broadcast service. Again, we seek further comment on this issue. How likely is the broadcast industry to establish a *de facto* standard in the absence of Commission action? Can the Commission take actions short of mandating a standard in order to help the industry establish a standard, for example by conferring benefits to licensees utilizing the standard? Furthermore, should we decide that a Commission-mandated standard is necessary, what should be the constituent elements of such a standard?

D. Comments on the *Notice*

While the Commission asked many thoughtful questions—such as “what should be the constituent elements of such a standard?”—comments tended to range from vague to repetitious, with principals reiterating what they previously said in reply to the *Petition*. However, two comments deserve special mention.

First, USADR commented:¹⁸

In the Notice the Commission questions whether the nature of IBOC technology would lead to compatibility or would favor a designated standard. USADR believes the IBOC systems are highly incompatible, and interoperability will not occur without a standard. The basic core components of the systems, such as the audio codec and the coding schemes, are incompatible. If a listener had an IBOC receiver with a codec other than AAC, that receiver would not be able to decode the signal from a station using the USADR system. USADR is not aware of any mechanism to make the systems compatible, other than multimode receivers which USADR believes would be an unacceptable means to achieve compatibility. In addition to increasing costs substantially, a multimode receiver would increase the size and weight of the unit, power consumption and the acquisition time of the digital signal.²⁷ Thus, broadcasters and consumers would be forced to choose between systems. Finally, the Commission should be aware the IBOC system may not use standard off-the-shelf DSPs but rather may need to use more customized DSPs or even Application Specific Integrated Circuits (“ASICs”) that ensure lowest costs for consumers. This would greatly complicate any effort to make systems compatible.

I generally concur with these comments, but I believe that the details are slightly disorganized. For receivers that are designed using general-purpose DSPs, such as IBOC receivers that are currently on the market, adding additional software options (such as the ability to utilize multiple audio codecs or modulation codes) need not increase size, weight, or power consumption—provided that sufficient unused memory is available. (Adding software options would, however, require increased development and licensing costs.)

Nevertheless, it remains a challenge to reduce the size, weight, and power consumption of IBOC receivers to the point where they may become a practical replacement for the classic “transistor” (portable, battery operated) radio. Digital receivers require substantially more power than the analog ones they replace. IBOC receivers are similar in complexity to cellular telephones, where “talk time” (in this case, “playing time”) is measured in hours. I believe that the impact of customized DSPs and ASICs will not be so much on “cost,” but rather as the fundamental enabler of low power, long playing receivers.

In this regard, I call the Commission’s attention to examples of emerging technology in customized hardware, as are described at <http://www.eetimes.com/story/OEG20011218S0048> (QuickSilver adaptive computing DSPs) and http://www.nero.com/en/PR_2004_10_11.html (Nero Digital ASICs). In both cases, these describe hardware assists that substantially reduce the power required to decode AAC data.

¹⁸ Comments of USA Digital Radio, Inc., January 24, 2000, at VII (pp. 24–25); available electronically at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6010952691.

The public relies on battery-operated radios for essential information in emergencies, such as severe weather that knocks out local electric utilities for extended periods. Low-power portable receivers with long operating times are essential for this situation. Therefore, the public interest is well served by standardization on all details of the IBOC signal.

Another key comment was by Gannett:¹⁹

II. THE COMMISSION SHOULD PLAY A KEY ROLE IN ADOPTING A DAB TRANSMISSION STANDARD.

The Commission seeks comment on whether the private industry can or will be able to achieve a voluntary DAB transmission standard in the absence of Commission action.¹⁰ Gannett submits that, because of the technical characteristics of DAB systems and the nature of the radio market, the FCC must provide a mechanism for government-mandated standards. Without an active, coordinated effort by the Commission, the benefits of DAB cannot be brought expediently to the American listening public. Gannett therefore agrees with the Commission's tentative conclusion "that the public interest compels a Commission role in the development of DAB transmission standards."¹¹ As the USADR petition illustrates, some type of DAB standard is necessary to guarantee the compatibility between DAB transmitters and receivers.¹²

First, as discussed in the previous section, Commission action is necessary because there is significant public benefit from the establishment of a DAB transmission standard. Gannett asserts that without a standard, the public interest benefits of the system will fail to materialize. It is vital to understand that any DAB system will have a multitude of components, all of which must be compatible for the system to function properly. For example, the specifications for forward error correction and interleaving codes must be able to work together in order for the system to achieve the enhanced robustness a digital signal can generate over a comparable analog signal. If a transmitter and receiver are operating on incompatible systems, the benefits of DAB are completely lost because the digital signal could not even be processed in the first instance.

Second, Commission intervention would simply comport with its past practices of adopting a single, industry-wide standard when approving new communications technologies.¹³ Moreover, such intervention is necessary, because, as recent experience has shown, private industry alone will simply be unable to achieve a standard. The DAB industry is comprised of a vast number of players—broadcasters, manufacturers, retailers, and consumers—all with divergent agendas, incentives, and cost/benefit parameters. Despite the critical need for standards in order to ensure the success of DAB, the industry, acting on its own, is incapable of establishing such standards given the nature of the radio broadcast industry. Indeed, even within a given subgroup in the industry, sufficient divergent forces exist to prevent convergence around a set of standards by just that isolated subset of players. The Commission only needs to look at the history of the industry's less than successful implementation of AM Stereo as evidence of the divergent forces operating within the radio broadcast industry.

Based upon these circumstances, it is clear that the Commission must play a central role in evaluating, establishing and coordinating the implementation of DAB for terrestrial radio. Gannett urges the Commission to ensure compatibility among DAB components, so that the public might enjoy the benefits of DAB technology.

¹⁹ Comments of Gannett Co., Inc., January 24, 2000, at II (pp. 4–6); available electronically at http://gulfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6010952688.

¹³ For example, the FCC adopted single standards when it approved the technologies for digital television, stereo television, and FM radio broadcasting.

This comment points out that the premise in paragraph 51 of the *Notice* was unduly restrictive. The Commission has historically standardized technical parameters of broadcast services in its rules. Rather than this being driven by any inability of the private sector to develop consensus, historically it was often quite the opposite. I note, for example, that the Commission's rules on TV transmission standards (§73.682) derive in part from standards previously agreed to by the NTSC in 1941 (for monochrome television), the NTSC in 1953 (for color television), and the ATSC in 1995 (for digital television).

Such is the case here, too. Even after iBiquity emerged as the sole surviving developer of an IBOC DAB system, they still sought establishment of a technical standard:²⁰

iBiquity's coalition of supporters [provides] evidence of a strong industry consensus on the need for the prompt introduction of IBOC. Moreover, unlike the situation the Commission confronted in 1999, there are no longer conflicting proposals for an IBOC system. Thus, all the issues raised in the NPRM have now been resolved. Today, the Commission's task is clear. It should provide a strong endorsement of IBOC and the iBiquity system in order to promote a prompt commercial implementation of the technology. At the same time, it should move forward to adopt final IBOC transition rules and an IBOC standard.

E. First Report and Order

After NRSC testing of prototype IBOC hardware, and public comment on their testing reports, the Commission issued its *First Report and Order* (the "*Report and Order*") on October 11, 2002. The Commission decided:²¹

IV. ADOPTION OF IBOC AM AND FM STANDARDS

44. The record of NRSC test results, combined with the industry consensus reflected in the comments, demonstrates that IBOC provides a technical path forward to digital operations for radio broadcasters. By our action today, we select the hybrid AM and FM IBOC systems tested by the NRSC as *de facto* standards for interim digital operation. As of the effective date of this *Report and Order*, the Commission will no longer entertain in this proceeding any proposal for digital radio broadcasting other than IBOC. We agree with the many commenters who advocate the adoption of a single DAB transmission standard. Although this is not a situation in which competing technologies pose a risk of market splintering, we believe the adoption of a standard will facilitate an efficient and orderly transition to digital radio. This approach is particularly

²⁰ Comments of iBiquity Digital Corporation, February 19, 2002, at I.B (p. 4); available electronically at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513077758.

²¹ Digital Audio Broadcasting Systems and Their Impact on the Terrestrial Radio Broadcast Service, *First Report and Order*, FCC 02-286, 17 FCC Rcd 19990, released October 11, 2002; available electronically at <http://www.fcc.gov/fcc-bin/audio/FCC-02-286A1.pdf>.

warranted at a time when broadcasters face competitive challenges from various digital media and when many station owners link their continued viability to the prompt introduction of a digital transmission technology. The Commission's support of a standard-setting process is designed to provide regulatory clarity and to compress the timeframe for finalizing the rules and policies that will affect the ultimate success of this service. We solicit the assistance of a broad cross-section of interested parties in developing a formal AM and FM IBOC standard through a public and open standard-setting process. In this regard, we are encouraged by the recent action of the NRSC to form an IBOC standards development working group, formally initiating a process designed to establish AM and FM IBOC standards.

The Commission's interest in utilizing such a standard is entirely in keeping with OMB Circular A-119, "Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities."²²

One additional portion of the *Report and Order* deserves mention.

18. *FM tests with alternate audio compression technology.* The NRSC FM IBOC tests were done on a version of the iBiquity FM system that used MPEG-2 AAC perceptual audio coding. Because iBiquity intends to use its proprietary PACTM coding in the commercial version of its system, the NRSC recommended—and iBiquity agreed—to repeat some tests with the PACTM coding to verify the NRSC's conclusions. ATTC repeated a subset of the NRSC's audio quality tests with both "generation 1" hardware using MPEG coding and "generation 2" hardware using PACTM coding. Objective and subjective tests of audio quality in the presence of noise and multipath interference show little difference between the two versions.²⁹ No commenters dispute the results of the "generation 2" tests. In these circumstances, we conclude that further audio quality testing using PACTM coding is unnecessary.

