

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Carriage of Digital Television Broadcast	)	CS Docket No. 98-120
Signals: Amendment to Part 76 of the	)	
Commission's Rules	)	

**COMMENTS OF AT&T**

Picture quality, like beauty, is in the eye of the beholder. As the Commission recognized in the *First Report and Order*, the statutory requirement that cable operators retransmit “without material degradation” the signal of a local broadcast station exercising its right to mandatory carriage pursuant to the must-carry rules is about “the picture quality the consumer receives and is capable of perceiving and not about the number of bits transmitted by the broadcaster if the difference is not really perceptible to the viewer.”<sup>1</sup> The Commission found that this interpretation is fairly compelled by both the language and structure of the Act. In particular, it found that its interpretation was “consistent with the language of the Act, which applies to *material* degradation, not merely technical changes in the signals” carried, as well as the express limitations on a cable operator’s must carry obligation for “ancillary or supplementary services” as well as non-program-related material, which may be included in a station’s digital broadcast bit-stream but is not subject to the mandatory carriage requirement.<sup>2</sup> In this regard, the Commission observed that, insofar as “such bitstream material that is not subject to mandatory

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<sup>1</sup> *Carriage of Digital Television Broadcast Signals, et al.*, CS Docket No. 98-120, *et al.*, First Report and Order and Further Notice of Proposed Rulemaking, 16 FCC Rcd 2598, 2629 (2001) (*First Report and Order*).

<sup>2</sup> *Id.* (emphasis in original).

carriage is subtracted from the entire 6 MHz over-the-air signal,” a cable system “by necessity” would have fewer bits to carry.<sup>3</sup> The Commission further observed that whenever a digital signal is remodulated for carriage on a cable system, fewer bits are needed than to transmit a signal over the air because (among other things) the overhead data used for error correction over-the-air must be replaced with data appropriate for the specific cable system, resulting in a lower bit rate without affecting picture quality.<sup>4</sup> The Commission concluded that, for the foregoing reasons, it would be inappropriate to use “any specific number of bits” to determine what constitutes a degraded signal, and therefore rejected proposals by NAB and MSTV that it ban cable systems from blocking or deleting any bits comprising the over-the-air digital signal.<sup>5</sup>

In the six years since the *First Report and Order* was adopted, no new facts, or marketplace or technological developments have emerged to call into question the Commission’s conclusion that the “issue of material degradation is about . . . picture quality . . . and not about the number of bits transmitted . . . if the difference is not really perceptible.” Indeed, if anything, subsequent developments confirm that the Commission was right to reject proposals to require cable operators to retransmit without alteration broadcasters’ entire over-the-air digital signals or to establish a purportedly “objective” standard for evaluating “material degradation” based on the number of bits retransmitted, and instead to evaluate material degradation from the subscriber’s point of view.

Over the past six years, digital transmission technologies, and in particular compression technologies, have continued to develop and improve, enabling video service providers to

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<sup>3</sup> *Id.*

<sup>4</sup> *Id.*

<sup>5</sup> *Id.* at 2628-29.

transmit high quality video signals with vastly greater efficiency, but without causing any reduction in picture quality discernible to the naked eye. With this greater efficiency, video service providers have been able to transmit much higher quality and higher resolution video signals at any given bit-rate. For example, service providers using MPEG-2 digital compression previously were required to maintain a bit-rate of approximately 5-6 Mbps to transmit standard definition (SD) television, and approximately 18-20 Mbps to transmit high definition (HD) video signals. Today, providers using MPEG-4 (a successor technology to MPEG-2) have been able to reduce transmission bit-rates to approximately 2-3 Mbps and 6-10 Mbps to transmit SD and HD signals respectively, depending on how they configure their networks, and even greater improvements in efficiency are on the horizon.