It should not escape notice that both PAC and MPEG codecs (e.g., AAC, and Layer 3 (MP3) for that matter) are "proprietary." Indeed, almost all codecs in common commercial use are proprietary—that is, covered by patents that must be licensed.²³ This includes the AC-3 audio codec adopted by the ATSC for digital television.²⁴

²² Available electronically at <http://www.whitehouse.gov/omb/circulars/a119/a119.html> (HTML) and http://www.dsp.dla.mil/documents/omb_a119.pdf (PDF). See also 63 FR 8546; available electronically at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=1998_register&docid=fr19fe98-146.pdf.

²³ Anticipating a reply comment, I point out that Vorbis (<http://en.wikipedia.org/wiki/Vorbis>), a non-proprietary codec, does not yet compress audio sufficiently tightly to make it suitable for the bandwidth constraints of IBOC broadcasting. AM, for example, has a data rate of only ~36 kbit/s.

²⁴ Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service, *Fourth Report and Order*, FCC 96-493, 11 FCC Rcd 17771, released December 27, 1996, at 23–24 (pp. 13–14); available electronically at http://www.fcc.gov/Bureaus/Mass_Media/Orders/1996/fcc96493.pdf. AC-3 is the generic name of the codec more commonly known by its common tradename, Dolby Digital.

F. Further Notice of Proposed Rulemaking

For completeness, I should note that, most recently, the Commission issued a *Further NPRM and NOI* in which you encouraged “significant input” from the NRSC:²⁵

3. Standards

56. In the *DAB R&O*, we stated that the adoption of a standard will facilitate the rollout of digital audio broadcasting.¹⁰⁸ We further stated that the Commission’s support of a standard-setting process was designed to provide regulatory clarity and to compress the timeframe for finalizing the rules and policies that will affect the ultimate success of DAB. We solicited the assistance of a broad cross-section of interested parties in developing a formal AM and FM IBOC standard through a public and open standard-setting process. We stated that we were encouraged by the action of the NRSC to form an IBOC standards development working group, formally initiating a process designed to establish AM and FM IBOC standards. We encourage this group to provide us with significant input at this stage of the proceeding and seek comment from other parties on any such submissions.

G. Codec Technology

Some of my comments concern codecs. A codec (a contraction of coder/decoder) is a data specification and related method of representing information in the digital domain. The “coding” portion of the system creates derived data with desired properties—usually a reduction in the number of bits needed to represent unencoded information, but other possible design goals include embedding integrity checks, adding redundancy (for error correction), structuring interrelated data (e.g., metadata, or multiple audio channels for stereo or surround sound), watermarking (for non-repudiation, a.k.a. digital signatures), and encryption. The Recording Industry Association of America (RIAA) has commented about codecs that might contain digital rights management (DRM, not to be confused with Digital Radio Mondiale) features.²⁶ Codecs may have a multiplicity of design goals. The term “codec” may also refer to a matching half of a coder or decoder combination, or to a specific implementation of a particular coding and/or decoding scheme.

Over the history of this proceeding, three codecs have featured prominently. Prior to 2000, USADR was associated with “AAC.” AAC is a generic name for a family of codecs that are documented in MPEG standards (originally ISO/IEC 13818-7 (MPEG-2), subsequently also ISO/IEC 14496-3 (MPEG-4)). In their *Petition for Rulemaking*, USADR described their codec as

²⁵ Digital Audio Broadcasting Systems and Their Impact on the Terrestrial Radio Broadcast Service, *Further NPRM and NOI*, MM Docket 99-325, released April 20, 2004, at 56 (p. 23); available electronically at <http://www.fcc.gov/fcc-bin/audio/FCC-04-99A4.pdf>.

²⁶ Comments of the Recording Industry Association of America, Inc., June 16, 2004, at V.D (pp. 64–67); available electronically from the Electronic Comments Filing System at http://gulfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516213850.

the MPEG standard (“MPEG AAC”).²⁷ However, they subsequently said, “Fraunhofer Institut für Integrierte Schaltungen (IIS) is customizing its internationally standardized Advanced Audio Coding (‘AAC’) codec for USADR’s IBOC system.”²⁸ This is referred to as the “Gen-1” or “Generation 1” IBOC codec.

“PAC” is the tradename of a series of successive versions of a codec originally identified with Lucent Digital Radio (and other Lucent enterprises). To the best of my knowledge, there is neither a generic implementation of PAC nor publicly available documentation that rises to the level of a technical standard.²⁹ Following the August 2000 merger of USADR and Lucent Digital Radio, forming iBiquity, this became their developmental codec. It is referred to as the “Gen-2” IBOC codec.

However, in May 2003, according to published reports,³⁰ the Steering Committee of the NRSC suspended standardization activity after the Committee concluded that the AM version of PAC had issues that made it not “suitable for broadcast.” This led to the August 2003 introduction by iBiquity of a third codec, with a tradename of “HDC” (a.k.a. “HD Codec”).³¹ It is HDC, the so-called “Gen-3” IBOC codec, that was included in the commercial launch of the system in January 2004.³²

To the best of my knowledge, there is no authoritative, publicly available information on the technical underpinnings of HDC, other than that it was developed in partnership with Coding Technologies, utilizes a Coding Technologies innovation called Spectral Band Reproduction (SBR),³³ and “makes use of AT&T Bell Labs core patents,”³⁴ the latter being a description that would also apply equally well to both AAC and PAC.

The histories of Coding Technologies and Fraunhofer IIS are intertwined, with a “spin-off” and a transfer of staff from Fraunhofer IIS to Coding Technologies in 2000.³⁵ Coding Technologies licenses brand-name implementations of MPEG codecs that were pioneered by Fraunhofer.³⁶

²⁷ USA Digital Radio, *Petition for Rulemaking*, October 7, 1998 (RM-9395), at Appendix J (p. 1); available electronically at http://gullfoss2.fcc.gov/cgi-bin/websql/prod/ecfs/comsrch_v2.hts?ws_mode=retrieve_list&id_proceeding=RM-9395&id_submission_type=PU, more specifically, http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=2170270019.

²⁸ Comments of USA Digital Radio, Inc., January 24, 2000, at I (p. 4); available electronically at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6010952691.

²⁹ Numerous articles describe PAC in nonspecific terms. See, e.g., “The Perceptual Audio Coder (PAC)” at <http://www.atc-labs.com/crcchapter.pdf>.

³⁰ See, e.g., <http://www.rwonline.com/reference-room/iboc/iboc-06.04.shtml>, <http://www.rwonline.com/dailynews/one.php?id=3148>, and http://beradio.com/departments/radio_iboc_roadblock/index.html.

³¹ See, e.g., <http://www.ibiquity.com/press/pr/081203.htm>.

³² See, e.g., <http://www.ibiquity.com/press/pr/010704HDRadioLaunch.htm>.

³³ See, e.g., http://www.codingtechnologies.com/products/assets/SBR_White_Paper_v1.pdf.

³⁴ *HD Radio: Will New Codec Do the Trick?* in Radio World Online, September 10, 2003; available electronically at http://www.rwonline.com/reference-room/iboc/01_rw_hd_codec_2-09.10.03.shtml.

³⁵ <http://www.codingtechnologies.com/company/history.htm>

³⁶ <http://www.codingtechnologies.com/products/index.htm>

“mp3PRO” is an MPEG Layer-3 (MP3) codec implementation that includes SBR. “aacPlus” is an AAC implementation that includes SBR (aacPlus version 1) and/or “Parametric Stereo” (PS) (aacPlus version 2). The Coding Technologies website summarizes their business as follows:³⁷

Coding Technologies offers licenses to SBR and Parametric Stereo patents. In addition, Coding Technologies develops and licenses optimized implementations for MPEG-4 aacPlus, mp3PRO, MPEG Layer-2 and MPEG Layer-2+SBR.³⁸

Coding Technologies has been vigilant in working with MPEG to create documentary standards of its innovations, SBR and PS. Within the MPEG-4 standard, aacPlus version 1 is called generically “High-Efficiency AAC” (HE AAC). Patents for HE AAC are pooled and are available for licensing under reasonable, non-discriminatory, and openly published terms from Via Licensing Corp.³⁹ Implementations are competitively available from multiple sources. According to Coding Technologies, “The combination of AAC, SBR and PS is called aacPlus v2 and is fully specified in MPEG-4.”⁴⁰

II. Comments on NRSC-5

A. NRSC-5 lacks essential elements

NRSC-5, including its nine “Reference Documents” that are incorporated into the whole, clearly demonstrates years of detailed work, clever and innovative engineering, and an architecture designed for future flexibility. iBiquity and its development partners should be very proud of their achievement.

However, one need look no further than Figure 1 (p. 7) to realize that something has gone terribly askew. This proceeding began with a clear articulation of what a standard must contain: “[all] necessary technical elements,” of which the three most prominent ones were (1) “an audio compression or source coding (the ‘codec’) standard,” (2) “specifications for forward error correction and interleaving codes” (Channel Coding), and (3) “a modulation standard [to] assemble the digital bits on carriers, determine how the carriers relate to each other, and determine how the carriers are placed in the channel” (Modulation).⁴¹ Even though this short list of vital issues was not meant to be all-inclusive, of the top-three elements, NRSC-5 has addressed only two of them.

I assure the Commission that the previous analysis is still valid today. It remains true that, “If a broadcaster transmits information that has been encoded, it cannot be received unless the receiver has a decoder based on the same system.”⁴² Further, “If a listener had an IBOC receiver

³⁷ <http://www.codingtechnologies.com/licensing/index.htm>

³⁸ MPEG Layer-2 is an older, high-bit-rate codec used by Eureka 147 DAB in Europe. Addition of SBR is intended to make it more efficient. See, e.g., <http://www.codingtechnologies.com/products/layer2.htm>.

³⁹ See http://www.vialicensing.com/products/HE_AAC/.

⁴⁰ <http://www.codingtechnologies.com/products/index.htm>

⁴¹ USA Digital Radio, *Petition for Rulemaking*, October 7, 1998 (RM-9395), *op. cit.*, at IX.D.2 (p. 95).

⁴² *ibid.*

with a codec other than [a specific one], that receiver would not be able to decode the signal from a station using [it].”⁴³

Unlike in childhood games, success in only 2 out of 3 *is* bad.

B. NRSC-5 is unsuitable for engineering

Documentary standards, such as NRSC-5, are meant to be practical rather than abstract. Such documents derive their value from their ability to be actually practiced by those skilled in the art to which they pertain. Indeed, in circumstances comparable the present one, the Advanced Television Systems Committee (ATSC) established a bright-line test for documenting the advanced television system standard: “Complete functional system details (permitting those skilled in the art to construct a working system) were to be made publicly available.”⁴⁴ The Commission has already considered and incorporated this principle into its rules for broadcast television.⁴⁵ No lesser standard should apply to broadcast radio.

It should be clear to all that NRSC-5 does not contain enough functional system detail to allow construction of a working DAB transmitter or DAB receiver, compatible with those previously described in this proceeding. On the transmission side, as shown in Figure 1, as Main Program Service (MPS) audio data flow into the system from the left, they immediately encounters a functional block that is not specified. Engineers are provided with no information that would allow them to construct this portion of the system. On the reception side, NRSC-5 provides enough detail to interpret the modulation of the radio wave as a stream of digital bits. But NRSC-5 stops at the point of ascribing meaning to those bits. NRSC-5 is silent on the subject of relating the digital bits to the sounds that they are intended to represent.

C. NRSC-5 is unsuitable for its most basic purpose

Chapter 6 of NRSC-5 begins:

This section specifies some of the characteristics of audio codecs designed for use with the NRSC-5 IBOC digital radio system. As noted above, NRSC-5 does not include specifications for audio source coding and compression. Suitable audio source coding and compression systems will use perceptual audio coding or other appropriate technologies to reduce the bit rate required for description of audio signals.

The record in this proceeding well establishes that the encoder in the transmitter must match the decoder in the receiver in order for the broadcast to be received. Therefore, this notion that

⁴³ Comments of USA Digital Radio, Inc., January 24, 2000, *op. cit.*, at VII (pp. 24–25).

⁴⁴ ATSC Standard: Digital Television Standard (A/53), Revision C, Including Amendment No. 1 and Corrigendum No. 1, March 23, 2005, at 4.4 (p. 23); available electronically at http://www.atsc.org/standards/a_53c_amend-1_corr-1.pdf.

⁴⁵ 47 CFR 73.682(d)

NRSC-5 accommodates a variety of codecs designed for its use is in fundamental contradiction to the very purpose of the standard itself:⁴⁶

The purpose of a transmission standard is to ensure seamless compatibility between transmitters and receivers.

NRSC-5 implies endorsement of the idea that different groups of radio stations could broadcast in different codes, each of which would be receivable only by its own matching group of receivers. However, consistently over the course of almost seven years, no idea has been more thoroughly rejected by commenters in this proceeding. A mere sampling of these comments is found in Section I.B, above. After years of the steady drumbeat ‘*single standard, single standard, single standard,*’ to have before the Commission now a document that says, ‘*never mind*’ is absolutely mind-boggling.

The standard of NRSC-5 is no standard. Rather than providing for a single, national broadcast radio system, NRSC-5 allows a free-for-all.

D. NRSC-5 does not meet its public interest objectives

iBiquity (then USADR) laid out in meticulous detail the “substantial public benefits” that a DAB transmission standard must provide.⁴⁷ NRSC-5 fails to provide them.

First and foremost:

The principal public benefit stemming from a single standard is the preservation of the ubiquitous properties of radio; a single standard will ensure compatibility between transmission and reception enabling a listener to travel anywhere in the country and be assured of being able to receive the transmissions of all licensed radio stations.

...

By ensuring compatibility through a transmission standard, radio broadcasting will remain ubiquitous, which is necessary to preserve the radio system as it currently exists in the United States. Radio is an essential communications medium relied upon by virtually all Americans in their daily lives. The CRA Report discusses the two features of radio that consumers expect from radio broadcasting: (1) portability: consumers expect that their radio receiver will receive signals from any station as long as they are within that station’s geographical contour; and (2) universal reception: consumers expect to receive all broadcasts within the area in which they live.⁹⁷ Without a single standard, consumers cannot be confident that their receiver will be able to receive all signals across the country, or all broadcasts within a defined area. The existence of multiple, incompatible standards would obstruct this primary customer expectation. A listener traveling from Baltimore to Washington, for example, could suddenly be denied digital

⁴⁶ USA Digital Radio, *Petition for Rulemaking*, October 7, 1998 (RM-9395), *op. cit.*, at IX.D.1 (p. 94).

⁴⁷ *ibid.*, at IX.D.3 (pp. 96–98).

radio reception. Likewise, within that listener's primary listening area, an individual listener could potentially acquire only a small percentage of local broadcasts.

The Commission noted in the DTV proceeding that a single standard was important because the vast majority of Americans rely upon TV as their primary source of news and information.⁹⁸ Radio broadcasting serves a similar primary function, and is indeed more ubiquitous than television because of its mobility.⁹⁹ A standard is required to preserve this essential characteristic and the role of radio.

As proven in the preceding section, NRSC-5 fails in these regards.

An additional benefit is that a single standard will give direction as well as certainty to all interested parties: equipment manufacturers, broadcasters, content providers, and the public. Specifically, a single standard will reduce the risk that equipment manufacturers, broadcasters and consumers may hesitate to invest in a new system for fear of being stranded with an unusable technology.

...

The Commission has consistently supported standards that promote the rapid development of broadcast technology equipment. The Commission noted in the DTV proceeding, for example, that a single standard provides certainty to consumers, licensees and equipment manufacturers, thereby protecting equipment manufacturers and consumers alike against losses resulting from obsolete equipment.¹⁰⁰ Equipment manufacturers themselves have demanded such certainty in digital broadcast devices, as they have indicated that a single standard is a necessary precondition to their investment in the development of digital radio transmitters or receivers.¹⁰¹ Similarly, consumers are less likely to purchase digital radio receivers if there is no DAB standard.

The CRA Report notes that the initial absence of a transmission standard and the resulting lack of universal AM stereo reception likely were instrumental in retarding the growth of AM stereo.¹⁰² The Commission should not permit the same result for DAB.

This is indeed a key aspect of standardization. However, I defer discussion of this important issue until Section III.C, below.

A single standard also increases demand for equipment, which leads to economies of scale for equipment manufacturers and lower costs and increased choice for consumers.

Perhaps demand is more a function of price and utility. However, the point is well taken that the ability to amortize development costs over a larger quantity of products lowers costs. For a given demand function (curve), this provides the headroom that enables equipment manufacturers to allocate more resources to developing a variety of consumer features, rather than developing a variety of imperceptible platform variations.

Standards provide even larger leverage when it comes to international trade. The AM and FM broadcast bands have been used in similar fashion all around the world. This near uniformity has allowed multinational sales of broadcasting and receiving equipment that require a minimum of localization, thus broadening markets and lowering costs.

International harmonization is not an explicit goal of this proceeding, but minimizing costs to consumers is.⁴⁸ For the benefits to consumers, and for maintaining the universal character of broadcast radio as we know it today, I would hope that other nations might consider using IBOC to enhance their traditional broadcast bands—irrespective of any additional DAB technologies that they might permit. While I encourage the Commission to continue to evaluate DAB options in light of what is best for the U.S., rather than what might be best for others, it nonetheless makes no sense to adopt a “standard” that fails to rise to the true meaning of the term as understood and used around the world.⁴⁹ Documentary standards are increasingly important for acceptance of technology in major markets of the world, particularly in Europe. A miscalculation that NRSC-5 is ‘good enough’ would only preclude the wide adoption of IBOC technology, leaving the U.S. stranded with a one-of-a-kind broadcast radio system for which we alone would foot the entire bill.

The Commission noted in the DTV proceeding that a single standard would increase competition in price, service, and product features.¹⁰³ This rationale for a standard is also present in this instance. The lower costs associated with a single standard will give numerous entities the ability and the incentive to introduce new products and to respond to consumer demand. In return, consumers will have greater access to technology with new features and functions.

This cuts to the heart of the matter. I wholeheartedly concur that standards, when correctly drafted, increase competition and thus initiate the many benefits that a free market can provide. But NRSC-5 is structured to do just the opposite. By concealing rather than teaching the essential knowledge required to build compatible devices, NRSC-5 does not meet its public interest objective of giving “numerous entities” the ability to compete.

Given the critical role of radio, the risk posed by a multitude of incompatible digital transmission standards would be too great, and therefore, the government must take an active role in the development of a DAB transmission standard.

True.

⁴⁸ Notice of Proposed Rule Making in the Matter of *Digital Audio Broadcasting Systems And Their Impact On the Terrestrial Radio Broadcast Service* (FCC 99-327), *op. cit.*, at 34 (p. 14). “With regard to affordability, the *Petition* points out that the relatively low cost of receivers contributes to the radio broadcast service’s unmatched penetration.⁸⁰ We wish to consider the costs to consumers of digital receivers as well, including the trade-offs between receiver performance and cost.”

⁴⁹ This is consistent with past Commission practice and policy. For example, the Commission cited the international compatibility of AM stereo systems as a factor in its decision to adopt C-Quam as the U.S. standard. See, “In the Matter of Amendment of the Commission’s Rules to Establish a Single AM Radio Stereophonic Transmitting Equipment Standard,” *Report and Order*, FCC 93-485, 8 FCC Rcd 8216, adopted October 25, 1993, released November 23, 1993, at 5 and 7 (NAB and EIA/CEG (now CEA) concurrence); available electronically at <http://www.fcc.gov/fcc-bin/assemble?docno=931123>. It is also consistent with OMB guidance as found in Circular A-119, which encourages agencies to expand export opportunities for U.S. industry. “This policy does not establish a preference between domestic and international voluntary consensus standards. However, in the interests of promoting trade and implementing the provisions of international treaty agreements, your agency should consider international standards in procurement and regulatory applications.” OMB Circ. A-119, *op. cit.*, at 6.h.