As another example, AT&T utilizes H.264 video compression technology in transmitting its IPTV video service to end users. H.264, which is sometimes referred to as “MPEG-4 Part 10,” is a highly efficient compression technology that is two-to-three times more efficient than MPEG-2 (the standard compression technology in use by cable systems today), and is expected to achieve even greater levels of efficiency as its compression algorithms are improved over time. In late 2006, AT&T launched its HD service at a bit rate of 8.5 Mbps, but expects that it will be able to substantially reduce that rate by the end of 2007, without sacrificing picture quality. Indeed, AT&T has conducted human factors testing of its service, which shows that the latest H.264 encoders produce significantly better picture quality than older encoders operating at a significantly higher bit-rate, and that its picture quality is as good as, or better than, that of AT&T’s cable competitors.

Imposing rigid, or purportedly “objective,” standards regarding picture quality, such as requiring retransmission of all primary video and program-related content bits transmitted by a

broadcaster, could slow these developments, dampening incentives to invest in video compression and other technologies (such as pre-filtering technologies, which filter out compression artifacts and other noise prior to retransmission, producing better picture quality at lower bit-rates) that would allow even greater transmission efficiencies and higher quality pictures. In addition, as multichannel video delivery increasingly becomes only one of multiple services delivered over a single, converged broadband platform, any effort to “standardize” picture quality based on bit-rates or other technologically-defined levels would have a concomitant deleterious impact on broadband deployment, and could stifle innovation in new broadband technologies – contrary to congressional objectives set forth in section 706 of the Act. In the end, consumers will be the losers, as they are denied the benefits of these increases in efficiency, including the introduction of new, high bandwidth services. Particularly now that consumers can (or soon will be able to) choose from among a variety of multi-channel video service providers – including cable systems, DBS and telcos (like AT&T) – the Commission should decline the broadcasters’ invitation to set in stone arbitrary technical standards that have little to do with the picture quality viewers actually experience. Rather, it should reaffirm its holding in the *First Report and Order* that the prohibition against material degradation establishes a non-discrimination obligation that requires only that a cable operator may not treat cable programming services more favorably than broadcast signals, provided that, if a broadcast signal is delivered in HDTV, it must be carried in HDTV.<sup>6</sup>

The Commission should provide additional clarification concerning the substance and scope of this non-discrimination requirement. Specifically, the Commission should clarify that the non-discrimination standard requires a comparison of signal processing and carriage between

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<sup>6</sup> *Id.*

only over-the-air digital broadcast signals and comparably delivered digital programming. For example, an over-the-air digital broadcast signal should be compared to other digital programming delivered over-the-air, rather than to programming delivered directly via fiber, because signals delivered over fiber are not subject to atmospheric and other environmental factors that may interfere with over-the-air signals.

Finally, the Commission should not adopt specific measurement tools for evaluating picture quality. Just as video compression and other technologies are rapidly evolving and improving, so too are measures for testing picture quality. In addition to human factors testing, new tools for measuring digital signal quality are being developed. For example, many companies are developing tools that analyze picture quality with repeatable, objective measurements that replicate subjective human visual assessments.<sup>7</sup> Many of these tools still are in the early stages of development, but they promise to deliver effective and objective methods of testing signal quality. Establishing specific standards or measurement tools now would derail further development of these and other tools. Accordingly, the Commission should decline to identify specific measurement tools for evaluating picture quality.

For the foregoing reasons, the Commission should reaffirm its conclusion in the *First Report and Order* that “issue of material degradation is about . . . picture quality . . . and not about the number of bits transmitted . . . if the difference is not really perceptible,” and decline the broadcasters’ proposals to adopt rigid, and purportedly “objective,” standards requiring cable operators to retransmit specific bits to avoid material degradation. Any such standard may serve broadcasters’ interests but will do little, if anything, to promote the public interest, and indeed

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<sup>7</sup> See, e.g., [www.tek.com/products/video\\_test/signal\\_analyzers.html](http://www.tek.com/products/video_test/signal_analyzers.html).

will harm consumers by preventing cable operators from using their bandwidth efficiently to provide consumers the programming and services they want.

Respectfully submitted,

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