III. NRSC-5 diverts the proceeding towards faulty regulatory policy

A. NRSC-5 demonstrates a change of tactics, at the sacrifice of principle

It should strike one as remarkable that NRSC-5 has received the support that it has despite its obvious and major faults. Does NRSC-5 really reflect a change of view of the past commenters in this proceeding? I doubt it—the actual situation is much better understood by interpreting NRSC-5 as a change of tactics, at the sacrifice of principle.

The first evidence of this appeared in Radio World Online:⁵⁰

The standards-setting body, the National Radio Systems Committee, and Ibiquity [sic] Digital have been going back and forth over how much information Ibiquity needs to divulge so the NRSC can set its IBOC, or HD Radio, standard. Ibiquity has said that its new HDC codec is proprietary and unique. NAB SVP Science and Technology Lynn Claudy told the board Ibiquity is unable to disclose the technical details of the codec, in turn, delaying the standards-setting process.

The board decided to recommend that the NRSC should pursue “modulation and transmission” standards for AM and FM HD Radio, standards that include provisions for advanced data applications. All of these are elements Ibiquity can disclose, the technology developer told Radio World.

The codec would be left out of the standard, so “audio compression methods thus would be subject to selection by market forces,” according to board minutes released by NAB.

A casual reading of the last paragraph might lead one to presume that NAB was speaking of “market forces” of the type relied upon to determine the best AM stereo system in the 1980s. However, a careful reader of the docket in this proceeding would find that presumption highly doubtful.⁵¹

Instead, I believe that NAB was referring to another type of market force. The relevant phenomenon is often referred to as “network effects” (not to be confused with the term “network” as used in broadcasting, computer interconnection, or electronics in general).⁵²

⁵⁰ *NAB Radio Board Supports Leaving Codec Out of IBOC Standard*, Radio World Online, January 21, 2004; available electronically at <http://www.rwonline.com/dailynews/one.php?id=4467>.

⁵¹ “The Commission has seen the folly of demurring from adoption of a single standard in broadcasting in the case of AM stereo. NAB doubts whether the Commission would wish to travel down that road again.” Comments of the National Association of Broadcasters, February 19, 2002 [marked as 2001], at V (p. 10); available electronically from the Electronic Comments Filing System at http://gulfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513077606. Commenters to the *NPRM* that cited the AM stereo proceeding as failed policy include Gulf Coast Broadcasting Company, Inc., Perception Media Group, Inc., Willis Broadcasting Corporation, Wright Broadcasting Systems, Inc., Visteon Automotive Systems, Gannett Co., Inc., Lucent Digital Radio, Inc., and Greater Media, Inc. Additional firms commented similarly on the *Petition*.

⁵² See, e.g., http://en.wikipedia.org/wiki/Network_effect.

Suppose for the sake of illustration that a community has two operational telephone systems, each of which allows its subscribers to call any other subscriber on the same (but not the other) system. Since the utility of each system arises from the other subscribers that can be reached by using it, to which system would a new customer subscribe? In some communities, there might be groupings that would influence the decision. However, in most cases—all other things being equal—the advantage clearly goes to the system that already has the most preexisting subscribers. Thus, equilibrium of two such competing but disjoint entities is inherently unstable—the more subscribers one system attracts, the more likely it is to attract additional subscribers in the future.

These sorts of market dynamics are well recognized. No discussion about competition seems to go on for very long before someone brings up the history of home videocassette players or personal computer operating systems. Even closer to the present matter, this is exactly the market force that led to the selection of the C-Quam AM Stereo system as the U.S. standard in 1993. In its decision, the Commission cited the large installed base of C-Quam equipment as adding to the value of that technology, regardless of any claimed technical advantages the competing Kahn system might have had.⁵³

While the NAB statement acknowledged the *opportunity* for a competitive market in codec options to develop, they were nonetheless safe in the knowledge that this was extremely unlikely to occur once the HDC codec became established among early entrants—in many cases the corporate owners of iBiquity. Receivers would be sold incorporating HDC because that would be the predominant codec used by broadcasters. Conversely, future broadcasters would have to use HDC in order to reach the largest installed base of receivers. Therefore, the goal of establishing uniform practice in broadcasting could be achieved even in the absence of a documentary standard.

This is a sacrifice of greater principal for the sake of expediency, and it has negative consequences that the Commission must reject. Gone is the notion that standards enable competition. Gone is the notion that standards lower costs. Gone is the notion that standards increase choices for consumers. But most importantly, as I shall explain below, gone are basic protections that the U.S. Constitution provides for the American people.

The notion that NRSC-5 might be acceptable despite its incompleteness overlooks the fact that the situation today was not arrived at through the competitive forces of a free market. iBiquity petitioned for and received a Government grant of exclusivity, and thus the power to dictate the codec, on the promise that a complete documentary standard would be forthcoming. It is ironic, if not worse, that any justification for the omissions in NRSC-5 derives from the previous agreement that there would not be any such omissions.

⁵³ “In the Matter of Amendment of the Commission’s Rules to Establish a Single AM Radio Stereophonic Transmitting Equipment Standard,” *Report and Order, op. cit.*, at 13 (etc.).

B. The disclosure standard for the Commission's adoption of a "single standard" transmission system is the same as that required for patents

NRSC-5 is inadequate for technology disclosure for the purposes of the current proceeding. This section gives the fundamental reason why: the technology disclosure in NRSC-5 does not rise to the level of that required for issuing patents, and the Commission must also apply the standard for patents to its process.

Article I, Section 8, Clause 8 of the U.S. Constitution provides:⁵⁴

[The Congress shall have Power...] To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries;

This is often referred to as the "Patent Clause," though as you can see, patents are not explicitly mentioned (nor are copyrights—which are of no concern in these comments). Congress has delegated most of the administrative responsibility in this area to the U.S. Patent and Trademark Office (the "Patent Office"). Nonetheless, the Patent Clause has more general applicability in circumscribing the power of all Federal agencies (including the Commission) when it touches upon their areas of mission and responsibility.

This clause is indeed relevant here, both in a direct and in a paradoxical way. Directly, it describes the essence of this proceeding. To promote the progress of the science and useful arts of broadcast radio, the Commission is granting (indeed, has already granted) the right to a particular inventor have their invention be the exclusive means of digital audio broadcasting in the United States. This is being done for good purposes, to ensure interoperability and for the other reasons previously discussed, and nothing in these comments should be interpreted as opposing this action. Nonetheless, the Commission has chosen to go the route of a prescriptive standard for a particular scheme of digital audio broadcasting, rather than a performance standard for digital audio broadcasting in general. This implicates the Patent Clause.

The type of exclusivity granted by the Commission and the type of exclusivity granted by the Patent Office are somewhat different. In the modern system of U.S. patents, inventors are given the right to exclude others from making or using their invention, though this does not prevent others from achieving the same or an equivalent outcomes through other means. The Commission's grant, on the other hand, uses the power of Government to ensure that an outcome—in this case, digital audio broadcasting—can only be achieved through single means. This is actually closer to what the Framers knew as the practice of "letters patent"—in Imperial England, the Crown would grant monopolies.⁵⁵

The record in this proceeding contains concern about the juxtaposition of these two types exclusivity—simultaneously constraining both the desired outcome and the method that may be used to achieve it. However, that is *not* my concern here. A Government requirement that a

⁵⁴ http://www.archives.gov/national_archives_experience/charters/constitution_transcript.html

⁵⁵ See, e.g., <http://www.catalogue.nationalarchives.gov.uk/RdLeaflet.asp?sLeafletID=76>.

previously patented invention must be used to achieve a certain end is a matter for antitrust theory and competition policy, and the Commission has already addressed this issue. Here, instead, I comment upon the applicability of the Patent Clause to the Commission's work, not with respect to technology that is patented, but—paradoxically—to that which is not.

The Congress and Courts have found, over many years, that the Patent Clause is rooted in two essential purposes that must guide and constrain the power of Federal Government. First, the overriding purpose of the Patent Clause, “to promote the progress of science and useful arts,” means not only immediate improvement of contemporary technology (e.g., broadcast radio) but also the enabling of future innovation that would necessarily build upon the invention of today.

It is axiomatic that the *quid pro quo* for granting to an inventor a 17-year [now 20-year] right to exclude others from the use of his invention is the disclosure of such invention in such full and clear terms that others skilled in the art may learn from the patent how to practice the invention after expiration of the patent and perhaps to build upon this technological foundation to create improvements which further advance the state of the art.⁵⁶

Second, the phrase “for limited times” means exactly that. Exclusivity for an invention must ultimately yield to free and unfettered public rights to it. Of special interest to some commenters may be a reminder of the Supreme Court finding in the “Betamax Case:”⁵⁷

The monopoly privileges that Congress may authorize are neither unlimited nor primarily designed to provide a special private benefit. Rather, the limited grant is a means by which an important public purpose may be achieved. It is intended to motivate the creative activity of authors and inventors by the provision of a special reward, and to allow the public access to the products of their genius after the limited period of exclusive control has expired.

The key to achieving both of these aims is that all Government grants of exclusivity must come at a price—an inventor must disgorge himself of *all* trade secrets that are essential to the manufacture and use of the invention. In the first instance, the purpose is to teach the invention to practitioners in the art so that they would have the knowledge and ability to continue the process of innovation. In the latter, the purpose is to guarantee to the public that upon the expiration of the period of exclusivity there would be no trade secrets that would block them from having full and free access to the invention. The Congress has provided the statutory standard of disclosure:⁵⁸

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out

⁵⁶ Foster Wheeler Corp. v. Babcock & Wilcox Co., 512 F. Supp. 792, 798; 210 U.S.P.Q. 232 (S.D.N.Y. 1981).

⁵⁷ Sony Corp. of America v. Universal City Studios, Inc. (1984) 464 US 417, 78 L. Ed 2d 574, 104 S Ct 774, 220 U.S.P.Q. 665.

⁵⁸ 35 USC 112, available electronically at

http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=browse_usc&docid=Cite:+35USC112.

his invention.

The paradoxical problem that arises is that the invention covered by the Commission's grant of exclusivity—the particular IBOC digital audio broadcasting system in use in the United States—is *not* one that has already been disgorged of trade secrets through the patent process. The present invention is an amalgam of patented and unpatented technology, including patented technology used in specific modes that may differ from those contemplated in their patent specifications. Further, merely calling attention to patented inventions used as components of a system sheds no light on the manner in which they are integrated together.

A lack of disclosure about a specific, integrated system, to the same standard required to patent its components, would create a loophole that would thwart both Constitutional and Congressional intent.

With respect to the continuity of innovation, when essential trade secrets are withheld other innovative entrepreneurs lack the technical knowledge and detail required to add their contributions to the art, influence design improvements, and be properly rewarded for their efforts. The imposition of a “single standard” requires innovators to replicate the standard before they might begin to incrementally improve narrow parts of it. Trade secrets not only impose unwarranted technical roadblocks, they can give an inventor coercive leverage over independent entrepreneurs to the point where the incentive for competitive innovation is removed.

With respect to public access, when essential trade secrets are withheld the public is blocked from free access to an invention even after all covering patents expire—presuming the technology was patented, or patentable, in the first place. Since trade secrets last in perpetuity, this allows an inventor to demand royalties and license fees for a Government-mandated invention well beyond the limited time allowed by law, if allowed by law at all. This is directly contrary to Constitutional intent.

Therefore, to preclude these contrary outcomes—a “back door” patent system subject to none of the constraints of the real one—the Commission has the Constitutional responsibility to require the same standard of disclosure for its grants of exclusivity as the Patent Office has for theirs. To the extent that a technology has already been patented, the disclosure has already been made. To the extent that it has not, the Commission must independently require it. I know of no precedent in administrative law where Government, through regulation, actually or constructively requires use of a company's trade secrets—nor do I believe that OMB would knowingly allow it.⁵⁹

Sometimes complex issues can be reduced to simple statements of principle. Such is the case here: an inventor earns his right of exclusivity by instructing the art how to practice what he seeks to protect.⁶⁰

⁵⁹ See, e.g., E.O. 12866 (as amended by E.O. 13258); available electronically at <http://www.ombwatch.org/article/articleprint/2285/-1/224>.

⁶⁰ *Foster Wheeler Corp. v. Babcock & Wilcox Co.*, 512 F. Supp. 792, 801; 210 U.S.P.Q. 232, 241 (S.D.N.Y. 1981). I have substituted the word “exclusivity” for the word “exclusion” in the original, as the former more aptly describes a regulatory scheme while the latter pertains solely to patent rights.

C. The Commission's observance of this Constitutional principle is being tested

The record of the Commission thus far in this proceeding has been commendable, though NRSC-5 presents a serious challenge to the Commission's resolve.

In 1998, iBiquity (then USADR) voluntarily petitioned the Commission to “select a single IBOC system to be implemented in the United States,” more specifically, to make their “system ... the U.S. DAB transmission standard.”⁶¹ In doing so, they asked for exclusivity—a shield against competition backed by the power of Government—with respect to both other DAB technologies (e.g., Digital Radio Mondiale and Eureka 147) and other IBOC design (e.g., different codecs, forward error correction and interleaving codes, and modulation methods).

According to the Patent Clause, the Government's power to grant this request was constrained. So not insignificantly, the petition offered in return the usual arrangement. They posited a documentary standard covering “[all] necessary technical elements.” This standard, described as inclusive of all necessary information to ensure seamless compatibility, was nothing less than the revelation of all essential trade secrets required to make and use their system. That is, the documentary standard was to be the mechanism for teaching practitioners skilled in the art all they needed to know. And discounting an interpretation that they expected the Commission to divine the standard on its own, it was an offer of this information in exchange for adoption of the rules requested. Also not insignificantly, a public benefit claimed to arise from this proposal echoed the fundamental one underlying the Patent Clause: giving the “ability and incentive” to “numerous entities” to develop “new features and functions.” These terms satisfied necessary prerequisites for the Commission to grant the exclusivity requested.

Following its usual due process, the Commission granted iBiquity's *Petition*.⁶² In October 2002, the Commission released the *First Report and Order* which said, “As of the effective date of this *Report and Order*, the Commission will no longer entertain in this proceeding any proposal for digital radio broadcasting other than IBOC.” Further, “By our action today, we select the hybrid AM and FM IBOC systems tested by the NRSC [those of iBiquity] as *de facto* standards for interim digital operation.” It is most significant that the Commission *selected*, rather than merely *allowed*, use of the iBiquity system. While the *Report and Order* permitted *interim digital operation*, final authority has not yet been issued, pending receipt of the information that iBiquity promised.

The nexus between the October 1998 *Petition* and the October 2002 *Report and Order* should be undisputed. iBiquity themselves connect the dots:⁶³

⁶¹ Section I.A, above.

⁶² Sections I.B through I.E, above.

⁶³ iBiquity Digital Corporation, *Opposition and Comments*, February 19, 2003; available electronically at http://gulfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513482914. See also, “This proceeding commenced in 1998 when USADR filed a Petition for Rulemaking on IBOC DAB.” Comments of iBiquity Digital Corporation, February 19, 2002, at I.B (p. 3); available electronically at http://gulfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513077758.

On October 11, 2002, the Commission issued its Report and Order endorsing In-Band On-Channel Digital Audio Broadcasting (“IBOC DAB”) for the United States and authorizing AM and FM stations to commence digital broadcasts. This proceeding began in 1998 with the submission of a Petition for Rulemaking to the FCC by iBiquity’s predecessor company USA Digital Radio.

It is important to note that the obligation to produce the documentary standard lies with iBiquity, not the NRSC. Not only did iBiquity assume that responsibility in their *Petition*, there is nothing in OMB Circular A-119 that requires a consensus standard to satisfy Government requirements. OMB poses the question, “Does this policy establish a preference between consensus and non-consensus standards that are developed in the private sector?” And the answer is ‘no.’ “This policy does not establish a preference among standards developed in the private sector.”⁶⁴

The plain fact is that, after almost three years, iBiquity has yet to honor their commitment. And NRSC-5 relays the bad news to the Commission that iBiquity—with the support of their owners and friends—has no intention of doing so now.

The plain fact is that the HDC codec remains a trade secret. It effectively encrypts intelligible audio into a secret and complex digital code that is then broadcast on the public airwaves, and it is unrealistic to expect that this code could be broken by other practitioners in the field. This means that consumers have no choice but to buy (license) the decoding software from iBiquity in order to gain any utility from the broadcast signal. Similarly, broadcasters would have no choice but to license the encoding software from iBiquity in order to continue to reach the installed base of receivers.

iBiquity is fundamentally a *software* company.⁶⁵ The plain fact is that trade secrets last in perpetuity, and that by retaining the trade secrets of what HDC actually does, iBiquity would achieve perpetual exclusivity in the market for its software.⁶⁶

The plain fact is that iBiquity has benefited enormously from the Commission’s grant of exclusivity. In the *Petition*, in the section laying out the “substantial public benefits” of a single standard, iBiquity fully documented how a standard provides “certainty” to prospective producers and buyers. “Equipment manufacturers themselves have demanded such certainty in digital broadcast devices, as they have indicated that a single standard is a necessary precondition to their investment in the development of digital radio transmitters or receivers.”

⁶⁴ OMB Circular A-119, *op. cit.*, at 6.g.

⁶⁵ “[At] NAB2001, iBiquity President and CEO Robert Struble told attendees that his company intended to charge broadcasters licensing fees to use its in-band, on-channel digital audio broadcasting technology. ... He likened iBiquity to Microsoft and said, ‘We’re a software company. If you buy a transmitter, you’ll need new software from us.’” *IBOC Fees Stir Reaction*, Radio World Online, April 10, 2002; available electronically at <http://www.rwonline.com/reference-room/iboc/rw-iboc-fees.shtml>.

⁶⁶ I use the term “software” to be inclusive of “firmware,” which is software embedded into products in a semi-permanent or permanent manner. Software is also protected by copyright, which covers the tangible expression of practical information rather than the practical information itself. These comments do not pertain to the copyrights iBiquity might have on its software.

The comments on the *Petition* bore this out. CBS Corporation,⁶⁷ Heftel Broadcasting Corporation,⁶⁸ Cumulus Media,⁶⁹ and Walt Disney Company (“ABC”)⁷⁰ all said to varying degrees that such “certainty” was needed before investment decisions could be made.

Today, having been granted this “certainty” by the Commission, iBiquity boasts of 702 licensees and 301 stations on the air, mostly leading stations in major markets.⁷¹ It is fair to say that this business was built in large part on the Government guarantee that they sought and received. It was this grant, as much as anything else, that generated the “market forces” of which NAB spoke.

I expect that this comment period will yield many calls upon the Commission to turn NRSC-5 into Final Rules. Some may even call upon the Commission to ‘set the standard’⁷² of the HDC codec despite its lack of documentation. These would be enormous steps backwards. Today, the American people rightly believe that the public airwaves belong to them. Imagine what their shock would be if the Government facilitated construction of a permanent tollbooth for private benefit at the gate to public property.

The Commission is obliged to summarily reject NRSC-5 in its current form as the basis for Final Rules, and to take necessary action to ensure that iBiquity honors its commitments, which the Commission trusted in good faith.

D. iBiquity’s commitments were of their own choosing

I anticipate reply comments to the effect that I am a thief who would rip from industrious private enterprise the rights, privileges, and rewards of their hard earned, much invested, “valuable trade secrets.”⁷³ To such commenters, I would recommend the class Intellectual Property 101.

In the United States, inventors have inherent right to practice their inventions (though in the present circumstance, since broadcasting is a regulated industry, Commission authorization may be required). Inventors are under no obligation to disclose their proprietary trade secrets—they may capture benefit from their inventions forever if they can keep their know-how to themselves.

⁶⁷ Comments of CBS Corporation, December 23, 1998, *op. cit.*, at IV (pp. 8–12).

⁶⁸ Comments of Heftel Broadcasting Corporation, December 23, 1998, at p. 3; available electronically at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6005940182.

⁶⁹ Comments of Cumulus Media Inc., December 23, 1998, *op. cit.*, at IV (p. 7).

⁷⁰ Comments of the Walt Disney Company (“ABC”), December 23, 1998, *op. cit.*, at p. 4.

⁷¹ “HD Radio™ Station Rollout Status,” in presentation HD Radio™ Update, April 27, 2005, *ex parte* presentation; available electronically at

http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6517586233.

⁷² It is unfortunate that many in this proceeding have used phrases such as ‘set the standard,’ implying that standards are primarily *decisions* made by authority. Within the standards community, it is more commonly said that standards are “developed,” indicating that standards are primarily *documents* that are researched, compiled, and written by consensus process. See, e.g., OMB Circ. A-119, *op. cit.*

⁷³ This phrase is a tautology: having value is necessary for something to be a trade secret.

However, inventors have a well-known choice, which they are free to exercise as they wish. They can either compete in the market on the basis of their confidential and proprietary know-how, or—if they so choose—they can approach the Government for a grant of exclusivity. The latter carries with it the obligations we have already discussed.

iBiquity could have petitioned the Commission merely for authorization. Instead, they asked to be shielded from competition too.

iBiquity made their choice willingly, knowingly, and for tactical business reasons. The record in this proceeding shows incumbent broadcasters disfavoring Eureka 147 and other new-spectrum approaches to DAB, which would challenge them with new competition. The record demonstrates the advantages of a single standard in reducing risk and protecting against obsolescence arising from the uncertainties and vagaries of winning in the marketplace (think: AM stereo)—factors that induce potential customers to buy quicker and in greater numbers, avoid “wait and see” behavior, and generate greater licensing revenue. The record demonstrates that rapid deployment of IBOC is a key strategy of incumbent broadcasters to retain market share in the face of increasing penetration of SDARS.

So, yes—iBiquity must give up “valuable trade secrets,” but (1) only the ones essential to practice the system, and (2) in a calculated bargain to gain something of even greater value.

This matter might have devolved into abstract argument about property rights, regulatory process, exclusivity, and Government meddling in the marketplace, but iBiquity has made that unnecessary. They voluntarily *offered* to make discloser. In the end, this matter is more about keeping one’s word than interpreting nuances of Constitutional law.

NRSC-5 takes a shot at having it both ways—Government protections on one hand, retention of trade secrets on the other. Put bluntly, it is an experiment to see if one can get a better deal at the back door of the FCC than at the counter of the Patent Office.

I trust that the Commission will provide the answer: No.

E. There are no excuses for withholding technical disclosure of the HDC codec

Section III.A, above, began with a news item from Radio World Online in which the statement, “[iBiquity] is unable to disclose the technical details of the codec” was attributed to a third-party source [Lynn Claudy]. This raises several questions, the first of which is: when did this supposedly happen?

iBiquity has a duty of candor, the essence of which is to be fully informative to the Commission on matters of decisional significance.⁷⁴ I can think of nothing that would have greater decisional

⁷⁴ “The FCC ... must rely heavily on the completeness and accuracy of the submissions made to it, and its applicants in turn have an affirmative duty to inform the Commission of the facts it needs in order to

significance than information required by the Commission to stay within its Constitutional bounds, but substantively changing the terms and conditions of a petition would qualify as decisionally significant on its own. As of this writing, the Commission's Electronic Comments Filing System shows 47 filings by iBiquity on this docket, and I can find no backpedaling in any of them of the offer made in the *Petition*. In particular, iBiquity's comments of February 19, 2002, say:⁷⁵

- (1) "This proceeding commenced in 1998 when USADR filed a Petition for Rulemaking on IBOC DAB,"
- (2) "Since August 2000, iBiquity has integrated the former LDR and USADR technology, creating a unified IBOC DAB platform that is ready for commercial implementation," and
- (3) "[The Commission] should move forward to adopt final IBOC transition rules and an IBOC standard."

The January 2004 article suggests that the purported difficulty relates specifically to the HDC codec, which was first announced in August 2003. Unfortunately, notwithstanding the Commission's request for a "public" standardization process,⁷⁶ minutes of NRSC meetings are not publicly available. So the Commission would have to inquire as to when the reported "back and forth" might have begun—after August 2003, prior to May 2003 (when PAC was codec of choice), or perhaps as early as 2002 (when standards development began and the ink had barely dried on the *Report and Order*).

The next question relates to the published statement, "iBiquity has said that its new HDC codec is proprietary and unique," which indeed they did say.⁷⁷ However, these attributes are hardly distinctive. As discussed above, almost all codecs in common commercial use are proprietary, including the AC-3 audio codec standardized (documented) by the ATSC for digital television. Further, uniqueness can arise due to the process of fitting codecs into the larger systems in which they are embedded—variations that fall within the doctrine of equivalents.

fulfill its statutory mandate. This duty of candor is basic, and well known." *RKO General, Inc. v. FCC*, 670 F.2d 215, 232 (D.C. Cir. 1981). The duty of candor requires an applicant before the FCC to be "fully forthcoming as to all facts and information relevant" to its application. *Swan Creek Communications v. FCC*, 39 F.3d 1217, 1222 (D.C. Cir. 1994). Relevant information is defined as information that may be of "decisional significance." *RKO General*, 670 F.2d at 229. The duty of candor can be breached both by affirmative misrepresentations and by a "fail[ure] to come forward with a candid statement of relevant facts," *ibid.*, "whether or not such information is particularly elicited" by the Commission or its staff. *Swan Creek*, 39 F.3d at 1222.

⁷⁵ Comments of iBiquity Digital Corporation, February 19, 2002, at I (pp. 2–4); available electronically at http://gulfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513077758.

⁷⁶ Digital Audio Broadcasting Systems and Their Impact on the Terrestrial Radio Broadcast Service, *First Report and Order*, *op. cit.*, at 44.

⁷⁷ "iBiquity Enhances Performance of HD Radio™ System," press release of August 12, 2003; available electronically at <http://www.ibiquity.com/press/pr/081203.htm>.

So what, in fact, is the substance of the HDC codec?

iBiquity has not been very forthcoming about this question.⁷⁸ Note, in particular, their IP disclosure to the NRSC.⁷⁹ This disclosure lists patents covered by NRSC-5 (Appendix A), and receiver patents that are purportedly not necessary to implement NRSC-5 (Appendix B). Not listed are patents covering the HDC codec—though these patents are of equivalent relevance. Of course, were this information to be made available, it would reveal which, if any, well-known codec technologies HDC might use.

I am very troubled by this lack of disclosure. Regardless of the omission of a codec specification in NRSC-5, the codec is clearly within the scope of iBiquity's *Petition* and the Commission's *Report and Order*.⁸⁰ I again point out that the crux of this proceeding is to grant iBiquity exclusivity in the marketplace, and that any such exclusivity must eventually yield to free access to the invention by the public. Therefore, the courts have found a particular duty of candor in the process of gaining exclusivity—a duty that may be projected onto the Commission's regulatory scheme as well:

The limits of a patent must be known for the protection of the patentee, the encouragement of the inventive genius of others and the assurance that the subject of the patent will be dedicated ultimately to the public. The statute seeks to guard against unreasonable advantages to the patentee and disadvantages to others arising from uncertainty as to their rights. The inventor must “inform the public during the life of the patent of the limits of the monopoly asserted, so that it may be known which features may be safely used or manufactured without a license and which may not.”⁸¹

Here, too, the Commission and the public are entitled to know the limits of the monopoly asserted in the invention being considered. Delineation of patents covering a product is not proprietary information. In fact, as the courts have ruled, the situation is the opposite. The public is *entitled* to know patents asserted for a product so as to minimize the uncertainty as to their rights.

In the present circumstance, there is uncertainty both as to patents and the possible availability of multiple sources of supply. Rather than providing clarity as to which aspects of the brand-name HDC codec might be compatible with generic equivalents available elsewhere, iBiquity offers only silence. As a result, iBiquity cements its position as the sole-source supplier of codec software for IBOC radio.

⁷⁸ See, e.g., *Ibiquity's Mystery Codec: What is It?* Radio World Online, August 4, 2003; available electronically at <http://www.rwonline.com/dailynews/one.php?id=3697>.

⁷⁹ Letter dated April 13, 2005 from Albert Shuldiner to various members of the National Radio Systems Committee, available electronically at <http://www.nrsstandards.org/Standards/NRSC-5/04-13-05%20iBiquity%20IP%20Disclosure.pdf>.

⁸⁰ Digital Audio Broadcasting Systems and Their Impact on the Terrestrial Radio Broadcast Service, *First Report and Order*, *op. cit.*, at 18 (p. 7).

⁸¹ *General Electric Co. v. Wabash Appliance Corp.*, *supra*, 304 U.S. 364, 369; 58 S. Ct. 899, 901; 82 L. Ed. 1402 (1938). The context of the citation involved patent claims. I argue that the principle applies more generally to like information of decisional significance required for any Federal administrative procedure in which exclusivity is granted.

This silence is all the more galling because of persistent evidence in the trade press that HDC may, indeed, have generic equivalents—near enough, if not identical, to allow those skilled in the art to make the necessary adaptations. I call the Commission’s attention to the following:⁸²

- HDC is “a close relative of AAC+ [aacPlus]”⁸³
- “Sources told Radio World that Rick Martinson had been working on integrating AAC+ for HD-R [IBOC DAB]. ... It’s now clear that Ibiquity teamed up with Coding Technologies to develop HDC ... around the beginning of this year. ‘We’ve been working behind the scenes for quite some time on HDC ...,’ [iBiquity President/CEO Robert] Struble stated in his unveiling announcement.”⁸⁴
- “While [HDC] may contain elements from other algorithms, including PAC, it appears to be primarily a product of Coding Technologies and the MPEG-4 core technology.”⁸⁵
- Combining IBOC and XM satellite radio functions in the same radio receiver would be “relatively easy since the codecs are virtually identical.”⁸⁶
- “Witness Ibiquity’s change of codecs from PAC to HDC. They say it’s unique, but HDC is merely a multi-streaming version of HEAAC (MPEG AAC+ with SBR)”⁸⁷

The accuracy of these statements is unknown. However, circumstantial evidence lends them credibility. First, there was the pressure of getting to market. According to a published report,⁸⁸ problems with the PAC codec surfaced during testing prior to February 2003. Yet the first attempt at commercial launch of IBOC radio was in January 2003,⁸⁹ following the *Report and Order* in October 2002. Time was of the essence. Under this circumstance, what would prudent

⁸² Section I.G, above, discusses codecs and relevant terminology. High-Efficiency AAC (HE AAC) is the generic name of a codec that is well documented in ISO/IEC 14496-3 (MPEG-4). A well-known implementation of HE AAC is aacPlus, a product of Coding Technologies—iBiquity’s codec development partner.

⁸³ *Ibiquity Charts a New Course*, Radio World Online, August 14, 2003; available electronically at <http://www.rwonline.com/reference-room/guywire/gw-08-28-03.shtml>.

⁸⁴ *ibid.*

⁸⁵ *ibid.*

⁸⁶ *Let’s Break Down the Anti-HD Radio Arguments*, Radio World Online, October 11, 2004; available electronically at http://www.rwonline.com/reference-room/guywire/anti_hd.shtml.

⁸⁷ *ibid.*

⁸⁸ *From the Editor: Charlie Morgan’s Take on HD Radio Standards*, Radio World Online, August 1, 2003; available electronically at

http://www.rwonline.com/reference-room/special-report/02_rw_page_4_aug_1.shtml.

⁸⁹ *HD Radio Ship Sets Sail*, Radio World Online, February 3, 2003; available electronically at <http://www.rwonline.com/reference-room/guywire/guywire-feb03.shtml>. See also Comments of iBiquity Digital Corporation, February 19, 2002, *op. cit.*, at I.A (pp. 2–3).

management do? Take a sure thing? Or begin experimenting with something new and unproven? The AAC option had already passed muster with the NRSC⁹⁰ and others.⁹¹

The second area of circumstantial evidence I can dub “the carry-out principle.” If mother tells me that she’s bringing home dinner from a Chinese restaurant, I may not know with certainty what dinner will be, but I can safely presume that it won’t be a pizza. Coding Technologies specializes in customized implementations of MPEG-standard codecs. And of their three known product lines, derivatives of Layer 2, Layer 3, and AAC codecs, I know that Layer 2 and Layer 3 do not have sufficient compression required for IBOC broadcasting.

There are basically two alternatives to the analysis of the statement “[iBiquity] is unable to disclose the technical details of the codec.”

Alternative 1 is that, in fact, HDC is a derivative of HE AAC. Under this circumstance, the IBOC radio codec as implemented is a natural evolution of what was described in the *Petition*. While, over time, MPEG-2 AAC became MPEG-4 AAC, USADR became iBiquity, and Coding Technologies left the Fraunhofer IIS nest, the central principle put forth in the *Petition* still holds: “the codec should be based on commonly used coding schemes to promote standardization.”⁹² Under this alternative, iBiquity would be lacking of any excuse for not providing technical disclosure of the codec, as they originally promised.

Alternative 2 is that, despite all indications to the contrary, HDC is actually a new invention in audio compression that the inventor has elected to retain as a trade secret. Under this circumstance, the question would be: why would iBiquity choose this path, after having previously made a commitment to disclose the codec? Well, reportedly HDC is a very good codec—perhaps it is superior to HE AAC (e.g., aacPlus v.2). However, the difficulty here is that there are no publicly available data to support such a claim. When the NRSC compared HDC (Gen-3) to AAC (Gen-1), Gen-1 actually scored higher in most instances, and higher overall on average.⁹³

⁹⁰ “AM IBOC audio quality is comparable to that achieved by analog FM radio in an unimpaired environment.” NRSC DAB Subcommittee Evaluation of the iBiquity Digital Corporation IBOC System, Part 2 – AM IBOC, Report from the Evaluation Working Group, Dr. H. Donald Messer, Chairman (as adopted by the Subcommittee on April 6, 2002), at 2.1.1 (p. 9); available electronically at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513184876.

⁹¹ Digital Audio Broadcasting Systems and Their Impact on the Terrestrial Radio Broadcast Service, *First Report and Order*, *op. cit.*, at 22 (p. 8). See also comments such as, “AM IBOC is simply a spectacular improvement for AM stations. Subjective evaluations showed listener perception of AM IBOC to be on a par with analog FM in terms of quality and fidelity. And full stereo is part and parcel of the equation.” Comments of the National Association of Broadcasters, June 18, 2002, at II (p. 3); available electronically at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513198227.

⁹² USA Digital Radio, *Petition for Rulemaking*, *op. cit.*, at Appendix J (p. 1).

⁹³ National Radio Systems Committee, Memorandum from Evaluation Working Group (H. Donald Messer, Chairman) to DAB Subcommittee (Milford Smith, Chairman) regarding *Evaluation of iBiquity AM and FM IBOC “Gen 3” hardware*, June 30, 2004, at Tables 9 and 11; available electronically at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516285308. Note that the differences in scores have marginal, if any, statistical significance. However, the Gen-1 codec ceased development ca. 2000, whereas the Gen-3 codec represented best effort as of 2003 or 2004. All other

Under this alternative, the record is lacking of any legitimate technical or business reason why details of the codec cannot be disclosed. Should any such reason be proposed in reply comments, the proponent would have the burden to show why this path was chosen when others in keeping with the original agreement were clearly available but not chosen. I remind the Commission that the Gen-1 codec was pre-merger technology. Testing does not support, nor can it be argued, that any possible subsequent contributions added value. Further, while the Supplemental Program Services (SPS, "Tomorrow Radio") feature of the system arose after the Gen-1 codec was abandoned, the equivalent if not superior performance of the Gen-1 codec over Gen-3 at the lowest bit rates tested indicates that the Gen-1 codec would have been appropriate for SPS as well.

Under either alternative, the Commission must discount any claims that might be put forth by iBiquity or others that a codec 'can not' be disclosed. I urge the Commission to be skeptical of any purported reasons that might arise and demand appropriate proof.

F. HDC codec licensing terms are inherently unreasonable and discriminatory, and they stifle innovation

Perhaps in an attempt to ameliorate concerns over lack of codec disclosure in NRSC-5, iBiquity's intellectual property disclosure to the NRSC made the following offer:⁹⁴

5. iBiquity also has committed to license on reasonable terms and conditions that are demonstrably free of any unfair discrimination the object code to the HDC codec separately from the remainder of the HD Radio software implementation but subject to the requirement that it be used in independent IBOC implementations compliant with NRSC-5[.]

In the *Report and Order*, the Commission wrote:⁹⁵

Our decision to permit interim operations during the pendency of this proceeding provides an excellent opportunity to assess whether iBiquity and other patent holders are entering into licensing agreements under reasonable terms and conditions that are demonstrably free of unfair discrimination. The Commission will monitor this situation and seek additional comment as warranted.

I regret to inform the Commission that iBiquity's offer with respect to HDC codec licensing is inherently unreasonable and discriminatory. The reasons are threefold.

things being equal, this should have given advantage to Gen-3. Note that while Table 9 represents a head-to-head comparison by a single panel of listeners, Table 11 incorporates data from different listeners, in different settings, on different days. The latter data are not as reliable as the former. Finally, a column in Table 11 is labeled "96 kbps." I believe that this should actually read "36 kbps," as in Table 12.

⁹⁴ Letter dated April 13, 2005 from Albert Shuldiner to various members of the National Radio Systems Committee, available electronically at

<http://www.nrcstandards.org/Standards/NRSC-5/04-13-05%20iBiquity%20IP%20Disclosure.pdf>.

⁹⁵ Digital Audio Broadcasting Systems and Their Impact on the Terrestrial Radio Broadcast Service, *First Report and Order*, *op. cit.*, at 34 (p. 13).

First, I repeat the central theme of these comments that this arrangement serves primarily to give iBiquity perpetual licensing rights. This is inherently unreasonable since it is directly contrary to the Constitutional mandate that exclusivity must only last for “limited times.”

Second, to explain the offer I must explain the term “object code.” Computer software is produced by skilled engineers who express an idea for achieving a goal, often referred to as an “algorithm,” as a set of specific step-by-step instructions for accomplishing the task. While the algorithm is an abstract mathematical or logical process, the expression of that idea, in what is called “source code,” gives the idea practical effect. Source code uses English-like syntax, semantics, and vocabulary to tailor abstract algorithms for specific computing architectures. Source code also contains documentary engineering notes in human-readable English that memorialize the knowledge and intent of the programmer. This enables future correction, adaptation, expansion, or other maintenance of the software.

In order to actually implement the software on a computing device, the source code must be converted to object code by a software application called a compiler. The compiler takes the human-readable source code and converts it by rote into cryptic object code that is specific to a particular type of microprocessor—such as a particular make and model of DSP or CPU chip.

It is sometimes the intent of source-code authors to be sufficiently broad in their expression so as to allow compilers to translate a single work of source code into object code for many types of processing chips. However, in practice, the process is fraught with difficulty. One cannot anticipate with certainty the features and foibles of future types of chips, a class of product with a short life cycle. Source code must be frequently updated to correct bugs, work-around compiler differences and errors, take advantage of new chip features, customize the work for different computing platforms, and innovate new products.

When iBiquity says that they will license “object code,” what they mean that they will not cede control of product innovation to others. Any competitor wishing to license object code would be at the mercy of iBiquity to make modifications to source code to tailor it for upcoming products. That development process would also be iterative, perhaps requiring many cycles of changes and testing. Competitors would be dependant upon iBiquity for quality of workmanship, and would have no means to gain advantage by making the software more robust or efficient, or to add new features. (As an example of a new feature, adding surround sound to the codec is a current issue.)

In the race to bring new and innovative products to the market, do iBiquity’s competitors have any right to expect that iBiquity would prioritize their competitors’ programming needs ahead of their own? This is inherently discriminatory. Further, since it flies in the face of Constitutional intent “to promote the progress of science and useful arts” by allowing others to independently build upon past invention, it is also inherently unreasonable.

So what is the alternative? Most certainly it is *not* mandatory licensing of source code. Source code does contain proprietary information that a firm should be under no obligation to disclose. Just as I object to iBiquity having custody of the source code of its competitors, I defend iBiquity’s right to keep its own source code to itself. Instead, the better alternative is public

disclosure of the abstract codec algorithm, thus allowing any firm to express it in their own source code, over which they would have complete control. This is the manner in which codecs are documented in the ISO/IEC MPEG standards, and the manner in which the remainder of the IBOC radio system is documented in NRSC-5.

Third, on its face the offer is limited to NRSC-5 compliant devices. Figure 1 in NRSC-5 shows that IBOC transmitters can be compliant devices, but it is ambiguous with respect to IBOC receivers. Definitely excluded are digital audio players, of which the Apple iPod is the best-known example. This is inherently discriminatory since it indicates intent to restrict competitors from certain markets.

The iPod is currently used to repurpose audio content from radio broadcasters in a process called “podcasting.”⁹⁶ Audio files are sent over the Internet and stored in the semi-permanent memory of the iPod for future playback at the convenience of the listener. The preferred audio compression format for the iPod is AAC; that is, it is an AAC player. So what logic is there in license restrictions that block iPods or similar devices from storing raw digital data from NRSC-5-compliant IBOC receivers for later playback (decoding)?

In Section I.D, above, I elaborate on a comment originally filed by iBiquity (USADR) concerning ASICs and customized DSPs. The point discussed in that Section was that developing these electronic components to match the codec is necessary innovation required to reduce the power consumption (in particular) of IBOC radios—an essential step to battery-powered consumer radios that could operate during utility outages for extended periods. Absent public knowledge of the codec, entrepreneurs cannot independently develop the necessary inventions and innovations and be appropriately rewarded for their efforts.

There are other applications where knowledge of the codec used in over-the-air broadcasting could provide competitive advantage. These include digital communications links from the radio studio to the transmitter, or to the studio from the site of remote program origin. I envision engineers of digital studio production tools (e.g., storage systems and editing bays) as needing access to the over-the-air codec to design most effectively.

Let me conclude with an illustrative if hypothetical example of the folly of this HDC licensing scheme.

The analog NTSC color television system of which we are all familiar was the direct result of the 1947 invention and patent application of the shadow mask CRT by Alfred Schroeder, a researcher at RCA Laboratories.⁹⁷ This invention allowed a single CRT to show all three primary colors (red, green, and blue), rather than requiring three separate CRTs for the purpose. It took a

⁹⁶ See, e.g., <http://www.apple.com/podcasting/>.

⁹⁷ “More than any other component of the system, the shadow-mask CRT made color television a practical household technology.” IEEE History Center, IEEE Milestones: Monochrome-Compatible, Electronic Color Television, 1946-1953; available electronically at http://www.ieee.org/organizations/history_center/milestones_photos/colortv.html.

few additional years of research at RCA to turn the invention into a practical device. These innovations were key to the July 1953 adoption by the NTSC of the technical standard, and its adoption into regulation by the FCC the following December.

Now, imagine for the sake of argument that RCA, then dominant in its field, had not publicly disclosed the technical detail of the shadow mask CRT, but instead had merely offered to sell them to all comers on “reasonable and non-discriminatory terms.” How would this have affected the technology development of color television?

As it turned out, the story of color television was one of continuous improvement in shadow mask CRTs in ways that could barely have been anticipated in 1953.⁹⁸ There were improvements in geometry (size and shape), reliability, and color purity. But in addition, there are three particular innovations deserving mention. The first was the development by GTE/Sylvania in 1964 of rare earth phosphors. This was a sea change in the technology, allowing brighter and more vivid reds than possible before. In 1968, Sony introduced the single-electron-gun CRT under the brand name “Trinitron.” Its improvements in quality and reliability elevated Sony to the top tier in the television business. And in 1969, Zenith introduced the “black matrix” picture tube, which markedly increased picture contrast and color saturation. All three of these firms were keen competitors of RCA.

Would any of these innovations occurred had the industry been stuck with buying color picture tubes from RCA? Perhaps. But the record is clear that innovation arises from competition to be better, not merely to be the same.

In the instant matter, the codec plays as core a role in the technology of digital radio as the CRT did for color television.⁹⁹ The Constitutional goal of the Patent Clause, given life through the motivations of the free market, is to continue to foster this type of competitive innovation. The framework of NRSC-5 will only serve to stifle it.

⁹⁸ Many of these innovations are summarized in Table 11 of: Steven Klepper and Kenneth L. Simons, “Technological Extinctions of Industrial Firms: An Inquiry into their Nature and Causes,” *Industrial and Corporate Change*, vol. 6 no. 2, March 1997, pp. 379–460; available electronically at <http://www.rpi.edu/~simonk/pdf/te.pdf>.

⁹⁹ As an historical note, earlier attempts at developing a practical IBOC DAB system were unsuccessful. It was not until the invention of the AAC codec that the concept succeeded.

IV. Conclusion

William J. Baer, former Director of the FTC's Bureau of Competition once said, "firms cannot commit to an open standard, and then, after it becomes successful, assert patent rights in an effort to block use of the design or drive up the price through royalty payments."¹⁰⁰

The situation here is similar. In 1998, iBiquity Digital Corporation (then USADR) committed to an open standard for IBOC DAB. Based on this representation and others made subsequently, the Commission in good faith granted iBiquity's request to make their product the exclusive system for digital audio broadcasting in the United States. And now that the iBiquity system has become successful, overcoming market resistance to become entrenched as the only viable DAB option, they appear to assert trade secrecy rights that would benefit them with a perpetual stream of royalties and a stifling of competitive innovation.

This is wrong. This is *seriously* wrong.

No cure can be affected by merely changing expectations of the documentary standard required, or by reopening IBOC DAB (or its inclusive elements) to possible competition. The record is clear that the Commission has already left an indelible imprint on the market that would defy any attempt to erase it.

Due to the seriousness and egregiousness of the breach of good faith in clear evidence, I am forced to conclude that the Commission has no other responsible choice but to rescind all interim and temporary authorizations for IBOC broadcasting during the pendency of this proceeding. I nonetheless would be sympathetic to a 60-day stay to such an order to allow iBiquity one final opportunity to honor their commitments.

This request is not being made out of motivation to reverse past decisions allowing IBOC broadcasting. Quite the contrary—I believe that the Commission has taken prudent and responsible steps to bring to the public the benefits of a valuable technology. But I am not so overwhelmed by the glitz of the technology to as to have it distort my values and priorities. The immediate conversion of broadcasting from analog to digital provides only marginal public benefit, and a stand-down in the process would affect virtually no one outside of the broadcasting industry. This industry has had, and continues to have, the opportunity through ownership and business relationships to impress upon iBiquity the right thing to do. In contrast, everybody suffers when we lose respect for the Constitution, the law, and fair dealing.

A stand-down would give iBiquity the opportunity, if they need it, to remove from their transmission and reception software anything that they might consider to be too sensitive to see the light of day. I remind the Commission that once before, during the conversion from PAC to HDC (which occurred during a stand-down precipitated by the NRSC), iBiquity proved that

¹⁰⁰ Federal Trade Commission, press release of November 2, 1995, in announcing the consent decree settling the Dell Computer matter; available electronically at <http://www.ftc.gov/opa/1995/11/dell.htm>.

products can be reprogrammed to meet evolving needs.¹⁰¹

Further, the Commission must rearticulate a clear finding that its intent is public availability of documentary standards covering all aspects of the IBOC radio broadcasting system, except for those used exclusively for subscriber services. The Commission must direct that these standards will be in such full, clear, concise, and exact terms as to enable any persons skilled in the art to which they pertain to make devices that works compatibly and seamlessly within a single, national U.S. digital radio broadcasting system. (This is not to imply that there must be single means for optional features such as surround sound or a particular type of freely available data service—only that all such means would be well documented and nondestructive of each other.) The model for this should be that of ATSC standards, where a minimal level of standardization is incorporated into regulation and the remainder are developed as industry consensus documents. NRSC-5, in its current state of incompleteness, is not suitable as such a standard.

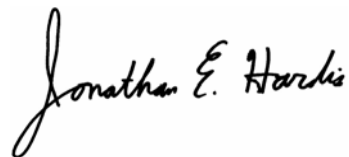
Finally, given the unfortunate record in this proceeding, I look to the Commission to get commitment from iBiquity on an “errors and omissions” provision. Given the complexity of the IBOC system there are bound to arise discoveries of documentary standards being inadvertently erroneous, ambiguous, or incomplete. iBiquity needs to be on record with enforceable commitments to disclose the technical detail of any such matters that may subsequently arise.

With a bit of irony, let me close with a quote from iBiquity:¹⁰²

Unlike the NRSC, which focuses solely in technical attributes of the technology, the FCC has the ability to synthesize the technical, legal, regulatory and commercial considerations which must be addressed in any DAB standard.

I urge the Commission to reject comments to the effect that NRSC-5 is the final word on the subject. There are greater issues in play than those within the purview of the NRSC, and I thank the Commission for its leadership in guarding the public interest.

Sincerely,



Jonathan E. Hardis
356 Chestertown St.
Gaithersburg, MD 20878-5724

¹⁰¹ Additionally, a prominent receiver manufacturer recently provided a software update to their products to add SPS (“Tomorrow Radio”) features.

¹⁰² Reply comments of USA Digital Radio, Inc., February 22, 2000, at IV (p. 6); available electronically at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6010955697.